



EUROPEAN COMMISSION
Executive Agency for Small and Medium-sized Enterprises

Director



S11/20-511-01

GRANT AGREEMENT

NUMBER 869496 — REWAISE

This **Agreement** ('the Agreement') is **between** the following parties:

on the one part,

the **Executive Agency for Small and Medium-sized Enterprises (EASME)** ('the Agency'), under the powers delegated by the European Commission ('the Commission'), represented for the purposes of signature of this Agreement by Head of Unit, Executive Agency for Small and Medium-sized Enterprises, LIFE and H2020 Energy, Environment, Resources, H2020 Environment & Resources, Arnoldas MILUKAS,

and

on the other part,

1. 'the coordinator':

FCC AQUALIA SA (AQUA), established in CALLE FEDERICO SALMON 13, MADRID 28016, Spain, VAT number: ESA26019992, represented for the purposes of signing the Agreement by Head of Tenders and Operations, [REDACTED]

and the following other beneficiaries, if they sign their 'Accession Form' (see Annex 3 and Article 56):

2. **SEVERN TRENT WATER LIMITED (STW)**, established in SEVERN TRENT CENTRE 2 ST JOHNS STREET, COVENTRY CV1 2LZ, United Kingdom,

3. **VA SYD (VASYD)**, established in HJALMAREGATAN 3, MALMO 201 21, Sweden, VAT number: SE222000237801,

4. **AQUANET SPOLKA AKCYJNA (ANET)**, established in UL. DOLNA WILDA 126, POZNAN 61-492, Poland, VAT number: PL7770003274,

5. **EUROPEAN NETWORK OF LIVING LABS IVZW (ENOLL)**, established in PLEINLAAN 9, BRUSSEL 1050, Belgium, VAT number: BE0824793473,

6. **HIDROTEC TECNOLOGIA DEL AGUA SL (HIDRO)**, established in AVENIDA KANSAS CITY 9, SEVILLA 41007, Spain, VAT number: ESB91033621,

7. **MALMO STAD (MALM)**, established in AUGUST PALM PLATS 1, MALMO 200 42, Sweden, VAT number: SE212000112401,

8. **POLYMEM (POLY)**, established in 3 RUE DE L INDUSTRIE ZONE DE VIC, CASTANET-TOLOSAN 31320, France,
9. **RESOURSEAS S.R.L. (RESA)**, established in EDIFICIO 16, VIALE DELLE SCIENZE (ARCA), PALERMO 90128, Italy, VAT number: IT06596440823,
10. **BLUETECHTRACKER LIMITED (BLUE)**, established in UNIT 4 JOYCE HOUSE BARRACK SQUARE, CORK, Ireland, VAT number: IE9836588F,
11. **AQUAPORIN AS (APOR)**, established in NYMOLLEVEJ 78, KOBENHAVN 2800, Denmark, VAT number: DK28315694,
12. **WATER, ENVIRONMENT AND BUSINESS FORDEVELOPMENT SL (WE&B)**, established in PLAZA SANT JAUME 10 PLANTA 2 PUERTA 2, SANT QUIRZE DEL VALLES 08192, Spain, VAT number: ESB66119330,
13. **ENVIRONMENTAL MONITORING SOLUTIONS LIMITED (EMS)**, established in 7 PRESIDENT BUILDINGS SAVILE STREET EAST, SHEFFIELD S4 7UQ, United Kingdom, VAT number: GB804048360,
14. **SOLAR WATER PLC (SOLWA)**, established in SALISBURY HOUSE LONDON WALL, LONDON EC2M 5PS, United Kingdom, VAT number: GB279101893,
15. **INSTYTUT EKOLOGII TERENOW UPRZEMYSLOWIONYCH (IETU)**, established in ULICA KOSSUTHA 6, KATOWICE 40 844, Poland, VAT number: PL6340125519,
16. **UNIVERSITAT DE VALENCIA (UVAL)**, established in AVENIDA BLASCO IBANEZ 13, VALENCIA 46010, Spain, VAT number: ESQ4618001D,
17. **VYSOKA SKOLA BANSKA - TECHNICKA UNIVERZITA OSTRAVA (TUOS)**, established in 17 LISTOPADU 2172/15, OSTRAVA PORUBA 708 00, Czechia, VAT number: CZ61989100,
18. **SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (UNIZ)**, established in UNSKA 3, ZAGREB 10000, Croatia, VAT number: HR57029260362,
19. **FUNDACION CENTRO TECNOLOGICO DE INVESTIGACION MULTISECTORIAL (CETIM)**, established in PARQUE EMPRESARIAL ALVEDRO, CALLE H NUMERO 20, CULLEREDO 15180, Spain, VAT number: ESG70302427,
20. **COVENTRY UNIVERSITY (COVU)**, established in PRIORY STREET, COVENTRY CV1 5FB, United Kingdom, VAT number: GB918037524,
21. **LUNDS UNIVERSITET (LUND)**, established in Paradisgatan 5c, LUND 22100, Sweden, VAT number: SE202100321101,
22. **POLITECHNIKA POZNANSKA (PUT)**, established in PL MARII SKLODOWSKIEJ CURIE 5, POZNAN 60 965, Poland, VAT number: PL7770003699,
23. **PKF ATTEST INNCOME SL (INNCO)**, established in CALLE ORENSE 81 7 PLANTA, MADRID 28020, Spain, VAT number: ESB87239489,

24. UNIVERSITA DEGLI STUDI DI PALERMO (UNIPA), established in PIAZZA MARINA 61, PALERMO 90133, Italy, VAT number: IT00605880822.

Unless otherwise specified, references to ‘beneficiary’ or ‘beneficiaries’ include the coordinator.

The parties referred to above have agreed to enter into the Agreement under the terms and conditions below.

By signing the Agreement or the Accession Form, the beneficiaries accept the grant and agree to implement it under their own responsibility and in accordance with the Agreement, with all the obligations and conditions it sets out.

The Agreement is composed of:

Terms and Conditions

- Annex 1 Description of the action
- Annex 2 Estimated budget for the action
 - 2a Additional information on the estimated budget
- Annex 3 Accession Forms
- Annex 4 Model for the financial statements
- Annex 5 Model for the certificate on the financial statements
- Annex 6 Model for the certificate on the methodology

TERMS AND CONDITIONS

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CHAPTER 1 GENERAL

ARTICLE 1 — SUBJECT OF THE AGREEMENT

This Agreement sets out the rights and obligations and the terms and conditions applicable to the grant awarded to the beneficiaries for implementing the action set out in Chapter 2.

CHAPTER 2 ACTION

ARTICLE 2 — ACTION TO BE IMPLEMENTED

The grant is awarded for the action entitled ‘**REsilient Water Innovation for Smart Economy**’ — ‘**REWAISE**’ (‘**action**’), as described in Annex 1.

ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION

The duration of the action will be **60 months** as of 1 September 2020 (‘**starting date of the action**’).

ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS

4.1 Estimated budget

The ‘**estimated budget**’ for the action is set out in Annex 2.

It contains the estimated eligible costs and the forms of costs, broken down by beneficiary (and linked third party) and budget category (see Articles 5, 6, and 14).

4.2 Budget transfers

The estimated budget breakdown indicated in Annex 2 may be adjusted — without an amendment (see Article 55) — by transfers of amounts between beneficiaries, budget categories and/or forms of costs set out in Annex 2, if the action is implemented as described in Annex 1.

However, the beneficiaries may not add costs relating to subcontracts not provided for in Annex 1, unless such additional subcontracts are approved by an amendment or in accordance with Article 13.

CHAPTER 3 GRANT

ARTICLE 5 — GRANT AMOUNT, FORM OF GRANT, REIMBURSEMENT RATES AND FORMS OF COSTS

5.1 Maximum grant amount

The ‘**maximum grant amount**’ is **EUR 14 984 656.81** (fourteen million nine hundred and eighty four thousand six hundred and fifty six EURO and eighty one eurocents).

5.2 Form of grant, reimbursement rates and forms of costs

The grant reimburses **100% of the eligible costs of the beneficiaries and the linked third parties that are non-profit legal entities and 70% of the eligible costs of the beneficiaries and the linked third parties that are profit legal entities** (see Article 6) (**'reimbursement of eligible costs grant'**) (see Annex 2).

The estimated eligible costs of the action are EUR **18 816 721.93** (eighteen million eight hundred and sixteen thousand seven hundred and twenty one EURO and ninety three eurocents).

Eligible costs (see Article 6) must be declared under the following forms (**'forms of costs'**):

(a) for **direct personnel costs**:

- as actually incurred costs (**'actual costs'**) or
- on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices (**'unit costs'**).

Personnel **costs for SME owners or beneficiaries that are natural persons** not receiving a salary (see Article 6.2, Points A.4 and A.5) must be declared on the basis of the amount per unit set out in Annex 2a (**'unit costs'**);

(b) for **direct costs for subcontracting**: as actually incurred costs (**'actual costs'**);

(c) for **direct costs of providing financial support to third parties**: not applicable;

(d) for **other direct costs**:

- for costs of internally invoiced goods and services: on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices (**'unit costs'**);
- for all other costs: as actually incurred costs (**'actual costs'**);

(e) for **indirect costs**: on the basis of a flat-rate applied as set out in Article 6.2, Point E (**'flat-rate costs'**);

(f) **specific cost category(ies)**: not applicable.

5.3 Final grant amount — Calculation

The **'final grant amount'** depends on the actual extent to which the action is implemented in accordance with the Agreement's terms and conditions.

This amount is calculated by the Agency — when the payment of the balance is made (see Article 21.4) — in the following steps:

Step 1 — Application of the reimbursement rates to the eligible costs

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

5.3.1 Step 1 — Application of the reimbursement rates to the eligible costs

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and linked third parties (see Article 20) and approved by the Agency (see Article 21).

5.3.2 Step 2 — Limit to the maximum grant amount

If the amount obtained following Step 1 is higher than the maximum grant amount set out in Article 5.1, it will be limited to the latter.

5.3.3 Step 3 — Reduction due to the no-profit rule

The grant must not produce a profit.

‘**Profit**’ means the surplus of the amount obtained following Steps 1 and 2 plus the action’s total receipts, over the action’s total eligible costs.

The ‘**action’s total eligible costs**’ are the consolidated total eligible costs approved by the Agency.

The ‘**action’s total receipts**’ are the consolidated total receipts generated during its duration (see Article 3).

The following are considered **receipts**:

- (a) income generated by the action; if the income is generated from selling equipment or other assets purchased under the Agreement, the receipt is up to the amount declared as eligible under the Agreement;
- (b) financial contributions given by third parties to the beneficiary or to a linked third party specifically to be used for the action, and
- (c) in-kind contributions provided by third parties free of charge and specifically to be used for the action, if they have been declared as eligible costs.

The following are however not considered receipts:

- (a) income generated by exploiting the action’s results (see Article 28);
- (b) financial contributions by third parties, if they may be used to cover costs other than the eligible costs (see Article 6);
- (c) financial contributions by third parties with no obligation to repay any amount unused at the end of the period set out in Article 3.

If there is a profit, it will be deducted from the amount obtained following Steps 1 and 2.

5.3.4 Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations — Reduced grant amount — Calculation

If the grant is reduced (see Article 43), the Agency will calculate the reduced grant amount by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the maximum grant amount set out in Article 5.1.

The final grant amount will be the lower of the following two:

- the amount obtained following Steps 1 to 3 or
- the reduced grant amount following Step 4.

5.4 Revised final grant amount — Calculation

If — after the payment of the balance (in particular, after checks, reviews, audits or investigations; see Article 22) — the Agency rejects costs (see Article 42) or reduces the grant (see Article 43), it will calculate the ‘**revised final grant amount**’ for the beneficiary concerned by the findings.

This amount is calculated by the Agency on the basis of the findings, as follows:

- in case of **rejection of costs**: by applying the reimbursement rate to the revised eligible costs approved by the Agency for the beneficiary concerned;
- in case of **reduction of the grant**: by calculating the concerned beneficiary’s share in the grant amount reduced in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations (see Article 43.2).

In case of **rejection of costs and reduction of the grant**, the revised final grant amount for the beneficiary concerned will be the lower of the two amounts above.

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS

6.1 General conditions for costs to be eligible

‘**Eligible costs**’ are costs that meet the following criteria:

(a) for **actual costs**:

- (i) they must be actually incurred by the beneficiary;
- (ii) they must be incurred in the period set out in Article 3, with the exception of costs relating to the submission of the periodic report for the last reporting period and the final report (see Article 20);
- (iii) they must be indicated in the estimated budget set out in Annex 2;
- (iv) they must be incurred in connection with the action as described in Annex 1 and necessary for its implementation;
- (v) they must be identifiable and verifiable, in particular recorded in the beneficiary’s accounts in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary’s usual cost accounting practices;

- (vi) they must comply with the applicable national law on taxes, labour and social security, and
- (vii) they must be reasonable, justified and must comply with the principle of sound financial management, in particular regarding economy and efficiency;

(b) for **unit costs**:

- (i) they must be calculated as follows:

{amounts per unit set out in Annex 2a or calculated by the beneficiary in accordance with its usual cost accounting practices (see Article 6.2, Point A and Article 6.2.D.5)}

multiplied by

the number of actual units};

- (ii) the number of actual units must comply with the following conditions:

- the units must be actually used or produced in the period set out in Article 3;
- the units must be necessary for implementing the action or produced by it, and
- the number of units must be identifiable and verifiable, in particular supported by records and documentation (see Article 18);

(c) for **flat-rate costs**:

- (i) they must be calculated by applying the flat-rate set out in Annex 2, and
- (ii) the costs (actual costs or unit costs) to which the flat-rate is applied must comply with the conditions for eligibility set out in this Article.

6.2 Specific conditions for costs to be eligible

Costs are eligible if they comply with the general conditions (see above) and the specific conditions set out below for each of the following budget categories:

- A. direct personnel costs;
- B. direct costs of subcontracting;
- C. not applicable;
- D. other direct costs;
- E. indirect costs;
- F. not applicable.

‘Direct costs’ are costs that are directly linked to the action implementation and can therefore be attributed to it directly. They must not include any indirect costs (see Point E below).

‘Indirect costs’ are costs that are not directly linked to the action implementation and therefore cannot be attributed directly to it.

A. Direct personnel costs

Types of eligible personnel costs

A.1 Personnel costs are eligible, if they are related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action (**‘costs for employees (or equivalent)’**). They must be limited to salaries (including during parental leave), social security contributions, taxes and other costs included in the **remuneration**, if they arise from national law or the employment contract (or equivalent appointing act).

Beneficiaries that are non-profit legal entities¹ may also declare as personnel costs **additional remuneration** for personnel assigned to the action (including payments on the basis of supplementary contracts regardless of their nature), if:

- (a) it is part of the beneficiary’s usual remuneration practices and is paid in a consistent manner whenever the same kind of work or expertise is required;
- (b) the criteria used to calculate the supplementary payments are objective and generally applied by the beneficiary, regardless of the source of funding used.

‘Additional remuneration’ means any part of the remuneration which exceeds what the person would be paid for time worked in projects funded by national schemes.

Additional remuneration for personnel assigned to the action is eligible up to the following amount:

- (a) if the person works full time and exclusively on the action during the full year: up to EUR 8 000;
- (b) if the person works exclusively on the action but not full-time or not for the full year: up to the corresponding pro-rata amount of EUR 8 000, or
- (c) if the person does not work exclusively on the action: up to a pro-rata amount calculated as follows:

$$\left\{ \begin{array}{l} \text{EUR 8 000} \\ \text{divided by} \\ \text{the number of annual productive hours (see below)}, \\ \text{multiplied by} \\ \text{the number of hours that the person has worked on the action during the year} \end{array} \right\}.$$

A.2 The **costs for natural persons working under a direct contract** with the beneficiary other than an employment contract are eligible personnel costs, if:

- (a) the person works under conditions similar to those of an employee (in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed);
- (b) the result of the work carried out belongs to the beneficiary (unless exceptionally agreed otherwise), and

¹ For the definition, see Article 2.1(14) of the Rules for Participation Regulation No 1290/2013: ‘**non-profit legal entity**’ means a legal entity which by its legal form is non-profit-making or which has a legal or statutory obligation not to distribute profits to its shareholders or individual members.

- (c) the costs are not significantly different from those for personnel performing similar tasks under an employment contract with the beneficiary.

A.3 The **costs of personnel seconded by a third party against payment** are eligible personnel costs, if the conditions in Article 11.1 are met.

A.4 **Costs of owners** of beneficiaries that are small and medium-sized enterprises (**'SME owners'**) who are working on the action and who do not receive a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

A.5 **Costs of 'beneficiaries that are natural persons'** not receiving a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

Calculation

Personnel costs must be calculated by the beneficiaries as follows:

{ hourly rate
multiplied by
the number of actual hours worked on the action },
plus
for non-profit legal entities: additional remuneration to personnel assigned to the action under the conditions set out above (Point A.1) }.

The number of actual hours declared for a person must be identifiable and verifiable (see Article 18).

The total number of hours declared in EU or Euratom grants, for a person for a year, cannot be higher than the annual productive hours used for the calculations of the hourly rate. Therefore, the maximum number of hours that can be declared for the grant are:

{ number of annual productive hours for the year (see below)
minus
total number of hours declared by the beneficiary, for that person in that year, for other EU or Euratom grants }.

The **'hourly rate'** is one of the following:

- (a) for personnel costs declared as **actual costs** (i.e. budget categories A.1, A.2, A.3): the hourly rate is calculated *per full financial year*, as follows:

{ actual annual personnel costs (excluding additional remuneration) for the person
divided by
number of annual productive hours },

using the personnel costs and the number of productive hours for each full financial year covered by the reporting period concerned. If a financial year is not closed at the end of the

reporting period, the beneficiaries must use the hourly rate of the last closed financial year available.

For the 'number of annual productive hours', the beneficiaries may choose one of the following:

- (i) 'fixed number of hours': 1 720 hours for persons working full time (or corresponding pro-rata for persons not working full time);
- (ii) 'individual annual productive hours': the total number of hours worked by the person in the year for the beneficiary, calculated as follows:

{annual workable hours of the person (according to the employment contract, applicable collective labour agreement or national law)

plus

overtime worked

minus

absences (such as sick leave and special leave)).

'Annual workable hours' means the period during which the personnel must be working, at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.

If the contract (or applicable collective labour agreement or national working time legislation) does not allow to determine the annual workable hours, this option cannot be used;

- (iii) 'standard annual productive hours': the 'standard number of annual hours' generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the 'standard annual workable hours'.

If there is no applicable reference for the standard annual workable hours, this option cannot be used.

For all options, the actual time spent on **parental leave** by a person assigned to the action may be deducted from the number of annual productive hours.

As an alternative, beneficiaries may calculate the hourly rate *per month*, as follows:

{actual monthly personnel cost (excluding additional remuneration) for the person

divided by

{number of annual productive hours / 12}}

using the personnel costs for each month and (one twelfth of) the annual productive hours calculated according to either option (i) or (iii) above, i.e.:

- fixed number of hours or
- standard annual productive hours.

Time spent on **parental leave** may not be deducted when calculating the hourly rate per month. However, beneficiaries may declare personnel costs incurred in periods of parental leave in proportion to the time the person worked on the action in that financial year.

If parts of a basic remuneration are generated over a period longer than a month, the beneficiaries may include only the share which is generated in the month (irrespective of the amount actually paid for that month).

Each beneficiary must use only one option (per full financial year or per month) for each full financial year;

(b) for personnel costs declared on the basis of **unit costs** (i.e. budget categories A.1, A.2, A.4, A.5): the hourly rate is one of the following:

- (i) for SME owners or beneficiaries that are natural persons: the hourly rate set out in Annex 2a (see Points A.4 and A.5 above), or
- (ii) for personnel costs declared on the basis of the beneficiary's usual cost accounting practices: the hourly rate calculated by the beneficiary in accordance with its usual cost accounting practices, if:
 - the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
 - the hourly rate is calculated using the actual personnel costs recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual personnel costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information;

and

- the hourly rate is calculated using the number of annual productive hours (see above).

B. Direct costs of subcontracting (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if the conditions in Article 13.1.1 are met.

C. Direct costs of providing financial support to third parties

Not applicable

D. Other direct costs

D.1 Travel costs and related subsistence allowances (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if they are in line with the beneficiary's usual practices on travel.

D.2 The depreciation costs of equipment, infrastructure or other assets (new or second-hand) as recorded in the beneficiary's accounts are eligible, if they were purchased in accordance with

Article 10.1.1 and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

The **costs of renting or leasing** equipment, infrastructure or other assets (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are also eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets and do not include any financing fees.

The costs of equipment, infrastructure or other assets **contributed in-kind against payment** are eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets, do not include any financing fees and if the conditions in Article 11.1 are met.

The only portion of the costs that will be taken into account is that which corresponds to the duration of the action and rate of actual use for the purposes of the action.

D.3 Costs of other goods and services (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible, if they are:

- (a) purchased specifically for the action and in accordance with Article 10.1.1 or
- (b) contributed in kind against payment and in accordance with Article 11.1.

Such goods and services include, for instance, consumables and supplies, dissemination (including open access), protection of results, certificates on the financial statements (if they are required by the Agreement), certificates on the methodology, translations and publications.

D.4 Capitalised and operating costs of 'large research infrastructure'² directly used for the action are eligible, if:

- (a) the value of the large research infrastructure represents at least 75% of the total fixed assets (at historical value in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure³);
- (b) the beneficiary's methodology for declaring the costs for large research infrastructure has been positively assessed by the Commission ('**ex-ante assessment**');
- (c) the beneficiary declares as direct eligible costs only the portion which corresponds to the duration of the action and the rate of actual use for the purposes of the action, and
- (d) they comply with the conditions as further detailed in the annotations to the H2020 grant agreements.

² '**Large research infrastructure**' means research infrastructure of a total value of at least EUR 20 million, for a beneficiary, calculated as the sum of historical asset values of each individual research infrastructure of that beneficiary, as they appear in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure.

³ For the definition, see Article 2(6) of the H2020 Framework Programme Regulation No 1291/2013: '**Research infrastructure**' are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. Where relevant, they may be used beyond research, e.g. for education or public services. They include: major scientific equipment (or sets of instruments); knowledge-based resources such as collections, archives or scientific data; e-infrastructures such as data and computing systems and communication networks; and any other infrastructure of a unique nature essential to achieve excellence in research and innovation. Such infrastructures may be 'single-sited', 'virtual' or 'distributed'.

D.5 Costs of internally invoiced goods and services directly used for the action are eligible, if:

- (a) they are declared on the basis of a unit cost calculated in accordance with the beneficiary's usual cost accounting practices;
- (b) the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
- (c) the unit cost is calculated using the actual costs for the good or service recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the costs, reasonable and correspond to objective and verifiable information;

- (d) the unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.

'Internally invoiced goods and services' means goods or services which are provided by the beneficiary directly for the action and which the beneficiary values on the basis of its usual cost accounting practices.

E. Indirect costs

Indirect costs are eligible if they are declared on the basis of the flat-rate of 25% of the eligible direct costs (see Article 5.2 and Points A to D above), from which are excluded:

- (a) costs of subcontracting and
- (b) costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises;
- (c) not applicable;
- (d) not applicable.

Beneficiaries receiving an operating grant⁴ financed by the EU or Euratom budget cannot declare indirect costs for the period covered by the operating grant, unless they can demonstrate that the operating grant does not cover any costs of the action.

F. Specific cost category(ies)

Not applicable

6.3 Conditions for costs of linked third parties to be eligible

⁴ For the definition, see Article 121(1)(b) of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 ('**Financial Regulation No 966/2012**') (OJ L 218, 26.10.2012, p.1): '**operating grant**' means direct financial contribution, by way of donation, from the budget in order to finance the functioning of a body which pursues an aim of general EU interest or has an objective forming part of and supporting an EU policy.

Costs incurred by linked third parties are eligible if they fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 14.1.1.

6.4 Conditions for in-kind contributions provided by third parties free of charge to be eligible

In-kind contributions provided free of charge are eligible direct costs (for the beneficiary or linked third party), if the costs incurred by the third party fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 12.1.

6.5 Ineligible costs

‘Ineligible costs’ are:

(a) costs that do not comply with the conditions set out above (Article 6.1 to 6.4), in particular:

- (i) costs related to return on capital;
- (ii) debt and debt service charges;
- (iii) provisions for future losses or debts;
- (iv) interest owed;
- (v) doubtful debts;
- (vi) currency exchange losses;
- (vii) bank costs charged by the beneficiary’s bank for transfers from the Agency;
- (viii) excessive or reckless expenditure;
- (ix) deductible VAT;
- (x) costs incurred during suspension of the implementation of the action (see Article 49);

(b) costs declared under another EU or Euratom grant (including grants awarded by a Member State and financed by the EU or Euratom budget and grants awarded by bodies other than the Agency for the purpose of implementing the EU or Euratom budget); in particular, indirect costs if the beneficiary is already receiving an operating grant financed by the EU or Euratom budget in the same period, unless it can demonstrate that the operating grant does not cover any costs of the action.

6.6 Consequences of declaration of ineligible costs

Declared costs that are ineligible will be rejected (see Article 42).

This may also lead to any of the other measures described in Chapter 6.

CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES

SECTION 1 — RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION

ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION

7.1 General obligation to properly implement the action

The beneficiaries must implement the action as described in Annex 1 and in compliance with the provisions of the Agreement and all legal obligations under applicable EU, international and national law.

7.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 8 — RESOURCES TO IMPLEMENT THE ACTION — THIRD PARTIES INVOLVED IN THE ACTION

The beneficiaries must have the appropriate resources to implement the action.

If it is necessary to implement the action, the beneficiaries may:

- purchase goods, works and services (see Article 10);
- use in-kind contributions provided by third parties against payment (see Article 11);
- use in-kind contributions provided by third parties free of charge (see Article 12);
- call upon subcontractors to implement action tasks described in Annex 1 (see Article 13);
- call upon linked third parties to implement action tasks described in Annex 1 (see Article 14);
- call upon international partners to implement action tasks described in Annex 1 (see Article 14a).

In these cases, the beneficiaries retain sole responsibility towards the Agency and the other beneficiaries for implementing the action.

ARTICLE 9 — IMPLEMENTATION OF ACTION TASKS BY BENEFICIARIES NOT RECEIVING EU FUNDING

Not applicable

ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES

10.1 Rules for purchasing goods, works or services

10.1.1 If necessary to implement the action, the beneficiaries may purchase goods, works or services.

The beneficiaries must make such purchases ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their contractors.

10.1.2 Beneficiaries that are 'contracting authorities' within the meaning of Directive 2004/18/EC⁵ (or 2014/24/EU⁶) or 'contracting entities' within the meaning of Directive 2004/17/EC⁷ (or 2014/25/EU⁸) must comply with the applicable national law on public procurement.

10.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 10.1.1, the costs related to the contract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 10.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 11 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES AGAINST PAYMENT

11.1 Rules for the use of in-kind contributions against payment

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties against payment.

The beneficiaries may declare costs related to the payment of in-kind contributions as eligible (see Article 6.1 and 6.2), up to the third parties' costs for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services.

The third parties and their contributions must be set out in Annex I. The Agency may however approve in-kind contributions not set out in Annex I without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors

⁵ Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public work contracts, public supply contracts and public service contracts (OJ L 134, 30.04.2004, p. 114).

⁶ Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC. (OJ L 94, 28.03.2014, p. 65).

⁷ Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors (OJ L 134, 30.04.2004, p. 1)

⁸ Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC (OJ L 94, 28.03.2014, p. 243).

(ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

11.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the costs related to the payment of the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 12 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES FREE OF CHARGE

12.1 Rules for the use of in-kind contributions free of charge

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties free of charge.

The beneficiaries may declare costs incurred by the third parties for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services as eligible in accordance with Article 6.4.

The third parties and their contributions must be set out in Annex 1. The Agency may however approve in-kind contributions not set out in Annex 1 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

12.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the costs incurred by the third parties related to the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS

13.1 Rules for subcontracting action tasks

13.1.1 If necessary to implement the action, the beneficiaries may award subcontracts covering the implementation of certain action tasks described in Annex 1.

Subcontracting may cover only a limited part of the action.

The beneficiaries must award the subcontracts ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The tasks to be implemented and the estimated cost for each subcontract must be set out in Annex 1 and the total estimated costs of subcontracting per beneficiary must be set out in Annex 2. The Agency may however approve subcontracts not set out in Annex 1 and 2 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- they do not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their subcontractors.

13.1.2 The beneficiaries must ensure that their obligations under Articles 35, 36, 38 and 46 also apply to the subcontractors.

Beneficiaries that are ‘contracting authorities’ within the meaning of Directive 2004/18/EC (or 2014/24/EU) or ‘contracting entities’ within the meaning of Directive 2004/17/EC (or 2014/25/EU) must comply with the applicable national law on public procurement.

13.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 13.1.1, the costs related to the subcontract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 13.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES

14.1 Rules for calling upon linked third parties to implement part of the action

14.1.1 The following **affiliated entities**¹⁰ and **third parties with a legal link to a beneficiary**¹¹ (**‘linked third parties’**) may implement the action tasks attributed to them in Annex 1:

¹⁰ For the definition see Article 2.1(2) Rules for Participation Regulation No 1290/2013: ‘**affiliated entity**’ means any legal entity that is:

- under the direct or indirect control of a participant, or
- under the same direct or indirect control as the participant, or
- directly or indirectly controlling a participant.

‘Control’ may take any of the following forms:

- (a) the direct or indirect holding of more than 50% of the nominal value of the issued share capital in the legal entity concerned, or of a majority of the voting rights of the shareholders or associates of that entity;
- (b) the direct or indirect holding, in fact or in law, of decision-making powers in the legal entity concerned.

However the following relationships between legal entities shall not in themselves be deemed to constitute controlling relationships:

- (a) the same public investment corporation, institutional investor or venture-capital company has a direct or indirect holding of more than 50% of the nominal value of the issued share capital or a majority of voting rights of the shareholders or associates;
- (b) the legal entities concerned are owned or supervised by the same public body.

- SEVEROMORAVSKE VODOVODY A KANALIZACE OSTRAVA AS (SMVAK), affiliated or linked to AQUA
- SWEDEN WATER RESEARCH AB (SWR), affiliated or linked to VASYD
- Winning Innovation i Lund AB (WIN) (WIN), affiliated or linked to VASYD
- LUNDS KOMMUN (CoL), affiliated or linked to VASYD
- MALMO KOMMUNS PARKERINGSAKTIEBOLAG (P-MALMO), affiliated or linked to MALM
- MKB FASTIGHETS AB (MKB), affiliated or linked to MALM

The linked third parties may declare as eligible the costs they incur for implementing the action tasks in accordance with Article 6.3.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their linked third parties.

14.1.2 The beneficiaries must ensure that their obligations under Articles 18, 20, 35, 36 and 38 also apply to their linked third parties.

14.2 Consequences of non-compliance

If any obligation under Article 14.1.1 is breached, the costs of the linked third party will be ineligible (see Article 6) and will be rejected (see Article 42).

If any obligation under Article 14.1.2 is breached, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS

Not applicable

ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES

15.1 Rules for providing financial support to third parties

Not applicable

15.2 Financial support in the form of prizes

Not applicable

15.3 Consequences of non-compliance

¹¹ 'Third party with a legal link to a beneficiary' is any legal entity which has a legal link to the beneficiary implying collaboration that is not limited to the action.

Not applicable

ARTICLE 16 — PROVISION OF TRANS-NATIONAL OR VIRTUAL ACCESS TO RESEARCH INFRASTRUCTURE

16.1 Rules for providing trans-national access to research infrastructure

Not applicable

16.2 Rules for providing virtual access to research infrastructure

Not applicable

16.3 Consequences of non-compliance

Not applicable

SECTION 2 — RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION

ARTICLE 17 — GENERAL OBLIGATION TO INFORM

17.1 General obligation to provide information upon request

The beneficiaries must provide — during implementation of the action or afterwards and in accordance with Article 41.2 — any information requested in order to verify eligibility of the costs, proper implementation of the action and compliance with any other obligation under the Agreement.

17.2 Obligation to keep information up to date and to inform about events and circumstances likely to affect the Agreement

Each beneficiary must keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system; see Article 52) up to date, in particular, its name, address, legal representatives, legal form and organisation type.

Each beneficiary must immediately inform the coordinator — which must immediately inform the Agency and the other beneficiaries — of any of the following:

- (a) **events** which are likely to affect significantly or delay the implementation of the action or the EU's financial interests, in particular:
 - (i) changes in its legal, financial, technical, organisational or ownership situation or those of its linked third parties and
 - (ii) changes in the name, address, legal form, organisation type of its linked third parties;
- (b) **circumstances** affecting:
 - (i) the decision to award the grant or
 - (ii) compliance with requirements under the Agreement.

17.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION

18.1 Obligation to keep records and other supporting documentation

The beneficiaries must — for a period of five years after the payment of the balance — keep records and other supporting documentation in order to prove the proper implementation of the action and the costs they declare as eligible.

They must make them available upon request (see Article 17) or in the context of checks, reviews, audits or investigations (see Article 22).

If there are on-going checks, reviews, audits, investigations, litigation or other pursuits of claims under the Agreement (including the extension of findings; see Article 22), the beneficiaries must keep the records and other supporting documentation until the end of these procedures.

The beneficiaries must keep the original documents. Digital and digitalised documents are considered originals if they are authorised by the applicable national law. The Agency may accept non-original documents if it considers that they offer a comparable level of assurance.

18.1.1 Records and other supporting documentation on the scientific and technical implementation

The beneficiaries must keep records and other supporting documentation on scientific and technical implementation of the action in line with the accepted standards in the respective field.

18.1.2 Records and other documentation to support the costs declared

The beneficiaries must keep the records and documentation supporting the costs declared, in particular the following:

- (a) for **actual costs**: adequate records and other supporting documentation to prove the costs declared, such as contracts, subcontracts, invoices and accounting records. In addition, the beneficiaries' usual cost accounting practices and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documentation;
- (b) for **unit costs**: adequate records and other supporting documentation to prove the number of units declared. Beneficiaries do not need to identify the actual eligible costs covered or to keep or provide supporting documentation (such as accounting statements) to prove the amount per unit.

In addition, for **unit costs calculated in accordance with the beneficiary's usual cost accounting practices**, the beneficiaries must keep adequate records and documentation to prove that the cost accounting practices used comply with the conditions set out in Article 6.2.

The beneficiaries and linked third parties may submit to the Commission, for approval, a certificate (drawn up in accordance with Annex 6) stating that their usual cost accounting practices comply with these conditions (**‘certificate on the methodology’**). If the certificate is approved, costs declared in line with this methodology will not be challenged subsequently, unless the beneficiaries have concealed information for the purpose of the approval.

- (c) for **flat-rate costs**: adequate records and other supporting documentation to prove the eligibility of the costs to which the flat-rate is applied. The beneficiaries do not need to identify the costs covered or provide supporting documentation (such as accounting statements) to prove the amount declared at a flat-rate.

In addition, for **personnel costs** (declared as actual costs or on the basis of unit costs), the beneficiaries must keep **time records** for the number of hours declared. The time records must be in writing and approved by the persons working on the action and their supervisors, at least monthly. In the absence of reliable time records of the hours worked on the action, the Agency may accept alternative evidence supporting the number of hours declared, if it considers that it offers an adequate level of assurance.

As an exception, for **persons working exclusively on the action**, there is no need to keep time records, if the beneficiary signs a **declaration** confirming that the persons concerned have worked exclusively on the action.

For costs declared by linked third parties (see Article 14), it is the beneficiary that must keep the originals of the financial statements and the certificates on the financial statements of the linked third parties.

18.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, costs insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 42), and the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 19 — SUBMISSION OF DELIVERABLES

19.1 Obligation to submit deliverables

The coordinator must submit the **‘deliverables’** identified in Annex 1, in accordance with the timing and conditions set out in it.

19.2 Consequences of non-compliance

If the coordinator breaches any of its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

ARTICLE 20 — REPORTING — PAYMENT REQUESTS

20.1 Obligation to submit reports

The coordinator must submit to the Agency (see Article 52) the technical and financial reports set out

in this Article. These reports include requests for payment and must be drawn up using the forms and templates provided in the electronic exchange system (see Article 52).

20.2 Reporting periods

The action is divided into the following **'reporting periods'**:

- RP1: from month 1 to month 18
- RP2: from month 19 to month 36
- RP3: from month 37 to month 60

20.3 Periodic reports — Requests for interim payments

The coordinator must submit a periodic report within 60 days following the end of each reporting period.

The **periodic report** must include the following:

(a) a **'periodic technical report'** containing:

- (i) an **explanation of the work carried out** by the beneficiaries;
- (ii) an **overview of the progress** towards the objectives of the action, including milestones and deliverables identified in Annex 1.

This report must include explanations justifying the differences between work expected to be carried out in accordance with Annex 1 and that actually carried out.

The report must detail the exploitation and dissemination of the results and — if required in Annex 1 — an updated **'plan for the exploitation and dissemination of the results'**.

The report must indicate the communication activities;

- (iii) a **summary** for publication by the Agency;
- (iv) the answers to the **'questionnaire'**, covering issues related to the action implementation and the economic and societal impact, notably in the context of the Horizon 2020 key performance indicators and the Horizon 2020 monitoring requirements;

(b) a **'periodic financial report'** containing:

- (i) an **'individual financial statement'** (see Annex 4) from each beneficiary and from each linked third party, for the reporting period concerned.

The individual financial statement must detail the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) for each budget category (see Annex 2).

The beneficiaries and linked third parties must declare all eligible costs, even if — for actual costs, unit costs and flat-rate costs — they exceed the amounts indicated in the estimated budget (see Annex 2). Amounts which are not declared in the individual financial statement will not be taken into account by the Agency.

If an individual financial statement is not submitted for a reporting period, it may be included in the periodic financial report for the next reporting period.

The individual financial statements of the last reporting period must also detail the **receipts of the action** (see Article 5.3.3).

Each beneficiary and each linked third party must **certify** that:

- the information provided is full, reliable and true;
 - the costs declared are eligible (see Article 6);
 - the costs can be substantiated by adequate records and supporting documentation (see Article 18) that will be produced upon request (see Article 17) or in the context of checks, reviews, audits and investigations (see Article 22), and
 - for the last reporting period: that all the receipts have been declared (see Article 5.3.3);
- (ii) an **explanation of the use of resources** and the information on subcontracting (see Article 13) and in-kind contributions provided by third parties (see Articles 11 and 12) from each beneficiary and from each linked third party, for the reporting period concerned;
- (iii) not applicable;
- (iv) a **'periodic summary financial statement'**, created automatically by the electronic exchange system, consolidating the individual financial statements for the reporting period concerned and including — except for the last reporting period — the **request for interim payment**.

20.4 Final report — Request for payment of the balance

In addition to the periodic report for the last reporting period, the coordinator must submit the final report within 60 days following the end of the last reporting period.

The **final report** must include the following:

- (a) a **'final technical report'** with a **summary** for publication containing:
- (i) an overview of the results and their exploitation and dissemination;
 - (ii) the conclusions on the action, and
 - (iii) the socio-economic impact of the action;
- (b) a **'final financial report'** containing:
- (i) a **'final summary financial statement'**, created automatically by the electronic exchange system, consolidating the individual financial statements for all reporting periods and including the **request for payment of the balance** and

- (ii) a **'certificate on the financial statements'** (drawn up in accordance with Annex 5) for each beneficiary and for each linked third party, if it requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 5.2 and Article 6.2).

20.5 Information on cumulative expenditure incurred

In addition to the reporting requirements set out above (Article 20.1 to 20.3), the coordinator must inform the Agency by 31 December each year of the cumulative expenditure incurred by the beneficiaries from the starting date of the action.

This information is required for the Commission's accounting purposes and will not be used to calculate the final grant amount.

20.6 Currency for financial statements and conversion into euro

Financial statements must be drafted in euro.

Beneficiaries and linked third parties with accounting established in a currency other than the euro must convert the costs recorded in their accounts into euro, at the average of the daily exchange rates published in the C series of the *Official Journal of the European Union*, calculated over the corresponding reporting period.

If no daily euro exchange rate is published in the *Official Journal of the European Union* for the currency in question, they must be converted at the average of the monthly accounting rates published on the Commission's website, calculated over the corresponding reporting period.

Beneficiaries and linked third parties with accounting established in euro must convert costs incurred in another currency into euro according to their usual accounting practices.

20.7 Language of reports

All reports (technical and financial reports, including financial statements) must be submitted in the language of the Agreement.

20.8 Consequences of non-compliance

If the reports submitted do not comply with this Article, the Agency may suspend the payment deadline (see Article 47) and apply any of the other measures described in Chapter 6.

If the coordinator breaches its obligation to submit the reports and if it fails to comply with this obligation within 30 days following a written reminder, the Agency may terminate the Agreement (see Article 50) or apply any of the other measures described in Chapter 6.

ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS

21.1 Payments to be made

The following payments will be made to the coordinator:

- one **pre-financing payment**:

- one or more **interim payments**, on the basis of the request(s) for interim payment (see Article 20), and
- one **payment of the balance**, on the basis of the request for payment of the balance (see Article 20).

21.2 Pre-financing payment — Amount — Amount retained for the Guarantee Fund

The aim of the pre-financing is to provide the beneficiaries with a float.

It remains the property of the EU until the payment of the balance.

The amount of the pre-financing payment will be EUR **7 991 816.97** (seven million nine hundred and ninety one thousand eight hundred and sixteen EURO and ninety seven eurocents).

The Agency will — except if Article 48 applies — make the pre-financing payment to the coordinator within 30 days, either from the entry into force of the Agreement (see Article 58) or from 10 days before the starting date of the action (see Article 3), whichever is the latest.

An amount of EUR **749 232.84** (seven hundred and forty nine thousand two hundred and thirty two EURO and eighty four eurocents), corresponding to 5% of the maximum grant amount (see Article 5.1), is retained by the Agency from the pre-financing payment and transferred into the ‘**Guarantee Fund**’.

21.3 Interim payments — Amount — Calculation

Interim payments reimburse the eligible costs incurred for the implementation of the action during the corresponding reporting periods.

The Agency will pay to the coordinator the amount due as interim payment within 90 days from receiving the periodic report (see Article 20.3), except if Articles 47 or 48 apply.

Payment is subject to the approval of the periodic report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as interim payment** is calculated by the Agency in the following steps:

Step 1 — Application of the reimbursement rates

Step 2 — Limit to 90% of the maximum grant amount

21.3.1 Step 1 — Application of the reimbursement rates

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and the linked third parties (see Article 20) and approved by the Agency (see above) for the concerned reporting period.

21.3.2 Step 2 — Limit to 90% of the maximum grant amount

The total amount of pre-financing and interim payments must not exceed 90% of the maximum grant amount set out in Article 5.1. The maximum amount for the interim payment will be calculated as follows:

{90% of the maximum grant amount (see Article 5.1)

minus

{pre-financing and previous interim payments} }.

21.4 Payment of the balance — Amount — Calculation — Release of the amount retained for the Guarantee Fund

The payment of the balance reimburses the remaining part of the eligible costs incurred by the beneficiaries for the implementation of the action.

If the total amount of earlier payments is greater than the final grant amount (see Article 5.3), the payment of the balance takes the form of a recovery (see Article 44).

If the total amount of earlier payments is lower than the final grant amount, the Agency will pay the balance within 90 days from receiving the final report (see Article 20.4), except if Articles 47 or 48 apply.

Payment is subject to the approval of the final report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as the balance** is calculated by the Agency by deducting the total amount of pre-financing and interim payments (if any) already made, from the final grant amount determined in accordance with Article 5.3:

{final grant amount (see Article 5.3)

minus

{pre-financing and interim payments (if any) made} }.

At the payment of the balance, the amount retained for the Guarantee Fund (see above) will be released and:

- if the balance is positive: the amount released will be paid in full to the coordinator together with the amount due as the balance;
- if the balance is negative (payment of the balance taking the form of recovery): it will be deducted from the amount released (see Article 44.1.2). If the resulting amount:
 - is positive, it will be paid to the coordinator
 - is negative, it will be recovered.

The amount to be paid may however be offset — without the beneficiaries' consent — against any other amount owed by a beneficiary to the Agency, the Commission or another executive agency (under the EU or Euratom budget), up to the maximum EU contribution indicated, for that beneficiary, in the estimated budget (see Annex 2).

21.5 Notification of amounts due

When making payments, the Agency will formally notify to the coordinator the amount due, specifying whether it concerns an interim payment or the payment of the balance.

For the payment of the balance, the notification will also specify the final grant amount.

In the case of reduction of the grant or recovery of undue amounts, the notification will be preceded by the contradictory procedure set out in Articles 43 and 44.

21.6 Currency for payments

The Agency will make all payments in euro.

21.7 Payments to the coordinator — Distribution to the beneficiaries

Payments will be made to the coordinator.

Payments to the coordinator will discharge the Agency from its payment obligation.

The coordinator must distribute the payments between the beneficiaries without unjustified delay.

Pre-financing may however be distributed only:

- (a) if the minimum number of beneficiaries set out in the call for proposals has acceded to the Agreement (see Article 56) and
- (b) to beneficiaries that have acceded to the Agreement (see Article 56).

21.8 Bank account for payments

All payments will be made to the following bank account:

Name of bank: BANCO SANTANDER, S.A.
Full name of the account holder: FCC AQUALIA SA
IBAN code: ES8300494084422514319746

21.9 Costs of payment transfers

The cost of the payment transfers is borne as follows:

- the Agency bears the cost of transfers charged by its bank;
- the beneficiary bears the cost of transfers charged by its bank;
- the party causing a repetition of a transfer bears all costs of the repeated transfer.

21.10 Date of payment

Payments by the Agency are considered to have been carried out on the date when they are debited to its account.

21.11 Consequences of non-compliance

21.11.1 If the Agency does not pay within the payment deadlines (see above), the beneficiaries are entitled to **late-payment interest** at the rate applied by the European Central Bank (ECB) for its main refinancing operations in euros ('reference rate'), plus three and a half points. The reference rate is

the rate in force on the first day of the month in which the payment deadline expires, as published in the C series of the *Official Journal of the European Union*.

If the late-payment interest is lower than or equal to EUR 200, it will be paid to the coordinator only upon request submitted within two months of receiving the late payment.

Late-payment interest is not due if all beneficiaries are EU Member States (including regional and local government authorities or other public bodies acting on behalf of a Member State for the purpose of this Agreement).

Suspension of the payment deadline or payments (see Articles 47 and 48) will not be considered as late payment.

Late-payment interest covers the period running from the day following the due date for payment (see above), up to and including the date of payment.

Late-payment interest is not considered for the purposes of calculating the final grant amount.

21.11.2 If the coordinator breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or the participation of the coordinator may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 22 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS

22.1 Checks, reviews and audits by the Agency and the Commission

22.1.1 Right to carry out checks

The Agency or the Commission will — during the implementation of the action or afterwards — check the proper implementation of the action and compliance with the obligations under the Agreement, including assessing deliverables and reports.

For this purpose the Agency or the Commission may be assisted by external persons or bodies.

The Agency or the Commission may also request additional information in accordance with Article 17. The Agency or the Commission may request beneficiaries to provide such information to it directly.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

22.1.2 Right to carry out reviews

The Agency or the Commission may — during the implementation of the action or afterwards — carry out reviews on the proper implementation of the action (including assessment of deliverables and reports), compliance with the obligations under the Agreement and continued scientific or technological relevance of the action.

Reviews may be started up to two years after the payment of the balance. They will be formally

notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the review is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The Agency or the Commission may carry out reviews directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information and data in addition to deliverables and reports already submitted (including information on the use of resources). The Agency or the Commission may request beneficiaries to provide such information to it directly.

The coordinator or beneficiary concerned may be requested to participate in meetings, including with external experts.

For **on-the-spot** reviews, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the review findings, a **‘review report’** will be drawn up.

The Agency or the Commission will formally notify the review report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations (**‘contradictory review procedure’**).

Reviews (including review reports) are in the language of the Agreement.

22.1.3 Right to carry out audits

The Agency or the Commission may — during the implementation of the action or afterwards — carry out audits on the proper implementation of the action and compliance with the obligations under the Agreement.

Audits may be started up to two years after the payment of the balance. They will be formally notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the audit is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The Agency or the Commission may carry out audits directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to

verify compliance with the Agreement. The Agency or the Commission may request beneficiaries to provide such information to it directly.

For **on-the-spot** audits, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the audit findings, a **'draft audit report'** will be drawn up.

The Agency or the Commission will formally notify the draft audit report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations (**'contradictory audit procedure'**). This period may be extended by the Agency or the Commission in justified cases.

The **'final audit report'** will take into account observations by the coordinator or beneficiary concerned. The report will be formally notified to it.

Audits (including audit reports) are in the language of the Agreement.

The Agency or the Commission may also access the beneficiaries' statutory records for the periodical assessment of unit costs or flat-rate amounts.

22.2 Investigations by the European Anti-Fraud Office (OLAF)

Under Regulations No 883/2013¹⁶ and No 2185/96¹⁷ (and in accordance with their provisions and procedures), the European Anti-Fraud Office (OLAF) may — at any moment during implementation of the action or afterwards — carry out investigations, including on-the-spot checks and inspections, to establish whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the EU.

22.3 Checks and audits by the European Court of Auditors (ECA)

Under Article 287 of the Treaty on the Functioning of the European Union (TFEU) and Article 161 of the Financial Regulation No 966/2012¹⁸, the European Court of Auditors (ECA) may — at any moment during implementation of the action or afterwards — carry out audits.

The ECA has the right of access for the purpose of checks and audits.

22.4 Checks, reviews, audits and investigations for international organisations

Not applicable

¹⁶ Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999 (OJ L 248, 18.09.2013, p. 1).

¹⁷ Council Regulation (Euratom, EC) No 2185/1996 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L 292, 15.11.1996, p. 2).

¹⁸ Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298, 26.10.2012, p. 1).

22.5 Consequences of findings in checks, reviews, audits and investigations — Extension of findings

22.5.1 Findings in this grant

Findings in checks, reviews, audits or investigations carried out in the context of this grant may lead to the rejection of ineligible costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44) or to any of the other measures described in Chapter 6.

Rejection of costs or reduction of the grant after the payment of the balance will lead to a revised final grant amount (see Article 5.4).

Findings in checks, reviews, audits or investigations may lead to a request for amendment for the modification of Annex 1 (see Article 55).

Checks, reviews, audits or investigations that find systemic or recurrent errors, irregularities, fraud or breach of obligations may also lead to consequences in other EU or Euratom grants awarded under similar conditions (**`extension of findings from this grant to other grants`**).

Moreover, findings arising from an OLAF investigation may lead to criminal prosecution under national law.

22.5.2 Findings in other grants

The Agency or the Commission may extend findings from other grants to this grant (**`extension of findings from other grants to this grant`**), if:

- (a) the beneficiary concerned is found, in other EU or Euratom grants awarded under similar conditions, to have committed systemic or recurrent errors, irregularities, fraud or breach of obligations that have a material impact on this grant and
- (b) those findings are formally notified to the beneficiary concerned — together with the list of grants affected by the findings — no later than two years after the payment of the balance of this grant.

The extension of findings may lead to the rejection of costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44), suspension of payments (see Article 48), suspension of the action implementation (see Article 49) or termination (see Article 50).

22.5.3 Procedure

The Agency or the Commission will formally notify the beneficiary concerned the systemic or recurrent errors and its intention to extend these audit findings, together with the list of grants affected.

22.5.3.1 If the findings concern **eligibility of costs**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings;
- (b) the request to submit **revised financial statements** for all grants affected;
- (c) the **correction rate for extrapolation** established by the Agency or the Commission on the basis of the systemic or recurrent errors, to calculate the amounts to be rejected if the beneficiary concerned:

- (i) considers that the submission of revised financial statements is not possible or practicable or
- (ii) does not submit revised financial statements.

The beneficiary concerned has 90 days from receiving notification to submit observations, revised financial statements or to propose a duly substantiated **alternative correction method**. This period may be extended by the Agency or the Commission in justified cases.

The Agency or the Commission may then start a rejection procedure in accordance with Article 42, on the basis of:

- the revised financial statements, if approved;
 - the proposed alternative correction method, if accepted
- or
- the initially notified correction rate for extrapolation, if it does not receive any observations or revised financial statements, does not accept the observations or the proposed alternative correction method or does not approve the revised financial statements.

22.5.3.2 If the findings concern **substantial errors, irregularities or fraud or serious breach of obligations**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings and
- (b) the flat-rate the Agency or the Commission intends to apply according to the principle of proportionality.

The beneficiary concerned has 90 days from receiving notification to submit observations or to propose a duly substantiated alternative flat-rate.

The Agency or the Commission may then start a reduction procedure in accordance with Article 43, on the basis of:

- the proposed alternative flat-rate, if accepted
- or
- the initially notified flat-rate, if it does not receive any observations or does not accept the observations or the proposed alternative flat-rate.

22.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, any insufficiently substantiated costs will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION

23.1 Right to evaluate the impact of the action

The Agency or the Commission may carry out interim and final evaluations of the impact of the action measured against the objective of the EU programme.

Evaluations may be started during implementation of the action and up to five years after the payment of the balance. The evaluation is considered to start on the date of the formal notification to the coordinator or beneficiaries.

The Agency or the Commission may make these evaluations directly (using its own staff) or indirectly (using external bodies or persons it has authorised to do so).

The coordinator or beneficiaries must provide any information relevant to evaluate the impact of the action, including information in electronic format.

23.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the Agency may apply the measures described in Chapter 6.

SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS

SUBSECTION 1 GENERAL**ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY****23a.1 Obligation to take measures to implement the Commission Recommendation on the management of intellectual property in knowledge transfer activities**

Beneficiaries that are universities or other public research organisations must take measures to implement the principles set out in Points 1 and 2 of the Code of Practice annexed to the Commission Recommendation on the management of intellectual property in knowledge transfer activities¹⁹.

This does not change the obligations set out in Subsections 2 and 3 of this Section.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

23a.2 Consequences of non-compliance

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND

¹⁹ Commission Recommendation C(2008) 1329 of 10.4.2008 on the management of intellectual property in knowledge transfer activities and the Code of Practice for universities and other public research institutions attached to this recommendation.

ARTICLE 24 — AGREEMENT ON BACKGROUND

24.1 Agreement on background

The beneficiaries must identify and agree (in writing) on the background for the action (**‘agreement on background’**).

‘Background’ means any data, know-how or information — whatever its form or nature (tangible or intangible), including any rights such as intellectual property rights — that:

- (a) is held by the beneficiaries before they acceded to the Agreement, and
- (b) is needed to implement the action or exploit the results.

24.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND

25.1 Exercise of access rights — Waiving of access rights — No sub-licensing

To exercise access rights, this must first be requested in writing (**‘request for access’**).

‘Access rights’ means rights to use results or background under the terms and conditions laid down in this Agreement.

Waivers of access rights are not valid unless in writing.

Unless agreed otherwise, access rights do not include the right to sub-license.

25.2 Access rights for other beneficiaries, for implementing their own tasks under the action

The beneficiaries must give each other access — on a royalty-free basis — to background needed to implement their own tasks under the action, unless the beneficiary that holds the background has — before acceding to the Agreement —:

- (a) informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel), or
- (b) agreed with the other beneficiaries that access would not be on a royalty-free basis.

25.3 Access rights for other beneficiaries, for exploiting their own results

The beneficiaries must give each other access — under fair and reasonable conditions — to background needed for exploiting their own results, unless the beneficiary that holds the background has — before acceding to the Agreement — informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel).

‘Fair and reasonable conditions’ means appropriate conditions, including possible financial terms or royalty-free conditions, taking into account the specific circumstances of the request for access, for example the actual or potential value of the results or background to which access is requested and/or the scope, duration or other characteristics of the exploitation envisaged.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

25.4 Access rights for affiliated entities

Unless otherwise agreed in the consortium agreement, access to background must also be given — under fair and reasonable conditions (see above: Article 25.3) and unless it is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel) — to affiliated entities²⁰ established in an EU Member State or **‘associated country’**²¹, if this is needed to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above: Article 25.1), the affiliated entity concerned must make the request directly to the beneficiary that holds the background.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

25.5 Access rights for third parties

Not applicable

25.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS

ARTICLE 26 — OWNERSHIP OF RESULTS

26.1 Ownership by the beneficiary that generates the results

Results are owned by the beneficiary that generates them.

‘Results’ means any (tangible or intangible) output of the action such as data, knowledge or information — whatever its form or nature, whether it can be protected or not — that is generated in the action, as well as any rights attached to it, including intellectual property rights.

²⁰ For the definition, see ‘affiliated entity’ footnote (Article 14.1).

²¹ For the definition, see Article 2.1(3) of the Rules for Participation Regulation No 1290/2013: **‘associated country’** means a third country which is party to an international agreement with the Union, as identified in Article 7 of Horizon 2020 Framework Programme Regulation No 1291/2013. Article 7 sets out the conditions for association of non-EU countries to Horizon 2020.

26.2 Joint ownership by several beneficiaries

Two or more beneficiaries own results jointly if:

- (a) they have jointly generated them and
- (b) it is not possible to:
 - (i) establish the respective contribution of each beneficiary, or
 - (ii) separate them for the purpose of applying for, obtaining or maintaining their protection (see Article 27).

The joint owners must agree (in writing) on the allocation and terms of exercise of their joint ownership ('**joint ownership agreement**'), to ensure compliance with their obligations under this Agreement.

Unless otherwise agreed in the joint ownership agreement, each joint owner may grant non-exclusive licences to third parties to exploit jointly-owned results (without any right to sub-license), if the other joint owners are given:

- (a) at least 45 days advance notice and
- (b) fair and reasonable compensation.

Once the results have been generated, joint owners may agree (in writing) to apply another regime than joint ownership (such as, for instance, transfer to a single owner (see Article 30) with access rights for the others).

26.3 Rights of third parties (including personnel)

If third parties (including personnel) may claim rights to the results, the beneficiary concerned must ensure that it complies with its obligations under the Agreement.

If a third party generates results, the beneficiary concerned must obtain all necessary rights (transfer, licences or other) from the third party, in order to be able to respect its obligations as if those results were generated by the beneficiary itself.

If obtaining the rights is impossible, the beneficiary must refrain from using the third party to generate the results.

26.4 Agency ownership, to protect results

26.4.1 The Agency may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to disseminate its results without protecting them, except in any of the following cases:

- (a) the lack of protection is because protecting the results is not possible, reasonable or justified (given the circumstances);
- (b) the lack of protection is because there is a lack of potential for commercial or industrial exploitation, or

- (c) the beneficiary intends to transfer the results to another beneficiary or third party established in an EU Member State or associated country, which will protect them.

Before the results are disseminated and unless any of the cases above under Points (a), (b) or (c) applies, the beneficiary must formally notify the Agency and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the Agency decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

No dissemination relating to these results may take place before the end of this period or, if the Agency takes a positive decision, until it has taken the necessary steps to protect the results.

26.4.2 The Agency may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to stop protecting them or not to seek an extension of protection, except in any of the following cases:

- (a) the protection is stopped because of a lack of potential for commercial or industrial exploitation;
- (b) an extension would not be justified given the circumstances.

A beneficiary that intends to stop protecting results or not seek an extension must — unless any of the cases above under Points (a) or (b) applies — formally notify the Agency at least 60 days before the protection lapses or its extension is no longer possible and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the Agency decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

26.5 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to the any of the other measures described in Chapter 6.

ARTICLE 27 — PROTECTION OF RESULTS — VISIBILITY OF EU FUNDING

27.1 Obligation to protect the results

Each beneficiary must examine the possibility of protecting its results and must adequately protect them — for an appropriate period and with appropriate territorial coverage — if:

- (a) the results can reasonably be expected to be commercially or industrially exploited and
- (b) protecting them is possible, reasonable and justified (given the circumstances).

When deciding on protection, the beneficiary must consider its own legitimate interests and the legitimate interests (especially commercial) of the other beneficiaries.

27.2 Agency ownership, to protect the results

If a beneficiary intends not to protect its results, to stop protecting them or not seek an extension of protection, the Agency may — under certain conditions (see Article 26.4) — assume ownership to ensure their (continued) protection.

27.3 Information on EU funding

Applications for protection of results (including patent applications) filed by or on behalf of a beneficiary must — unless the Agency requests or agrees otherwise or unless it is impossible — include the following:

“The project leading to this application has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869496”.

27.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 28 — EXPLOITATION OF RESULTS

28.1 Obligation to exploit the results

Each beneficiary must — up to four years after the period set out in Article 3 — take measures aiming to ensure ‘**exploitation**’ of its results (either directly or indirectly, in particular through transfer or licensing; see Article 30) by:

- (a) using them in further research activities (outside the action);
- (b) developing, creating or marketing a product or process;
- (c) creating and providing a service, or
- (d) using them in standardisation activities.

This does not change the security obligations in Article 37, which still apply.

28.2 Results that could contribute to European or international standards — Information on EU funding

If results are incorporated in a standard, the beneficiary concerned must — unless the Agency requests or agrees otherwise or unless it is impossible — ask the standardisation body to include the following statement in (information related to) the standard:

“Results incorporated in this standard received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869496”.

28.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced in accordance with Article 43.

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 29 — DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF EU FUNDING

29.1 Obligation to disseminate results

Unless it goes against their legitimate interests, each beneficiary must — as soon as possible — **‘disseminate’** its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of — unless agreed otherwise — at least 45 days, together with sufficient information on the results it will disseminate.

Any other beneficiary may object within — unless agreed otherwise — 30 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests.

If a beneficiary intends not to protect its results, it may — under certain conditions (see Article 26.4.1) — need to formally notify the Agency before dissemination takes place.

29.2 Open access to scientific publications

Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results.

In particular, it must:

- (a) as soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

- (b) ensure open access to the deposited publication — via the repository — at the latest:
 - (i) on publication, if an electronic version is available for free via the publisher, or
 - (ii) within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.

- (c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include all of the following:

- the terms “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

29.3 Open access to research data

Regarding the digital research data generated in the action (**‘data’**), the beneficiaries must:

- (a) deposit in a research data repository and take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate — free of charge for any user — the following:
 - (i) the data, including associated metadata, needed to validate the results presented in scientific publications, as soon as possible;
 - (ii) not applicable;
 - (iii) other data, including associated metadata, as specified and within the deadlines laid down in the ‘data management plan’ (see Annex I);
- (b) provide information — via the repository — about tools and instruments at the disposal of the beneficiaries and necessary for validating the results (and — where possible — provide the tools and instruments themselves).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

As an exception, the beneficiaries do not have to ensure open access to specific parts of their research data under Point (a)(i) and (iii), if the achievement of the action's main objective (as described in Annex I) would be jeopardised by making those specific parts of the research data openly accessible. In this case, the data management plan must contain the reasons for not giving access.

29.4 Information on EU funding — Obligation and right to use the EU emblem

Unless the Agency requests or agrees otherwise or unless it is impossible, any dissemination of results (in any form, including electronic) must:

- (a) display the EU emblem and
- (b) include the following text:

“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869496”.

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the EU emblem without first obtaining approval from the Agency.

This does not however give them the right to exclusive use.

Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

29.5 Disclaimer excluding Agency responsibility

Any dissemination of results must indicate that it reflects only the author's view and that the Agency is not responsible for any use that may be made of the information it contains.

29.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS

30.1 Transfer of ownership

Each beneficiary may transfer ownership of its results.

It must however ensure that its obligations under Articles 26.2, 26.4, 27, 28, 29, 30 and 31 also apply to the new owner and that this owner has the obligation to pass them on in any subsequent transfer.

This does not change the security obligations in Article 37, which still apply.

Unless agreed otherwise (in writing) for specifically-identified third parties or unless impossible under applicable EU and national laws on mergers and acquisitions, a beneficiary that intends to transfer ownership of results must give at least 45 days advance notice (or less if agreed in writing) to the other beneficiaries that still have (or still may request) access rights to the results. This notification must include sufficient information on the new owner to enable any beneficiary concerned to assess the effects on its access rights.

Unless agreed otherwise (in writing) for specifically-identified third parties, any other beneficiary may object within 30 days of receiving notification (or less if agreed in writing), if it can show that the transfer would adversely affect its access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

30.2 Granting licenses

Each beneficiary may grant licences to its results (or otherwise give the right to exploit them), if:

- (a) this does not impede the access rights under Article 31 and
- (b) not applicable.

In addition to Points (a) and (b), exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights (see Article 31.1).

This does not change the dissemination obligations in Article 29 or security obligations in Article 37, which still apply.

30.3 Agency right to object to transfers or licensing

Not applicable

30.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 31 — ACCESS RIGHTS TO RESULTS

31.1 Exercise of access rights — Waiving of access rights — No sub-licensing

The conditions set out in Article 25.1 apply.

The obligations set out in this Article do not change the security obligations in Article 37, which still apply.

31.2 Access rights for other beneficiaries, for implementing their own tasks under the action

The beneficiaries must give each other access — on a royalty-free basis — to results needed for implementing their own tasks under the action.

31.3 Access rights for other beneficiaries, for exploiting their own results

The beneficiaries must give each other — under fair and reasonable conditions (see Article 25.3) — access to results needed for exploiting their own results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

31.4 Access rights of affiliated entities

Unless agreed otherwise in the consortium agreement, access to results must also be given — under fair and reasonable conditions (Article 25.3) — to affiliated entities established in an EU Member State or associated country, if this is needed for those entities to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above; Article 31.1), the affiliated entity concerned must make any such request directly to the beneficiary that owns the results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

31.5 Access rights for the EU institutions, bodies, offices or agencies and EU Member States

The beneficiaries must give access to their results — on a royalty-free basis — to EU institutions, bodies, offices or agencies, for developing, implementing or monitoring EU policies or programmes.

Such access rights are limited to non-commercial and non-competitive use.

This does not change the right to use any material, document or information received from the beneficiaries for communication and publicising activities (see Article 38.2).

31.6 Access rights for third parties

Not applicable

31.7 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

SECTION 4 OTHER RIGHTS AND OBLIGATIONS

ARTICLE 32 — RECRUITMENT AND WORKING CONDITIONS FOR RESEARCHERS

32.1 Obligation to take measures to implement the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers

The beneficiaries must take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers²³, in particular regarding:

- working conditions;
- transparent recruitment processes based on merit, and
- career development.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

32.2 Consequences of non-compliance

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

ARTICLE 33 — GENDER EQUALITY

²³ Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

33.1 Obligation to aim for gender equality

The beneficiaries must take all measures to promote equal opportunities between men and women in the implementation of the action. They must aim, to the extent possible, for a gender balance at all levels of personnel assigned to the action, including at supervisory and managerial level.

33.2 Consequences of non-compliance

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY

34.1 Obligation to comply with ethical and research integrity principles

The beneficiaries must carry out the action in compliance with:

- (a) ethical principles (including the highest standards of research integrity)
- and
- (b) applicable international, EU and national law.

Funding will not be granted for activities carried out outside the EU if they are prohibited in all Member States or for activities which destroy human embryos (for example, for obtaining stem cells).

The beneficiaries must ensure that the activities under the action have an exclusive focus on civil applications.

The beneficiaries must ensure that the activities under the action do not:

- (a) aim at human cloning for reproductive purposes;
- (b) intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or
- (c) intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity²⁴.

This implies compliance with the following fundamental principles:

- **reliability** in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources;
- **honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way;

²⁴ European Code of Conduct for Research Integrity of ALLEA (All European Academies)
http://ec.europa.eu/research-participants/data-ref/h2020/other/h2020-ethics_code-of-conduct_en.pdf

- **respect** for colleagues, research participants, society, ecosystems, cultural heritage and the environment;
- **accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices and refrain from the research integrity violations described in this Code.

This does not change the other obligations under this Agreement or obligations under applicable international, EU or national law, all of which still apply.

34.2 Activities raising ethical issues

Activities raising ethical issues must comply with the ‘**ethics requirements**’ set out as deliverables in Annex 1.

Before the beginning of an activity raising an ethical issue, each beneficiary must have obtained:

- (a) any ethics committee opinion required under national law and
- (b) any notification or authorisation for activities raising ethical issues required under national and/or European law

needed for implementing the action tasks in question.

The documents must be kept on file and be submitted upon request by the coordinator to the Agency (see Article 52). If they are not in English, they must be submitted together with an English summary, which shows that the action tasks in question are covered and includes the conclusions of the committee or authority concerned (if available).

34.3 Activities involving human embryos or human embryonic stem cells

Activities involving research on human embryos or human embryonic stem cells may be carried out, in addition to Article 34.1, only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the Agency (see Article 52).

34.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 35 — CONFLICT OF INTERESTS

35.1 Obligation to avoid a conflict of interests

The beneficiaries must take all measures to prevent any situation where the impartial and objective

implementation of the action is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest (**'conflict of interests'**).

They must formally notify to the Agency without delay any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The Agency may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

35.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 36 — CONFIDENTIALITY

36.1 General obligation to maintain confidentiality

During implementation of the action and for four years after the period set out in Article 3, the parties must keep confidential any data, documents or other material (in any form) that is identified as confidential at the time it is disclosed (**'confidential information'**).

If a beneficiary requests, the Agency may agree to keep such information confidential for an additional period beyond the initial four years.

If information has been identified as confidential only orally, it will be considered to be confidential only if this is confirmed in writing within 15 days of the oral disclosure.

Unless otherwise agreed between the parties, they may use confidential information only to implement the Agreement.

The beneficiaries may disclose confidential information to their personnel or third parties involved in the action only if they:

- (a) need to know to implement the Agreement and
- (b) are bound by an obligation of confidentiality.

This does not change the security obligations in Article 37, which still apply.

The Agency may disclose confidential information to its staff, other EU institutions and bodies. It may disclose confidential information to third parties, if:

- (a) this is necessary to implement the Agreement or safeguard the EU's financial interests and
- (b) the recipients of the information are bound by an obligation of confidentiality.

Under the conditions set out in Article 4 of the Rules for Participation Regulation No 1290/2013²⁵,

²⁵ Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the

the Commission must moreover make available information on the results to other EU institutions, bodies, offices or agencies as well as Member States or associated countries.

The confidentiality obligations no longer apply if:

- (a) the disclosing party agrees to release the other party;
- (b) the information was already known by the recipient or is given to him without obligation of confidentiality by a third party that was not bound by any obligation of confidentiality;
- (c) the recipient proves that the information was developed without the use of confidential information;
- (d) the information becomes generally and publicly available, without breaching any confidentiality obligation, or
- (e) the disclosure of the information is required by EU or national law.

36.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 37 — SECURITY-RELATED OBLIGATIONS

37.1 Results with a security recommendation

Not applicable

37.2 Classified information

Not applicable

37.3 Activities involving dual-use goods or dangerous materials and substances

Not applicable

37.4 Consequences of non-compliance

Not applicable

ARTICLE 38 — PROMOTING THE ACTION — VISIBILITY OF EU FUNDING

38.1 Communication activities by beneficiaries

38.1.1 Obligation to promote the action and its results

rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" (OJ L 347, 20.12.2013 p.81).

The beneficiaries must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner.

This does not change the dissemination obligations in Article 29, the confidentiality obligations in Article 36 or the security obligations in Article 37, all of which still apply.

Before engaging in a communication activity expected to have a major media impact, the beneficiaries must inform the Agency (see Article 52).

38.1.2 Information on EU funding — Obligation and right to use the EU emblem

Unless the Agency requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.) and any infrastructure, equipment and major results funded by the grant must:

(a) display the EU emblem and

(b) include the following text:

For communication activities:

“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869496”.

For infrastructure, equipment and major results:

“This *[infrastructure][equipment][insert type of result]* is part of a project that has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869496”.

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the EU emblem without first obtaining approval from the Agency.

This does not, however, give them the right to exclusive use.

Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

38.1.3 Disclaimer excluding Agency and Commission responsibility

Any communication activity related to the action must indicate that it reflects only the author's view and that the Agency and the Commission are not responsible for any use that may be made of the information it contains.

38.2 Communication activities by the Agency and the Commission

38.2.1 Right to use beneficiaries’ materials, documents or information

The Agency and the Commission may use, for its communication and publicising activities, information relating to the action, documents notably summaries for publication and public deliverables as well as any other material, such as pictures or audio-visual material received from any beneficiary (including in electronic form).

This does not change the confidentiality obligations in Article 36 and the security obligations in Article 37, all of which still apply.

If the Agency's or the Commission's use of these materials, documents or information would risk compromising legitimate interests, the beneficiary concerned may request the Agency or the Commission not to use it (see Article 52).

The right to use a beneficiary's materials, documents and information includes:

- (a) **use for its own purposes** (in particular, making them available to persons working for the Agency, the Commission or any other EU institution, body, office or agency or body or institutions in EU Member States; and copying or reproducing them in whole or in part, in unlimited numbers);
- (b) **distribution to the public** (in particular, publication as hard copies and in electronic or digital format, publication on the internet, as a downloadable or non-downloadable file, broadcasting by any channel, public display or presentation, communicating through press information services, or inclusion in widely accessible databases or indexes);
- (c) **editing or redrafting** for communication and publicising activities (including shortening, summarising, inserting other elements (such as meta-data, legends, other graphic, visual, audio or text elements), extracting parts (e.g. audio or video files), dividing into parts, use in a compilation);
- (d) translation;
- (e) giving **access in response to individual requests** under Regulation No 1049/2001²⁷, without the right to reproduce or exploit;
- (f) **storage** in paper, electronic or other form;
- (g) **archiving**, in line with applicable document-management rules, and
- (h) the right to authorise **third parties** to act on its behalf or sub-license the modes of use set out in Points (b), (c), (d) and (f) to third parties if needed for the communication and publicising activities of the Agency or the Commission.

If the right of use is subject to rights of a third party (including personnel of the beneficiary), the beneficiary must ensure that it complies with its obligations under this Agreement (in particular, by obtaining the necessary approval from the third parties concerned).

Where applicable (and if provided by the beneficiaries), the Agency or the Commission will insert the following information:

“© – [year] – [name of the copyright owner]. All rights reserved. Licensed to the Executive Agency for Small and Medium-sized Enterprises (EASME) and the European Union (EU) under conditions.”

38.3 Consequences of non-compliance

²⁷ Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents, OJ L 145, 31.5.2001, p. 43.

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 39 — PROCESSING OF PERSONAL DATA

39.1 Processing of personal data by the Agency and the Commission

Any personal data under the Agreement will be processed by the Agency or the Commission under Regulation No 45/2001²⁸ and according to the ‘notifications of the processing operations’ to the Data Protection Officer (DPO) of the Agency or the Commission (publicly accessible in the DPO register).

Such data will be processed by the ‘**data controller**’ of the Agency or the Commission for the purposes of implementing, managing and monitoring the Agreement or protecting the financial interests of the EU or Euratom (including checks, reviews, audits and investigations; see Article 22).

The persons whose personal data are processed have the right to access and correct their own personal data. For this purpose, they must send any queries about the processing of their personal data to the data controller, via the contact point indicated in the privacy statement(s) that are published on the Agency and the Commission websites.

They also have the right to have recourse at any time to the European Data Protection Supervisor (EDPS).

39.2 Processing of personal data by the beneficiaries

The beneficiaries must process personal data under the Agreement in compliance with applicable EU and national law on data protection (including authorisations or notification requirements).

The beneficiaries may grant their personnel access only to data that is strictly necessary for implementing, managing and monitoring the Agreement.

The beneficiaries must inform the personnel whose personal data are collected and processed by the Agency or the Commission. For this purpose, they must provide them with the privacy statement(s) (see above), before transmitting their data to the Agency or the Commission.

39.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 39.2, the Agency may apply any of the measures described in Chapter 6.

ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE AGENCY

The beneficiaries may not assign any of their claims for payment against the Agency to any third party, except if approved by the Agency on the basis of a reasoned, written request by the coordinator (on behalf of the beneficiary concerned).

²⁸ Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data (OJ L 8, 12.01.2001, p. 1).

If the Agency has not accepted the assignment or the terms of it are not observed, the assignment will have no effect on it.

In no circumstances will an assignment release the beneficiaries from their obligations towards the Agency.

CHAPTER 5 DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

ARTICLE 41 — DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

41.1 Roles and responsibility towards the Agency

The beneficiaries have full responsibility for implementing the action and complying with the Agreement.

The beneficiaries are jointly and severally liable for the **technical implementation** of the action as described in Annex 1. If a beneficiary fails to implement its part of the action, the other beneficiaries become responsible for implementing this part (without being entitled to any additional EU funding for doing so), unless the Agency expressly relieves them of this obligation.

The **financial responsibility** of each beneficiary is governed by Article 44.

41.2 Internal division of roles and responsibilities

The internal roles and responsibilities of the beneficiaries are divided as follows:

(a) Each **beneficiary** must:

- (i) keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system) up to date (see Article 17);
- (ii) inform the coordinator immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 17);
- (iii) submit to the coordinator in good time:
 - individual financial statements for itself and its linked third parties and, if required, certificates on the financial statements (see Article 20);
 - the data needed to draw up the technical reports (see Article 20);
 - ethics committee opinions and notifications or authorisations for activities raising ethical issues (see Article 34);
 - any other documents or information required by the Agency or the Commission under the Agreement, unless the Agreement requires the beneficiary to submit this information directly to the Agency or the Commission.

(b) The coordinator must:

- (i) monitor that the action is implemented properly (see Article 7);
- (ii) act as the intermediary for all communications between the beneficiaries and the Agency (in particular, providing the Agency with the information described in Article 17), unless the Agreement specifies otherwise;
- (iii) request and review any documents or information required by the Agency and verify their completeness and correctness before passing them on to the Agency;
- (iv) submit the deliverables and reports to the Agency (see Articles 19 and 20);
- (v) ensure that all payments are made to the other beneficiaries without unjustified delay (see Article 21);
- (vi) inform the Agency of the amounts paid to each beneficiary, when required under the Agreement (see Articles 44 and 50) or requested by the Agency.

The coordinator may not delegate or subcontract the above-mentioned tasks to any other beneficiary or third party (including linked third parties).

41.3 Internal arrangements between beneficiaries — Consortium agreement

The beneficiaries must have internal arrangements regarding their operation and co-ordination to ensure that the action is implemented properly. These internal arrangements must be set out in a written ‘**consortium agreement**’ between the beneficiaries, which may cover:

- internal organisation of the consortium;
- management of access to the electronic exchange system;
- distribution of EU funding;
- additional rules on rights and obligations related to background and results (including whether access rights remain or not, if a beneficiary is in breach of its obligations) (see Section 3 of Chapter 4);
- settlement of internal disputes;
- liability, indemnification and confidentiality arrangements between the beneficiaries.

The consortium agreement must not contain any provision contrary to the Agreement.

41.4 Relationship with complementary beneficiaries — Collaboration agreement

Not applicable

41.5 Relationship with partners of a joint action — Coordination agreement

Not applicable

CHAPTER 6 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS — DAMAGES — SUSPENSION — TERMINATION — FORCE MAJEURE

SECTION 1 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS

ARTICLE 42 — REJECTION OF INELIGIBLE COSTS

42.1 Conditions

The Agency will — after **termination of the participation of a beneficiary**, at the time of an **interim payment, at the payment of the balance or afterwards** — reject any costs which are ineligible (see Article 6), in particular following checks, reviews, audits or investigations (see Article 22).

The rejection may also be based on the **extension of findings from other grants to this grant** (see Article 22.5.2).

42.2 Ineligible costs to be rejected — Calculation — Procedure

Ineligible costs will be rejected in full.

If the rejection of costs does not lead to a recovery (see Article 44), the Agency will formally notify the coordinator or beneficiary concerned of the rejection of costs, the amounts and the reasons why (if applicable, together with the notification of amounts due; see Article 21.5). The coordinator or beneficiary concerned may — within 30 days of receiving notification — formally notify the Agency of its disagreement and the reasons why.

If the rejection of costs leads to a recovery, the Agency will follow the contradictory procedure with pre-information letter set out in Article 44.

42.3 Effects

If the Agency rejects costs at the time of an **interim payment or the payment of the balance**, it will deduct them from the total eligible costs declared, for the action, in the periodic or final summary financial statement (see Articles 20.3 and 20.4). It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the Agency rejects costs **after termination of the participation of a beneficiary**, it will deduct them from the costs declared by the beneficiary in the termination report and include the rejection in the calculation after termination (see Article 50.2 and 50.3).

If the Agency — **after an interim payment but before the payment of the balance** — rejects costs declared in a periodic summary financial statement, it will deduct them from the total eligible costs declared, for the action, in the next periodic summary financial statement or in the final summary financial statement. It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the Agency rejects costs **after the payment of the balance**, it will deduct the amount rejected from

the total eligible costs declared, by the beneficiary, in the final summary financial statement. It will then calculate the revised final grant amount as set out in Article 5.4.

ARTICLE 43 — REDUCTION OF THE GRANT

43.1 Conditions

The Agency may — **after termination of the participation of a beneficiary, at the payment of the balance or afterwards** — reduce the grant amount (see Article 5.1), if :

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

43.2 Amount to be reduced — Calculation — Procedure

The amount of the reduction will be proportionate to the seriousness of the errors, irregularities or fraud or breach of obligations.

Before reduction of the grant, the Agency will formally notify a '**pre-information letter**' to the coordinator or beneficiary concerned:

- informing it of its intention to reduce the grant, the amount it intends to reduce and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive any observations or decides to pursue reduction despite the observations it has received, it will formally notify **confirmation** of the reduction (if applicable, together with the notification of amounts due; see Article 21).

43.3 Effects

If the Agency reduces the grant **after termination of the participation of a beneficiary**, it will calculate the reduced grant amount for that beneficiary and then determine the amount due to that beneficiary (see Article 50.2 and 50.3).

If the Agency reduces the grant **at the payment of the balance**, it will calculate the reduced grant amount for the action and then determine the amount due as payment of the balance (see Articles 5.3.4 and 21.4).

If the Agency reduces the grant **after the payment of the balance**, it will calculate the revised final grant amount for the beneficiary concerned (see Article 5.4). If the revised final grant amount for the beneficiary concerned is lower than its share of the final grant amount, the Agency will recover the difference (see Article 44).

ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS

44.1 Amount to be recovered — Calculation — Procedure

The Agency will — after **termination of the participation of a beneficiary, at the payment of the balance or afterwards** — claim back any amount that was paid, but is not due under the Agreement.

Each beneficiary's financial responsibility in case of recovery is limited to its own debt (including undue amounts paid by the Agency for costs declared by its linked third parties), except for the amount retained for the Guarantee Fund (see Article 21.4).

44.1.1 Recovery after termination of a beneficiary's participation

If recovery takes place after termination of a beneficiary's participation (including the coordinator), the Agency will claim back the undue amount from the beneficiary concerned, by formally notifying it a debit note (see Article 50.2 and 50.3). This note will specify the amount to be recovered, the terms and the date for payment.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

- (a) by **'offsetting'** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

- (b) not applicable;

- (c) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date specified in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the payment date in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC²⁹ applies.

²⁹ Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services

44.1.2 Recovery at payment of the balance

If the payment of the balance takes the form of a recovery (see Article 21.4), the Agency will formally notify a '**pre-information letter**' to the coordinator:

- informing it of its intention to recover, the amount due as the balance and the reasons why;
- specifying that it intends to deduct the amount to be recovered from the amount retained for the Guarantee Fund;
- requesting the coordinator to submit a report on the distribution of payments to the beneficiaries within 30 days of receiving notification, and
- inviting the coordinator to submit observations within 30 days of receiving notification.

If no observations are submitted or the Agency decides to pursue recovery despite the observations it has received, it will **confirm recovery** (together with the notification of amounts due; see Article 21.5) and:

- pay the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is positive** or
- formally notify to the coordinator a **debit note** for the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is negative**. This note will also specify the terms and the date for payment.

If the coordinator does not repay the Agency by the date in the debit note and has not submitted the report on the distribution of payments: the Agency or the Commission will **recover** the amount set out in the debit note from the coordinator (see below).

If the coordinator does not repay the Agency by the date in the debit note, but has submitted the report on the distribution of payments: the Agency will:

- (a) identify the beneficiaries for which the amount calculated as follows is negative:

$\{ \{ \{ \text{beneficiary's costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned}$

plus

$\{ \text{its linked third parties' costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned} \}$

divided by

$\{ \text{the EU contribution for the action calculated according to Article 5.3.1} \}$

multiplied by

$\{ \text{the final grant amount (see Article 5.3)} \}$,

minus

in the internal market amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC (OJ L 319, 05.12.2007, p. 1).

{pre-financing and interim payments received by the beneficiary} }.

- (b) formally notify to each beneficiary identified according to point (a) a **debit note** specifying the terms and date for payment. The amount of the debit note is calculated as follows:

{ {amount calculated according to point (a) for the beneficiary concerned

divided by

the sum of the amounts calculated according to point (a) for all the beneficiaries identified according to point (a) }

multiplied by

the amount set out in the debit note formally notified to the coordinator } }.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

- (a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

- (b) by **drawing on the Guarantee Fund**. The Agency or the Commission will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

- (i) not applicable;

- (ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the payment date in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

44.1.3 Recovery of amounts after payment of the balance

If, for a beneficiary, the revised final grant amount (see Article 5.4) is lower than its share of the final grant amount, it must repay the difference to the Agency.

The beneficiary's share of the final grant amount is calculated as follows:

{{beneficiary's costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned

plus

its linked third parties' costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned;

divided by

the EU contribution for the action calculated according to Article 5.3.1}

multiplied by

the final grant amount (see Article 5.3)}.

If the coordinator has not distributed amounts received (see Article 21.7), the Agency will also recover these amounts.

The Agency will formally notify a **pre-information letter** to the beneficiary concerned:

- informing it of its intention to recover, the due amount and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If no observations are submitted or the Agency decides to pursue recovery despite the observations it has received, it will **confirm** the amount to be recovered and formally notify to the beneficiary concerned a **debit note**. This note will also specify the terms and the date for payment.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

- (a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

- (b) by **drawing on the Guarantee Fund**. The Agency or the Commission will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

- (i) not applicable;
- (ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the date for payment in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

ARTICLE 45 — ADMINISTRATIVE SANCTIONS

In addition to contractual measures, the Agency or the Commission may also adopt administrative sanctions under Articles 106 and 131(4) of the Financial Regulation No 966/2012 (i.e. exclusion from future procurement contracts, grants, prizes and expert contracts and/or financial penalties).

SECTION 2 LIABILITY FOR DAMAGES

ARTICLE 46 — LIABILITY FOR DAMAGES

46.1 Liability of the Agency

The Agency cannot be held liable for any damage caused to the beneficiaries or to third parties as a consequence of implementing the Agreement, including for gross negligence.

The Agency cannot be held liable for any damage caused by any of the beneficiaries or third parties involved in the action, as a consequence of implementing the Agreement.

46.2 Liability of the beneficiaries

Except in case of force majeure (see Article 51), the beneficiaries must compensate the Agency for any damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement.

SECTION 3 SUSPENSION AND TERMINATION

ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE

47.1 Conditions

The Agency may — at any moment — suspend the payment deadline (see Article 21.2 to 21.4) if a request for payment (see Article 20) cannot be approved because:

- (a) it does not comply with the provisions of the Agreement (see Article 20);
- (b) the technical or financial reports have not been submitted or are not complete or additional information is needed, or
- (c) there is doubt about the eligibility of the costs declared in the financial statements and additional checks, reviews, audits or investigations are necessary.

47.2 Procedure

The Agency will formally notify the coordinator of the suspension and the reasons why.

The suspension will **take effect** the day notification is sent by the Agency (see Article 52).

If the conditions for suspending the payment deadline are no longer met, the suspension will be **lifted** — and the remaining period will resume.

If the suspension exceeds two months, the coordinator may request the Agency if the suspension will continue.

If the payment deadline has been suspended due to the non-compliance of the technical or financial reports (see Article 20) and the revised report or statement is not submitted or was submitted but is also rejected, the Agency may also terminate the Agreement or the participation of the beneficiary (see Article 50.3.1(I)).

ARTICLE 48 — SUSPENSION OF PAYMENTS

48.1 Conditions

The Agency may — at any moment — suspend payments, in whole or in part and interim payments or the payment of the balance for one or more beneficiaries, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed or is suspected of having committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

If payments are suspended for one or more beneficiaries, the Agency will make partial payment(s) for the part(s) not suspended. If suspension concerns the payment of the balance, — once suspension is lifted — the payment or the recovery of the amount(s) concerned will be considered the payment of the balance that closes the action.

48.2 Procedure

Before suspending payments, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend payments and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the suspension procedure is not continued.

The suspension will **take effect** the day the confirmation notification is sent by the Agency.

If the conditions for resuming payments are met, the suspension will be **lifted**. The Agency will formally notify the coordinator or beneficiary concerned.

During the suspension, the periodic report(s) for all reporting periods except the last one (see Article 20.3), must not contain any individual financial statements from the beneficiary concerned and its linked third parties. The coordinator must include them in the next periodic report after the suspension is lifted or — if suspension is not lifted before the end of the action — in the last periodic report.

The beneficiaries may suspend implementation of the action (see Article 49.1) or terminate the Agreement or the participation of the beneficiary concerned (see Article 50.1 and 50.2).

ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION

49.1 Suspension of the action implementation, by the beneficiaries

49.1.1 Conditions

The beneficiaries may suspend implementation of the action or any part of it, if exceptional circumstances — in particular *force majeure* (see Article 51) — make implementation impossible or excessively difficult.

49.1.2 Procedure

The coordinator must immediately formally notify to the Agency the suspension (see Article 52), stating:

- the reasons why and
- the expected date of resumption.

The suspension will **take effect** the day this notification is received by the Agency.

Once circumstances allow for implementation to resume, the coordinator must immediately formally notify the Agency and request an **amendment** of the Agreement to set the date on which the action will be resumed, extend the duration of the action and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement or the participation of a beneficiary has been terminated (see Article 50).

The suspension will be **lifted** with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension of the action implementation are not eligible (see Article 6).

49.2 Suspension of the action implementation, by the Agency

49.2.1 Conditions

The Agency may suspend implementation of the action or any part of it, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed or is suspected of having committed:

- (i) substantial errors, irregularities or fraud or
- (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (b) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2), or
- (c) the action is suspected of having lost its scientific or technological relevance.

49.2.2 Procedure

Before suspending implementation of the action, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend the implementation and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the procedure is not continued.

The suspension will **take effect** five days after confirmation notification is received (or on a later date specified in the notification).

It will be **lifted** if the conditions for resuming implementation of the action are met.

The coordinator or beneficiary concerned will be formally notified of the lifting and the Agreement will be **amended** to set the date on which the action will be resumed, extend the duration of the action and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement has already been terminated (see Article 50).

The suspension will be lifted with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension are not eligible (see Article 6).

The beneficiaries may not claim damages due to suspension by the Agency (see Article 46).

Suspension of the action implementation does not affect the Agency's right to terminate the Agreement or participation of a beneficiary (see Article 50), reduce the grant or recover amounts unduly paid (see Articles 43 and 44).

ARTICLE 50 — TERMINATION OF THE AGREEMENT OR OF THE PARTICIPATION OF ONE OR MORE BENEFICIARIES

50.1 Termination of the Agreement, by the beneficiaries

50.1.1 Conditions and procedure

The beneficiaries may terminate the Agreement.

The coordinator must formally notify termination to the Agency (see Article 52), stating:

- the reasons why and
- the date the termination will take effect. This date must be after the notification.

If no reasons are given or if the Agency considers the reasons do not justify termination, the Agreement will be considered to have been **'terminated improperly'**.

The termination will **take effect** on the day specified in the notification.

50.1.2 Effects

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the open reporting period until termination; see Article 20.3) and
- (ii) the final report (see Article 20.4).

If the Agency does not receive the reports within the deadline (see above), only costs which are included in an approved periodic report will be taken into account.

The Agency will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4) on the basis of the reports submitted. Only costs incurred until termination are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Improper termination may lead to a reduction of the grant (see Article 43).

After termination, the beneficiaries' obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

50.2 Termination of the participation of one or more beneficiaries, by the beneficiaries

50.2.1 Conditions and procedure

The participation of one or more beneficiaries may be terminated by the coordinator, on request of the beneficiary concerned or on behalf of the other beneficiaries.

The coordinator must formally notify termination to the Agency (see Article 52) and inform the beneficiary concerned.

If the coordinator's participation is terminated without its agreement, the formal notification must be done by another beneficiary (acting on behalf of the other beneficiaries).

The notification must include:

- the reasons why;

- the opinion of the beneficiary concerned (or proof that this opinion has been requested in writing);
- the date the termination takes effect. This date must be after the notification, and
- a request for amendment (see Article 55), with a proposal for reallocation of the tasks and the estimated budget of the beneficiary concerned (see Annexes 1 and 2) and, if necessary, the addition of one or more new beneficiaries (see Article 56). If termination takes effect after the period set out in Article 3, no request for amendment must be included unless the beneficiary concerned is the coordinator. In this case, the request for amendment must propose a new coordinator.

If this information is not given or if the Agency considers that the reasons do not justify termination, the participation will be considered to have been **terminated improperly**.

The termination will **take effect** on the day specified in the notification.

50.2.2 Effects

The coordinator must — within 30 days from when termination takes effect — submit:

- (i) a report on the distribution of payments to the beneficiary concerned and
- (ii) if termination takes effect during the period set out in Article 3, a ‘**termination report**’ from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, an overview of the use of resources, the individual financial statement and, if applicable, the certificate on the financial statement (see Articles 20.3 and 20.4).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 20.3).

If the request for amendment is rejected by the Agency (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the Agreement may be terminated according to Article 50.3.1(c).

If the request for amendment is accepted by the Agency, the Agreement is **amended** to introduce the necessary changes (see Article 55).

The Agency will — on the basis of the periodic reports, the termination report and the report on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the Agency.

Only costs incurred by the beneficiary concerned until termination takes effect are

eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the Agency will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The Agency will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the Agency will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the Agency will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due and the Agency will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
 - termination takes effect after an interim payment and
 - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the Agency will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due. The Agency will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the Agency does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the Agency does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that

- the beneficiary concerned must not repay any amount to the coordinator.

Improper termination may lead to a reduction of the grant (see Article 43) or termination of the Agreement (see Article 50).

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

50.3 Termination of the Agreement or the participation of one or more beneficiaries, by the Agency

50.3.1 Conditions

The Agency may terminate the Agreement or the participation of one or more beneficiaries, if:

- (a) one or more beneficiaries do not accede to the Agreement (see Article 56);
- (b) a change to their legal, financial, technical, organisational or ownership situation (or those of its linked third parties) is likely to substantially affect or delay the implementation of the action or calls into question the decision to award the grant;
- (c) following termination of participation for one or more beneficiaries (see above), the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants (see Article 55);
- (d) implementation of the action is prevented by force majeure (see Article 51) or suspended by the coordinator (see Article 49.1) and either:
 - (i) resumption is impossible, or
 - (ii) the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants;
- (e) a beneficiary is declared bankrupt, being wound up, having its affairs administered by the courts, has entered into an arrangement with creditors, has suspended business activities, or is subject to any other similar proceedings or procedures under national law;
- (f) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has been found guilty of professional misconduct, proven by any means;
- (g) a beneficiary does not comply with the applicable national law on taxes and social security;
- (h) the action has lost scientific or technological relevance;
- (i) not applicable;
- (j) not applicable;
- (k) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed fraud, corruption, or is involved in a criminal organisation, money laundering or any other illegal activity;

- (l) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (m) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2);
- (n) despite a specific request by the Agency, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its linked third parties or international partners that is in one of the situations under points (e), (f), (g), (k), (l) or (m) and to reallocate its tasks.

50.3.2 Procedure

Before terminating the Agreement or participation of one or more beneficiaries, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to terminate and the reasons why and
- inviting it, within 30 days of receiving notification, to submit observations and — in case of Point (l.ii) above — to inform the Agency of the measures to ensure compliance with the obligations under the Agreement.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify to the coordinator or beneficiary concerned **confirmation** of the termination and the date it will take effect. Otherwise, it will formally notify that the procedure is not continued.

The termination will **take effect**:

- for terminations under Points (b), (c), (e), (g), (h), (j), (l.ii) and (n) above: on the day specified in the notification of the confirmation (see above);
- for terminations under Points (a), (d), (f), (i), (k), (l.i) and (m) above: on the day after the notification of the confirmation is received.

50.3.3 Effects

- (a) for **termination of the Agreement**:

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the last open reporting period until termination; see Article 20.3) and

on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the Agency.

Only costs incurred by the beneficiary concerned until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the Agency will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The Agency will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the Agency will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the Agency will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due and the Agency will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
 - termination takes effect after an interim payment and
 - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the Agency will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due. The Agency will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the Agency does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the Agency does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that
- the beneficiary concerned must not repay any amount to the coordinator.

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

SECTION 4 — FORCE MAJEURE

ARTICLE 51 — FORCE MAJEURE

'Force majeure' means any situation or event that:

- prevents either party from fulfilling their obligations under the Agreement,
- was unforeseeable, exceptional situation and beyond the parties' control,
- was not due to error or negligence on their part (or on the part of third parties involved in the action), and
- proves to be inevitable in spite of exercising all due diligence.

The following cannot be invoked as force majeure:

- any default of a service, defect in equipment or material or delays in making them available, unless they stem directly from a relevant case of force majeure,
- labour disputes or strikes, or
- financial difficulties.

Any situation constituting force majeure must be formally notified to the other party without delay, stating the nature, likely duration and foreseeable effects.

The parties must immediately take all the necessary steps to limit any damage due to force majeure and do their best to resume implementation of the action as soon as possible.

The party prevented by force majeure from fulfilling its obligations under the Agreement cannot be considered in breach of them.

CHAPTER 7 — FINAL PROVISIONS

ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES

52.1 Form and means of communication

Communication under the Agreement (information, requests, submissions, ‘formal notifications’, etc.) must:

- be made in writing and
- bear the number of the Agreement.

All communication must be made through the Participant Portal **electronic** exchange system and using the forms and templates provided there.

If — after the payment of the balance — the Agency finds that a formal notification was not accessed, a second formal notification will be made by registered post with proof of delivery (‘formal notification on **paper**’). Deadlines will be calculated from the moment of the second notification.

Communications in the electronic exchange system must be made by persons authorised according to the Participant Portal Terms & Conditions. For naming the authorised persons, each beneficiary must have designated — before the signature of this Agreement — a ‘legal entity appointed representative (LEAR)’. The role and tasks of the LEAR are stipulated in his/her appointment letter (see Participant Portal Terms & Conditions).

If the electronic exchange system is temporarily unavailable, instructions will be given on the Agency and Commission websites.

52.2 Date of communication

Communications are considered to have been made when they are sent by the sending party (i.e. on the date and time they are sent through the electronic exchange system).

Formal notifications through the **electronic** exchange system are considered to have been made when they are received by the receiving party (i.e. on the date and time of acceptance by the receiving party, as indicated by the time stamp). A formal notification that has not been accepted within 10 days after sending is considered to have been accepted.

Formal notifications **on paper** sent by **registered post** with proof of delivery (only after the payment of the balance) are considered to have been made on either:

- the delivery date registered by the postal service or
- the deadline for collection at the post office.

If the electronic exchange system is temporarily unavailable, the sending party cannot be considered in breach of its obligation to send a communication within a specified deadline.

52.3 Addresses for communication

The **electronic** exchange system must be accessed via the following URL:

https://ec.europa.eu/info/funding-tenders/opportunities/portal_screen/myarea/projects

The Agency will formally notify the coordinator and beneficiaries in advance any changes to this URL.

Formal notifications on paper (only after the payment of the balance) addressed **to the Agency** must be sent to the official mailing address indicated on the Agency's website.

Formal notifications on paper (only after the payment of the balance) addressed to the **beneficiaries** must be sent to their legal address as specified in the Participant Portal Beneficiary Register.

ARTICLE 53 — INTERPRETATION OF THE AGREEMENT

53.1 Precedence of the Terms and Conditions over the Annexes

The provisions in the Terms and Conditions of the Agreement take precedence over its Annexes.

Annex 2 takes precedence over Annex 1.

53.2 Privileges and immunities

Not applicable

ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES

In accordance with Regulation No 1182/71³⁰, periods expressed in days, months or years are calculated from the moment the triggering event occurs.

The day during which that event occurs is not considered as falling within the period.

ARTICLE 55 — AMENDMENTS TO THE AGREEMENT

55.1 Conditions

The Agreement may be amended, unless the amendment entails changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

Amendments may be requested by any of the parties.

55.2 Procedure

The party requesting an amendment must submit a request for amendment signed in the electronic exchange system (see Article 52).

The coordinator submits and receives requests for amendment on behalf of the beneficiaries (see Annex 3).

If a change of coordinator is requested without its agreement, the submission must be done by another beneficiary (acting on behalf of the other beneficiaries).

The request for amendment must include:

³⁰ Regulation (EEC, Euratom) No 1182/71 of the Council of 3 June 1971 determining the rules applicable to periods, dates and time-limits (OJ L 124, 8.6.1971, p. 1).

- the reasons why;
- the appropriate supporting documents, and
- for a change of coordinator without its agreement: the opinion of the coordinator (or proof that this opinion has been requested in writing).

The Agency may request additional information.

If the party receiving the request agrees, it must sign the amendment in the electronic exchange system within 45 days of receiving notification (or any additional information the Agency has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

An amendment **enters into force** on the day of the signature of the receiving party.

An amendment **takes effect** on the date agreed by the parties or, in the absence of such an agreement, on the date on which the amendment enters into force.

ARTICLE 56 — ACCESSION TO THE AGREEMENT

56.1 Accession of the beneficiaries mentioned in the Preamble

The other beneficiaries must accede to the Agreement by signing the Accession Form (see Annex 3) in the electronic exchange system (see Article 52) within 30 days after its entry into force (see Article 58).

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 58).

If a beneficiary does not accede to the Agreement within the above deadline, the coordinator must — within 30 days — request an amendment to make any changes necessary to ensure proper implementation of the action. This does not affect the Agency's right to terminate the Agreement (see Article 50).

56.2 Addition of new beneficiaries

In justified cases, the beneficiaries may request the addition of a new beneficiary.

For this purpose, the coordinator must submit a request for amendment in accordance with Article 55. It must include an Accession Form (see Annex 3) signed by the new beneficiary in the electronic exchange system (see Article 52).

New beneficiaries must assume the rights and obligations under the Agreement with effect from the date of their accession specified in the Accession Form (see Annex 3).

ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

57.1 Applicable law

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

57.2 Dispute settlement

If a dispute concerning the interpretation, application or validity of the Agreement cannot be settled amicably, the General Court — or, on appeal, the Court of Justice of the European Union — has sole jurisdiction. Such actions must be brought under Article 272 of the Treaty on the Functioning of the EU (TFEU).

If a dispute concerns administrative sanctions, offsetting or an enforceable decision under Article 299 TFEU (see Articles 44, 45 and 46), the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 TFEU. Actions against offsetting and enforceable decisions must be brought against the Commission (not against the Agency).

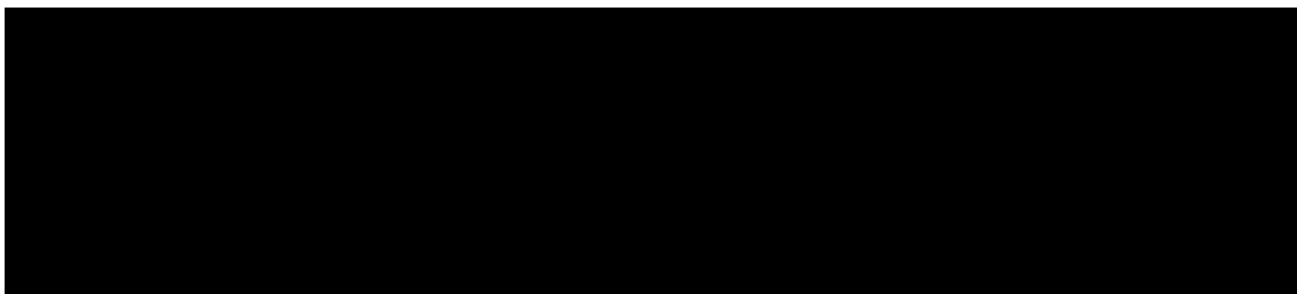
ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT

The Agreement will enter into force on the day of signature by the Agency or the coordinator, depending on which is later.

SIGNATURES

For the coordinator

For the Agency





EUROPEAN COMMISSION
Executive Agency for Small and Medium-sized Enterprises

The Director



ANNEX 1 (part A)

Innovation action

NUMBER — 869496 — REWAISE

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1.1. The project summary

Associated with document Ref. Ares(2020)1951614 - 06/04/2020

Project Number ¹	869496	Project Acronym ²	REWAISE
One form per project			
General information			
Project title ³	REsilient WATER Innovation for Smart Economy		
Starting date ⁴	01/09/2020		
Duration in months ⁵	60		
Call (part) identifier ⁶	H2020-SC5-2019-2		
Topic	CE-SC5-04-2019 Building a water-smart economy and society		
Fixed EC Keywords	Wastewater management, Water recycling and re-use, Environment, resources and sustainability, Water management, Water scarcity management, Large scale applications with multiple water users at various relevant scales		
Free keywords	smart water economy, governance, climate change, resilience, energy recovery, sustainability		
Abstract ⁷			
REWAISE will create a new “smart water ecosystem”, mobilising all relevant stakeholders to make society embrace the true value of water, reducing freshwater and energy use, resulting in a carbon free, sustainable hydrological cycle, to transition into a resilient circular economy. A network of nine living labs, involving 5 major water utilities, demonstrates real-life, large-scale operational environments for technological innovations and new governance methods to secure a resource-efficient water supply for the EU. New business niches will be created, incentivizing water-related investments, and accelerating SME growth, by linking users with specific water needs, incorporating life cycle and cost assessments, and collective action in new governance frameworks for smart value creation and high social returns. By incorporating paradigm shifts from a linear Roman heritage to a new circular, water-smart economy, REWAISE reveals the full Value of Water for Europe, considering 3 key components of the economic and societal value generated by integral water cycles: • Value in Water: is accomplished by extracting and putting to beneficial use dissolved substances such as nutrients, minerals, chemicals and metals, as well as organic matter and energy, embedded in raw and used water streams. • Value from Water: encompasses the economic activities inherent to the water cycle, related products and services that generate benefits and jobs, directly or in other sectors that depend on water, such as energy and transportation, • Value through Water: the societal, health and well-being functions of water, which will be enhanced by inter-linking users, regulators, water operators and other stakeholders in electricity and chemicals markets through a digital platform that optimizes decision making and business opportunities through socio-economics-based coordination between them, while minimizing emissions , risks and vulnerability.			

1.2. List of Beneficiaries

Associated with document Ref. Ares(2020)1951614 - 06/04/2020

Project Number ¹	869496	Project Acronym ²	REWAISE		
List of Beneficiaries					
No	Name	Short name	Country	Project entry month ⁵	Project exit month
1	FCC AQUALIA SA	AQUA	Spain	1	60
2	SEVERN TRENT WATER LIMITED	STW	United Kingdom	1	60
3	VA SYD	VASYD	Sweden	1	60
4	AQUANET SPOLKA AKCYJNA	ANET	Poland	1	60
5	EUROPEAN NETWORK OF LIVING LABS IVZW	ENOLL	Belgium	1	60
6	HIDROTEC TECNOLOGIA DEL AGUA SL	HIDRO	Spain	1	60
7	MALMO STAD	MALM	Sweden	1	60
8	POLYMEM	POLY	France	1	60
9	RESOURSEAS S.R.L.	RESA	Italy	1	60
10	BLUETECHTRACKER LIMITED	BLUE	Ireland	1	60
11	AQUAPORIN AS	APOR	Denmark	1	60
12	WATER, ENVIRONMENT AND BUSINESS FORDEVELOPMENT SL	WE&B	Spain	1	60
13	ENVIRONMENTAL MONITORING SOLUTIONS LIMITED	EMS	United Kingdom	1	60
14	SOLAR WATER PLC	SOLWA	United Kingdom	1	60
15	INSTYTUT EKOLOGII TERENOW UPRZEMYSLOWIONYCH	IETU	Poland	1	60
16	UNIVERSITAT DE VALENCIA	UVAL	Spain	1	60
17	VYSOKA SKOLA BANSKA - TECHNICKA UNIVERZITA OSTRAVA	TUOS	Czechia	1	60
18	SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA	UNIZ	Croatia	1	60
19	FUNDACION CENTRO TECNOLOGICO DE INVESTIGACION MULTISECTORIAL	CETIM	Spain	1	60
20	COVENTRY UNIVERSITY	COVU	United Kingdom	1	60
21	LUNDS UNIVERSITET	LUND	Sweden	1	60
22	POLITECHNIKA POZNANSKA	PUT	Poland	1	60
23	PKF ATTEST INNCOME SL	INNCO	Spain	1	60
24	UNIVERSITA DEGLI STUDI DI PALERMO	UNIPA	Italy	1	60

1.3. Workplan Tables - Detailed Implementation

Associated with document Ref. Area(2020)1951614 - 06/04/2020

1.3.1. WT1 List of work packages

WP Number ⁹	WP Title	Lead beneficiary ¹⁰	Person-months ¹¹	Start month ¹²	End month ¹³
WP1	Coordination, Management & Communication	1 - AQUA	134.00	1	60
WP2	Resource Efficient Solutions	3 - VASYD	236.40	1	30
WP3	REWAISE platform. Control and Optimisation of Data and Processes	6 - HIDRO	214.00	1	60
WP4	Continental Hub	4 - ANET	224.49	7	60
WP5	Mediterranean Hub	1 - AQUA	243.00	12	60
WP6	Atlantic Hub	2 - STW	289.00	7	60
WP7	Analysis of KPIs, LCCA and Risk Assessment (ETV)	19 - CETIM	116.50	6	60
WP8	New Business Models, Alternative Funding for Market Uptake and Dissemination	10 - BLUE	164.40	5	60
WP9	Governance and Social Engagement	12 - WE&B	148.00	1	60
Total			1 769.79		

1.3.2. WT2 list of deliverables

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D1.1	#1 Project Manual: Strategic management, Quality Assurance and Risk Plan	WP1	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	6
D1.2	#2 Project Manual: Strategic management, Quality Assurance and Risk Plan	WP1	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	20
D1.3	#3 Project Manual: Strategic management, Quality Assurance and Risk Plan	WP1	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	40
D1.4	#1 Communication Plan	WP1	23 - INNCO	Report	Public	6
D1.5	#2 Communication Plan	WP1	23 - INNCO	Report	Public	20
D1.6	#3 Communication Plan	WP1	23 - INNCO	Report	Public	40
D1.7	#1 IPR Methodology and Policy and Data Management Plan	WP1	1 - AQUA	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	17
D1.8	#2 IPR Methodology and Policy and Data Management Plan	WP1	1 - AQUA	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	36
D1.9	#1 Internal Ethical and Gender Dimensions Guideline	WP1	5 - ENOLL	Report	Public	17
D1.10	#2 Internal Ethical and Gender Dimensions Guideline	WP1	5 - ENOLL	Report	Public	36
D2.1	Prototype of UF to improve stormwater quality	WP2	21 - LUND	Report	Confidential, only for members of the consortium (including the Commission Services)	9

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D2.2	Prototype of “detection methods”	WP2	21 - LUND	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.3	Demo units individually for diluted WW management	WP2	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.4	Optimal feed mixtures of organic matter	WP2	3 - VASYD	Report	Confidential, only for members of the consortium (including the Commission Services)	18
D2.5	Mining ground water recovery prototypes	WP2	17 - TUOS	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.6	Construction of AnMBR	WP2	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.7	Lab Prototype electrolyser for hydrogen generation	WP2	20 - COVU	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.8	Feed Mixtures and Pilot Trials for agrifood waste	WP2	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.9	Prototypes for fertilizers production in toilet units	WP2	3 - VASYD	Report	Confidential, only for members of the consortium (including the Commission Services)	24

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D2.10	Prototypes for minerals recovery from desalination	WP2	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.11	Selective Precipitation and Minerals Extraction	WP2	9 - RESA	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.12	Biopolymer production prototype started up	WP2	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D3.1	REWAISE platform IT architecture	WP3	6 - HIDRO	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D3.2	REWAISE catalogue of mathematical models for water cycle entities	WP3	6 - HIDRO	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D3.3	Methodology for grey box modelling	WP3	18 - UNIZ	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D3.4	WWTP model	WP3	4 - ANET	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D3.5	Optimal Control Strategies of Water Cycle.	WP3	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	34

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D3.6	Operational logic for supply-demand mechanism	WP3	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D3.7	Methodological Tool for socio-economic, environmental and social evaluation of water supply and sanitation projects	WP3	1 - AQUA	Other	Public	59
D4.1	#1 Optimisation of the struvite recovery process	WP4	4 - ANET	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D4.2	#2 Evaluation of struvite as fertilizer	WP4	4 - ANET	Report	Confidential, only for members of the consortium (including the Commission Services)	50
D4.3	#1 Analysis of the demo- model	WP4	22 - PUT	Report	Confidential, only for members of the consortium (including the Commission Services)	38
D4.4	#2 Analysis of the demo- model	WP4	22 - PUT	Report	Confidential, only for members of the consortium (including the Commission Services)	50
D4.5	Local indicators on WW treatment and social awareness campaign	WP4	4 - ANET	Report	Public	50
D4.6	Fresh water production in Moravia-Silesia	WP4	17 - TUOS	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D4.7	Minerals recovery	WP4	1 - AQUA	Other	Confidential, only for members of the consortium (including the	36

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
					Commission Services)	
D4.8	Biomethane recovery	WP4	1 - AQUA	Other	Confidential, only for members of the consortium (including the Commission Services)	58
D4.9	Risk and market assessment of minerals recovered in Moravia-Silesia	WP4	1 - AQUA	Other	Confidential, only for members of the consortium (including the Commission Services)	52
D4.10	#1 Increase resilience through rain and storm water – implementation	WP4	7 - MALM	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D4.11	#2 Increase resilience through rain and storm water – operation	WP4	7 - MALM	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D4.12	#1 Demonstration of Digital Twin and holistic water coordination	WP4	3 - VASYD	Other	Confidential, only for members of the consortium (including the Commission Services)	35
D4.13	#2 Demonstration of Digital Twin and holistic water coordination	WP4	3 - VASYD	Other	Confidential, only for members of the consortium (including the Commission Services)	53
D5.1	#1 Low energy desalination units - implementation	WP5	14 - SOLWA	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D5.2	# 2 Low energy desalination units – operation	WP5	14 - SOLWA	Other	Confidential, only for members of the consortium (including the Commission Services)	60

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D5.3	# 1 Minerals recovery demonstration units – implementation	WP5	24 - UNIPA	Other	Confidential, only for members of the consortium (including the Commission Services)	42
D5.4	# 2 Minerals recovery demonstration units – operation	WP5	24 - UNIPA	Other	Confidential, only for members of the consortium (including the Commission Services)	54
D5.5	#1 Smart Water System at Denia. Control strategies for water entities – definition	WP5	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D5.6	# 2 Smart Water System at Denia. Control strategies for water entities - evaluation	WP5	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D5.7	#1 Optimal control for WDS, WTP, full scale – implementation	WP5	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D5.8	# 2 Optimal control for WDS, WTP, full scale – operation	WP5	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D5.9	Industrial integration demonstration -	WP5	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D5.10	Fertilizers and bioproducts production units	WP5	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D5.11	Early Warning System EWS for Algae bloom	WP5	1 - AQUA	Report	Confidential, only for members	48

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
					of the consortium (including the Commission Services)	
D5.12	New strategies for Drinking water production.	WP5	11 - APOR	Report	Confidential, only for members of the consortium (including the Commission Services)	45
D5.13	Prediction models for THM/ quality	WP5	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D6.1	Smart meters and consumer consumption	WP6	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	18
D6.2	#1 Leakage detection module - development	WP6	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D6.3	#2 Leakage detection module - evaluation	WP6	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	43
D6.4	Demonstrator deployment of IWAN	WP6	13 - EMS	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D6.5	Installation, commissioning and field testing of hydrogen stripping unit for electrolyte generation	WP6	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	42
D6.6	#1 Construction and optimization of AnMBR	WP6	16 - UVAL	Report	Confidential, only for members of the consortium (including the	36

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
					Commission Services)	
D6.7	# 2 Control of AnMBR, performance outputs	WP6	16 - UVAL	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D6.8	Smart Digital Water system and Early Warning EWS	WP6	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	52
D6.9	UF Ultrafiltration	WP6	8 - POLY	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D6.10	Optimal control procedures for water coordination	WP6	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D6.11	Biopolymer production at WWTP	WP6	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	40
D7.1	Report on KPIs and RRI approach	WP7	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D7.2	# 1 Life Cycle and environmental performance Methodology	WP7	19 - CETIM	Report	Public	18
D7.3	# 2 Life Cycle and environmental performance Evaluation	WP7	19 - CETIM	Report	Public	42
D7.4	# 1 Risk and vulnerability assessment - Methodology	WP7	19 - CETIM	Report	Confidential, only for members of the consortium (including the	36

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
					Commission Services)	
D7.5	#2 Risk and vulnerability assessment – evaluation	WP7	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D7.6	#1 Economic performance analysis - Methodology	WP7	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D7.7	#2Economic performance analysis – Evaluation	WP7	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D7.8	Feasibility study of technologies for ETV	WP7	15 - IETU	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D7.9	Performance of ETV for the 3 selected technologies	WP7	15 - IETU	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D8.1	Market Analysis	WP8	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D8.2	#1 Go-To-Market Strategy Report	WP8	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D8.3	#2 Go-To-Market Strategy Report	WP8	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	60

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D8.4	Funding Assessment	WP8	23 - INNCO	Report	Confidential, only for members of the consortium (including the Commission Services)	52
D8.5	Guidance for Replication Strategies	WP8	10 - BLUE	Report	Public	52
D8.6	#1 Dissemination & Exploitation Plan	WP8	23 - INNCO	Report	Public	18
D8.7	#2 Dissemination & Exploitation Plan	WP8	23 - INNCO	Report	Public	55
D8.8	Innovation Deal and Reuse Risk Management	WP8	16 - UVAL	Report	Public	57
D9.1	Stakeholder mapping and societal contexts in each Living Lab	WP9	12 - WE&B	Report	Public	12
D9.2	Activities and Outcomes from the Competency Groups	WP9	12 - WE&B	Report	Public	48
D9.3	Governance White Papers	WP9	20 - COVU	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D9.4	#1 Living Lab Methodology and Online Handbook	WP9	5 - ENOLL	Report	Confidential, only for members of the consortium (including the Commission Services)	15
D9.5	# 2 Living lab methodology and online handbook	WP9	5 - ENOLL	Report	Public	27
D9.6	#1 Experimentation in the Living Lab assessment reports	WP9	5 - ENOLL	Report	Public	36
D9.7	# 2 Experimentation in the Living Lab assessment reports	WP9	5 - ENOLL	Report	Public	60
D9.8	SROI report white paper	WP9	5 - ENOLL	Report	Public	56

1.3.3. WT3 Work package descriptions

Work package number ⁹	WP1	Lead beneficiary ¹⁰	I - AQUA
Work package title	Coordination, Management & Communication		
Start month	1	End month	60

Objectives

- Sustainable and effective project overall project management implementation, within the contractual and time frames, with respect to scientific, technical, administrative and financial issues.
- Ensuring highest quality, completing deliverables according to time and budget.
- Monitoring and reporting of the status of the project, avoiding conflicts and taking corrective actions.
- IPR Management through efficient innovation management of the project outputs.
- Mobilize the external advisors (SAB, SEEC, InPa, GREAP and IPAG) involved in the project. Interaction with other WPs: This WP continuously monitors all other WP ensuring the effective project.

Description of work and role of partners

WP1 - Coordination, Management & Communication [Months: 1-60]

AQUA, STW, VASYD, ANET, ENOIL, HIDRO, MALM, POLY, RESA, BLUE, APOR, WE&B, EMS, SOLWA, IETU, UVAL, TUOS, UNIZ, CETIM, COVU, LUND, PUT, INNCO, UNIPA

T1.1 – Strategic management: Quality Assurance and Risk Prevention [M1-M60] [Leader: AQUA. Participants: ALL] [D1.1] This task coordinates and plans the whole project ensuring its quality:

- Day-by-day project progress is reported by Work Package Leaders (WPL), assisted by the task leaders (TL), and monitored by the management team (MT), to review reports and deliverables before uploading in the EC portal.
- The strategic aspects on Governance, Social and Community Engagement Policies and the Market will be followed up by the MT supported by five advisory boards in each strategic aspect of the project.

Project quality policy is set in the Project Manual [D1.1], detailing methodologies to check that all contributions are consistent and meet the document requirements for deliverables. The MT will monitor the progress and any deviations will be reported directly to the PC, to evaluate any need to correct or prevent any problems and risks, including a Risk Management Plan in the Project Manual [D1.1]. Possible risks and mitigation/contingency measures are described in section 3.2.9.

T1.2 – Communication [M1-M60] [Leader: INNCO. Participants: ALL] [D1.2] in close cooperation with all partners a whole set of communication actions described in 2.2.3 will be developed, tailoring to the needs of target audience with the aim to maximize the project visibility. Including: i) Mapping of Key Messages and target audiences; ii) Develop a detailed Communication Plan [D1.2] iii) Corporate identity and corporate materials (templates and style guide), presentations, web pages and newsletters; iv) Project websites, public and private, and linked newsletter. v) Different accounts for social communication (Twitter, Facebook, LinkedIn and Youtube); vi) Promotion materials presenting REWASE objectives and expected results; vii) A promotional video explaining project objectives, outcomes and testimonials will be prepared; viii) Articles in non-scientific publications and media-related actions; ix) Presentations of results in conferences, fairs, workshops and events organization.

T1.3 – Administrative and Budgetary Management [M1-M60] [Leader: AQUA. Participants: ALL] [D1.1].

The coordinator PC is responsible for administrative project coordination, and liaison with the EC. Supported by the A&B Manager (INNCO), all administrative documents required by the EC will be delivered within well-determined procedures defined both in the CA and the Project Management Manual [D1.1]. It will cover management, reporting, documents, review, general quality assurance, standards, among others. The A&BM Will be responsible for economic coordination, including delivery of all financial documents required by the EC. An internal reporting period every 6 mo. will be set up to follow up on project expenses and track potential deviations.

T1.4 – Scientific and Technical management [M1-M60] [Leader: UVAL. Participants: ALL] This task ensures the excellency of the innovation activities, and the proper upscaling and implementation regarding technical aspects, consisting in continuous monitoring of the scientific and technical development of WP2 to WP7.

T1.5 – Innovation, IPR and Data Management [M1-M60] [Leader: AQUA. Participants: ALL] [D1.3] This task manages, coordinates and supports efficient processes for handling and protection of data. An IP Advisory Group coordinated by the innovation director IIPRE will help the consortium defining and supervise the IPR Methodology Policy and Data Management Plan [D1.3] including (see section 2.2.2):

- Knowledge base portfolio generated, patents filed, licenses granted, and protection obtained.

- Technological progresses of the REWAISE, to detect and protect intellectual property and its exploitation.
- Data identification, organization and management.
- Project Innovation strategy according to European legislation, markets, consumer needs, etc.
- Identification of new ways to exploit innovations from the project results.

T1.6 – Ethics and Gender dimension [M1-M60] [Leader: ENOLL. Participants: ALL] [D1.4]. REWAISE activities involves individuals, as well as their personal data. This task ensures the safety, rights, dignity, and wellbeing of each person and related data collection and processing. The following actions are planned: i) Webinar for participants on Ethical Issues and Gender Dimension with the consortium after the kick-off meeting; ii) Ethical approvals for the collection of personal data by relevant data protection authority/ies; iii) Developing internal guidelines for involving humans in innovation actions (informed consent procedures and transparent recruiting).

REWAISE fully complies with Regulation (EU) 2016/679 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, and Directive 95/46/EC (General Data Protection Regulation). An Internal Ethical and Gender Dimensions Guideline will be created and continuously updated throughout project duration, and rigorously implemented to prevent gender dimension issues.

Participation per Partner

Partner number and short name	WPI effort
1 - AQUA	30.00
SMVAK	1.00
2 - STW	4.00
3 - VASYD	6.00
SWR	3.00
CoL	1.00
4 - ANET	4.00
5 - ENOLL	9.00
6 - HIDRO	4.00
7 - MALM	3.00
8 - POLY	3.00
9 - RESA	1.00
10 - BLUE	5.00
11 - APOR	1.00
12 - WE&B	4.00
13 - EMS	2.00
14 - SOLWA	2.00
15 - IETU	2.00
16 - UVAL	3.00
17 - TUOS	3.00
18 - UNIZ	3.00
19 - CETIM	2.00
20 - COVU	2.00
21 - LUND	2.00
22 - PUT	4.00

Partner number and short name	WP1 effort
23 - INNCO	29.00
24 - UNIPA	1.00
Total	134.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D1.1	#1 Project Manual: Strategic management, Quality Assurance and Risk Plan	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	6
D1.2	#2 Project Manual: Strategic management, Quality Assurance and Risk Plan	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	20
D1.3	#3 Project Manual: Strategic management, Quality Assurance and Risk Plan	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	40
D1.4	#1 Communication Plan	23 - INNCO	Report	Public	6
D1.5	#2 Communication Plan	23 - INNCO	Report	Public	20
D1.6	#3 Communication Plan	23 - INNCO	Report	Public	40
D1.7	#1 IPR Methodology and Policy and Data Management Plan	1 - AQUA	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	17
D1.8	#2 IPR Methodology and Policy and Data Management Plan	1 - AQUA	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	36
D1.9	#1 Internal Ethical and Gender Dimensions Guideline	5 - ENOLL	Report	Public	17
D1.10	#2 Internal Ethical and Gender Dimensions Guideline	5 - ENOLL	Report	Public	36

Description of deliverables

D1.1 #1 Project Manual: Strategic management, Quality Assurance and Risk Management Plan
D1.2 #2 Project Manual: Strategic management, Quality Assurance and Risk Management Plan

D1.3 #3 Project Manual: Strategic management, Quality Assurance and Risk Management Plan

D1.4 #1 Communication Plan

D1.5 #2 Communication Plan

D1.6 #3 Communication Plan

D1.7 #1 IPR Methodology and Policy and Data Management Plan

D1.8 #2 IPR Methodology and Policy and Data Management Plan

D1.9 #1 Internal Ethical and Gender Dimensions Guideline

D1.10 #2 Internal Ethical and Gender Dimensions Guideline

D1.1 : #1 Project Manual: Strategic management, Quality Assurance and Risk Plan [6]

This Manual defines the Consortium operating procedures summarizing all the required knowledge for the good management of the project (in terms of administrative forms, financial aspects, quality process...); establishes the guidelines for financial reporting, presentation standards for deliverables and reports; guarantee the quality of the results of the project. In addition, it reports on the quality measures to be adopted within REWAISE to ensure quality of work and management. They are reported both at general and partner levels, and describe the actions to ensure: (1) Quality follow-up in terms of resources, capacity and budget, (2) coherent information exchange, and (3) work according to quality standards. Task related: T1.1, T1.3 and T1.4

D1.2 : #2 Project Manual: Strategic management, Quality Assurance and Risk Plan [20]

This Manual defines the Consortium operating procedures summarizing all the required knowledge for the good management of the project (in terms of administrative forms, financial aspects, quality process...); establishes the guidelines for financial reporting, presentation standards for deliverables and reports; guarantee the quality of the results of the project. In addition, it reports on the quality measures to be adopted within REWAISE to ensure quality of work and management. They are reported both at general and partner levels, and describe the actions to ensure: (1) Quality follow-up in terms of resources, capacity and budget, (2) coherent information exchange, and (3) work according to quality standards. Task related: T1.1, T1.3 and T1.4

D1.3 : #3 Project Manual: Strategic management, Quality Assurance and Risk Plan [40]

This Manual defines the Consortium operating procedures summarizing all the required knowledge for the good management of the project (in terms of administrative forms, financial aspects, quality process...); establishes the guidelines for financial reporting, presentation standards for deliverables and reports; guarantee the quality of the results of the project. In addition, it reports on the quality measures to be adopted within REWAISE to ensure quality of work and management. They are reported both at general and partner levels, and describe the actions to ensure: (1) Quality follow-up in terms of resources, capacity and budget, (2) coherent information exchange, and (3) work according to quality standards. Task related: T1.1, T1.3 and T1.4

D1.4 : #1 Communication Plan [6]

The communication plan will describe the coordination of the overall communication efforts of the consortium and the actions tailoring to the needs of target audience with the aim to maximize the project visibility. It will ensure the design, implementation and follow up of an efficient communication strategy, starting with the mapping of Key Messages and target audiences, and adapted by continuous fine tuning made during implementation of the different actions. Task related: T1.2

D1.5 : #2 Communication Plan [20]

The communication plan will describe the coordination of the overall communication efforts of the consortium and the actions tailoring to the needs of target audience with the aim to maximize the project visibility. It will ensure the design, implementation and follow up of an efficient communication strategy, starting with the mapping of Key Messages and target audiences, and adapted by continuous fine tuning made during implementation of the different actions. Task related: T1.2

D1.6 : #3 Communication Plan [40]

The communication plan will describe the coordination of the overall communication efforts of the consortium and the actions tailoring to the needs of target audience with the aim to maximize the project visibility. It will ensure the design, implementation and follow up of an efficient communication strategy, starting with the mapping of Key Messages and target audiences, and adapted by continuous fine tuning made during implementation of the different actions. Task related: T1.2

D1.7 : #1 IPR Methodology and Policy and Data Management Plan [17]

This deliverable will contribute to manage, coordinate and support efficient processes for handling and protection of data. It will include: knowledge base portfolio generated, patents filed, licenses granted and protection obtained,

Technological progresses of the REWAISE, to detect and protect intellectual property and its exploitation, Data identification, organization and management, Project Innovation strategy according to European legislation, markets, consumer needs and Identification of new ways to exploit innovations from the project results. Task related: T1.5

D1.8 : #2 IPR Methodology and Policy and Data Management Plan [36]

This deliverable will contribute to manage, coordinate and support efficient processes for handling and protection of data. It will include: knowledge base portfolio generated, patents filed, licenses granted and protection obtained, Technological progresses of the REWAISE, to detect and protect intellectual property and its exploitation, Data identification, organization and management, Project Innovation strategy according to European legislation, markets, consumer needs and Identification of new ways to exploit innovations from the project results. Task related: T1.5

D1.9 : #1 Internal Ethical and Gender Dimensions Guideline [17]

It will contribute to ensure the safety, rights, dignity, and wellbeing of each person and related data collection and processing. It will include the guidelines for involving humans in innovation actions and the ethical approvals for the collection of personal data. Task related: T1.6

D1.10 : #2 Internal Ethical and Gender Dimensions Guideline [36]

It will contribute to ensure the safety, rights, dignity, and wellbeing of each person and related data collection and processing. It will include the guidelines for involving humans in innovation actions and the ethical approvals for the collection of personal data. Task related: T1.6

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	Efficient coordination and associated follow up	1 - AQUA	25	Proj. Manual, Data Mgmt Plan

Work package number ⁹	WP2	Lead beneficiary ¹⁰	3 - VASYD
Work package title	Resource Efficient Solutions		
Start month	1	End month	30

Objectives

This WP appropriately defines, designs and validates the innovative solutions for the beneficial use of nonconventional water sources, WW and solids streams, to recover water, energy and resources on demonstration scale. In particular, this WP ensures that each technology reaches the appropriate TRL to be implemented in the 9 Living Labs, and analyses the individual prototypes working under controlled conditions to allow upscaling.

Interaction with other WPs -The information from this WP will be exploited for:

- The architecture design of the common digital platform developed in WP3.
- The implementation of the technologies and its optimization in WP4, WP5 and WP6.
- Promotion of innovative financial concepts and new business models in WP8.
- The acceptance of consumers and social engagement in WP9.
- The creation of new governance models in WP9.

Description of work and role of partners

WP2 - Resource Efficient Solutions [Months: 1-30]

VASYD, AQUA, STW, ANET, MALM, POLY, RESA, APOR, SOLWA, UVAL, TUOS, CETIM, COVU, LUND, PUT, UNIPA

T2.1 – Water - alternative resources, desalination, regeneration and reuse [M1-M30] [Leader: VASYD. Participants: AQUA, POLY, TUOS, UVAL, STW, LUND, SOLWA, SMVAK, APOR & ANET]

To reduce freshwater consumption, making available alternative water sources, the task divides in 4 subtask (ST),

ST2.1.1: Rain & Storm Water Recovery. Microplastics removal [M3-M30] [Ld:LUND, Part.:VASYD]

- Design and procurement of prototype UF modules for urban stormwater filtration [D2.1], rainwater harvesting at residential houses, and mixed rain- and storm water from a parking garage [M3-M6]. This ST demonstrates a new application of membranes for removal of micro-plastics and pollutants from stormwater with UF in dead-end filtration. Water will pass through the membrane for discharge, while pollutants and bacteria are accumulated, and collected. Direct Membrane Filtration (DMF) in plate module configuration retains pollutants down to 1 nm. LUND will monitor Water Quality to assess diversification of non-potable uses [WP7].

- Pilots for improving the quality beyond membrane filtration [M12-M30]: New “detection methods” [D2.2] using DNA/RNA techniques such as flow cytometry for quick response and real-time monitoring to ensure suitability for use in irrigation systems and the agricultural sector.

ST2.1.2: Dilute WW filtration and Digestion [M1-M24] [Leader: AQUA. Participants: VASYD, LUND] The diluted WW treatment is based on integrated management of nutrients and organic pollution in decentralized “sewer mining” and eco-efficient multibarrier WWTP [D2.3]. Removal of pollutants will be optimised, and the beneficial use of resources contained in WW will ensure a high quality effluent for reuse, free of microplastics. This solution will be demonstrated in 2 LL: Atlantic (ES) and Skaane (SE). The following subsystems will be constructed and operated individually: i) enhanced decentralized or primary treatment ii) micro sieving and ozonized microfiltration, iii) advanced tertiary treatment (MABR and AOP) to remove soluble components.

Organic matter recovered from WW will be mixed with biowaste (from regional agroalimentary industries). Resulting biogas will lead to a self-sufficient WWTP and bio-CNG to power vehicles.

Ideal Carbon Utilisation (ICU) strategies developed in ST2.1.1 will be also analysed by VASYD to optimize the use of organic matter for two purposes [D2.4]: i. biological nutrients removal and/or ii. Green biofuel production.

ST2.1.3: Low energy desalination and mining ground water recovery (Moravia-Silesia) [M1-M24] [Leader: AQUA, Participants: POLY, SMVAK, SOLWA, APOR, TUOS]

- Low energy brackish and seawater desalination [M1-M24] [Leader: AQUA, Participants: POLY, SOLWA]: 6 innovative technologies will be designed, constructed and validated (individually): (1) A membrane filtration with 2 enhanced membranes specifically for desalination by POLY: anti-biofouling, anti-scaling, improved ion exchange capacity, high selectivity, low electrical resistance, high mechanical strength. Membranes will be fully analysed for ease of fabrication, physical and chemical properties and long-time tests will study biofouling, resistance, and permeability. (2) A modular design for easy expansion and construction of Capacitive De-Ionisation (CDI) will operate between 5 to 60 °C on high turbidity feed waters. The system will provide automated cleaning and remote monitoring and control functionality to reach low energy consumption (< 1 kWh/m³) and minimal to no chemical usage; (3) Design of high

performance nanofiltration (NF, brackish water) by AQUA; (4) reverse osmosis (RO, seawater) membranes will be developed by APOR to enhance rejection of specific ions and to accept higher pressure regimes, reducing electricity demand and ensuring permeability. New membranes will be optimised by varying the initial chemistry and process conditions as well as post treatment processes within membrane fabrication, especially the loading of Aquaporin inside @ vesicles, in order to lead to a stable upscaled membrane preparation to ensure a defect free production; (5) Design of electrodialysis with bipolar membranes (EDBM) by AQUA; (6) Design of a solar dome by SOLWA.

The resulting permeates, promotes corrosion in distribution systems. Post-treatment via pH adjustment and addition of calcium and alkalis serves a double purpose: stabilization and remineralization of permeate.

AQUA will evaluate the use of an alternative source of calcite for permeate remineralization, obtained from RO brines through intermediate precipitation softening (ST2.3.2). Acidification of permeate by addition of CO₂ in upflow calcite contactors will be evaluated, as an emerging method of RO post-treatment. CO₂ consumption is halved by replacing conventional lime addition by calcite use (alkalinity and calcium hardness adjustment).

- Mining ground water recovery [M6-M24] [D2.5] [Leader: TUOS, Participants: POLY, AQUA (SMVAK)]: Focused on mine tailings as resource for water supply and new products. Recover industrial ground water from Jeremenko mine (CZ) to obtain water for different qualities and develop: Pre-treatment: (1) novel filtration media; (2) Polymeric membranes will be adapted to feed properties.

ST2.1.4: Sewer mining: Vigo [M1-M18] [Leader: UVAL] [D2.6] UVAL will design and operate a pilot-scale AnMBR for urban WW. AnMBR effluent (2.1 m³·d⁻¹) is saturated with methane (CH₄), meaning a considerable loss of energy generated in the anaerobic process, contributing to GHG emissions. This ST will install and operate two degassing membrane systems: 1) downstream of the pilot-scale AnMBR plant, a degassing membrane with which to recover the dissolved methane in the effluent and 2) generated biogas.

T2.2 – Energy recovery for development of carbon neutral services [M1-M 30] [Leader: STW, Participants: UVAL, AQUA, COVU] Achieve a zero-carbon water cycle service and minimize energy consumption in distribution, collection and treatment of water. Divided in 4 subtask (ST).

ST2.2.1: H₂ Generation from Ammonia: Coventry [M3- M 30] [Leader: STW] [D2.8] With two phases: A laboratory Micro-flow electrolyser tests and an evaluation of Lab prototype electrolyser.

- Laboratory Micro-flow electrolyser tests [D2.7]:

(1) Optimisation of anode materials (COVU): Work on pre-treatment of the substrate; coating application method; evaluation of the adhesion, catalyst loading, electrochemical active surface area (ECSA) investigation using suitable electrochemical techniques; alloying with other metals to improve properties for ammonia electro-oxidation.

(2) Evaluate stability of anode material: evaluation of coating stability and lifetime; coating will be characterised by SEM and EDS

(3) Screening of membrane materials:

Appropriate materials will be tested for ion selectivity, transportation properties, conductivity and resistance in order to improve cell performance and decrease energy costs

(4) Assess different electrolyser flow regimes: turbulence promoters will be also tested to improve cell hydrodynamics and thereby prevent localised pH changes close to the electrode surface

Evaluation of prototype electrolyser:

Design prototype electrolyser [D2.6]

(1) Build prototype electrolyser: COVU Will source a suitable electrolyser for the next phase

(2) Characterise electrolyser flow regime

(3) Confirm electrolyser performance: Cell voltage, electrode performance and stability, membrane performance, H₂ generation, ammonia removal will be evaluated over an extended period.

(4) Test electrolyser with ammonia electrolyte generated from centrate water / scrubbing system (STW)

(5) H₂: Test the H₂ to determine levels of impurities.

(6) Confirm current efficiency for ammonia electro-oxidation, H₂ generation

(7) Technical/economic assessment of process at this scale by COVU, STW.

ST2.2.2: Biomethane Recovery and Upgrading [M1-M30] [Leader: AQUA, Participants: UVAL & SMVAK] [D2.6]. Different wastes from agri-food processing will be characterized [D2.8]. Physicochemical properties (energy content, biomethane potential, minerals, valuable compounds and water content) will establish the energy potential.

Preliminary tests will optimise the process parameters (efficiency, energy consumption) involved individually (thermal hydrolysis (TH), Co-AD, biogas production and upgrading).

In pilot-scale AnMBR for urban WW (Vigo living lab), UVAL will install a biogas upgrading system (membrane contactor) to decrease the CO₂ content. Pilot trials will validate this solution and an innovative/cost-competitive demonstrator will be designed to transform WWTP into biofactories and obtain green energy (high quality biogas) and biofuel (Compressed Natural Biogas, Bio-CNG). This integrated, flexible and adaptable strategy will be implemented and evaluated in WP4, 5 and 6 in the three hubs: Continental (Moravia-Silesia, CZ), Mediterranean (Salamanca, ES) and Atlantic (Cantabrian, ES) to demonstrate its replicability in EU. This solution will lead to an increase of biogas

production by 510 m³/y (3x170) to cover 100% of energy demand at WWTP, as well as 10 m³/h (3x10) of Bio-CNG biofuel (equivalent to 3,000,000 km³/y in CNG vehicles, saving 1,146 t.eqCO₂/y).

T2.3 – Valuable materials recovery [M1- M 30] [Leader: AQUA. Participants: ANET, CETIM, POLY, SOLWA, SMVAK, TUOS, AQUA, RESA, PUT, LUND, VASYD, MALM, UNIPA]

ST2.3.1: Nutrient Recovery from WW and urine separators [M1-M24] [WPL: VASYD, Part.: LUND, ANET]

- Urine Separation [D2.9]: Malmoe: Developing prototypes for production of new dry and safe fertilisers based on urine separation/dehydration toilet units. To stabilise and dehydrate the collected urine and enhance resource recovery, urine is dried in a mixed biochar and lime bed directly in the toilet room. The heat energy required for drying can either be sourced as standalone or a combination of the following: (a) electricity (preferably renewable); (b) waste heat available from the space/water heating; (c) household ventilation systems. In WP4, prototypes will be installed, operated and evaluated in various environments (public toilet, working place, show room, households).

- Struvite and Vivianite Separation: Poznan: To investigate the best options for PO₄ recovery at CWWT, struvite and vivianite crystallisation and extraction from sludge will be compared, to reach an optimised recovery (precipitation of 75 t PO₄ during the whole yr) and evaluation of fertilizer. These steps will be carried out:

- Existing digestate retention tank retrofit: Using one of six existing digestate retention tanks (587m³) by adding aeration, and equipment for preparation and dosing, as well as online measurement (pH, T, ds concentration).

- Crystallisation process: Trying to find the most efficient way of struvite and vivianite crystallisation, different agents will be tested in different dosages. Also, the impact of aeration and pH correction will be examined.

- Dewatering analysis of the change in % DS (higher), the impact on PE dosing – the change in dosages needed (lower) and liquor quality and recovery rates: P, N, Mg (P- and N-load returned to main WW flow path).

ST2.3.2: Minerals Recovery from Desalination and Mining Water [M1- M 30] [Leader: AQUA, Participants: POLY, SOLWA, SMVAK, TUOS, AQUA, RESA, CETIM, UNIPA]

(1) Minerals from Mining Water: Moravia-Silesia (CZ): Recover industrial valuable materials (gypsum, calcite and salt mixture) from ground water of Jeremenko mine (CZ). This ST uses the off-streams obtained from desalination in ST2.1.3: (mining ground water recovery in Moravia-Silesia, CZ), which will be further processed to obtain a variety of products: 3.7 kg of gypsum / m³; 13.6 kg of calcite / m³; and 20.0 kg of salt mixture/m³.

(2) Minerals from Desalination [D2.10]: Mediterranean hub (ES): Concentrate streams produced in ST2.1.3 can be combined sequentially to extract and concentrate useful products like calcite (CaCO₃), gypsum (CaSO₄), table salt (NaCl), Mg(OH)₂. A complete RO brine recovery will be implemented in the desalination plant in Mediterranean hub / Canary Island (ES). Feasibility to produce a broad portfolio of value products such as magnesium, table salt, gypsum, chlorine and calcite from brine will be evaluated by means of three strategies:

A. Selective precipitation followed by (electro)catalytic chloride conversion (3C):

• A.1 Selective precipitation (UNIPA+RESA) [D2.11] The resulting brine will be used to produce table salt in evaporation pond (300 m²) and Mg(OH)₂ suspension in a crystallizer (developed and supplied by UNIPA with support from RESA), reaching TRL7 for recovering high-purity Mg from real brines, reaching purities over 99%, suitable for the highest value applications such as chemical and pharmaceutical uses.

• A.2 (Electro)catalytic chloride conversion (3C) (AQUA) Chloride will be transformed into disinfection agents in a 3C system.

Nanofiltration and electrodialysis with bipolar membranes (EDBM). AQUA will construct and operate an EDBM unit with a capacity of 8m³/d to treat brines from the desalination process in ST2.1.3, recovering separately from the two EDBM concentrate streams, i.e., the mixed Cl-stream and the mixed Na-stream. The resulting solutions will be concentrated to obtain HCl and NaOH (2.6 – 4.1%) at a relatively low cost (2.3 -2.9 kWh/ kgNaOH).

• A.3 Li recovery (CETIM). First, lab tests (M1-M18) will optimise the electrochemical reactor electrode area ≤10 cm²; reactor volume 100-500 mL). Different spare Li batteries will be used as source of the Li-selective electrodes and tests will use simulated desalination brines. The main operational parameters will be: current density (typically 0.01-1 mA/cm²), type of electrodes (composition, size, shape, specific surface...) and electric potential applied (0.2-1 V).

The main monitoring variables will be: energy consumption, Li recovery, and number of cycles that electrodes are used. After tests with simulated brines, the same setup will optimise the treatment of real brines. Li recovery (>95%) will be developed for desalination brines, employing reused battery electrodes, with a recovery ≥ 10 mg Li/(g h) and save 15% of energy with respect to current best values (i.e. < 0.85 W h/mol Li).

- Prototype will be designed, constructed and tested with simulated brines (M18-M33). Lab tests by CETIM allow design and build an electrochemical cell prototype (target cell volume ~1L). The cell will be optimised treating simulated desalination brines and varying the same operational parameters pointed out above. Finally, two cell prototypes will be arranged in parallel (including the corresponding pumping and control system), to be operated semi-continuously (i.e. the first cell is in charge mode, the second one in discharge mode: one Will take up Li while the other Will release Li). In a final step, real brines will be used to optimize reactor yield.

ST2.3.3: Biopolymer recovery from WW[M1-M24] [Leader: CETIM. Participants: AQUA] [D2.12]

- Optimisation of microbial consortium for biopolymer production: CETIM Will investigate and optimise the production of polihidroxiakanoates (PHAs) from urban WW (Cantabrico) and slaughterhouse WW (SWW, Salamanca) using 5L lab reactors, set the optimal conditions to maximise both biopolymer production and process stability. PHA production will use a two-reactor configuration and a feast-famine dynamic feeding process, to achieve the selection and enrichment of a mixed microbial culture (MMC) with high PHA accumulation capacity (>70%). MMC will be subjected to a 12 h feast-famine cycle to promote a selective pressure to produce PHA (Proteobacteria, Actinobacteria, Bacteroidetes y Firmicutes, etc).

The accumulation reactor will be fed together with raw WW to increase PHA production, operated first with urban WW (lower load), which will be replaced by SWW (higher load) using the enriched MMC achieved. In both cases, operation of the reactors will be optimised, and cycle duration reduced to maximise both load and PHA yield.

- Pilot plant design and construction: Based on lab results and characteristics of both WW used as substrates, pilot plant for PHA production will be constructed for further validation in two Hubs (Atlantic & Mediterranean), to demonstrate feasibility under real conditions. Design is based on the same enrichment-accumulation configuration tested at lab-scale in a 2-reactor configuration size ranging 1-3 m3, allowing to treat up to 2-6 m3/d. Design Will be integrated into a container (40-20 feet standard) to ensure its easy transportation and integration in the two validation sites. A yield >0.4 g PHA/Lsubstrate·h (>0.7 g PHA/g SSV) is expected, reaching a PHA production cost of 7€/kg (about 40% lower than current cost) and with a global efficiency of the process >50%.

Participation per Partner

Partner number and short name	WP2 effort
1 - AQUA	36.00
SMVAK	4.00
2 - STW	4.00
3 - VASYD	9.00
SWR	7.00
WIN	2.00
CoL	3.00
4 - ANET	7.00
7 - MALM	3.40
P-MALMO	1.00
MKB	2.00
8 - POLY	14.00
9 - RESA	7.00
11 - APOR	8.00
14 - SOLWA	20.00
16 - UVAL	10.00
17 - TUOS	8.00
19 - CETIM	21.00
20 - COVU	26.00
21 - LUND	12.00
22 - PUT	14.00
24 - UNIPA	18.00
Total	236.40

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D2.1	Prototype of UF to improve stormwater quality	21 - LUND	Report	Confidential, only for members of the consortium (including the Commission Services)	9
D2.2	Prototype of "detection methods"	21 - LUND	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.3	Demo units individually for diluted WW management	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.4	Optimal feed mixtures of organic matter	3 - VASYD	Report	Confidential, only for members of the consortium (including the Commission Services)	18
D2.5	Mining ground water recovery prototypes	17 - TUOS	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.6	Construction of AnMBR	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.7	Lab Prototype electrolyser for hydrogen generation	20 - COVU	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.8	Feed Mixtures and Pilot Trials for agrifood waste	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.9	Prototypes for fertilizers production in toilet units	3 - VASYD	Report	Confidential, only for members of the consortium (including the Commission Services)	24

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D2.10	Prototypes for minerals recovery from desalination	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.11	Selective Precipitation and Minerals Extraction	9 - RESA	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D2.12	Biopolymer production prototype started up	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	24

Description of deliverables

D2.1 Prototype of UF to improve stormwater quality
D2.2 Prototype of “detection methods”
D2.3 Demo units individually for diluted WW management
D2.4 Optimal feed mixtures of organic matter
D2.5 Mining ground water recovery prototypes
D2.6 Construction of AnMBR
D2.7 Lab Prototype electrolyser for hydrogen generation
D2.8 Feed Mixtures and Pilot Trials for agrifood waste
D2.9 Prototypes for fertilizers production in toilet units
D2.10 Prototypes for minerals recovery from desalination
D2.11 Selective Precipitation and Minerals Extraction
D2.12 Biopolymer production prototype started up

D2.1 : Prototype of UF to improve stormwater quality [9]
Demonstration of a new application of membranes for removal of micro-plastics and pollutants from stormwater with UF in dead-end filtration. Water will pass the membrane for discharge and pollutants & bacteria down to 1 nm will be accumulated and collected. Task related: T2.1 - ST2.1.1

D2.2 : Prototype of “detection methods” [30]
Demonstrator of new detection methods using DNA/RNA techniques to ensure suitability for use in irrigation systems and the agricultural sector. Task related: T2.1 (ST2.1.1)

D2.3 : Demo units individually for diluted WW management [24]
WW treatment based on integrated management of nutrients and organic pollution in decentralized “sewer mining” and eco-efficient multibarrier WWTP: i) enhanced decentralized or primary treatment by pile cloth media, ii) microsieving and ozonized microfiltration, iii) advanced tertiary treatment (MABR and AOP) to remove soluble components. Task related: T2.1 (ST2.1.2)

D2.4 : Optimal feed mixtures of organic matter [18]
Organic matter recovered from WW will be mixed with biowaste and analysis of Ideal Carbon Utilisation strategies will be developed to optimize the use of organic matter. Task related: T2.1- ST2.1.2

D2.5 : Mining ground water recovery prototypes [24]
Demonstration of mine tailings as resource for water supply and new products. Task related: T2.1 (ST2.1.3)

D2.6 : Construction of AnMBR [24]

Demonstrator and Manual of the design and operation of a pilot-scale AnMBR. Task related: T2.1 (ST2.1.4) and T2.2 (ST2.2.2)

D2.7 : Lab Prototype electrolyser for hydrogen generation [30]

Design and operation of a prototype electrolyser to generate H₂ from ammonia after carrying out the optimization of anode materials. Task related: T2.2 (ST2.2.1)

D2.8 : Feed Mixtures and Pilot Trials for agrifood waste [24]

Different wastes from agri-food processing will be characterized and physicochemical properties will establish the energy potential. Task related: T2.2 (ST2.2.2)

D2.9 : Prototypes for fertilizers production in toilet units [24]

Prototypes for production of new dry and safe fertilisers based on urine separation/dehydration toilet units. Urine is stabilized and dehydrated by drying it in a mixed biochar and lime bed directly in the toilet room. Task related: T2.3 (ST2.3.1)

D2.10 : Prototypes for minerals recovery from desalination [30]

Complete Reverse Osmosis brine recovery in desalination plant. Task related: T2.3 (ST2.3.2)

D2.11 : Selective Precipitation and Minerals Extraction [30]

Demonstrator and Methodology. Brine will be used to produce table salt in evaporation pond and Mg(OH)₂ suspension in a crystallizer. Task related: T2.3 (ST2.3.2)

D2.12 : Biopolymer production prototype started up [24]

Investigation of the production of polyhydroxyalkanoates (PHAs) from urban WW and slaughterhouse WW. Task related: T2.3 (ST2.3.3)

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS2	Validation of a pilot-scale AnMBR for urban WW	3 - VASYD	24	Pilot in place validated

Work package number ⁹	WP3	Lead beneficiary ¹⁰	6 - HIDRO
Work package title	REWAISE platform. Control and Optimisation of Data and Processes		
Start month	1	End month	60

Objectives

The main goal is to establish a common framework of digital innovations that support alternative water management strategies, optimizing existing infrastructure and giving insights in decision making to different stakeholders (operators, authorities, consumers, citizens) in the value chains (urban, rural, industrial, agricultural).

REWAISE does not intend to create yet another platform from scratch, as many of them in FP7 and H2020 projects they have proven to be useful. REWAISE aims at integrating and exploiting existing and new data creating a common service for visualization improving decision making by shared criteria of different stakeholders along the water cycle, including IT software implemented at every water utility or municipality. The new Common Data Platform (CDP) includes intelligence that allows more efficient operation at top level, improving economic, social and environmental benefits by matching water supply and demand in iterative interactions.

The REWAISE platform will be modular, with its decentralized instances adding up on the existing automation systems of water cycle entities for their optimization, using a central instance for socio-economics-based coordination. It will include flows and pressures, water quality, nutrients recovered etc., ensuring the health of the environment (water and soil) and conditions (chemicals, and electricity), legal requirements, sewage capacity etc. The objectives are:

- Develop a common digital platform CDP to improve operational decision making by shared criteria.
- Establish the architecture of the platform to interconnect and interface data from heterogeneous data sources managing multiple data flows through secure and resilient channels, and standardize the data acquisition.
- Model the water cycle entities for different purposes (water catchment and treatment plants, water distribution system, consumers, sewerage water system, WWTP) including intelligent modules and top-level optimal control with characterization of supply-demand functions for the interaction variables of water cycle entities.
- Develop computational methods for processing supply and demand functions, allowing for socio-economics based coordination, leading to energy efficiency and a dynamic water fit-for-use scenario.
- Develop prediction modules for non-controllable quantities in the water cycle, based on advance analytics techniques, using different subsystems data sources.

Interaction with other WPs: The CDP, integrating new and existing software modules including FIWARE, will be the umbrella of all hubs. The economics-based coordination T3.6 will be implemented in 2 hubs [WP5; WP6], allowing for definition of patterns of use, climatic trends, and socio-economic issues. The modules will be interconnected with the FIWARE Platform through interfaces with different kinds of devices configured with existing algorithms to adjust them ad-hoc to technologies proposed in REWAISE. Results will also adapt to governance models existing or new ones [WP8], and consumers & social engagement [WP9].

Description of work and role of partners

WP3 - REWAISE platform. Control and Optimisation of Data and Processes [Months: 1-60]

HIDRO, AQUA, ANET, UNIZ, PUT

T3.1 – Definition of requirements [M1-M15] [Leader: HIDRO. Participants: UNIZ, AQUA, ANET, STW] [D3.1]
The overall requirements of various components to be introduced in the REWAISE platform, such as data acquisition (definition of data formats, and data models) and data mining (data sources, algorithms), data flows and data refresh rates, will be defined, as well as how it matches the proven data management software in the water domain where water ontology already exists will be defined.

It will be necessary to implement strategies that guarantee its security ensuring data integrity, in accordance with legislation for protection and processing of data in Europe.

ST3.1.1: Definition of interoperability principles [M1-M15]: An analysis of the different data sources and the typology of data is performed to find the solutions that will allow the interoperability between different infrastructures, adapting to users' needs in every scenario. Platform Modules will be designed with a convenient API-fication criteria in order to provide scalability and flexibility, making implementation easy for different installations and harmonizing data exchange and data processing procedures acquired from different sources. The standards applied to the water sector will be adapted to ensure consistency and interoperability with other standards and web services. The application of the European Interoperability Framework will allow the creation of a solution that is modular, scalable and flexible.

ST3.1.2: Implementation of cyber secure data technology [M1-M15]: Cryptographic techniques will be implemented for the protection and security of the information, based on the AAA (Authentication, Authorization and Accounting)

protocol, defining and assigning different roles for data visualization, establishing security policies and controlling access to it by wrapping data with a protection layer. The information security system will guarantee an end-to-end encryption from the collection of data from different sources, to its treatment in the optimization procedures and subsequent storage, guaranteeing and protecting data integrity. The cybersecurity framework will be acting at different levels: user level, privacy level (hybrid architecture to provide solutions to sensitive data), communication and data levels (encrypted communications and data through MQTT, VPN, TLS), secured access level (Lightweight Directory Access Protocol), activity level (log audit).

T3.2 – REWAISE platform architecture [M1-M60] [Leader: HIDRO] [D3.1]

REWAISE will implement a modular, horizontal, scalable, interoperable and decentralized platform, considering the concepts of cybersecurity, traceability, trustworthiness and robustness of data. The platform will integrate Scada traditional interface (smart monitoring data: flows and pressures, water quality, nutrients recovered, etc.) together with suggested best action from predictive analytic techniques [T3.4] and variables necessary for mathematical modelling, optimization [T3.5] and supply-demand coordination [T3.6]) AGILE methodology will be adapted and used, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. Platform will take into account the Action Plan for a Digital Single Market, relevant global standards for water safety & security such as ISO 31000 and ISO 73:2009, ISA84 standard (also called IEC 61511) on safety instrumented systems (ANSI 2004), and ISA99 (also called IEC 62443) on control system security (ANSI 2007). A user- friendly interface will provide visualization charts and comparative tables facilitating access and analysis; to share results of optimization and improvements.

ST3.2.1: Data management layers for data Flow and integration [M1-M33]: This ST will implement a data management layer, including interface through protocols: IoT/(REST, MQTT, CoAP, WS, HTTP, Streamings), ETL (batch process of corporate or business sources), interfaces to integrate with other platforms M2M, interfaces with OpenData repository (to process formats such as CSV, GeoJSON, KML, etc.), interface of integration with GEOSS and COPERNICUS Services, batch and streaming analysis. By making use of FIWARE infrastructure, implementation of a modular and extensible IoT architecture is enhanced, both including existing FIWARE modules, such as water data models, and new FIWARE modules from innovative SME in WP8

ST3.2.2: Big data infrastructure and storage [M1-M60]: Data management of REWAISE for the acquisition and connection layer will be chosen amongst the state of the art of Big Data infrastructure. The interaction of different smart digital services enhances the operational capacities and functionalities for the whole water system by means of the proposed interoperability model. The following data processing and analytics are included:

- Statistical Modelling Engine that will allow the quality control of on-line data (SCADA, sensor data...), offline lab measurements, specifically designed experimental campaigns, open repositories, etc.
- Data mining tools for data reconstruction, data reconciliation and anomaly detection to increase data quality.

The process of extracting, transforming and loading information is based on the Extract, Transform and Load Model (ETL), to guarantee selection, transformation and objective integration before storing the information definitively.

ST3.2.3: Smart Visualization [M4-M60]: The platform will include a complete and configurable dashboard that easily allows the addition of new indicators, monitoring events and alerts, and providing reports. Easy, intuitive, and powerful Dashboard-KPI manager enables the quick KPI constructions based on the data persisted in the platform coming from different sources (sensors, weather forecast apps, Copernicus, GEOSS, open-data, social media) or KPIs based on data coming from the outputs of different Smart Digital Solutions implemented at each site. Users will have access to a level with different sections and functionalities.

T3.3 – Development of mathematical models for Artificial Intelligence [M1-M30] [Leader: UNIZ. Participants: ANET, PUT, AQUA, HIDRO, [D3.2]. Selected systems in the water cycle will be modelled for different purposes within the Living Labs. The integration of modelling and simulation tools will provide stakeholders valuable insight.

ST3.3.1: Modelling -principles assessment for targeted usages of models [M1-M12] [AQUA]-, HIDRO, UNIZ] [D3.2] Available and relevant modelling, modelling principles assessment for targeted usages of models tools will be assessed[D3.2]. Grey-box models, mathematical optimization models, process models will be included; also models to assess the impacts of hazards and risks on water infrastructures due to climatic extremes, contaminations, accidental failures and malicious threats, adopting early warning measures as well as customizable decision-support services enhancing the protection of systems and citizens from adverse events (D3.2)

ST3.3.2 Grey box modelling for top level optimization [M1-M30] [UNIZ, AQUA] [D3.3]: Mathematical models will be developed for predictive and optimal control of the integral water cycle entities. Models will merge the knowledge and experience of entity experts and past operational data, both internal and external will be required to characterize the system and validate the software modules. Common denominators of modelling procedures will facilitate further replications in selected water cycle entities (WP5 and WP6). A methodology will be proposed for gathering the necessary input data required for grey box models [D3.3]. Optimal control (T3.5) will further enable economics-based coordination via supply-demand mechanisms (T3.6) on interacting variables between water cycle entities.

ST3.3.3. Mathematical Modelling of WWTPs [M1- 30] [ANET, PUT, AQUA]. Due to the diverse configurations and specific energy consumption within WWTP, a mathematical model will be developed [D3.4] to investigate on WWTP's performance in various weather conditions (climate impact analysis) The model implementation in ST4.1.2 will allow a smart management of energy, resource and water in Poznan Living Lab (Continental Hub). Replicability of the model will be checked in a WWTP within the hubs with a compatible process but - in different climate (e.g. Atlantic).

T3.4: Prediction modules [HIDRO] [M6-M60]: Software modules, based on Machine Learning techniques, will be developed to give prediction for non-controllable variables in the water cycle. Prediction techniques based on advance algorithms will allow the connectivity between different subsystems allowing a smart management of infrastructures.

a) Demand predictions module [HIDRO] based on neural analysis of historical data from smart meters, and databases with climatic data, number of inhabitants/households, influence of supply pressure on the demand, socio demographic changes, tourism, immigration, etc. Outcomes from previous projects (FP7 UrbanWater project) will be used. This data will also allow for further social models of consumer patterns.

b) Water quality, contamination and concentration prediction models [HIDRO]: based on algorithms that consider the hydraulics of the system and the chemistry of chlorine and disinfection by-products (DBP) like trihalomethanes. Models will be calibrated and implemented at the hubs.

c) Algae bloom prediction models (AQUA). Factors that promote the appearance of algae blooms will be studied. A model to quantify the interactions between abiotic factors and algal genera will be developed/adapted in order to anticipate the algae bloom. Existing models and interaction with the European algae bloom network GLEON (Global Lake Ecological Observatory Network) will be encouraged. Model will be implemented at the Mediterranean hub.

d) Prediction of hydrological events [AQUA]- Based on Artificial Intelligence techniques a model will be developed for the prediction of the hydrological behavior of several pilot basins in a context of droughts and floods. This model will be implemented in the Mediterranean hub (Avila).

e) Asset Management Tool Value Report (AQUA): Using existing data from inventory, an asset management tool will be developed for an optimized management of strategic assets in terms of their performance. The result will be an asset lifecycle management tool allowing scheduling the asset's renewal sequence.

T3.5: Optimal control strategies of water cycle entities [M6- M60] [Leader: UNIZ; Participants: AQUA, HIDRO, ANET] [D3.5]: Optimal control problems will be formulated for water cycle entities (WTP, WWTP, water network). Top-level optimal control for each of the entities considered in coordination will be put in place. Optimal control strategies will weigh operational performance and economic benefit too, as well as environmental cost and societal well-being (through KPI's defined in WP7). The optimal control problem will be solved by employing a commercial or free available convex programming software. Software modules for optimal control will be adaptable and expandable to encompass different unit configurations of entities (WTP, WWTP, networks, pumping system). Close collaboration with the Living Labs will be necessary, as a large amount of data, both internal and external, will be required to characterize the system and validate the software modules: Implementations will be performed in hubs WP5 and WP6 (Mediterranean, Atlantic) while common denominator procedures and templates for different water cycle entity types are provided, to support further replication.

T3.6- Supply-demand coordination mechanism [M9-M60] [Leader: UNIZ. Participants: AQUA, HIDRO] [D3.6]. Within this task, supply-demand coordination mechanisms will be developed to optimise the water cycle as a whole and approaching the global optimum operation in an economical win-win scenario. The optimal control modules developed in T3.5 for each entity will be extended such that supply and demand functions can be computed, using multi-parametric programming. Supply-demand coordination is included in 2 hubs: Mediterranean/Denia and Atlantic/Cantabria, and is planned to be simulated with data obtained from the Digital Twin at Continental hub to ensure replicability and interoperability. A microgrid software module to bid flexible amount of power in demand response schemes will be inherited (3Smart project) making water cycle entities important contributors to de-carbonization of the energy system. Annex 2 provides a preliminary assessment of operational logic for top-level optimal control of water cycle entities as well as their outputs and inputs for supply-demand coordination.

T3.7: Holistic analysis of the water cycle results [M42-M60] [AQUA] [D3.7] A new and improved methodological tool will be developed to assess the impacts that water projects have on sustainability, macro-economy, environmental and society. It will include variables such as technology, digital tools, quality of the waters obtained after the treatments, socio-economic data, legal frameworks, and financial assessment. This tool will allow a simultaneous analysis of the three dimensions of sustainability (socio-economic, environmental and social impacts) by: i) evaluating the total socio-economic, environmental and social impact (direct, indirect and induced) of both existing and new projects; ii) providing results visualization showing impacts at different levels of detail (for example: total impacts or impacts by country and by economic sector); iii) showing results in terms of their quantitative contribution to the achievement of the SDGs (beyond objective 6) The methodology will be applied and validated in Denia at the Mediterranean hub. In this way, based on technological data and costs of investment and operation and maintenance of the projects, the impacts on the economy, the environment and society will be calculated simultaneously.

Participation per Partner

Partner number and short name	WP3 effort
1 - AQUA	37.00
4 - ANET	38.00
6 - HIDRO	58.00
18 - UNIZ	56.00
22 - PUT	25.00
Total	214.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D3.1	REWAISE platform IT architecture	6 - HIDRO	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D3.2	REWAISE catalogue of mathematical models for water cycle entities	6 - HIDRO	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D3.3	Methodology for grey box modelling	18 - UNIZ	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D3.4	WWTP model	4 - ANET	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D3.5	Optimal Control Strategies of Water Cycle.	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	34
D3.6	Operational logic for supply-demand mechanism	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D3.7	Methodological Tool for socio-economic, environmental and social evaluation of water	1 - AQUA	Other	Public	59

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
	supply and sanitation projects				

Description of deliverables

D3.1 REWAISE platform IT architecture
D3.2 REWAISE catalogue of models for water cycle entities
D3.3 Methodology for grey box modelling
D3.4 WWTP model
D3.5 Optimal Control Strategies of Water Cycle.
D3.6 Operational logic for supply-demand mechanism
D3.7 Methodological Tool for socio-economic, environmental and social evaluation of water supply and sanitation projects

D3.1 : REWAISE platform IT architecture [12]
Architecture of the REWAISE platform. Task related: T3.1 and T3.2

D3.2 : REWAISE catalogue of mathematical models for water cycle entities [12]
A compilation of all available modeling tools will be assessed. Through these tools water cycle entities will be modelled. Task related:T3.3 (ST3.3.1)

D3.3 : Methodology for grey box modelling [24]
A methodology will be proposed for gathering the necessary input data required for grey box models. Task related:T3.3 (ST3.3.2)

D3.4 : WWTP model [24]
Model developed for the WWTP to be implemented in WP4. Task related:T3.3-ST3.3.3

D3.5 : Optimal Control Strategies of Water Cycle. [34]
Operational logic for optimal control of water cycle entities as well as their outputs and inputs for improving performance of the operation are assessed and implemented. Task related:T3.5

D3.6 : Operational logic for supply-demand mechanism [48]
Control to optimize the different entities of a system in order to optimize it as a whole. Task related: T3.6

D3.7 : Methodological Tool for socio-economic, environmental and social evaluation of water supply and sanitation projects [59]
Methodological tool to assess the impacts that water projects have on sustainability (macro-economic, environmental and social impacts. Task related:T3.7

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS3	Supply-demand coordination of water cycle	18 - UNIZ	48	Algorithm Created

Work package number ⁹	WP4	Lead beneficiary ¹⁰	4 - ANET
Work package title	Continental Hub		
Start month	7	End month	60

Objectives

This WP implements new technologies developed in WP 2 and 3 into the 3 LL that conform the Continental Region, in Poznan (PL), Ostrava (CZ), and Skaane (SE), evaluating aspects such as resource recovery and reutilization of multiple water sources.

Interaction with other WPs: This WP integrates outputs from [WP2 & 3] and is in interactive dialogue with [WP7, 8 & 9] to deliver and analyse data, optimize operation with feedback received: to obtain ETV, to identify potential markets, develop new business models as well as governance models, stakeholder input and SROI.

Description of work and role of partners

WP4 - Continental Hub [Months: 7-60]

ANET, AQUA, VASYD, HIDRO, MALM, POLY, WE&B, TUOS, UNIZ, LUND, PUT

T4.1 – Poznan (PL) Living Lab [M13-M60] [Leader: ANET. Participants: [PUT]. This task demonstrates and evaluates SROI of the PO4 recovery platform in long-term operation at the WWTP in Poznan (PL):

ST4.1.1: Phosphorus (PO4) recovery and nutrient management at CWWTP Poznan [M13-M50] [D4.1, D4.2]. [Leader: ANET, Participants: PUT] Main results obtained in ST2.3.1 will be implemented, comparing struvite and vivianite recovery and fertilizer quality by verifying the total PO4 recovery and the estimated savings due to elimination of unwanted crystallisation (antiscalant agent dosing, avoidance of technical breakdowns caused by occlusions, etc.) and by evaluating recovered product quality – recognition of heavy metals contamination.

ST4.1.2: WWTP Model, Run Validation, Reporting and Analysis [M24-M50] [Leader: ANET. Participants: PUT] Data and Metadata Standards analysis tools will be implemented in different processes within the Living Labs, combining real-time data analysis and data analysis services. The influence of climate factors will be analysed: i) Rainfalls/droughts reflects in WWTP inlet changes ii) stormwater/droughts in the influent iii) rainfalls/long-term dry weather disturb(s) the efficiency of wastewater treatment. Bio-kinetic modelling (GPSX) will be enriched with Real-Time Data view for technological aspects validation. A specific cooperation of cognitive analysis and bio-kinetic rules will be evaluated in this WP. The experiments will be prepared for different continental climate conditions (seasoning). Implementation of equipment, sensors, calibration etc. and data integration. Fixed model will be running for 1-yr in demo-mode (TRL7) as the background for CWWTP, to be divided into two 6 mo. parts: (1) Validation time: comparison of real-time results and model predictions, detection of flaws, coefficient remarks & (2) Reporting and analysis [D4.3, D4.4].

ST4.1.3: User Interaction and analysis of Social and Economic Impact [M35-M60][Leader: ANET][D4.5]: To investigate local and social indicators that impact on WWTP efficiency, while increasing eco-awareness of WWTP has a fundamental part of water smart society. From Living Lab methodology and RRI Activities developed in WP8, a social awareness campaign will be developed during M48-M60. Results will be evaluated and optimized in T9.6 about Living Lab Evaluation and Optimisation.

T4.2 – Moravia-Silesia (CZ): Industrial Integration [M18-M60] [Leader: AQUA. Participants: POLY, TUOS] [D4.4]

This task implements value products recovery in Ostrava, in 3 subtask (ST):

ST4.2.1: Recovery of industrial ground water from Jeremenko mine [M18-M48] [Leader: POLY, Participants: SMVAK, AQUA, TUOS] Validating solutions [ST2.1.3] to recover fresh water [D4.6] and minerals [D4.7] in a desalination platform installed at a mining site (Jeremenko, CZ), the quantity and quality of products under long term operation will be assessed, process efficiency is measured. Different minerals will be evaluated for quality requirements, and market price according to purity and concentration, optimizing energy needs to < 0.8 kWh/m³.

- POLY provides a membrane-based pretreatment process (50 m³/d) to feed high quality water in RO

- SMVAK and TUOS will operate aeration/filtration and a RO unit for Ostrava production capacity: 20 m³/d).

ST4.2.2: Minerals Recovery from Mining [M24-M60] [Leader: AQUA, Participants: TUOS, SMVAK (LT): Validating the REWAISE solution [ST2.3.2] at Jeremenko mine (CZ). Permeate from mine water will be delivered to different consumers in Ostrava and a strategy on water supply in the region will be defined, creating interactive maps on alternative water sources for different purposes. Strategies will combine decision making diagrams to fulfil the demands (quantity and quality) taking into account location of mine, quality profiles (potable, pure and technological water) and price (production and transportation). Risk, quality and market assessment of minerals recovered from Moravia-Silesia living lab will be reported [D4.8].

ST4.2.3: Recovery of biomethane from industrial and urban streams [D4.7] [M36-M60] [Leader: SMVAK, Participants: AQUA]: The solution of ST2.2.2 will be implemented in a WWTP in CZ to obtain Bio-CNG.

for sustainable mobility in Ostrava region. Optimal residual mixtures will be fed into anaerobic reactors to optimize co-digestion and maximize the biogas production. The Demo unit will produce 10 m³/h of Bio-CNG (equivalent to 1,000,000 km/yr, saving 142 t.eqCO₂/yr). Bio-CNG will be validated as vehicle fuel in a fleet of 55 commercial mid-size vehicles or equivalent heavy vehicles (trucks, buses).

ST4.2.4: Digitalization of network for further social engagement [M18-48] [Lead: AQUA, Part: SMVAK (LTP), HIDRO]: Relying on meters already deployed, and connecting new ones using most advanced IoT devices, the platform will integrate different provider's communication protocols, establishing non-supplier-dependent smart metering. New IoT communication will also transmit disperse and remote data, and serving both the end user and the utility in rural areas, as metering can identify non-consumption and fight against isolation, another element of citizen engagement and satisfaction with smart meters - to be measured in the Living lab in WP9. Exploratory data analysis will be performed to:

i) discover trends and patterns in water usage; ii) assess the performance of the system; and iii) define operational goals. T4.3 – Skaane (Sweden) Living Lab: Reutilization of multiple water sources [M7-M53] [Leader: VASYD, Participants: LUND, MALM, UNIZ]. This task improves resilience in water resources, abating emerging pollution in stormwater by demonstrating resource-efficiency in rain and stormwater harvesting (RWH/SWH, RSWH), using ultrafiltration (UF), and providing prototyping opportunities for new water innovations. Divided in 3 subtask (ST):

ST4.3.1: Rain and storm water harvesting for microplastics, treatment and reuse [M7-M48] [Leader: MALM; Participants: VASYD, LUND] [D4.9, D4.10]. Objective is a large-scale demo of rain and stormwater filtration and reuse based on the design and on the prototypes of UF modules of T2.1.1. Results are the installation of rain and storm water harvesting and reuse infrastructure.

- Stormwater filtration and storage for local reuse to save water and control pollution [LUND, MALM]. Majority of stormwater will flow through a large-scale conveyance system and discharge from Sege Park at two locations to recipient Sege River (average 64,000 m³/yr). A 100 m³ levelling storage capacity will be built into a 1 m wide stormwater pipe including a new UF module. The capability of membrane for large scale stormwater buffering (during high runoff events), harvesting, treatment and reuse will be demonstrated.

- Residential Rainwater Harvesting (RWH) and innovations [MALM, LUND] property developers and 3rd party CoL and WIN]. It consists in construction, operation and maintenance of 6 RWH and UF systems for residential reuse in Sege Park (200 HHs, 5 properties) and in Lund's Brunnshög (75 HHs, 1 property). Rainwater, with airborne and on-roof particles, is transferred to subsurface tanks equipped with UF. Repurposed water is conveyed through separate pipes in the houses, connecting to toilets and non-potable taps. MALM organises multistakeholder dialogue platforms following an established model to engage developers.

- Rain and Storm Water Harvesting (R&SWH). Installation of R&SWH and UF for onsite reuse in 5-story parking garage. The building includes 1,400 m² vertical facades of perennial plants and 3,000 m² roof surface. The action will demonstrate the capability of the adapted UF for mixed rain and stormwater, treatment and reuse potential -notably for irrigation and washing floors.

- Socio-technical Performance and impact monitoring UF performance monitoring and technical evaluation Will be performed by LUND and WE&B, focusing on WQ and captured micropollutants. VASYD will undertake Citizen acceptance and behavioural analysis, in connection to WP 9.

ST4.3.2: Introduction of Urine Separation [M9-M48] [Leader: VASYD, Participants: MALM, 3rd party SLU] Demonstration of new dry and safe fertiliser in an urine separation system based on the prototypes developed in ST2.3.1. At least 3 toilets will be installed and operated in different demonstration environments (public toilet, working place at VASYD, households, at the facility Kretseum). Prototypes are evaluated during the first 2.5 yrs before being installed in larger scale at households in Sege Park (co-financed outside of project). Results obtained in a long-term demonstration will be integrated in a risk and quality assessment of the recovered products. Citizen acceptance and behavioural analysis will be also carried out for socio-technical verification.

ST4.3.3: Implementation of Digital Twin [M12-M53] [Leader: VASYD; Participants: MALM, LUND, UNIZ] [D4.6 11, D4.12] Water monitoring and data will be connected, based on modelling performed in WP3, to shifts in behaviour and demand among end-users. Results will show real-time water balance for Sege Park (Malmo), and monitor household's satisfaction and water savings through efficient operation and communication with consumers:

- Detail design and installation of digital monitoring systems:

- (i) Water balance. Identification of optimal equipment, sensors, and machine learning tools. ii) Water consumption. Design requirements and installation of smart water meters at household levels. iii) Water quality. Installation of sensors and data requirements across parameters critical for understanding the efficiency of UF, ii) IoT & machine learning. Implementation of IoT into water management (e.g. remotely controlled sensors, LoRaGateways and LoRaWAN) necessary to build machine learning capabilities. iii) Impact monitoring.

- Development and operation of the Digital Twin: Software for real-time models to build machine learning capabilities to operate and understand status of the area's hydrology, hydraulics and water quality.

- Installation of web and android/iOS interfaces for integration, analysis and communication.
- Based on digital twin and historical data the economics-based coordination will be simulated.

Participation per Partner

Partner number and short name	WP4 effort
1 - AQUA	12.00
SMVAK	20.00
3 - VASYD	32.00
CoL	3.59
4 - ANET	45.00
6 - HIDRO	4.00
7 - MALM	9.00
P-MALMO	0.80
MKB	1.60
8 - POLY	4.00
12 - WE&B	5.00
17 - TUOS	29.00
18 - UNIZ	8.00
21 - LUND	12.50
22 - PUT	38.00
Total	224.49

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.1	#1 Optimisation of the struvite recovery process	4 - ANET	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D4.2	#2 Evaluation of struvite as fertilizer	4 - ANET	Report	Confidential, only for members of the consortium (including the Commission Services)	50
D4.3	#1 Analysis of the demo-model	22 - PUT	Report	Confidential, only for members of the consortium (including the Commission Services)	38

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.4	#2 Analysis of the demo-model	22 - PUT	Report	Confidential, only for members of the consortium (including the Commission Services)	50
D4.5	Local indicators on WW treatment and social awareness campaign	4 - ANET	Report	Public	50
D4.6	Fresh water production in Moravia-Silesia	17 - TUOS	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D4.7	Minerals recovery	1 - AQUA	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D4.8	Biomethane recovery	1 - AQUA	Other	Confidential, only for members of the consortium (including the Commission Services)	58
D4.9	Risk and market assessment of minerals recovered in Moravia-Silesia	1 - AQUA	Other	Confidential, only for members of the consortium (including the Commission Services)	52
D4.10	#1 Increase resilience through rain and storm water – implementation	7 - MALM	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D4.11	#2 Increase resilience through rain and storm water – operation	7 - MALM	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D4.12	#1 Demonstration of Digital Twin and holistic water coordination	3 - VASYD	Other	Confidential, only for members of the consortium (including the Commission Services)	35
D4.13	#2 Demonstration of Digital Twin and holistic water coordination	3 - VASYD	Other	Confidential, only for members of the consortium (including the Commission Services)	53

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
				the Commission Services)	

Description of deliverables

D4.1 #1 Optimisation of the struvite recovery process
D4.2 #2 Evaluation of struvite as fertilizer
D4.3 #1 Analysis of the demo- model
D4.4 #2 Analysis of the demo- model
D4.5 Local indicators on WW treatment and social awareness campaign
D4.6 Fresh water production in Moravia-Silesia
D4.7 Minerals recovery
D4.8 Biomethane recovery
D4.9 Risk and market assessment of minerals recovered in Moravia-Silesia
D4.10 #1 Increase resilience through rain and storm water – implementation
D4.11 #2 Increase resilience through rain and storm water – operation
D4.12 #1 Demonstration of Digital Twin and holistic water coordination
D4.13 #2 Demonstration of Digital Twin and holistic water coordination

D4.1 : #1 Optimisation of the struvite recovery process [30]
To investigate the best options for PO₄ recovery at CWWT, struvite and vivianite crystallisation and extraction from sludge. Task related: T4.1-ST4.1.1

D4.2 : #2 Evaluation of struvite as fertilizer [50]
Evaluation of struvite as fertilizer according to the product quality. Task related: T4.1-ST4.1.1

D4.3 : #1 Analysis of the demo- model [38]
Analysis of the model running for 1 year in demo-model in the CWWTP of Poznan. This model based on biokinetic coefficients will allow high quality bio-balanced treatment along with economically wise decision-making, implementing devices and integrating data. Task related: T4.1-ST4.1.2

D4.4 : #2 Analysis of the demo- model [50]
Analysis of the model running for 1 year in demo-model in the CWWTP of Poznan. This model based on biokinetic coefficients will allow high quality bio-balanced treatment along with economically wise decision-making, implementing devices and integrating data. Task related: T4.1-ST4.1.2

D4.5 : Local indicators on WW treatment and social awareness campaign [50]
Investigation of local and social indicators that impact on WWTP efficiency and Development of a social awareness campaign. Task related: T4.1-ST4.1.3

D4.6 : Fresh water production in Moravia-Silesia [36]
Demonstration of the Moravia-Silesia Living Lab to obtain fresh water in a desalination platform at Jeremenko mining site. Task related: T4.2 (ST4.2.1)

D4.7 : Minerals recovery [36]
Minerals recovered in Moravia-Silesia Living Lab and evaluation of the quantity and quality of the products. Task related: T4.2 (ST4.2.3)

D4.8 : Biomethane recovery [58]
Development, installation and operation of Biomethane recovery will be carried out in order to produce Bio-CNG. Task related: T4.2 (ST4.2.3)

D4.9 : Risk and market assessment of minerals recovered in Moravia-Silesia [52]
A risk, quality and market assessment of products recovered in Moravia Silesia LL will be evaluated. Task related: T4.2 (ST4.2.2)

D4.10 : #1 Increase resilience through rain and storm water – implementation [24]
 Large-scale demo of rain and stormwater filtration with UF modules. Task related:T4.3-ST4.3.1

D4.11 : #2 Increase resilience through rain and storm water – operation [48]
 Large-scale demo of rain and stormwater filtration with UF modules. Task related:T4.3-ST4.3.1

D4.12 : #1 Demonstration of Digital Twin and holistic water coordination [35]
 Demonstrator of Digital Twin. Water monitoring and software for real-time models to understand hydrology, hydraulics and water quality as well as behavior and demand among end users. Task related:T4.3-ST4.3.3

D4.13 : #2 Demonstration of Digital Twin and holistic water coordination [53]
 Demonstrator of Digital Twin. Water monitoring and software for real-time models to understand hydrology, hydraulics and water quality as well as behavior and demand among end users. Task related:T4.3-ST4.3.3

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS4	Implementation of struvite recovery technology	4 - ANET	18	Struvite recovery methods

Work package number ⁹	WP5	Lead beneficiary ¹⁰	I - AQUA
Work package title	Mediterranean Hub		
Start month	12	End month	60

Objectives

This WP will implement new technologies developed in WP 2/3 into the Living Labs of the Mediterranean Region. In Denia/Levante/Canary Islands (ES): a) exploitation of saline water sources b) feasibility to recover critical raw materials from the desalination off-streams c) smart water system
In Salamanca region (ES): a) energy recovery from local food industry b) strategy on biowastes c) production and validation of the biofuel obtained (bio-CNG) d) implementation of hydrological prediction module at the river basin
In Extremadura: a) new strategies for DWTP and DW to increase water quality b) THM Prediction models c) Algae bloom prediction models and demonstration of smart Reservoir Management.
Interaction with other WPs: This WP integrates outputs from WPs 2 / 3, and delivers data to WP 7, 8 and 9 for analysis and iterative feedback to optimize operation, obtain ETV verification, identify potential markets, develop new business models as well as determine governance models, stakeholder input and social returns.

Description of work and role of partners

WP5 - Mediterranean Hub [Months: 12-60]

AQUA, HIDRO, POLY, RESA, APOR, SOLWA, UNIZ, CETIM, UNIPA

T5.1 –Spain Living Lab: Efficient Seawater Treatment [M14-M60] [Leader: AQUA. Participants: POLY, SOLWA, APOR, RESA, CETIM, UNIPA] [D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D5.7, D5.8]. Divided in 3 subtasks:

ST5.1.1: Low energy solar desalination [M24-M54] [Leader: SOLWA. Participants: APOR, AQUA, POLY] [D5.1, D5.2] to reduce energy needs by a factor of 8 (0.5 kWh/m³) enabling the exploitation of saline water sources:

- Long-term demonstration of solar dome designed and constructed by SOLWA for low energy drinking water production from seawater.

- Operation of the CDI demo plant constructed in T.2.1 to treat 50.0 m³/d for a range of water quality and removal efficiencies. This will provide DW to 250 people (estimated energy consumption of 0.6 kWh/m³). The CDI plant will be operated as sole desalination process and combined with UF (POLY), RO and EDBM desalination units.

- APOR membranes will be and tested in a desalination unit with hybrid RO membranes and high rejection plant by AQUA, evaluating a few different versions of BWRO membranes for capacities of 10 to 50 m³/h to adapt the chemistry to Salt removal (BW in the range of 5 to 10 g Cl/l) as well as retention of specific pollutants (nitrate, sulfate or fluoride)
- AQUA will operate an EDBM desalination unit with a production capacity of 8 m³/d.

- Product water post-conditioning (AQUA). Post-treatment via pH adjustment and addition of calcium and alkalis serves a double purpose: stabilization and remineralization of permeate. The chemical stability of potable water will be determined by three parameters: (i) pH buffering capacity or alkalinity, (ii) precipitation potential of scaling salts; (iii) concentration of soluble calcium ions. Calcite (recovered in ST5.1.2) has been selected as preferred remineralization species. In addition, CO₂ consumption with lime addition doubles compared to calcite use in post-treatment to adjust alkalinity and calcium hardness. Acidification of permeate by addition of CO₂ in upflow calcite contactors will be built and evaluated, as an emerging method of RO post-treatment, using an alternative source for calcite the RO brines through an intermediate precipitation softening step [ST5.1.2]. Magnesium (recovered in ST5.1.2) supplement can be also improve the DW quality following WHO recommendation.

ST5.1.2: Value extraction from desalination streams [M36-M54] [Leader: AQUA, Participants: POLY, SOLWA, TUOS, RESA, CETIM, UNIPA] [D5.3, D5.4] To recover critical raw materials and other chemicals from the desalination streams, feasibility to produce a broad portfolio of value products such as magnesium, table salt, gypsum, chlorine and calcite from brine is demonstrated. This subtask includes three strategies:

A. Selective precipitation followed by (electro)catalytic chloride conversion (3C):

A.1 Selective precipitation (UNIPA+RESA). The resulting brine will be used to produce table salt in an evaporation pond and Mg(OH)₂ suspension in a crystallizer built and operated by UNIPA with the support of RESA: a yield about 52.3 kg/d Mg(OH)₂ is expected, corresponding to a nominal annual capacity of 17.5 t. A total production of 200 kg Mg (OH)₂ during 6 month. operation will be reached on the site.

The project will develop technology for recovering high-purity Mg compounds from brine to reach TRL7. RESA UNIPA has demonstrated production of Mg compounds from real brines, reaching purities over 99%, suitable for the highest value applications such as chemical and pharmaceutical uses

A.2 (Electro)catalytic chloride conversion (3C) (AQUA). Onsite production of chlorine will be carried out in a catalytic reactor where chloride present in highly concentrated streams is transformed in green disinfection agents, which can be used onsite to guarantee water quality.

B. Nanofiltration and electrodialysis with bipolar membranes (EDBM). Concentrate streams produced in ST5.1.1 will be combined sequentially to extract and concentrate useful products like HCl and NaOH by EDBM constructed and operated by AQUA. In addition, recovered NaCl and Na₂SO₄ from brines can be reused as counter ion supply and electrolyte for the EDBM, respectively.

- Electrochemical Li recovery: The prototype designed and built in ST2.3.4 will be operated by CETIM to treat a flow rate of at least 20 L/h of brine. Other currents previously treated by selective precipitation or EDM Will be also tested as feed, to evaluate if they are more suitable for Li recovery. The process will be optimised to obtain high Li recovery rates at minimum energy consumption. The main variables to be modified will be Flow rate (i.e. HRT, typically 1-60 min), current density (0.01-1 mA/cm²) and electric potential applied (0.2-1 V). It is expected to reach a Li recovery >95%, recovery rate >10 mg Li/ (g h) and < 0.85 W h/mol Li treating ≥20L/h of Denia brine or brines pre-treated by EDM/selective precipitation.

ST5.1.3: Smart water system at Mediterranean Region [M14-M60] [Leader: HIDRO Parts: AQUA, UNIZ] [D5.5, D5.6]

A) Dynamic water quality mixing from different sources: Continuous system for optimization of the water quality mix from different sources will be developed and implemented. Grey-box models and optimisation software developed in WP3 will be applied to the conjunctive management of alternative water sources, achieving a more efficient water management system.

B) Smart Network implementation for water security and enhanced efficiency [D5.5, D5.6]:

A tool based on Simulated Annealing will be used to define the best position of flow meters and boundary (or gate) valves, inserted along the boundary pipes between districts previously determined, to provide the configuration parameters for pressure regulation valves to reduce water losses and improve energy efficiency. With strategic positioning, virtual district meter areas (DMAs) will be established between meters.

- Pressure Driven Analysis will allow smart pressure management to improve service and energy efficiency using real-time data and network optimization. Energy efficiency is improved by a specific algorithm for monitoring and control of pressure, optimizing water production and pumping costs to introduce only the energy needed to transport the fluid. It will be possible to manage shapefiles with the geometric and hydraulic information about the water supply network and loading geospatial image.

- The optimal position of innovative sensors and the automation of valves and escalating actions will allow isolation of DMAs preventing the spread of the contamination, while allowing the reduction of water losses.

C) Demand Prediction

Demand prediction models will be implemented in Denia, optimizing operation and the clustering of consumption of stakeholders through prediction models relating it to other variables (socioeconomic, climate, etc.). Demand patterns for different time scales will be identified through data mining, and the correlation with the several factors influencing demand will be analyzed (network pressure, type of consumer, consumption habits, weather) leading to future policies in flexible pricing, social behavior and personalized campaigns. This information will feed a decision support system to optimize the operation of the system, and will be used for optimal control of the WDS and economics-based coordination. D) Optimal control of water cycle entities and validation of supply-demand coordination strategies [D5.7, D5.8]. Proving the modularity and scalability of the optimal control software developed in WP3, and in line with the concept of the platform in WP3 software modules will be installed and tested in decentralized platforms on top of existing Scada. The optimal control procedures will be implemented in a DSS configuration, by keeping operators in the loop for checking the correct computations of different variables.

E) Interactions between water cycle entities, regarded by the supply-demand functions (T3.6) will pursue enabling global economic and environmental optimum for the water cycle operation. REWAISE platform will be prepared and matched via developed convex programming routines. Returning coordination signals will be fed back to reshape the optimized interaction variables. Flexibilities in electricity consumption will be established to show possible high gains and reductions and overall operational costs. Balance accounts on the platform will be established in accordance with the architecture [T3.2]. After the coordination is stable, relevant stakeholders will be involved.

F) Holistic vision of the Water cycles at Denia/Levante. The methodological tool developed in T3.7 will be implemented here, aiming to assess the impacts that any change in any water entity has on the total cycle, upstream and downstream. At Denia, exploratory data analysis will be performed to: i) discover trends and patterns in water usage; ii) assess the performance of the system; and iii) define operational goals. Sustainability KPI proposed by the EAE will be selected to address the 3 pillars: economic, social and environmental.

T5.2 – Salamanca (Spain) Living Lab [M 25-M60] [Leader: AQUA. Participants: CETIM] [D5.5, D5.6, D5.7] Divided in 5 subtasks.

ST5.2.1: Energy recovery [M25 -M60] [Leader: AQUA] To recover energy in meat industry from slaughterhouses by implementing the co-AD, co-financed with other projects and utility investments:

- Construction, installation and operation of co-AD to recover the biomethane contained in the WW.

- Upgrading the biofuel through an absorption/adsorption process using wastewater as absorbent for sustainable mobility to evaluate the effectiveness of the process to obtain bio-CNG from biogas in co-AD.

- Evaluation of the biofuel quality to promote sustainable mobility initiatives and injection in green biogas grids.

- Validation of 10 m³/h of biofuel in a CNG car exclusively powered by the biofuel produced during 40,000 km (saving 3.7 t eq. CO₂ per year) and evaluating digestate for soil amender.

ST5.2.2: Nutrient recovery [M25 -M48] [Leader: AQUA]: Nutrients recovery (struvite/vivianite) unit will be constructed and operated to obtain 112.5 t/yr of biofertilizer (saving 1.15kg eq.CO₂/kg from sludge/fats landfilling), co-financed with other projects and utility investments. Magnesium salts needed for phosphorous precipitation will be obtained in ST5.1.2 and transferred from Denia to Salamanca living lab. This will be the first experience on minerals recovery from desalination and utilisation as reagent to obtain fertilizers via nutrients recovery from WW. A local biofertilizer company (MIRAT Fertilizantes, see LoS) will validate the quality of fertilizers obtained. They expect at least 8 supply agreements in Europe by end of 2023. 10% of customers are willing to buy the new biofertilizer. The validation of the prototype/bioproductions will be complete to demonstrate this is an integrated, flexible, cost-effective and adaptable solution, easy to replicate in EU [D5.9].

ST5.2.3: Ammonia Conversion [M36-M56] [Leader: AQUA] [D5.10]: Participants: STW, UCOV. Using the technology developed in ST 2.2.1 to concentrate ammonia and convert it to H₂, and in collaboration with ST 6.1.3, a demo system will be installed and operated at the Salamanca WWTP to evaluate the parameters under different inflow and operating conditions, optimising bio-energy and fertilizer values.

ST5.2.4: Bioproducts [M37-M54] [Leader: CETIM] [D5.10] To obtain biopolymers (PHA) from slaughterhouse WW, the feasibility of bioproducts under real conditions is evaluated, reporting the yield PHA in deliverable D5.11. Under this ST, biopolymer plant constructed in ST2.3.3 will be transported and installed at Salamanca for a 15-mo validation. The enriched microbial consortium obtained after long-term operation at Cantabrian Living Lab will be used as inoculum to re-start the plant with a higher organic load from industrial WW.

ST5.2.5: Algae blooms (M12-M60) [AQUA, HIDROTEC] [D5.11]: prediction modules for algae blooms developed in WP3 will be adapted and implemented in the reservoirs of Salamanca/Avila for validation. Ávila City Council is supplied by three reservoirs with recurrent algae blooms issues. One reservoir will be monitored for the validation of the models. The implementation of the hydrological prediction models developed in T3.4 at the basins in Avila will also allow for further planning of Avila supply system management in the medium term.

ST5.3 – Extremadura (Spain) Living Lab [M12-M60] [Leader: AQUA] [D5.13, D5.14]. The objective of this task is to adapt the water treatment to changing conditions, and prevent degradation of reservoirs. Divided in 3 subtask (ST),

ST5.3.1: New strategies in DWTP [M16-M54] [Leader: AQUA] [D5.12]. (i) Biological pre-Treatment using biofilters to reduce the organic matter content (THM precursors); (ii) Replacing the use of hypochlorite in sand filters with other disinfectant (i.e. ClO₂) to avoid long contact times of NaClO with THM precursors; (iii) Other treatments: Evaluate alternative treatments with NF, UF and ceramic membranes.

ST5.3.2: New strategies in DW distribution system [M16-M40] [Leader: AQUA] Development of a low- energy desorption system in the distribution network to remove the high volatile THMs formed along the long pipelines in Extremadura region. Models of THM formation and its distribution along the pipes will be developed to minimize the amount of THM in water [D5.13].

ST5.3.3 Smart Reservoir Management Extremadura [M12-M60] [Leader: AQUA] The Ministry for the Ecological Transition and Sustainability of the Junta de Extremadura (see LoS) supplies approximately 25% of the population of the region. Continuous degradation of the quality of reservoir's water quality has long been observed, having to use increasingly sophisticated procedures (ozone, active carbon filters, etc.) for the treatment of drinking water. Aware of the need to reverse this situation, the Junta is promoting a project of over 30M€, focused mainly on watersheds and reservoirs. In these reservoirs the appearance of algae "blooms" is increasingly common, being potentially toxic to certain environmental conditions. Aligned with the activities, the modules developed in WP3 regarding the prediction of algae bloom will be implemented at the reservoir in Extremadura. Prediction modules and monitoring will allow early detection of algae bloom, allowing a better control and operation and improving water quality at the reservoir. Control devices will be also studied for disinfection.

Participation per Partner

Partner number and short name	WP5 effort
1 - AQUA	99.00
6 - HIDRO	43.00

Partner number and short name	WP5 effort
8 - POLY	12.00
9 - RESA	5.00
11 - APOR	7.00
14 - SOLWA	27.00
18 - UNIZ	20.00
19 - CETIM	13.00
24 - UNIPA	17.00
Total	243.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D5.1	#1 Low energy desalination units - implementation	14 - SOLWA	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D5.2	# 2 Low energy desalination units – operation	14 - SOLWA	Other	Confidential, only for members of the consortium (including the Commission Services)	60
D5.3	# 1 Minerals recovery demonstration units – implementation	24 - UNIPA	Other	Confidential, only for members of the consortium (including the Commission Services)	42
D5.4	# 2 Minerals recovery demonstration units – operation	24 - UNIPA	Other	Confidential, only for members of the consortium (including the Commission Services)	54
D5.5	#1 Smart Water System at Denia. Control strategies for water entities – definition	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D5.6	# 2 Smart Water System at Denia. Control strategies for water entities - evaluation	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	58

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D5.7	#1 Optimal control for WDS, WTP, full scale – implementation	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D5.8	# 2 Optimal control for WDS, WTP, full scale – operation	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D5.9	Industrial integration demonstration -	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D5.10	Fertilizers and bioproducts production units	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D5.11	Early Warning System EWS for Algae bloom	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D5.12	New strategies for Drinking water production.	11 - APOR	Report	Confidential, only for members of the consortium (including the Commission Services)	45
D5.13	Prediction models for THM/ quality	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	36

Description of deliverables

D5.1 #1 Low energy desalination units – implementation
 D5.2 # 2 Low energy desalination units – operation
 D5.3 # 1 Minerals recovery demonstration units – implementation
 D5.4 # 2 Minerals recovery demonstration units – operation
 D5.5 #1 Smart Water System at Denia. Control strategies for water entities – definition
 D5.6 # 2 Smart Water System at Denia. Control strategies for water entities - evaluation
 D5.7 #1 Optimal control for WDS, WTP, full scale – implementation
 D5.8 # 2 Optimal control for WDS, WTP, full scale – operation
 D5.9 Industrial integration demonstration
 D5.10 Fertilizers and bioproducts production units
 D5.11 Early Warning System EWS for Algae bloom

D5.12 New strategies for Drinking water production.
D5.13 Prediction models for THM/ quality
D5.1 : #1 Low energy desalination units - implementation [36]
Demonstration of the exploitation of saline water sources reducing energy needs by a factor of 8 by operating a chain of demo units: CDI IS12, Reverse Osmosis, CDI system, EDBM and post-treatment. Task related:T5.1-ST5.1.1
D5.2 : # 2 Low energy desalination units – operation [60]
Demonstration of the exploitation of saline water sources reducing energy needs. Task related:T5.1-ST5.1.1
D5.3 : # 1 Minerals recovery demonstration units – implementation [42]
Selective precipitation to produce table salt and Mg(OH)2. Task related:T5.1-ST5.1.2
D5.4 : # 2 Minerals recovery demonstration units – operation [54]
Selective precipitation to produce table salt and Mg(OH)2. Task related:T5.1-ST5.1.2
D5.5 : #1 Smart Water System at Denia. Control strategies for water entities – definition [36]
Smart Network implementation for water security and enhanced efficiency Task related:T5.1-ST5.1.3
D5.6 : # 2 Smart Water System at Denia. Control strategies for water entities - evaluation [58]
Smart Network implementation for water security and enhanced efficiency Task related:T5.1-ST5.1.3
D5.7 : #1 Optimal control for WDS, WTP, full scale – implementation [36]
Optimal control procedures implemented in DSS configuration, by keeping operators in the loop for checking the correct computations of different variables. Task related: T5.1 (ST5.1.3)
D5.8 : # 2 Optimal control for WDS, WTP, full scale – operation [58]
Optimal control procedures implemented in DSS configuration, by keeping operators in the loop for checking the correct computations of different variables. Task related: T5.1 (ST5.1.3)
D5.9 : Industrial integration demonstration - [55]
first experience on minerals recovery from desalination and utilisation as reagent to obtain fertilizers via nutrients recovery from WW. Task related:T5.2-ST5.2.2
D5.10 : Fertilizers and bioproducts production units [55]
Two units will be demonstrated. The first of them is a demo system operation at Salamanca to concentrate ammonia and convert it to H2 to optimize bio-energy and fertilizers. The other one will demonstrate the operation in Salamanca of the biopolymer plant with a higher organic load from industrial WW. Task related:T5.2 (ST5.2.3 and ST5.2.4)
D5.11 : Early Warning System EWS for Algae bloom [48]
Adaptation and implementation of models and prediction modules developed in WP3 in the reservoirs of Salamanca/ Avila for validation. Task related: T5.2 (ST5.2.5)
D5.12 : New strategies for Drinking water production. [45]
New treatments to obtain fresh water by reducing the organic matter content and avoiding long contact times of NaClO. Task related: T5.3 (ST5.3.1)
D5.13 : Prediction models for THM/ quality [36]
Development of a low- energy desorption system in the distribution network to remove the high volatile THMs formed along the long pipelines in Extremadura region. Task related: T5.3 (ST5.3.2)

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS5	Pretreatment and desalination process in operation	1 - AQUA	40	LL Denia running

Work package number ⁹	WP6	Lead beneficiary ¹⁰	2 - STW
Work package title	Atlantic Hub		
Start month	7	End month	60

Objectives

This WP implements processes developed in WP 2/3 and validates them in 3 living labs
 In the Midlands (UK): a) Ammonia scrubbing and H2 bio-energy demonstration b) integrated approach to leakage detection, c) smart WW networks for asset stretching.
 in Vigo (ES): a) recover water, energy and nutrients by sewer mining with AnMBR b) Ultrafiltration membrane in potable water and c) digital water system
 in Cantabria/Asturias: a) self sufficient WWTP b) Optimization control including FIWARE modules
 Interaction with other WPs- WP 2 & 3 are the inputs to the demo sites, which in turn feed the data analysis of WP 7, the market development of WP 8 as well as the governance and social participation activities of WP 9.

Description of work and role of partners

WP6 - Atlantic Hub [Months: 7-60]

STW, AQUA, HIDRO, POLY, APOR, EMS, UVAL, UNIZ, CETIM, COVU

T6.1 – Smart Midlands (UK) Living Lab [M7-M50] [Leader: STW. Participants: EMS; COVU]

ST6.1.1: Leakage detection module [M7-M43] [Leader: STW; Participants: EMS] [D6.1, D6.2, D6.3]: Development of smart solution which first records, optimize and then automates valve operations. Outputs will be used for the smart networks in Midlands and Mediterranean/atlantic hub. The following tasks will be performed:

- Implementation of a live trial of fiber as a means of leakage detection, followed by a trial to investigate other potential uses of fiber including other parameters and data transfer.
- Implement a live trial of a no dig leakage repair technique and deploy into business as usual.
- A smart meter trial with latest communication protocols is deployed, comparing results from other trials at different hubs to analyse jointly how to best use smart meter data to enhance operational decision making
- Monitoring of smart solution which records valve operations; optimises valve operations and then can automate valve operations. Solutions will be shared with results obtained at other hubs (Mediterranean)
- Evaluate network management solutions to analyse and present data on a single user interface to enable consistent and effective prioritisation of issues, capable of bringing together data from existing systems and new smart technologies which are being trialled and delivered as part of this WP.
- Work with Watchtower <https://www.wtrco.com> (robot scouts) on developing a leakage robot to be brought to market over the next three years. It will be benchmarked against other traditional and robotic technologies.

ST6.1.2: IWAN Smart Wastewater Management [M7-M37] [Leader: EMS] [D6.4]: The objective is to demonstrate the power of IWANs in addressing hydraulic capacity issues in wastewater networks. Expected results include:

- 1) Reduce local flash flooding; 2) Pumping station control, regarding these as another 'Flow Control Device'; 3) Smoothing flow profiles into energy intensive assets (pumping stations, treatment works). Unlike A and B this can be a dry-weather-flow as well as a wet-weather-flow application. Activities in this subtask will be:
1. Develop methods to select multiple Flow Control Device (FCD) locations, work in unison on several Targets
2. Multi-objective Control Algorithm(s) that allow FCDs to hydraulically interact to act on several Target Sites
3. Modelling of multiple FCDs acting on multiple Target Sites.

There will be an initial field deployment, followed by a further demonstrator deployment.

ST6.1.3: Ammonia recovery and hydrogen generation [M10-M49] [Leader: STW, Participants: COVU] [D6.3 5]: Objectives are ammonia scrubbing and electrolyser demonstrators running at the STW Spenall Living Lab in the U.K., processing centrate WW (5m3/d scale) to recover ammonia and generate 'green' hydrogen. Results will be a purified ammonia-based electrolyte, nitrogen and hydrogen. Activities in this subtask will be:

- Design and build a skid mounted filtration and packed tower unit complete with transfer pumps, control panel and instrumentation based on the design in ST2.2.2.
- Design and build a skid mounted electrolyser complete with pumps, control panel and instrumentation for ammonia electro-oxidation and hydrogen generation.
- Perform a HAZOP study to identify and evaluate problems that may represent risks to personnel or equipment.
- Deliver installation and integration of the ammonia scrubbing and electrolyser units. Assess performance of electrolyser with ammonia electrolyte produced centrate [COVU and STW]
- Technical - economic assessment of overall process [COVU, STW].

T6.2 – Smart Vigo (Spain) Living Lab [M13-M55] [Leader: AQUA. Participants: POLY, UVAL]

The objective of this task is to integrated Sewer Mining, Drinking Water filtration and smart network management

ST6.2.1: Nutrient Recovery for High Performance Fertilizer - AnMBR for Sewer Mining [M13-55] [Leader: AQUA] [D6.4 6, D6.7]: Objective is to recover water, energy and nutrients contained in WW by combining sewer mining with AnMBR. To evaluate its potential for on-site recycling and reuse, a relevant industrial park in Balaidos was selected, where PSA Peugeot-Citroen has one an important, innovative and efficient car factory (>1000 cars/d production capacity), hosting 9000 workers and 10 companies are installed in the industrial premises.

The main sewer of the industrial area will be the source of WW to be diverted to an anaerobic bioreactor where organic matter will be transformed into biogas. This on-site treatment recovers both water and energy while keeping nutrients in AnMBR permeate. Up to 500 m³/d of WW will be treated in an AnMBR demo-unit, monitoring reuse water quality and the KPIs to optimize the operation by minimizing membrane fouling and biosolids production through automation and control. With the results a global balance of the factory will evaluate market potential of multiple products (water, energy, fertilizer), as well as its social, economic and environmental benefits located close to its possible use for irrigation, cleaning, cooling or process water.

A) Design and construction of the AnMBR unit [Leader: AQUA; Participant: UVAL] Design and construction of AnMBR to treat up to 500 m³/d of urban WW generated by the industrial site workers, starting with its thorough characterization (flow and quality: solids, COD, nutrients, microcontaminants and microplastics). Detailed engineering of the plant will be elaborated by AQUA, purchasing and assembling the different elements.

B) Start-up, operation and optimization of the AnMBR unit [Leader: UVAL; Participant: AQUA] Once built and installed, the AnMBR performance will be optimized in terms of resource recovery (energy, nutrients and water) and environmental impact (e.g. human health, ecosystems and resources). Since membrane fouling is a key issue for economic and environmental feasibility, this parameter will be continuously monitored, while testing operating and cleaning strategies for membranes. (KPI for means of verification: Fluxes in AnMBR > 10 and up to 20 LMH, OLR > 1 and up to 2 kg COD/(m³ d) at ambient temperature, Decrease in CO₂ emissions compared to CAS: up to 70% decrease, Decrease in biosolids production: > 50% and up to 70% decrease).

C) AnMBR resource recovery potential assessment [Leader: AQUA; Participant: UVAL] Reuse potential of AnMBR permeate will be assessed with the site owner and PSA Peugeot to determine the needs and reuse potential of water, nutrients and energy. AnMBR does not remove phosphorous and nitrogen, yielding a valuable effluent for direct reuse especially in green areas (fertirrigation). Effluent use for cooling, washing and cleaning, even process water (e.g. for car painting) will be assessed, as will resource recovery under economic and environmental perspectives, such as feasibility of using biomethane for existing air conditioning devices running on natural gas.

D) Bio-Methane recovery for green gas grid [M29-M55] [Leader: UVAL. Participant: AQUA]: Objective is recovery biomethane for green gas grid. Activities in this subtask will be:

- Recovery of dissolved methane in AnMBR permeate through an adequate combination of stripping and membrane degasification, to avoid negative environmental impacts and enhance economic return. Previous tests in pilots must be scaled-up further to optimize the economic and environmental balance of AnMBR.
- Biogas produced needs to be conditioned, to remove Sulphur compounds, siloxanes, water, etc. and protect the downstream units. Low cost solutions for biogas upgrading developed by AQUA within a FP7 project (www.allgas.eu) will be compared (ABAD patent) to other simple solutions for low gas flows.

ST6.2.2 Digital system management [LEADER: AQUA] PARTICIPANT: (HIDRO) [M13 – M55] [D6.8] Taking advantage of the Continental Developments, a Digital Twin for the distribution network/other water entity will be developed and implemented. Data analytics will optimize the entity by creating alarms and notifications based on best practice operations already set forth in system design. Storage tanks time of operations will be optimized based on energy price optimization. Optimization based on blackout situations and water scarcity will be implemented.

ST6.2.3: Optimization of UF in potable water [M13-M48] [Leader: POLY] [D6.9]: Objective is the treatment of Surface water that is impaired by the reduced precipitation, higher temperatures and contamination caused by climate change. New Membranes will be demonstrated for efficient separation, and concentration of the coagulants to recover Fe and Al contained in DWT residuals (sludge). The recovered products will be reused as: i) Coagulant for WWT, and subsequent use of the biosolids for composting (fertilizers) (ii) Biogas cleaning by H₂S removal in digestors of WWT or farm residue.

T6.3 – Cantabrian/Asturias (Spain) Living Lab [M18-M60] [Ld: AQUA. Participants: APOR, CETIM, HIDRO, UNIZ]

The objective of this task is demonstrating resource recovery options in the Living Lab Divided in 3 subtasks (ST).

ST6.3.1: Asturias: Water, energy and microplastics recovery from diluted WW [M18-M54] [Leader: AQUA Participants: POLY]: The objective is to recover the energy contained in WW and other industrial biowastes to obtain self-sufficient WWTP and biofuel for green-vehicles by using anaerobic digestion (co-AD). The activities will be coordinated with the demonstrator at Skåne (SE) living lab since both sites present similarities with T4.3. Here, direct filtration strategy will be also implemented and combined with an innovative solution for diluted water management developed in WP3. In addition, valuable materials such as nutrients and microplastics will also be recovered. Results

will be a new generation of WWTP with close to zero waste. Activities are co-financed with other projects and utility investments:

- Enhanced primary treatment by pile cloth media, microsieving and ozonized microfiltration. This new multibarrier unit will recover nutrients and organic matter, as well as retain microplastics efficiently.
- Implementation of MABR and AOP photocatalysis in tertiary treatment to remove soluble components remaining from the primary treatment, and guarantee an excellent chemical and microbial quality for reuse.
- Operation of Co-AD and optimization of the feed mixtures to obtain self-sufficient energy from the organic matter recovered in the enhanced primary treatment.
- The resulting aqueous stream from co-AD will be processed in a membrane contactor to recover nutrients as a biofertilizer (ammonium nitrate), assessing the efficiency of separation and quality of the recovered biofertilizer.
- An absorption/adsorption process using WW as absorbent will produce green biofuel for sustainable mobility, and evaluate process effectiveness to obtain bio-CNG for self-sufficient WWTP and to power vehicles

ST6.3.2: Asturias Smart network [M25-M60] [Leader: AQUA, Participants: HIDRO, UNIZ]:

A) Optimal control and integrated water management [D6.10]: Infiltration detection system (of seawater, fresh water, etc.) will be studied and implemented to avoid/minimize the entrance of very diluted water into the WWTP. Linked to this, top-level grey-box modelling will be performed for the Cantabrian/Asturias WWTP, in a DSS configuration. The system will be upgraded with the installation of any required additional sensor. Defined KPIs will be used to track progress and savings.

B) Adaptation and connection of existing FIWARE modules. Santander Smart city where ICT developments have been carried out through FIWARE infrastructure will be the basis in order to learn, adapt and connect FIWARE modules to the platform. New FIWARE modules will be developed or implemented and validated at the Cantabrian site in order to prove the modularity of the solutions and its replicability.

C) Validation of socio-economics-based coordination. The software modules will be extended with computations of supply and demand functions to enable interaction between the relevant stakeholders, enabling a global economic and environmental optimum for the water cycle operation. Preparation campaigns will be a part of WP9, to enrol these additional actors. The platform will connect supply-demand functions, collected and matched via developed convex programming routines and fed back to the WWTP.

ST6.3.3: Asturias: Biopolymers and Solids Regeneration [M25-M40] [Leader: CETIM] [D6.11]: Objective is to obtain biopolymers (PHA) from the sludge produced on WW, demonstrating the feasibility of bioproducts at WWTP under real conditions, and achieving a high-yield & stable PHA production tested under real conditions. Under this ST, the pilot plant for biopolymer production will be transported and installed at Oviedo (NW Spain), for a 15-mo. validation using sludge from WWTP as substrate for PHA production. The pilot will be inoculated with an MMC obtained from activated sludge from WWTP, and will be subjected to the same selection procedure than at lab scale. Reactor operation will be optimised to maximise PHA production. Operational parameters (COD, N-NH₄, PHA production, etc.), energy consumption and biopolymer characteristics will be continuously monitored to evaluate the effectiveness of the organic matter conversion into biopolymers. Once validation at Oviedo is ended (M40), pilot plant will be transported to Salamanca [ST5.2.3] for a second operation period under an industrial WW effluent as substrate. Results obtained will be discussed and compared.

Participation per Partner

Partner number and short name	WP6 effort
1 - AQUA	87.00
2 - STW	62.00
6 - HIDRO	27.00
8 - POLY	4.00
11 - APOR	5.00
13 - EMS	56.00
16 - UVAL	15.00
18 - UNIZ	20.00
19 - CETIM	6.00

Partner number and short name	WP6 effort
20 - COVU	7.00
Total	289.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D6.1	Smart meters and consumer consumption	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	18
D6.2	#1 Leakage detection module - development	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D6.3	#2 Leakage detection module - evaluation	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	43
D6.4	Demonstrator deployment of IWAN	13 - EMS	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D6.5	Installation, commissioning and field testing of hydrogen stripping unit for electrolyte generation	2 - STW	Report	Confidential, only for members of the consortium (including the Commission Services)	42
D6.6	#1 Construction and optimization of AnMBR	16 - UVAL	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D6.7	# 2 Control of AnMBR, performance outputs	16 - UVAL	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D6.8	Smart Digital Water system and Early Warning EWS	1 - AQUA	Report	Confidential, only for members of the consortium (including the Commission Services)	52

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D6.9	UF Ultrafiltration	8 - POLY	Report	Confidential, only for members of the consortium (including the Commission Services)	30
D6.10	Optimal control procedures for water coordination	18 - UNIZ	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D6.11	Biopolymer production at WWTP	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	40

Description of deliverables

D6.1 Smart meters and consumer consumption
D6.2 Leakage detection module - development
D6.3 Leakage detection module - evaluation
D6.4 Demonstrator deployment of IWAN
D6.5 Installation, commissioning and field testing of hydrogen stripping unit for electrolyte generation
D6.6 #1 Construction and optimization of AnMBR,
D6.7 # 2 Control of AnMBR, performance outputs
D6.8 Smart Digital Water system and Early Warning EWS
D 6.9 UF Ultrafiltration
D6.10 Optimal control procedures for water coordination
D6.11 Biopolymer production at WWTP

D6.1 : Smart meters and consumer consumption [18]
Development of smart solution which first records, optimize and then automates valve operations. Task related: T6.1-ST6.1.1

D6.2 : #1 Leakage detection module - development [24]
Implementation of leakage detection technologies and network to evaluate management solutions. Task 6.1 (ST6.1.1)

D6.3 : #2 Leakage detection module - evaluation [43]
Implementation of leakage detection technologies and network to evaluate management solutions. Task 6.1 (ST6.1.1)

D6.4 : Demonstrator deployment of IWAN [36]
The objective is to demonstrate the power of IWANs in addressing hydraulic capacity issues in wastewater networks. Task related:T6.1-ST6.1.1

D6.5 : Installation, commissioning and field testing of hydrogen stripping unit for electrolyte generation [42]
Objectives are ammonia scrubbing and electrolyser demonstrators running at the STW Spenall Living Lab in the U.K., processing centrate WW (5m3/d scale) to recover ammonia and generate 'green' hydrogen. Task related:T6.1-ST6.1.3

D6.6 : #1 Construction and optimization of AnMBR [36]
WW treatment in an AnMBR demo-unit, monitoring reuse water quality and the KPIs to optimize the operation by minimizing membrane fouling and biosolids production through automation and control. Task related:T6.2-ST6.2.1

D6.7 : # 2 Control of AnMBR, performance outputs [55]

WW treatment in an AnMBR demo-unit, monitoring reuse water quality and the KPIs to optimize the operation by minimizing membrane fouling and biosolids production through automation and control. Task related:T6.2-ST6.2.1

D6.8 : Smart Digital Water system and Early Warning EWS [52]

A water system will be modelled, utilizing data from different sources with a constant stream of data for a continuous calibration. The demo will include simulation from different scenarios to prove the support of better decision, leading to better outcomes. Task related:T6.2-ST6.2.2

D6.9 : UF Ultrafiltration [30]

Ultrafiltration technology for diluted water treatment and recovery of nutrients. Task related: T6.2 (ST6.2.3)

D6.10 : Optimal control procedures for water coordination [55]

Optimal control software installation on the platform on top of existing Scada, tested in simulation with the developed models and predictions. Task related:T6.3 -ST6.3.2

D6.11 : Biopolymer production at WWTP [40]

The pilot plant for biopolymer production will be transported and installed at Oviedo and inoculated with an MMC obtained from activated sludge from WWTP. Reactor operation will be optimised to maximise PHA production. Task related:T6.3-ST6.3.2

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS6	Scenario analysis and indicators of IWAN	2 - STW	24	Deployment specs. ready

Work package number ⁹	WP7	Lead beneficiary ¹⁰	19 - CETIM
Work package title	Analysis of KPIs, LCCA and Risk Assessment (ETV)		
Start month	6	End month	60

Objectives

- KPI selection and evaluation in order to track and check process performance in REWAISE concepts.
 - Determine the environmental impact of REWAISE concept by LCA, including C footprint.
 - Assess risks and vulnerabilities of water systems, including physical, regulatory and reputational risks.
 - Assess the achievement of zero-carbon water cycle services accomplished by REWAISE approach.
 - CBA of economic value in water (recovering energy and materials) taking into account the cost of REWAISE
 - Increase market potential of the most advanced technical innovations (TRL >8) by third party ETV.
- Interaction with other WPs: WP7 will interact with all of WPs. Continuous bidirectional data flow will be established between WP7 and the LL in WPs 4,5,6. Furthermore, the results from WP7 will feed WPs 8 and 9.

Description of work and role of partners

WP7 - Analysis of KPIs, LCCA and Risk Assessment (ETV) [Months: 6-60]
CETIM, AQUA, STW, VASYD, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, IETU, UVAL, UNIZ, COVU, LUND, PUT

T7.1 – KPI Monitoring including the RRI approach [M6-M60] [Leader: CETIM. Participants: AQUA, STW, VASYD, SMVAK, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, IETU, UVAL, UNIZ, COVU, LUND, PUT] [D7.1]. Critical KPIs will be addressed to define, track and check optimisation in REWAISE concepts. KPI definition is supported by SAB, The SEEC and the rest of the partners, to be clustered in different categories:

- 1) Water quantity: measuring the reduction of freshwater abstraction and decrease of wastewater discharge
- 2) Water quality: assessing the improvements in chemical and biological water streams status
- 3) Environmental sustainability and efficiency, measured through indicators such as: electricity and chemicals use per unit of treated WW; reuse water, energy and materials recovered per WW stream input; production potential; resources consumption per unit of product/energy/water obtained; wastes generated per unit of product.
- 4) Economic and finance sustainability: to make sure REWAISE activities are economically sustainable through: profitability; cash flow; mobilized investment; investment evaluation; CAPEX & OPEX; expected sales
- 5) Society and governance, evaluates: regulation changes; water savings by responsible behaviour; innovation deals, frequency of undesirable events; response time to disruptions; share of water/WW bill in household expenses

KPIs will benchmark the obtained products with those existing in the market to optimise productivities and boost market uptake. Main KPIs will be identified in [M10] but modified along the project, according to the results.

IETU will be involved in KPI definition but excluded from tracking process optimisation to ensure impartiality.

To verify that RRI is transversally undertaken a set of specific indicators will be developed in [M6], divided in different dimensions of the RRI approach: Open science [WP1,2,3,4,5,6,7], ethics [WP1, WP9], governance [WP9], women [WP1, WP8, WP9] and participation [WP9, WP1] assessed in a yearly basis.

T7.2 – Environmental Assessment and Monitoring [M6-M58] [Leader: CETIM. Participants: AQUA, STW, VASYD, SMVAK, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, IETU, UVAL, UNIZ, COVU, LUND, PUT] [D7.2, D7.3]. Environmental impact of REWAISE water ecosystem will be addressed using LCA methodology under a holistic approach that would involve LCA into decision making, assessing environmental impact of each process and providing a continuous flow of information along the project. Based on this, the consortium will develop an interactive LCA, from the development of the different technologies [WP2-WP3] to its implementation in the HUBs [WP4-6], in order to serve, not only as monitoring but as DSS to achieve zero-carbon objective. Special focus will be made on energy demand; C footprint and the recovered substances (minerals, nutrients, bioCH₄...) in order to assess REWAISE value generation through water. References of existing benchmarks will be compared in sustainability with the new approaches in order to demonstrate REWAISE contribution in transition to a sustainable water sector. Geographic characteristics of each Hub will be also taken into account, as well as a wide set of environmental categories (human toxicity, atmospheric pollution, ecotoxicity, etc.). Interactive LCA will be carried out following ISO 14040 & 14044 and the ILCD Handbook from European Platform on LCA (JRC-DG Environment). Living labs' results, KPIs and information from partners will be the primary input of LCA, requiring collaboration from the entire consortium and LCA databases (Ecoinvent v3.5, ELCD, etc.) and literature will be used to complete the primary project inputs. Simapro 9 will be used as support tool for the LCA. Results from this task will be used as inputs for T.7.3, costing [T7.4], and ETV [T7.5].

T7.3 – Management of water related risks & vulnerabilities [M14-M58] [Leader: CETIM. Participants: AQUA, STW, VASYD, SMVAK, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, IETU, UVAL, UNIZ, COVU, LUND, PUT] [D7.4, D7.5]. This task will evaluate the risks and vulnerability of water systems. According to the OECD, major physical risks related to water are: (a) risk of too much (flooding), (b) too little (scarcity) and (c) unfit for use water (pollution), apart from (d) disruption of treatment systems. In addition, regulatory risks (changing, ineffective, poorly implemented, or inconsistent policies) and reputational risks (how stakeholders view real or perceived impacts on water resources, health and wellbeing of workers, aquatic ecosystems, and communities) will be considered. Physical risks is assessed with the support of modelling tools and indicators such as: occurrence of floods and droughts, net water depletion, aridity, groundwater over-abstraction, impact of climate change, pollutants loading, water and soil situation in the area, access to DW and WW services. From the results of risk assessment, identified water related risks will be handled and, if necessary, corrective measures and mitigation strategies will be proposed. Risk analysis and handling will include analysis of potential leakages and flooding events.

T7.4 – LCC, economic performance [M6-M58] [Leader: CETIM. Participants: ALL except IETU] [D7.6, D7.7] This task will quantify the total economic cost of REWAISE solutions along all stages. CBA of economic value in water (recovering energy and materials) will be performed over system lifetime using Value Sec BCA model and socio-economic impact analysis model. The starting point of a CBA is the identification of relevant cost and Benefit categories of all units and processes (i.e. investment, installation, use and disposal costs), further gathering of related cost data defined in monetary units. Results obtained from CBA will be shown in indicators like CAPEX / OPEX, benefit cost ratio (BCR), payback time and net present value (NPV). According to Directive 2014/24, LCC approach will include both the costs directly associated to the product or process and externalities associated to them (GHG gases, pollutant emissions...). These externalities will be calculated from the results obtained at LCA [T7.2], applying reliable monetisation factors. According to EU's 7 Action Programme recommendations, at least these 4 externalities will be considered (Human health, Ecosystem, Resource Available and Climate Change). Key impacts considered are potential for jobs creation and/or new SMEs due to effective market uptake of new solutions, or contribution to local economy and resources, evaluating the generation of value from water. The economic assessment will be completed at the end with available data from all LL to quantify all indirect economic impacts. The indicators will be compared with base case values to determine if REWAISE is meeting its targets, the acceptance of the project technology, etc.

T7.5 – Environmental Technology Verification, ETV [M24-M58] [Leader: IETU Participants: ANET, AQUA, STW, CETIM] To facilitate the market uptake of REWAISE innovations, an assessment of their performance will be provided by Environmental Technology Verification (ETV).

ST7.5.1: Feasibility study of REWAISE technologies for ETV [M36-M48] [Leader: IETU; Part: AQUA, STW, VASYD, SMVAK, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, CETIM, UVAL, UNIZ, COVU, LUND, PUT] [D7.8] An ETV feasibility study will be made for solutions likely to achieve $TRL \geq 7$ in the project, to determine its eligibility for a full ETV. Eligibility criteria (EU ETV GVP & EN-ISO 14034:2018) take into account market readiness, IPR, regulatory requirements, market relevant claim, test protocols and inputs from WP8. The study will be based on a questionnaire and interviews with technology providers and users from the hubs, available test data from the LL, site visits and the KPIs defined in [T7.1]. A workshop will be organised in M42 to summarise the feasibility results and build capacity among SMEs offering the assessed technologies on ETV. The feasibility study will define parameters to be investigated in view of verification (test data collection) as well as for exploitation strategy of these technologies and will provide support and guidance on next steps to technology providers.

ST7.5.2: ETV of the selected technologies [M48-M58] [Leader: IETU. Participants: AQUA, STW, VASYD, SMVAK, ANET, ENOLL, BLUE, APOR, WE&B, EMS, SOLWA, CETIM, UVAL, UNIZ, COVU, LUND, PUT] [D7.9]: Most advanced technologies from each hub (TRL 8-9) will be verified under the EU ETV, based on the previous feasibility study [7.5.1]. Three technologies are pre-selected: Continental Hub: Recovery of nutrients by struvite precipitation [ANET]; Mediterranean Hub: Energy recovery by AnMBR [AQUA]; Atlantic Hub: Leakage control [STW]. In conjunction with the workshop planned in [ST7.5.1] a separate training session will be organised for partners involved in ETV to define parameters and methodology requirements.

An ETV application form will be developed for each technology including the intended application, performance and all relevant data to support performance claim of the technology, including the assessment of the environmental added value based on results from LCA [T7.2] and KPI defined in [T7.1]. Based on the assessed and agreed applications, specific verification protocols (SVP) will be developed by ETV Body IETU and suppliers with the support of R&D partners involved in the demo. Parameters to be verified will be also defined in SVP and qualitative and quantitative test data requirements will be specified to ensure its validity. Test data acquired prior to application will be assessed. If needed, new test data will be produced by accredited laboratories upon approval of ETV Body IETU and based on test plans developed, to be audited and assessed by ETV Body IETU. For each verified technology, IETU will produce a verification report and a statement of verification.

Participation per Partner

Partner number and short name	WP7 effort
1 - AQUA	13.00
SMVAK	5.00
2 - STW	3.00
3 - VASYD	4.00
4 - ANET	6.00
5 - ENOLL	4.00
10 - BLUE	5.00
11 - APOR	0.50
12 - WE&B	6.00
13 - EMS	0.50
14 - SOLWA	0.50
15 - IETU	23.00
16 - UVAL	1.00
18 - UNIZ	4.00
19 - CETIM	36.00
20 - COVU	1.00
21 - LUND	1.00
22 - PUT	3.00
Total	116.50

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D7.1	Report on KPIs and RRI approach	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	55
D7.2	# 1 Life Cycle and environmental performance Methodology	19 - CETIM	Report	Public	18
D7.3	# 2 Life Cycle and environmental performance Evaluation	19 - CETIM	Report	Public	42
D7.4	# 1 Risk and vulnerability assessment - Methodology	19 - CETIM	Report	Confidential, only for members of the consortium (including	36

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
				the Commission Services)	
D7.5	#2 Risk and vulnerability assessment – evaluation	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D7.6	#1 Economic performance analysis - Methodology	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D7.7	#2Economic performance analysis – Evaluation	19 - CETIM	Report	Confidential, only for members of the consortium (including the Commission Services)	58
D7.8	Feasibility study of technologies for ETV	15 - IETU	Report	Confidential, only for members of the consortium (including the Commission Services)	48
D7.9	Performance of ETV for the 3 selected technologies	15 - IETU	Report	Confidential, only for members of the consortium (including the Commission Services)	58

Description of deliverables

D7.1 Report on KPIs and RRI approach
D7.2 # 1 Life Cycle and environmental performance Methodology
D7.3 # 2 Life Cycle and environmental performance Evaluation
D7.4 # 1 Risk and vulnerability assessment - Methodology
D7.5 #2 Risk and vulnerability assessment – evaluation
D7.6 Economic performance analysis - Methodology
D7.7 Economic performance analysis – Evaluation
D7.8 Feasibility study of technologies for ETV
D7.9 Performance of ETV for the 3 selected technologies

D7.1 : Report on KPIs and RRI approach [55]
Report of the KPI selection and evaluation in order to track and check process performance in REWAISE concepts. To verify that RRI is transversally undertaken a set of specific indicators will be developed. These indicators will be included in the report. Task related: T7.1

D7.2 : # 1 Life Cycle and environmental performance Methodology [18]
Environmental impact of REWAISE water ecosystem will be addressed using LCA methodology. An Interactive LCA, from the development of the different technologies to its implementation in the HUBs will be implemented, in order to serve, not only as monitoring but as DSS to achieve zero-carbon objective. Task related:T7.2

D7.3 : # 2 Life Cycle and environmental performance Evaluation [42]

Environmental impact of REWAISE water ecosystem will be addressed using LCA methodology. An Interactive LCA, from the development of the different technologies to its implementation in the HUBs will be implemented, in order to serve, not only as monitoring but as DSS to achieve zero-carbon objective. Task related: T7.2

D7.4 : #1 Risk and vulnerability assessment - Methodology [36]

Evaluation of the risks and vulnerability of water systems: major physical risks related to water, regulatory risks and reputational risks. Task related: T7.3

D7.5 : #2 Risk and vulnerability assessment – evaluation [58]

Evaluation of the risks and vulnerability of water systems: major physical risks related to water, regulatory risks and reputational risks. Task related: T7.3

D7.6 : #1 Economic performance analysis - Methodology [36]

Quantification of the total economic cost of REWAISE solutions along all stages. Task related: T7.4

D7.7 : #2 Economic performance analysis – Evaluation [58]

Quantification of the total economic cost of REWAISE solutions along all stages. Task related: T7.4

D7.8 : Feasibility study of technologies for ETV [48]

ETV feasibility study for solutions likely to achieve $TRL \geq 7$ to determine its their eligibility for a full ETV and to apply for verification under the EU ETV scheme. Task related: T7.5-ST7.5.1

D7.9 : Performance of ETV for the 3 selected technologies [58]

Most advanced technologies from each hub (TRL 8-9) will be verified under the EU ETV scheme, based on the previous feasibility study. Technologies will be audited and assessed by ETV Body IETU. For each verified technology, an EU ETV Statement of verification will be reported. Task related: T7.5 -ST7.5.2

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS7	Environmental Monitoring defined and operative	19 - CETIM	24	Interactive LCA

Work package number ⁹	WP8	Lead beneficiary ¹⁰	10 - BLUE
Work package title	New Business Models. Alternative Funding for Market Uptake and Dissemination		
Start month	5	End month	60

Objectives

- Create new market niches for the alternative products obtained (minerals, nutrients, energy, etc.)
- Attract investors to the innovative processes and services in water smart activities.
- Bring innovative processes for water treatment, energy and product generation to market.
- Boosting business related to new technologies as part of a circular smart water economy.
- Develop new marketing and financing concepts and strategies to maximize the multiple values of water
- Assure SME participation and accelerate their growth (WINcubator).
- Enhance market uptake of new raw materials production, handling and logistics of recycled product. Interaction with other WPs: Interaction with all WPs specifically with the Hub related WP4-5-6 and WP9.

Description of work and role of partners

WP8 - New Business Models, Alternative Funding for Market Uptake and Dissemination [Months: 5-60]
BLUE, AQUA, STW, VASYD, ANET, ENOLL, POLY, RESA, APOR, WE&B, EMS, SOLWA, IETU, UVAL, TUOS, UNIZ, CETIM, COVU, LUND, PUT, INNCO, UNIPA

Cost-Benefit Analysis (CBA) and CAPEX-OPEX financial analysis will be utilized to streamline business models. Through market research, a robust understanding of market dynamics will enable an effective go-to-market strategy leading to the acceptance and uptake of new products generated from the circular smart water economy (minerals, nutrients, energy, etc.). Innovative concepts such as crowdfunding, funding cooperatives, and other alternative investment strategies will be evaluated by an Investors Partnership to boost investment potential successfully, mobilizing water-related investments to update infrastructures that ensure safety of water resources.

T8.1 – New Business Models, Market Opportunities & Value Chains [M5-M60] [Leader: BLUE. Participants: ALL except HHDRO and MALM] D8.1; D8.2; D8.3. REWAISE innovations can be divided into three clusters: i) Value in Water; ii) Value from Water & iii) Value Through Water. Within each cluster there are three areas of distinct value creation that will address a large number of users and potential customers for both the technologies themselves as well as for the secondary products generated, as outlined in Figure 21. For each cluster actions will be conducted to define its new business model and its market opportunities:

ST8.1.1: Market Analysis & Technology Benchmarking [M6-M60] [D8.1]: Focusing on: i) Selection of relevant regions as market targets with potential interest in the products; ii) Desk-based market study and recollection of field inputs (e.g., interviews, online surveys, reports analysis); iii) Identification of the legal framework in selected markets; iv) Identification of technology end-users; v) Analysis of the implementation potential regarding market trends and volumes, relevant market segments, maturity, market and economic drivers/restraints, social barriers (local, national, international framework) & vi) Identification of sectors that may incorporate REWAISE solutions.

ST8.1.2: Competitive Landscape Analysis [M7-M60] [D8.1]: A targeted analysis of established and emerging competing technologies and solutions will be undertaken, specifically: i) The identification and analysis of similar products/technologies in defined sectors and regions; ii) The identification of threats for new entrants; and how new and emerging technologies pose risks to existing technological solution; iii) Profile reviews of the main technological competitors, and potential partners for the exploitation/distribution of the products.

ST8.1.3: Go-To-Market Strategy and Business Model Recommendations [M8-M60] [D8.2]: In close cooperation with suppliers, and based on the outcomes of the market study, competitor analysis and stakeholder feedback will build various scenarios for the exploitation of the most promising REWAISE products. Focused business plans will be elaborated, including recommendations for an adequate business model at selected markets and strategies for manufacturing and commercial approach to the market (partnerships, distribution channels). Business Model will cover the value proposition, the configuration of value creation and the revenue model.

T8.2 – Investment Advisory Panel - Funding Synergies and Price Mechanisms to Close Investment Gap [M9-M60] [Leader: BLUE. Participants: AQUA, STW, VASYD, SMVAK & ANET, WE&B] to mobilize cofunding and develop innovative financing concepts crowdfunding, cooperatives, barter, etc.). An Investor Partnership (InPa) consisting of a range of investor types, Strategic Corporate (e.g. Xylem, Grundfos, Dow- DuPont), Venture Capital (e.g. XPV, Emerald, Skion, Resonance), Microfinance, and Crowd Sourcing, Will identify funding synergies to overcome the gap between innovative concept and proven solution. The InPa Will provide “voice of customer” for the financing/investment options, stimulating stakeholder dialogue and innovative

financing concepts as well as match making between potential investors and new business models. Additionally, innovative pricing mechanisms will be studied to make investments in new water services attractive. Pricing issues will be tackled involving citizens through the polls -conducted in WP9 (WE&B). The collected information, through the demo sites experiences and the smart system developed in WP3 (which incorporates prediction of demand based on real time consumption), will serve to create new models of pricing. The output of this evaluation will feed into the REWAISE Business Plans.

T8.3 – Government Financing Identification [M9-M60] [Leader: INNCO]. [D8.3] REWAISE will look for Institutional Financing to support the exploitation of innovative technologies and activities developed by the consortium. A scan of municipal, regional, national and European funding mechanisms will be done and summarized in a Financing recommendations guide [D8.4], including a mapping of financing synergies.

T8.4 – Replication Strategies for Sustainable Value Chains. [M49-M60] [Leader: BLUE. Participants: AQUA, VASYD, STW, ANET] D8.4. REWAISE platform [WP3] will stimulate the incorporation of solutions to newly planned infrastructures and to identify synergies with new approaches from other finished or running H2020 projects. Hence, the social, economic and environmental impacts of the proposed solution through new or existing water facilities can be openly assessed by all stakeholders to optimize resource use in a circular approach. A Replication Strategy will be defined for the 9 living as guidance for future Adopters and Followers.

T8.5 – Promotion of Market Uptake and Citizen Satisfaction through Dissemination and Exploitation activities [M13-M60] [Leader: INNCO. Parts:ALL] [D8.5, D8.6] A set of dissemination actions are developed by INNCO in close collaboration with all partners, adapted to the stakeholder's necessities, to maximise the visibility of REWAISE results. Messages will be customized to the different needs and water visions existing at every hub to increase end user acceptance of new water management and services. Actions to be undertaken: i) Development of a detailed Dissemination Plan to be updated as project progresses, defining dissemination objectives, activities, tools and timetable; ii) Establish target groups as explained in 2.2.1.1. iii) Measure the effectiveness of dissemination activities on the target audience [2.2.1.2]; iv) Create contents of project results for the project websites (public and private), social media and other dissemination actions (brochure, infoboard, video and newsletters) for the media developed in the Communication plan [T1.2]. Networking meetings will be organised, jointly with project meetings or other events, for end-users and other key stakeholders, to test the value propositions of REWAISE, and present the Project products. These meetings connect the partners with citizens, suppliers and decision makers, to promote uptake and to optimize future development and replication. They will be also used to leverage project results, ensuring that new technology and concepts are being taken up by SMEs allowing an easy replication in other geographical locations. Lessons learned in these meetings will be collected in a document for future replications.

T8.6 – Early Adopters and Fast Followers [M48-M60] [Leader: WIN (3er Party). Participants: AQUA, SMVAK, BLUE, ANET, VASYD] A WINcubator (SME accelerator) will be amplified to enhance further replication and rapid growth. It will link large utility partners with SMEs product suppliers to boost the co-creation. Based on the WIN model in SE, together with the 7 SME of the consortium, 8 SMEs will form a market arena using open innovation, where specific challenges will be identified and solutions proposed, coaching them to realize their growth potential and to develop ambitious business plans with Cost-Benefit Analysis (CBA) and optimised CAPEX-OPEX values. TAG is used to identify further SME candidates (Table 32). The project outputs will be analysed by the professional public (companies, stakeholders, municipalities) for its full application potential, and translated to the development of new regional strategies, to integrate new technologies (membranes, desalination, products recovery) into the design of new circular water services. To that end, 6 sites (2 per hub) will be selected as replication followers where solutions proposed will be evaluated.

T8.7 – Analysis of legal, social and technical barriers to overcome for wide application (Innovation Deal) [M26- M57] [Leader: UVAL] [D8.7]. Following the methodology developed in the Innovation Deal by UVAL, technical, social and legal barriers of a given technology, product or service of interest will be studied and possible innovative solutions to overcome them for wide application are proposed. Participation of stakeholders involved is promoted to guarantee a holistic point of view. Water Reuse Risk Management plans following the EC regulation proposal for water reuse, will include experience acquired in the demonstration sites of the three Hubs.

Participation per Partner

Partner number and short name	WP8 effort
1 - AQUA	29.00
SMVAK	9.00
2 - STW	5.00

Partner number and short name	WP8 effort
3 - VASYD	4.40
SWR	5.00
WIN	9.00
CoL	2.00
4 - ANET	3.00
5 - ENOLL	5.00
8 - POLY	1.00
9 - RESA	0.50
10 - BLUE	35.00
11 - APOR	1.00
12 - WE&B	6.00
13 - EMS	0.50
14 - SOLWA	0.50
15 - IETU	2.00
16 - UVAL	8.00
17 - TUOS	2.00
18 - UNIZ	2.00
19 - CETIM	1.00
20 - COVU	1.00
21 - LUND	2.00
22 - PUT	1.00
23 - INNCO	29.00
24 - UNIPA	0.50
Total	164.40

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D8.1	Market Analysis	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D8.2	#1 Go-To-Market Strategy Report	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	36

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D8.3	#2 Go-To-Market Strategy Report	10 - BLUE	Report	Confidential, only for members of the consortium (including the Commission Services)	60
D8.4	Funding Assessment	23 - INNCO	Report	Confidential, only for members of the consortium (including the Commission Services)	52
D8.5	Guidance for Replication Strategies	10 - BLUE	Report	Public	52
D8.6	#1 Dissemination & Exploitation Plan	23 - INNCO	Report	Public	18
D8.7	#2 Dissemination & Exploitation Plan	23 - INNCO	Report	Public	55
D8.8	Innovation Deal and Reuse Risk Management	16 - UVAL	Report	Public	57

Description of deliverables

D8.1 Market Analysis
D8.2 #1 Go-To-Market Strategy Report
D8.3 #2 Go-To-Market Strategy Report
D8.4 Funding Assessment
D8.5 Guidance for Replication Strategies
D8.6 #1 Dissemination & Exploitation Plan
D8.7 #2 Dissemination & Exploitation Plan
D8.8 Innovation Deal and Reuse Risk Management

D8.1 : Market Analysis [24]
Report of the market analysis carried out: Selection of relevant regions as market targets with potential interest in the products; Desk-based market study and recollection of field inputs, Identification of the legal framework in selected markets; Identification of technology end-users; market trends and volumes and Identification of sectors that may incorporate REWAISE solutions. Competitive landscape analysis will identify competing offerings in defined sectors and regions and evaluate the threat of new entrants to the REWAISE solutions. Task related: T8.1 (ST8.1.1 and ST8.1.2)

D8.2 : #1 Go-To-Market Strategy Report [36]
Report on the appropriate business model for selected markets, strategies for manufacturing and commercial approach to the market including partnerships and distribution channels for the exploitation of the most promising REWAISE products. Task related: T8.1-ST8.1.3

D8.3 : #2 Go-To-Market Strategy Report [60]
Report on the appropriate business model for selected markets, strategies for manufacturing and commercial approach to the market including partnerships and distribution channels for the exploitation of the most promising REWAISE products. Task related: T8.1-ST8.1.3

D8.4 : Funding Assessment [52]
Financing recommendations guide, including a mapping of financing synergies, after the evaluation of municipal, regional, national and European funding mechanisms. Task related: T8.3

D8.5 : Guidance for Replication Strategies [52]

Report of the replication strategy defined for the 9 living as guidance for future Adopters and Followers. Task related:T8.4

D8.6 : #1 Dissemination & Exploitation Plan [18]

Dissemination & Exploitation Plan describing the set of dissemination in order to maximise the visibility of REWAISE results. In addition, lessons learned in networking meetings will be taken into account. Task related:T8.5

D8.7 : #2 Dissemination & Exploitation Plan [55]

Dissemination & Exploitation Plan describing the set of dissemination in order to maximise the visibility of REWAISE results. In addition, lessons learned in networking meetings will be taken into account. Task related:T8.5

D8.8 : Innovation Deal and Reuse Risk Management [57]

Report of the methodology developed in the Innovation Deal. Task related: T8.7

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS8	Launch of market study and competitor analysis	I0 - BLUE	36	Is report market ready

Work package number ⁹	WP9	Lead beneficiary ¹⁰	12 - WE&B
Work package title	Governance and Social Engagement		
Start month	1	End month	60

Objectives

To set up the 9 LL based on an understanding of their societal context towards a water smart community.

- To establish 3 Competency groups (one in each of the 3 Hubs) to facilitate a genuine engagement that fosters mutual understanding, greater collaboration and social and economic well-being within a water smart society.
- To redefine the governance models and provide recommendations that can remove unnecessary legal barriers to innovation (Innovation Deals), utilising inputs from the Competency Groups.
- To develop governance recommendations and support actions for implementing the principles of the EU Water Framework Directive, the EIP Water, Water Europe vision as well as of the EU Circular Economy Policies.
- To ensure that REWAISE acts as an umbrella to connect different aspects of Responsible Research and Innovation (RRI) approach in order to develop a Water Smart Society.
- To uncover the potential and "multiple dimensions of value of water" generated by the technologies through NCP's (nature's contribution to people) approach.

-Interaction with other WPs- Interaction with all WPs. Specifically with Hub related WPs 4,5 & 6, WP8 & WP1

Description of work and role of partners

WP9 - Governance and Social Engagement [Months: 1-60]

WE&B, AQUA, STW, VASYD, ANET, ENOLL, MALM, RESA, BLUE, APOR, EMS, SOLWA, IETU, UVAL, TUOS, UNIZ, CETIM, COVU, LUND, PUT, INNCO, UNIPA

T9.1 – Analysing societal context for the Living Labs [M1-M56] [Leader: WE&B. Participants: ENOLL, AQUA, ANET, SMVAK, VASYD & STW, COVU] [D9.1]. This task will analyse the changes at societal levels in each LL through an in-depth literature review at the start of the project. At the same time, a locally-embedded process will begin to map all key stakeholders and their relationships in the three Hubs, complemented by a SWOT societal analysis, conducted at the beginning, mid-term and end of the project to capture its evolution. This task will address the plurality of the social contexts as part of the RRI approach. Issues such as "value of water", notion of "power" and influential factors will be analysed through NCP's framework. Results will feed T9.2, T 9.3 and T9.4.

T9.2 –Stakeholder Engagement Strategies through Competency Groups (RRI approach) [M6-M56] [Leader: WE&B. Participants: ENOLL, COVU, AQUA, ANET, STW, INNCO] [D9.2] Three Competency Groups will be established, one in each Hub. The CG are an innovative and inclusive method for co-producing knowledge between multiple expert stakeholders (those in a professional capacity and those with non-certified expertise) to foster collaborative action to overcome societal challenges. Focus will be on sustained engagement between; i) Stakeholder and citizen groups in the LLs; ii) Relevant government agencies involved in water resources management and provision; iii) Companies providing the technology; iv) Academics involved in the project. The recruitment process will follow a bottom-up process, based on three calls for applicants, open to regional/local stakeholders that are linked to one or several of the LLs within each Hub. The three Competency Groups will be established as a result of public calls in M15, targeting all relevant stakeholders as identified in T9.1. In addition, the three CG will meet regularly throughout the project. Their activities will start with a training for the well-functioning of the CG, to meet regularly over a 30-mo. period (every 6 mo.). Each group will deliberate a range of issues related to a water-smart society, including the pros and cons of different forms of water supply. The CG will explore and design the conditions for their implementation and will reflect on proposed future developments, to develop up-scaling and down-scaling mechanisms of these models to engage effectively with and handle multiple- and cross-scale dynamics. The gender dimension in the water sector is covered transversally through, the CG will reconvene to review and validate the outcomes. An edited collection of podcasts is produced, capturing shared learning and first-hand stakeholders' experiences of collaborative practice.

T9.3 – Developing Governance strategies for water smart communities [M6-M36] [Leader: COVU. Participants: WE&B, ANET, AQUA, STW] [D9.3] This task provides the content of discussion in the CG meetings, based on aspects of governance. A prior analysis of the governance models existing in the LLs will be developed in collaboration with the LL framework in T9.4, to be transformed into a White Paper draft that will be exchanged with the CG, to allow working together in redefining these Governance White Papers. In this way, a validated basis is established in a participatory manner for the development or redefinition of new governance models according to the implementation of REWAISE.

T9.4 – Living Labs methodology establishment [M1-M27] [Leader: ENOLL. Participants: WE&B, AQUA, ANET, STW & COVU] [D9.4, D9.5] Living Labs refer to user-centred, open innovation ecosystems based on a systematic

co-creation approach, integrating research and innovation processes in real life communities. The LL multimethod develops, manages and contributes to orchestrate local ecosystems by involving multi-stakeholder teams in the design process, thus fostering inclusion within urban and regional contexts. LL combine and customize different user-centred, co-creation methodologies to best fit their purpose, allowing REWAISE to build a specific methodology in collaboration with the 9 Living Labs where activities happen (in WP4, WP5 and WP6). Resembling a quasi-experimental approach (Schuurman et al. 2015), LL project include LEAN methodology. Initially, the exploration gathers information on the current state, different needs and future expectations of LLs to co-create a specific methodology for innovation generation. A set of interviews will be conducted with the 9 LL in collaboration with T9.1, and a workshop in connection with OLLD21 conference, the annual conference of the Living Lab community, will validate and finalise the methodology with the sites. A handbook is published in [M24] to support other Living Labs to replicate this methodology internationally, informing on the results achieved.

T9.5 – Living Lab Evaluation and Optimisation [M25-M60] [Leader: ENOLL. Participants: WE&B, ANET, AQUA, STW] [D9.6, D9.7]. The outcomes of WP4, WP5 and WP6, as results of the experimentation in the different LL will be evaluated constantly throughout the project to optimise the activities. An online survey will be developed and shared with the Project Managers of the various LL to collect both information about progresses and to evaluate quali-quantitatively their results. Tools will be provided to the LLs to gather feedback from the users of the technologies implemented to evaluate their acceptability and the results achieved at socio-economic level, thus including analysis of the behavioural change. The training in T9.4 will support also the adoption of the dedicated tools and the LEAN methodologies behind the tools for user-feedback. Data will be evaluated 4 times and specific reports will be provided.

T9.6 – Social Return on Investment, SROI [M12-M60] [Leader: ENOLL; Participants: all except HIDRO, POLY] [D9.8] SROI analysis measures the impact of the improved water service in terms of water governance, including outcomes that do not have a market value. The SROI framework will be developed in connection with T9.4, taking advantage of the workshops with the LLs for development & adoption, completing the initial criterion by M24. SROI analysis will be applied in each Hub, in 2 evaluation cycles, in the following steps.

- 1) Development of an impact map, identifying inputs, valuing inputs, clarifying outputs and describing outcomes
- 2) Evidence outcomes and giving them a value: After mapping and describing outcomes, indicators are developed, to collect evidence on results, and assess their relative importance by valuing them.
- 3) Establishing impact: estimations on how much the outcome would have happened anyway and what proportion of it can be attributed to the project's activities will be established in the following parameters: deadweight i.e. what would have happened without the stakeholders engagement; attribution i.e. who else contributed to the change; and drop off i.e. it is expected to drop off in the future.
- 4) Calculating SROI and reporting: the net present value involves the summary of the financial information previously recorded, to establish the investment compared to social costs and benefits. SROI is completed by reporting to stakeholders using results in the social engagement

Participation per Partner

Partner number and short name	WP9 effort
1 - AQUA	12.00
SMVAK	3.00
2 - STW	5.00
3 - VASYD	3.00
SWR	4.00
WIN	5.00
CoL	2.00
4 - ANET	6.00
5 - ENOLL	36.00
7 - MALM	4.00
9 - RESA	0.50
10 - BLUE	4.00

Partner number and short name	WP9 effort
11 - APOR	1.00
12 - WE&B	25.00
13 - EMS	0.50
14 - SOLWA	0.50
15 - IETU	2.00
16 - UVAL	8.00
17 - TUOS	2.00
18 - UNIZ	4.00
19 - CETIM	2.00
20 - COVU	9.00
21 - LUND	1.00
22 - PUT	3.00
23 - INNCO	5.00
24 - UNIPA	0.50
Total	148.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D9.1	Stakeholder mapping and societal contexts in each Living Lab	12 - WE&B	Report	Public	12
D9.2	Activities and Outcomes from the Competency Groups	12 - WE&B	Report	Public	48
D9.3	Governance White Papers	20 - COVU	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D9.4	#1 Living Lab Methodology and Online Handbook	5 - ENOLL	Report	Confidential, only for members of the consortium (including the Commission Services)	15
D9.5	# 2 Living lab methodology and online handbook	5 - ENOLL	Report	Public	27
D9.6	#1 Experimentation in the Living Lab assessment reports	5 - ENOLL	Report	Public	36

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D9.7	# 2 Experimentation in the Living Lab assessment reports	5 - ENOLL	Report	Public	60
D9.8	SROI report white paper	5 - ENOLL	Report	Public	56

Description of deliverables

D9.1 Stakeholder mapping and societal contexts in each Living Lab
D9.2 Activities and Outcomes from the Competency Groups
D9.3 Governance White Papers
D9.4 #1 Living lab methodology and online handbook
D9.5 # 2 Living lab methodology and online handbook
D9.6 #1 Experimentation in the Living Lab assessment reports
D9.7 # 2 Experimentation in the Living Lab assessment reports
D9.8 SROI report white paper

D9.1 : Stakeholder mapping and societal contexts in each Living Lab [12]
Report of the societal analysis in each LL to overcome societal challenges, including the knowledge of expert stakeholders after the recruitment of regional/local stakeholder linked to the LLs. Task related: T9.1

D9.2 : Activities and Outcomes from the Competency Groups [48]
Report on the activities performed and results achieved by the CGe. Task: T9.2

D9.3 : Governance White Papers [36]
Developing Governance strategies for water smart communities provides the content of discussion in the CG meetings, based on aspects of governance.Task related:T9.3

D9.4 : #1 Living Lab Methodology and Online Handbook [15]
Interactive LCA will be carried out following ISO 14040 & 14044 and the ILCD Handbook from European Platform on LCA (JRC-DG Environment). Task related:T9.4

D9.5 : # 2 Living lab methodology and online handbook [27]
The outcomes of WP4, WP5 and WP6, as results of the experimentation in the different 9 LL will be evaluated constantly throughout the project to optimise the activities An online survey will be developed and shared with the Project Managers of the various LL to collect both information about progresses and to evaluate qualitatively and quantitative their results. Task related: T9.5

D9.6 : #1 Experimentation in the Living Lab assessment reports [36]
The outcomes of WP4, WP5 and WP6, as results of the experimentation in the different 9 LL will be evaluated constantly throughout the project to optimise the activities. Task related: T9.5

D9.7 : # 2 Experimentation in the Living Lab assessment reports [60]
The outcomes of WP4, WP5 and WP6, as results of the experimentation in the different 9 LL will be evaluated constantly throughout the project to optimise the activities. Task related: T9.5

D9.8 : SROI report white paper [56]
SROI analysis measures the impact of the improved water service in terms of water governance, including outcomes that do not have a market value.SROI is completed by reporting to stakeholders using results in the social engagement. Task related:T9.6

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS9	Creation of the regional stakeholder forum	12 - WE&B	24	Setting up of the 3 Competency Groups

1.3.4. WT4 List of milestones

Milestone number¹⁸	Milestone title	WP number⁹	Lead beneficiary	Due Date (in months)¹⁷	Means of verification
MS1	Efficient coordination and associated follow up	WP1	1 - AQUA	25	Proj. Manual, Data Mgmt Plan
MS2	Validation of a pilot-scale AnMBR for urban WW	WP2	3 - VASYD	24	Pilot in place validated
MS3	Supply-demand coordination of water cycle	WP3	18 - UNIZ	48	Algorithm Created
MS4	Implementation of struvite recovery technology	WP4	4 - ANET	18	Struvite recovery methods
MS5	Pretreatment and desalination process in operation	WP5	1 - AQUA	40	LL Denia running
MS6	Scenario analysis and indicators of IWAN	WP6	2 - STW	24	Deployment specs. ready
MS7	Environmental Monitoring defined and operative	WP7	19 - CETIM	24	Interactive LCA
MS8	Launch of market study and competitor analysis	WP8	10 - BLUE	36	1s report market ready
MS9	Creation of the regional stakeholder forum	WP9	12 - WE&B	24	Setting up of the 3 Competency Groups

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	a) Hidden costs not covered due to unforeseen events b) Loss of critical competencies or key people in the project	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8, WP9	a) Assessment of the situation by the MT and WP leaders to ensure overall Project result b) MT will decide if activities are carried out by other partners or further expertise is recruited
2	End product is not accepted by industry	WP8	Managed by IF Director with the advisory of InPa, will promote solutions through commercial contacts. New DAFO analysis to identify causes and adapt to market needs.
3	Violation of data privacy	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8, WP9	Define all necessary procedures to safeguard privacy requirements. Participation in the Competency Groups voluntarily, with documents on how private information is used. Private data anonymised according to ethical protocols. Compliance of GDPR
4	Decrease in performance in technologies respect to solutions	WP2, WP4, WP5, WP6	a) The extensive knowledge of partners and Scientific Advisory Board will review operating conditions b) Redesign of the project and Living Labs to adapt the new technologies
5	UK leaves the EU without a deal in place - Brexit	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8, WP9	UK government committed to guarantee funding for successful eligible UK bids to H2020 submitted before the end of 2020. Funding guarantee by UKRI (UK Research& Innovation)
6	Data gaps and data quality	WP3	Different strategies to integrate data and avoid gaps. Increase of the use of observational data (remote sensing platforms, low cost IoT devices, open data sources)
7	Delay on administrative permits, updating of regulations	WP2, WP4, WP5, WP6	REWAISE has a set of letters of support from living labs's municipalities in Annex III b) Review of new regulation and update of the protocols generated in the project
8	Little contact with stakeholders or show low interest to participate in	WP9	Elaboration of a communication strategy to attract stakeholders to participate in the Competency Groups. Special budget for these Groups

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total Person/Months per Participant
1 - AQUA	30	36	37	12	99	87	13	29	12	355
SMVAK	1	4	0	20	0	0	5	9	3	42
2 - STW	4	4	0	0	0	62	3	5	5	83
3 - VASYD	6	9	0	32	0	0	4	4.40	3	58.40
SWR	3	7	0	0	0	0	0	5	4	19
WIN	0	2	0	0	0	0	0	9	5	16
CoL	1	3	0	3.59	0	0	0	2	2	11.59
4 - ANET	4	7	38	45	0	0	6	3	6	109
5 - ENOLL	9	0	0	0	0	0	4	5	36	54
6 - HIDRO	4	0	58	4	43	27	0	0	0	136
7 - MALM	3	3.40	0	9	0	0	0	0	4	19.40
P-MALMO	0	1	0	0.80	0	0	0	0	0	1.80
MKB	0	2	0	1.60	0	0	0	0	0	3.60
8 - POLY	3	14	0	4	12	4	0	1	0	38
9 - RESA	1	7	0	0	5	0	0	0.50	0.50	14
10 - BLUE	5	0	0	0	0	0	5	35	4	49
11 - APOR	1	8	0	0	7	5	0.50	1	1	23.50
12 - WE&B	4	0	0	5	0	0	6	6	25	46
13 - EMS	2	0	0	0	0	56	0.50	0.50	0.50	59.50
14 - SOLWA	2	20	0	0	27	0	0.50	0.50	0.50	50.50
15 - IETU	2	0	0	0	0	0	23	2	2	29
16 - UVAL	3	10	0	0	0	15	1	8	8	45
17 - TUOS	3	8	0	29	0	0	0	2	2	44

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total Person/Months per Participant
18 - UNIZ	3	0	56	8	20	20	4	2	4	117
19 - CETIM	2	21	0	0	13	6	36	1	2	81
20 - COVU	2	26	0	0	0	7	1	1	9	46
21 - I.LUND	2	12	0	12.50	0	0	1	2	1	30.50
22 - PUT	4	14	25	38	0	0	3	1	3	88
23 - INNCO	29	0	0	0	0	0	0	29	5	63
24 - UNIPA	1	18	0	0	17	0	0	0.50	0.50	37
Total Person/Months	134	236.40	214	224.49	243	289	116.50	164.40	148	1769.79

1.3.7. WT7 Tentative schedule of project reviews

Review number ¹⁹	Tentative timing	Planned venue of review	Comments, if any
RV1	18	TBC	
RV2	36	TBC	
RV3	48	TBC	
RV4	60	TBC	

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the Agency). Please note that if a fixed starting date is used, you will be required to provide a written justification.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent filings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot
DATA	data sets, microdata, etc.

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

- PU Public
- CO Confidential, only for members of the consortium (including the Commission Services)
- EU-RES Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
- EU-CON Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
- EU-SEC Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number: MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

- VA if virtual access,
- TA-uc if trans-national access with access costs declared on the basis of unit cost,
- TA-ac if trans-national access with access costs declared as actual costs, and
- TA-cb if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.

0. History of Changes

Version	Date	Change
Part B Annex 1 v1.1	17.01.2020	-Implementation of the LEAN methodology and interdisciplinary activities according to this methodology (section 1.3.6) - Subcontracting detailed improved (4.2 Participants Third parties involved in the Project (including use of third parties' resources) - Recommendations to ethic issues improved (6. 4. Ethics and Security) - Gantt according to reallocation of tasks (3.6. Project schedule – Gantt Chart)
Part A Annex 1 v1.1	17.01.2020	- Reallocation of tasks in WP7, WP8 and WP9 (annex 1) - Modification of deliverables (annex 1) - Reallocation of budget in Aqualia, CETIM and Aquanet. (annex 2)
Part B v1.2	20.02.2020	- PARTICIPANTS THIRD PARTIES INVOLVED IN THE PROJECT: Reallocation of third parties (section): SLU is in-kind contribution instead of linked third party, SMVAK added as linked third party of Aqualia, Vasyd and Poly Subcontracting corrected according Part A. (4.2 Participants Third parties involved in the Project (including use of third parties resources) - Resources to be committed: reallocation of budget and suggestions checked (3.4.2 Other direct cost' items (travel, equipment, other goods and services, large research infrastructure) . - Numbering and short names consistency (3.4.2 Other direct cost' items (travel, equipment, other goods and services, large research infrastructure, 4.1 Participants). - Removal of Voltea and addition of Unipa, including its description and role (4.1 Participants) - Gantt modified according to duration of tasks (3.6. Project schedule – Gantt Chart).
Part A v1.2	20.02.2020	- Reallocation of third parties Budget: SLU is in-kind contribution instead of linked third party (annex 2) - Role of Aquaporin more detailed in WP section (annex 1). - SMVAK added as linked third party of Aqualia and SLU allocated as in-kind contribution (annex 2) - Numbering and short names consistency. - Reallocation of budget categories (annex 2) -Removal of Voltea and addition of Unipa (annex 1) - Description of tasks improved (annex 1). - More detailed description of deliverables and modification of deliverables (annex 1). - Modification of milestone MS9(annex 1) - Modification of PM (annex 1)
Part B Annex 1 v1.3	13.03.2020	-Addition of linked third parties subcontracting (4.2 Participants Third parties involved in the Project (including use of third parties resources) - Reallocation of budget items (3.4.2 Other direct cost' items (travel, equipment, other goods and services, large research infrastructure).
Part A Annex 1 v1.3	13.03.2020	- Description of tasks improved (annex 1). - Modification of deliverables following instructions (annex 1). - Modification of budget (annex 2). - Modification of PM (annex 1)
Part B Annex 1 v1.4	17.03.2020	-Gantt modified according to duration of tasks (3.6. Project schedule – Gantt Chart). -Removal of CFS costs and correction of inconsistencies (section 3.4 and 4.2)
Part A Annex 1 v1.4	23.03.2020	- New Deliverables 4.7/4.8 and 8.2/8.3, delivery dates modified

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1. Excellence

Population growth and related economic activities stress water resources across Europe (EU) and the globe, with water demand forecast to increase by more than 50% by 2050¹, while freshwater availability decreases due to pollution and climate change. For instance, in summer 2015, renewable freshwater resources were 20 % less than in the same period in 2014 because of a 10 % net drop in precipitation. Over the past 30 yrs, droughts have dramatically increased in the EU, and > 10% of its population and close to 20 % of its territory are affected by water scarcity.

One potential to **alleviate water stress** is reuse. At present², in the EU only about 1 billion m³/yr of urban wastewater is reused, whereas a potential of over 6 billion m³/yr could cover almost 25 % of the annual domestic demand (145 l/person x 500 M PE x 365 = 26,5 B m³/yr). While Cyprus already reuses more than 90% of its wastewater, Greece and Italy only reuse 5 % of their effluents, clearly indicating a huge potential for further uptake.

The water sector is also a major energy consumer, for pumping, treating, collecting, and discharging - counting for around 4% of global electricity consumption (International Energy Agency) – around the same as all of Russia. In the EU, 3.5% of electricity goes to the water sector, reaching close to 20 % in islands territories such as Canary or Balearic – and water services typically represent 30-50% of local authority's electricity consumption – with a **significant carbon footprint**.

To resolve these issues of both water scarcity and energy consumption, **REWAISE** proposes a **paradigm shift towards a carbon neutral water cycle**, addressing the technological, financial, legal, social issues to realize the **full value of water**, mobilizing alternative safe and sustainable water availability, and exploiting them better and smarter.

The project **demonstrates innovative technologies, processes and governance models in 9 living labs across the three main EU climate zones**, showing how to extract **value in water**, recovering materials and energy, to maximize business innovation and the **value from water**, creating new economic activities and jobs, and implementing social innovation by sharing the **value through water**, generating benefits for the environment, and the well-being of a water wise society – supported by the €45 B/yr invested by water utilities to renew infrastructure in the EU.

To increase EU resilience to water scarcity and climate change, REWAISE will contribute to transition society to a water smart economy, in line with EU Policies on Water, Climate and Environment, comprehensively implementing the Strategic Innovation and Research Agenda of Water Europe³.

1.1 Objectives

The **main objective of REWAISE** is to create a new “smart water ecosystem”, integrating an intelligent digital framework for decentralized water services and decision making, involving all relevant stakeholders to embrace the true value of water, reducing freshwater and energy use, and recovering nutrients and materials - resulting in a carbon free, sustainable hydrological cycle, in line with the concept of a resilient circular economy.

A **network of 9 living labs**, grouped in 3 hubs (Mediterranean, Atlantic and Continental) demonstrates in a real life, large scale operational environment the technological innovations, business models and new governance methods that contribute to a **secure water supply** for the European society. New market niches are created, by mobilizing water related investments and linking users with specific water needs, incorporating sustainability assessments (life cycle, cost and risk analysis) and economic models to optimize resources allocation and value creation.

This network integrates **climatic factors** such as precipitation and temperature, **multiple water sources** (seawater, groundwater, rainwater, surface water from rivers and reservoirs, as well as municipal and industrial wastewater (WW)) and a **variety of uses** (rural, agricultural, urban and industrial) with several innovative systems to achieve a reliable and safe water cycle, and to recover all high-value products embedded in the different streams.

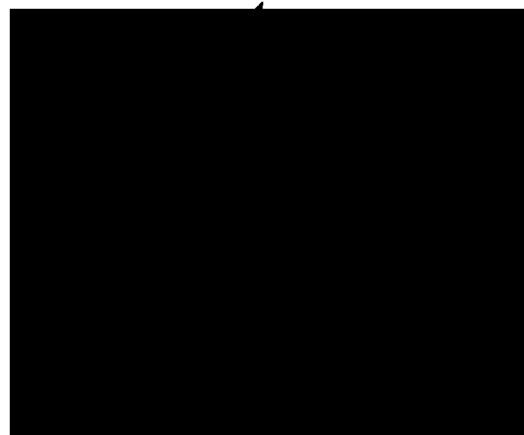


Fig. 1. REWAISE paradigm

¹ Organization for Economic Co-operation and Development (OECD). 2015

² <https://ec.europa.eu/environment/water/reuse.htm>

³ http://wsp.europa.eu/content/uploads/sites/1/2017/11/WSP_STR_Agenda.pdf

Moreover, circular economy will be stimulated by using local resources to solve local issues, enhancing social awareness of the stakeholders through targeted focus groups, strengthened by local perspectives.

The proposed approach is amplified by a **Common Digital Platform (CDP)** that will allow real time monitoring, control and optimization of data and networks, enabling smart management and decision making through Artificial Intelligence (AI) across legally separated entities. The sharing, learning and replicating of best practices, with an identified chain of fast followers, will contribute to resilience, adapting to new problems arising in the near future.

1.1.1 Specific Objectives (SO)

A) Extract the Value in Water, promoting efficient use and reuse, and recovering energy and materials

SO1. Reduce freshwater consumption by >30%, making available alternative water sources:

1.1. To improve the efficiency in the use of water resources [WP2]

- Rainwater harvesting from roofs, stormwater regeneration by Ultra Filtration, eliminating microplastics from runoff, tackling the removal of relevant emerging pollutants.
- Low-energy brackish & seawater desalination by solar technology & high-performance membranes.
- Recycle urban industrial effluents, as well as sewer mining, to generate reuse water for industries (cooling), households (washing), and agricultural use (selective irrigation and fertirrigation).

1.2. Minimize water loss (to below 10%) and other undesirable events in networks through monitoring, prediction models, proactive control and stimulating responsible behaviour by REWAISE CDP, and by investing in smarter and integrated approaches to leakage detection, reducing supply interruptions and customer consumption [WP3].

1.3. To protect and replenish surface water sources with high-quality reclaimed water [WP2].

SO2. Achieve a zero-carbon water cycle service (SDG13), and generate value from nutrients and materials:

2.1. Achieve “zero carbon water services” by optimized processes (reduce CO₂ emissions by 99 %) [WP2]:

- **Biogas generation** directly from industrial and urban WW with Anaerobic Membrane Bioreactor (AnMBR) and from food industry residuals (co-digestion of meat and fish wastes).
- **H₂ production** by low-energy electrolysis from NH₃ in industrial and urban WW [WP 2 and WP6].
- Upgrading Biogas to Vehicle Biofuel.

2.2. Minimize energy consumption in collection, treatment, transportation and distribution of waters [WP2 y WP3]

- **Low energy solar desalination**, reducing energy needs by a factor of 8 (from 3-4 kWh/m³ for seawater desalination by Reverse Osmosis (RO) to 0.5 kWh/m³), enabling the exploitation of saline water sources.
- Up to 25% **reduction of pumping energy** by automatic and dynamic pressure allocation adjusted to demand.
- **Advanced control of treatment plants with cognitive analytics**, using economics-based coordination within the water cycle, reducing energy, and chemicals by 25%, leading to fit-for-purpose treatment.

SO3. Demonstrate innovative recovery of raw materials, minerals from desalination and nutrients [WP2]

3.1. Extraction of Critical Raw Materials (CRM) from brines by **selective precipitation of Lithium (Li⁴⁴) and Magnesium, producing iron-sulfates, calcium-carbonate, chloride and other salts** (~90% recovery: Na₂SO₄, NaCl, gypsum, Fe-Ca salts, ettringite) for **reuse in industry, agriculture, balneotherapy, etc.**

3.2. Efficient production of biopolymers from WW organic matter (**~85% eff. per step**, >0.4 gPIIA/g subst.).

3.3. Production of fertilisers (> 90% NPK recovery) from Wastewater (WW) with concentrated NH₃ solutions and precipitation of Struvite (Magnesium-Ammonium-Phosphate) and Vivianite.

⁴ Criticality not achieved in terms of economic importance (EC, 2017. Study on the review of the list of Critical Raw Materials), however with the continuous growth of its use due to batteries technology, it can be expected to fulfil the CRM criteria in few years

Table 1. Relation between SOs, KR's and Deliverables of Value in Water

EXTRACT THE VALUE IN WATER	Specific Objectives	Key Results	Current situation	Target REWAISE	Deliverables
	SO1.1	Improve efficiency in use of water resources	65 m ³ /p/yr	35% freshwater reduction	D2.1; D2.5; D3.4, D3.5; D4.6
	SO1.2	Minimize water losses in networks	20-30%	10 %	D6.2; D6.3; D6.8
	SO1.3	Eutrophication protection + replenishment of surface water by rainwater harvesting	0	41 reservoirs 64,000m ³ /yr	D2.1; D6.8
	SO2.1	Production of bioenergy (Biomethane & H ₂)	≤60% CH ₄ ; No H ₂	≥92% CH ₄ ; 5m ³ H ₂ /d	D2.6; D4.7; D6.7; D6.5
	SO2.2	Low energy desalination	3-4 kWh/m ³	0.5kwh/m ³	D5.1
	SO3.1	Recovery of Critical Raw Materials: Mg Lithium purity	7kg/yr Mg 30-50% Li	7t/yr Mg ≥90% Li	D2.11; D4.7; D4.5; D5.4; D6.9
	SO3.2	Production of biopolymers and ammonia fertilisers	35% PHA _{eff.} 134Kg/yr	50% PHA _{eff.} 38t/yr	D2.9; D4.2; D5.10; D6.7; D6.11

B) Generate Value from Water, boosting economic activities and service quality, creating jobs and Business

SO4. Engage the community in new economic models, creating recurrent activities and employment [WP8, 9]

4.1. Optimize service costs, efficient use of resources, creation of **new markets and jobs** integrated in new value chains, improving competitiveness by new business models, cost benefit analysis (CBA) and innovative replication. **4.2. Contribute to mobilize water-related investments** to update infrastructures that ensure safety of water resources. Innovative concepts such as crowdfunding, funding cooperatives... will boost investment potential.

4.3. Connecting innovations to users and clients, by large scale demonstration and verification with **EU Environmental Technology Verification (ETV)**, to strengthen market position, growing companies and employment.

SO5. Create new market niches and boosting business related to the new technologies [WP8]

5.1. Enhance market uptake of new raw materials production, handling and logistics of **recycled products**.

5.2. Bring innovative processes for water treatment, energy and product generation **to market**.

5.3. Identify bottlenecks in market uptake and implement strategies to overcome them (e.g. Innovation Deals).

SO6. Develop a common digital framework to improve decision making by shared criteria [WP3]

6.1. Create a framework for **distributed management of the water cycle**, adaptable to different users (WW engineers, city planners, politicians & consumers) and generate new opportunities for the IT-water industry

6.2. Select the most appropriate regulatory platform to integrate the water sector to established IT standards and allow operation of modules for smart distributed and **economics-based coordination** of water cycle entities, connecting data from different sources (sensors, other devices, apps), and Key Performance Indicators (KPI).

6.3. Exploit the coupling of water cycle with other sectors, e.g. heat/electricity, cutting cost by promoting **interconnectivity** with local **green infrastructure** and integration of local renewable energy in neighbouring areas.

Table 2. Relation between SOs, KR's and Deliverables of Value from Water

GENERATE VALUE FROM WATER	Specific Objectives	Key Results	Current situation	Target REWAISE	Deliverables
	SO4.1	Number of new value chains for recovery products	-	7	D9.1
	SO4.2	Mobilization of water-related investments (6.1 M p)	100€/p/yr	8669 M €	D8.2-5
	SO4.3	Number of technologies verified through ETV	-	≥3	D7.8; D7.9
	SO5.1,2	Investments plans, business models & exploitation routes	-	15	D8.2; D8.3; D8.4
	SO5.1	SME growth in WINcubator business accelerator	8	16	D8.6; D8.7
	SO5.3	Identify solutions to bottlenecks (Innovation Deal)	1	6	D8.8; D3.7
	SO6.1, 2	Common Digital Platform for optimized operations	-	30% savings	D3.1, D3.3, D3.5
	SO6.3	Interlink with other sectors (energy, transport, chemicals)	-	3	D3.7; D5.10; D6.11

C) Generate Societal Well-Being and Value through Water

SO7. To develop new governance models that favour policy and regulatory changes [WP9].

7.1. Redefine regulatory frameworks and governance to remove legal barriers for innovations, integrating a proactive **Stakeholder Engagement and Equality Community (SEEC)** with main users and policy agents.

7.2. Support actions and improve policies for the implementation of the principles and objectives of the EU Water Framework Directive, the EIP Water and the WssTP Vision as well of the Circular Economy Policies.

7.3. Embracing the UN SDGs achieving indicators for water and sanitation (SDG6), resilient infrastructure (SDG9), sustainable city services (SDG11), and environmentally compatible production and consumption patterns (SDG12).

SO8. Increase sustainability, safety, security and resilience of water systems, to recover from disruption:

8.1. Assess vulnerability of water systems through modelling tools for environmental & health aspects, LCA, GHG balance and C footprint, strengthening resistance against risks (including. **leakages & flooding**) [WP7]

8.2. Improve risk handling by continuous data from relevantly positioned meters and sensors to allow a rapid response to contamination, reduce frequency of and response time to undesirable events (>25%) [WP3]

8.3. As a result, **>30% increase in resilience** assessed by latest methodologies ^{5 6} [WP3]

SO9. Demonstrate in 9 living labs across 3 EU climate zones a C-free smart water cycle [WP4, 5 & 6]

9.1. Achieve an integrated water management identifying specific climatic conditions that define the constraints associated to each hub (Mediterranean, Atlantic, Oceanic) and assess how climate change will affect “border zones” between different climatic regions.

9.2. Assess **the main constraints** (climatic, regulatory, social, etc.) through interactive tools to improve adaption. **9.3.** Create customized campaigns from behaviour analysis to make citizens embrace **the water-wise behaviour**. **9.4.** Ensure the responsibility of the activities of the project at the various social dimensions needs participatory, ethically and gender oriented, addressed in the engagement activities through the Competency Groups.

Table 3. Relation between SOs, KRrs and Deliverables of Value through Water

GENERATE VALUE THROUGH WATER	Specific Objectives	Key Results	Current situation	Target REWAISE	Deliverables
	SO7.1	Updated governance models & adapted regulatory frameworks	5	9	D9.3
	SO7.2, 3	Roadmaps for EU WFD, EIP Water, WssTP Vision, Circular Economy Policies and UN SDG.	-	5	D7.1, D9.4, D9.7
	SO8.1, 2, 3	Vulnerability+ Risk Assessment to improve resilience per LL.	-	9	D7.2; D7.5
	SO9.1, 2	Mitigation and Adaptation to Climate Change for each hub.	-	3	D3.5; D7.5; D9.7
	SO9.2	Gender equality in project decision making and directorships	-	50%	D1.9; D9.2
	SO9.3	B2B exploitation and new spin-offs in Living Labs	-	10	D8.1-4; D8.6-7
	SO9.4	Successful Competency Groups for stakeholders engagement	-	3	D9.2; D9.3

1.2 Relation to the work programme

REWAISE is applying to the H2020 Topic CE-SC5-04-2019 “Building a water-smart economy and society”, Scope b) Large scale applications with multiple water users), Innovation Actions (IA). The project is fully in line with both the specific challenge and the topic, and includes in the 3 main climatic regions various water sources from rain- to seawater, all water users from rural to urban, and 5 main Governance Models as specified in **Table 4** below:

Table 4: Governance Models relation to water sources, water sources and living labs

		Water sources used in REWAISE	Water users	Governance models ^{7*}
CONT	Skaene	Storm- and Rainwater	Urban, Industrial	PC (DPM)
	Moravia-Silesia	Groundwater	Urban, Industrial	DPO
	Poznan	Municipal - domestic and industrial - WWTP effluent	Urban, Agriculture	PC (DPM)
MED	Denia	Sea and brackish water	Urban, Industrial	C, DPO
	Salamanca	Industrial effluents	Rural, Industrial	C, DPO
	Extremadura	Surface water	Rural, Agriculture	C, DPO
ATL	Vigo	Urban, industrial effluents	Urban, Industrial	C, DPO
	Midlands	Surface and groundwater, municipal effluents	Urban, Rural	DPrM
	Cantabrian	Surface Water, Runoff	Industrial, Agriculture	C, DPO

Table 5 How the proposal responds to the topic specific challenges and expectations

⁵ <https://www.water.org.uk/publication/developing-and-trailing-wastewater-resilience-metrics>

⁶ Roach, L., Kaplan, Z., & Ledbetter, R. (2018). Resilience-based performance metrics for water resources management under uncertainty. *Advances in Water Resources*, 116, 18–28

⁷ PC: Public Company; DPM Delegated Public Management; DPrM Direct Private Management. DPO: Delegated Private Operation; C: Concessio

Topic specific challenge/scope	REWAISE approach
Make available alternative water resources, favour water reuse for different functions and users	REWAISE mobilises various types of alternative resources : seawater, rain and surface water, underground water as well as waste- and process water, applying different technologies such as solar desalination, low-energy membranes, CDI, EDM and rainwater harvesting to alleviate water stress and meet the requirements for reuse in industry, homes & agriculture (irrigation and fertirrigation).
Better exploit... valuable substances... from WW processes, ... embedded in water streams (recovery of energy and materials)	REWAISE recovers the value in water , by extracting critical materials and valuable substances from sea-, brackish, mine and potable water (Li, Mg, Na ₂ SO ₄ , NaCl, balneotherapy salts, calcite, ettringite...) and from WW (NPK nutrients, biopolymers), to serve as a raw material in the water process or for other sectors, such as electronics, advanced materials, agriculture.... Systematic recovery of energy and wastes (conversion of NH ₄ to H ₂ , co-digestion of food WW to biogas) will foster circular economy, eliminating the carbon footprint .
Testing and deployment in operational environments and at scales suitable for encouraging wider uptake	REWAISE deploys 9 Living Labs , in a network of 3 hubs in each climatic EU region (Continental, Mediterranean, Atlantic), sharing data in a common digital framework covering different governance models and water perception by society, and relevant scales: local, national and international [WP 4, 5, 6]. REWAISE includes large populations and real operational infrastructure promoting stakeholder involvement using smart communication networks , adapting to multiple constraints to make solutions transferable, reproducible and resilient . In addition, ETV verification is included for key processes to encourage wider uptake [WP 7].
Appropriately manage water related risks, systems vulnerability and other sustainability assessments (e.g. footprint, LCA)	REWAISE implements holistic methodologies to assess vulnerabilities and the mitigation of risks in each Living Lab. To analyse physical, regulatory and reputational water risks [WP7], different modelling tools and indicators are used. The Common Digital Platform (CDP) will appropriately allocate and manage risks, continuously monitoring and forecasting water-related threats. Interactive LCA and LCC, as well as footprint evaluations for Carbon, water and Greenhouse Gases will continuously improve environmental & socioeconomic sustainability.
Avoid pollution, water scarcity, and degradation of the environment and soil, and increase resilience to climate change	REWAISE reduces water stress and scarcity by lowering freshwater use (>30%) and minimising losses (less than 10%). Water pollution is avoided by regeneration of rainwater and runoff, including source prevention such as the removal of microplastics and emerging pollutants as well as by water reuse, for cooling, washing, (ferti)irrigation recovering raw materials and energy [WP2]. Water quality prediction modules linked to a CDP enhances preventive and corrective measures, such as minimizing specific pollutants [WP3]. Infrastructure optimisation will lead to a carbon free water cycle , using CDP to enable resilient management by anticipating imbalances and shortages , according to the climatic conditions and user input.
Managing water demand and efficient allocation of resources by cost-effective and smart management of the water infrastructure	Modelling and optimization of entities will reduce operational costs, including the energy consumption in the WDS (>25%). Cognitive analytics in WWTP control will reduce energy and chemicals (25% both), optimising plant operation, favouring reuse of resources to minimize residuals. Economical win-win situations are established for re-shaping the interactions between entities by matching supply and demand with minimized environmental and social impact .
New marketing and financing concepts and strategies to maximise the multiple values of water, increase the attractiveness of the water sector for investors and assure SME participation	REWAISE will make society recognize the true "value of water" : - first as a source of energy and raw materials (by-products extract the value in water), - second as a resource to create multiple value from water by boosting business with new products and services for agriculture, industries and homes. New business models and alternative funding mechanisms are developed [WP 8], using market research and competitive landscape analysis for a robust understanding of market dynamics. The stimulation of stakeholder dialogue and user feedback enables effective go-to-market strategies for rapid uptake of new products and processes, boosting SME participation by creating a WINcubator . This accelerator will support ambitious business plans with CBA and optimised CAPEX-OPEX values connecting large utility users with creative product suppliers. An Investor Panel (InPa) will focus on the identification of funding synergies to mobilize co-funding and to develop innovative financing concepts (crowdfunding, cooperatives, barter, etc.). REWAISE key strategies are aligned with the focus areas of the 280 B € ERDF : Research and Innovation, Digital Economy, SME Support and Low Carbon Economy.
New governance approaches guided by social sciences and humanities to cover human behaviour in decision-making, allow inter-linkages between policy and practice, address related regulatory and institutional barriers	REWAISE emphasizes value through water , boosting the awareness of society towards the benefits of water in a healthy economy . A participative governance model to select decision criteria and structures is reflected in the GREAP with users, administrations, associations, policy-makers, etc., to overcome regulatory and institutional barriers. Several key partners with wide expertise in social sciences and humanities will evaluate and adapt legal and governance frameworks, interacting with multilateral organisations (UN, UNESCO, WB, IDB) and NGOs, integrating the RRI approach , including key social parameters in the CDP to better adapt water services for different social structures and needs, with special focus on social impact, gender dimension, human behaviour and acceptance of the proposed solutions [WP 9].

Topic specific challenge/scope	REWAISE approach
Deployment of enabling digital solutions for the monitoring, control and optimisation of data and processes	REWAISE will develop and implement a CDP improve decision making on new situations, incorporating real time monitoring, control and data processing, connecting the stakeholder interface to other urban services (energy, waste, air monitoring, etc.) and foster interoperability by joint actions of all utilities. Interoperability will be ensured by data integration of heterogeneous sources (KPIs, weather, relevant data from Copernicus, WSI Data Centre) and by following guidelines to standardisation of water semantics and ontologies. Data connectivity will follow WISE recommendations, INSPIRE principles through online data links and redundancy support; and ISO 8000 framework. The CDP will integrate different water sources, climatic conditions, etc. to recommend corrective actions to adapt to climate change, based on machine learning and other AI tools. Water cycle entities will be coordinated via supply-demand mechanisms stemming from predictive control and mathematical optimization of each element of the value chain [WP 3] and to maximize Social Return on Investment SROI [WP 9].

In addition, REWAISE also meets the objectives of SPIRE Public-Private Partnership⁸, and its Roadmap 2030, by transitioning to a more circular economy and fostering re-use of energy, water and recovered products in a synergetic way. By integrating industries (food processing, car manufacturing, mining, etc.) with smart water services, resources are optimized and new materials extracted to contribute to the long-term sustainability of EU industry.

1.3 Concept and approach

1.3.1 Background

By 2050 world's population will reach more than 9 billion, and urban population will increase from 49% today to 70%. As a result of increase in water demand and decreasing freshwater availability, 700 M people could be displaced by intense water scarcity within the next 10 yrs. As EEA, has estimated, only a sustainability scenario will have a low water stress for Europe, with a water scarcity more significant in the southern of Europe. This problem is not only related to environmental and human issues, it is also linked to many economical activities, and there are complex channels through which water affects economic growth.

Traditionally, water infrastructure has been designed since roman times as a linear model, capturing fresh water upstream of cities, often in remote reservoirs and delivered as high-quality drinking water in sophisticated networks – while the majority of water is used for flushing and washing. WW is collected in sewer networks for rapid disposal in the receiving waters. To prevent contamination, big treatment plants with high energy needs remove organic matter and nutrients without harvesting their potential, becoming very expensive when removing emerging contaminants, owing to these kinds of pollutants are very difficult to remove in a conventional WWTP. In last years, a new concept was emerged: smart water services, which pretend to improve the water management and supply. REWAISE aligns with the **Smart Ecosystem concept** – in which multiple, in general legally separated units are linked together within a network to share data across platforms towards a coordination of the systems. REWAISE shows a **holistic view of the water system** and includes intelligence to lead the water system towards the more efficient operation point at the top level, improving economic benefits and respecting the environment by matching economical water supply and demand functions.

1.3.2 The REWAISE concept

To implement the new model towards a **carbon-free water smart economy**, REWAISE links a large network of **9 living labs**, to demonstrate innovative technologies and operative strategies, enhancing social engagement, adapting normative barriers, removing obstacles for sustainable value chains, and developing common digital tools in a holistic approach of water-smart society. The concepts will be **scalable and replicable** to other municipalities and utilities in Europe and worldwide, fostering the **transition towards resilient and smart water services**.

Living Labs are real-life, water oriented and demotype and platform-type environments with a crosssector nexus approach, which have the involvement and commitment of multistakeholders (including water authorities) and a certain continuity (good chance to continue to their existence), and provide a “field lab” to develop, test, and validate a

⁸ <https://www.spire2030.eu/>

combination of solutions as defined in the SIRA, which include technologies, their integration as well as combination with new business models and innovative policies based on the value of water ⁹.

REWAISE shifts the paradigm from a linear to a circular, water smart economy, to reveal the full **Value of Water**, considering **three key components** of the economic and societal value generated by integral water cycles:

- **Value in Water:** accomplished by extracting and putting to beneficial use dissolved substances such as nutrients, minerals, chemicals and metals, as well as organic matter and energy, embedded in raw and used water streams.
- **Value from Water:** expresses the importance of water for economic activities, and related businesses of the water sector, both in infrastructure construction, operation and maintenance, and control tools such as labs and ICT.
- **Value through Water:** the societal, health and well-being functions of water, as it enables almost all our economic activities, and most products have a significant water footprint: energy and transportation depend on it.

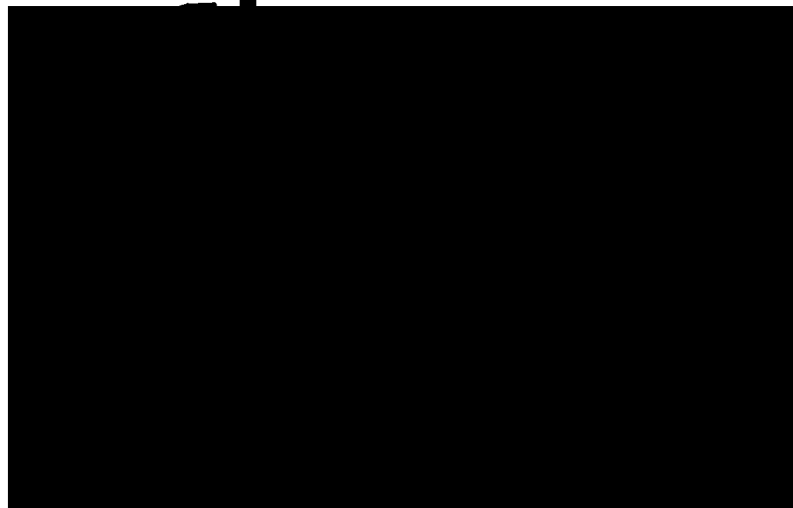


Fig. 2. REWAISE Concept – Towards a water Smart Society

1.3.3 Application and validation in Living Labs

The implementation of innovative technologies including the REWAISE CDP will be structured in **9 living labs** and grouped in **3 main hubs** according to hydro-logical resources and needs, depending on geography and climate. This approach ensures the flexibility and resiliency of the processes demonstrated, as different climates, governance frameworks, regulatory barriers and social perceptions, among others key parameters, are considered.

The three main regions selected are ^{10 11}:

- **Mediterranean** (temperate wet winters with dry, hot summer),
- **Atlantic** (highly variable with precipitations through all seasons)
- **Continental** (high temperature variation, moderate precipitation concentrated mostly in the warmer months).

The 9 living labs address:

- **Different water sources** (surface-, rain-, ground-, sea- and brackish water, municipal and industrial WW);
- **Various water users** (urban, rural, industrial, agricultural) and;
- **5 main governance models** (Public Company; Delegated Public Management; Direct Private Management, Delegated Private Operation; Concession) as shown in Table 4.

Continental Hub [Lead: ANET]: The 3 living labs of this hub are located in:

1. **Skaane (SE).** With 550,000 people in the catchment area, VASYD serves four municipalities on the SW coast of Sweden (1) Malmö 330,000, (2) Lund 120,000, (3) Eslöv 33,000 and (4) Burlöv 18,000. After Stockholm (1,500,000) and Gotheborg (580,000), Malmö is the 3rd largest city in SE; the region has continental climate with cold winters and warmer, wetter summers; strongly increasing population close to 2%/yr.

⁹ http://water.europa.eu/wp-content/uploads/sites/102/2019/06/WoLFS_online.pdf

¹⁰ "Köppen-Geiger climate classification

¹¹ Map of Climate Areas in Europe" (EUCA15000)

2. **Moravian-Silesian (CZ).** 0.7 M people in urban area and 1.2M in metropolitan region. Continental Climate with occasional droughts; Coalfield with a high industry concentration; Dense population; Mine water potentially contaminates surface waters but is also an alternative resource for water supply and economic activity.

3. **Poznan (PL).** Population about 540,000 citizens, is the fifth biggest city in Poland. The climate is within the transition zone between a humid continental and oceanic climate, cold winters and warm summers; the city has been working on the balance between the green&blue terrains, historical ventures and new high-potential industrial areas.

Mediterranean Hub [Lead: AQUA]: The Southern living labs are located in:

4. **Denia (ES).** In Denia, a coastal city of 50,000 people between Valencia (N) and Alicante (S); Mediterranean Climate; Seasonably Variable Population (peaks at 200,000 people); Water Shortage leads to Use of Seawater Desalination and Reuse to cover agricultural and industrial needs.

5. **Salamanca (ES).** The city has a population about 150,000 and it is located in Castile and Leon; Mediterranean climate, warm summer, colder winter, and nearly semi-arid levels of precipitation.

6. **Extremadura (ES).** This region is in the western Spain, having about 670,000 M citizens. The climate has cooler, mostly damp winters and hot, dry summers. Algae proliferation in reservoirs and Trihalomethanes (THMs) formation in drinking water have been detected.

Atlantic Hub [Lead: STW]: The 3 living lab of this hub are located in:

7. **Vigo (ES).** The city of Vigo has a population about 300,000 citizens; the oceanic climate remains cool enough, inside the rías, the temperature in winter is a bit lower than on the Atlantic coast, while in summer, it is a little higher.

8. **Midlands (UK).** STW serves a region of 8 M citizens, but only 35 % in urban areas are considered in this project. Atlantic climate, cold, cloudy, wet winters and comfortable, mostly dry, mostly sunny summers.

9. **Cantabrian region (ES).** The two cities on Spain's Northern Coast, Oviedo and Santander, with a combined population of around 400,000 citizens have a temperate and humid climate, with a dry season and a comfortable summer.

The municipalities in the 3 main hubs have > 3 M people, in addition to STW's service area of 8 M, and cover a large array of geographies, water sources and users, as well as 4 main water governance models. The hubs were also selected according to water stress and economics, ranging from one end of the spectrum (high water stress and low cost (ES, PL)) to the other (lower water stress and higher cost (SE, UK)), with CZ in the Middle.

In addition, 6 **target follower sites** are selected to implement the best practises observed. First commitment letters for replicate living labs are attached, including Dublin (IE, Urban and Agriculture), Atenas (GR, Urban and Industrial), Caltanissetta (IT, Rural and Urban), Algarve (PT, Agriculture and Rural), Odense (DK, Urban and Industrial) and Burgas (BG, Agriculture and Urban), adding around 2,5 M people more to the spectrum of different water situations. To reach out to as many other water services as possible, three main mechanisms of multiplication and replication will be used, in which AQUA, STW, VASYD and ANET are heavily engaged: Technology Approval Group TAG, EurEau Association of EU Water Associations, and EU Benchmarking Cooperation EBC (Section 2.2).

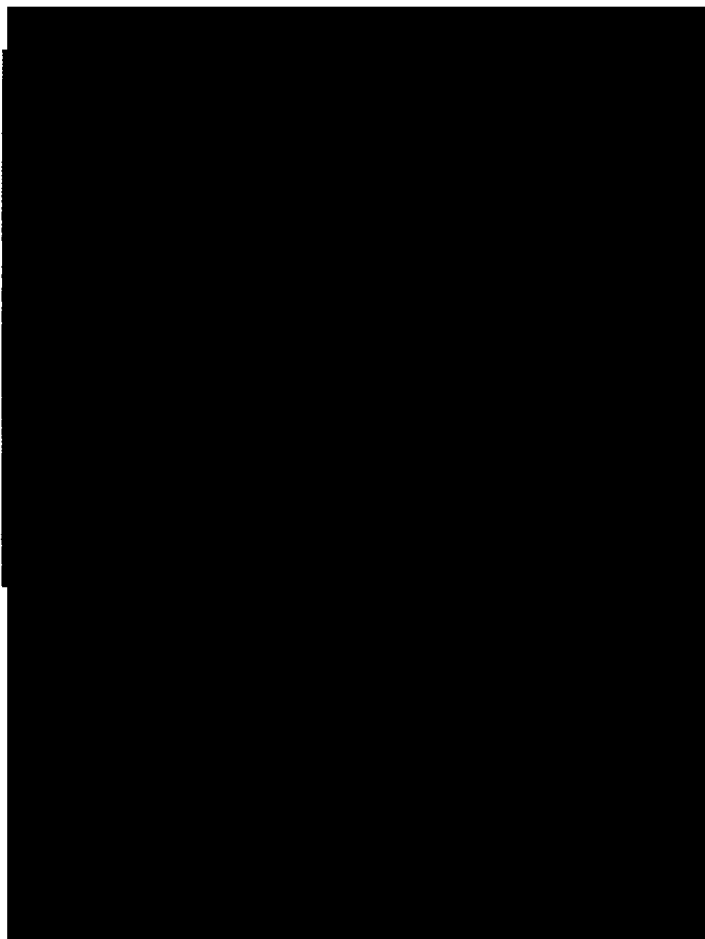


Fig. 4. Water Stress Index

Table 6 summarizes actual water related problems in our Living Labs and REWAISE impacts:

		Utility	Water (m ³ /d)	Population served	Problem	Application and Overall impact of REWAISE
CONTIN.	Skaane	VASYD	122.000	550.000	High dependency on out-of-region bulk raw water	Water saving, rainwater harvesting +resource recovery
	Ostrava	SMVAK	280.000	730.000	Industrial ground water	Alternative Water Resource
	Poznan	ANET	110.000	540.000	Drought with low rainfall	Water reuse and struvite recovery for fertilizers
MEDITERRANEA	Denia	AQUA	16.900	200.000	Restriction in freshwater availability	Low energy desalination, net-work mgt. to reduce losses. Manage dynamically water from various sources
	Salamanca	AQUA	30.000	150.000	Cost of Meatpacking Residuals, Distribution + Collection	Circular Economy: Co-Digest-ion and Bio-Products,
	Extremadura	AQUA	100.000	670.000	Algae+Trihalomethane (THM) in reservoirs	Develop of intelligent net-work + monitor water quality
ATLANTIC	Vigo	AQUA	50.000	300.000	Water Scarcity through Climate Change	High Performance Membranes, Sewer Mining
	Midlands	STW	500.000	2.800.000: 35% of 8 M	Eutrophication by Nitrogen + Phosphorus	Ammonia as a carbon free fertilizer and generate H ₂
	Cantabrian	AQUA	40.000	220.000	Energy and Water Inefficiencies + Losses	New Membranes, Smart Network Controls, Bio-Energy

Table 7: Utility multiplier and replication mechanisms

	ISLE/TAG: SME and Start-Up Evaluation	EurEau: Water Associations	EBC: Benchmarking
No. Entities	140	32	45
Countries	33	29	20

1.3.4 Positioning of the Project (Technology Readiness Level and Social Readiness Level)

The REWAISE consortium has analysed the whole conventional water cycle of treatment, distribution, collection and discharge, selecting specific modifications of the traditional approach with two different options: improving the existing practice to increase its efficiency and lower environmental impact, or changing radically to replace current practice and avoid its disadvantages. The first actions are normally at a TRL closer to practice, while the latter often have a longer way to maturity. **Table 8** shows the current TRL of the technologies proposed in REWAISE and their expected development. Section 1.4.1 describes more of these technologies against the current state-of-the-art (SoA):

Table 8: REWASE Technology Readiness Level and Social Readiness Level

Concept		Process or Technology	Main partners	Scale	TRL/ SRL	Target	Description (present state)
VALUE IN WATER	Brine & mine W	Recovery from Brine: selective precipitat-ion, EDM and electrochemical Li capture	RESA	10 m ³ /d	6	8	Proven at lab scale
		Membrane systems for products recovery from mine waters	AQUA, POLY	75 m ³ /d	6	8	Viable at lab scale
	Nutrients	Nutrient Recovery for high value Fertilizer with Struvite and Vivianite	ANET	1400 m ³ /d	5-6	8	Small pilots successful
		Ammonia Recovery as Carbon Free Fertilizer	STW	20 m ³ /d	5	7	Tests at lab scale
		Urine separation and dehydration	VASYD	30 m ³ /d	4	5	Initial Pilot Tests
		Optimization of UF membrane applications in potable water.	POLY	50 m ³ /d	7	9	Prototype to be optimised
		Sewer Mining for Energy, Water and Fertilizer Recovery (with AnMBR)	AQUA, UVAL	1000 m ³ /d	7	9	Proven up to 30m ³ /d
		Bio-Methane recovery for green gas grid	AQUA, UVAL	50 m ³ CH ₄ /d	6	8	Pilots successful
		H ₂ Generation	STW, COVU	5 m ³ /d	3	5	Tests at lab scale
		WW organic matter as Biopolymers	CETIM	5 m ³ /d	4	6	Lab Scale
VALUE FROM WATER	Smart network	Reduction of water loss and energy consumption by leak detection, pipe assessment and adaptive pumping	AQUA, EMS, UNIZ, HIDRO	Some 1000s smart meters	6	8-9	Pilots for Integration of data, interoperability of ICT platform, IoT sensors but no integration
		Water supply-demand coordination connecting data from different sources to achieve water for fit use scenario	HIDRO/UNIZ/AQUA	150 ha	5	7	Theoretical approaches based on mathematical program
	Smart WWT	Plant and distribution optimisation based on predictive and cognitive analytics	ANET	200,000 m ³ /d	6	8	First models and evaluations successful
		Digital twins as prediction, optimisation and decision-making tool	VASYD	100 000 m ³ /d	4	7	Proof of concept
	Energy	Decentralized energy recovery: supplementing upgraded biogas to the gas grid, biogas vehicles & H ₂ as clean fuel and potential energy storage	STW, UVAL	500 m ³ /d	5-6	8	Biogas upgrade & injection proven, low economic feasibility H ₂ proven at lab scale
VALUE THROUGH	Low C	Low energy solar desalination/CDI and Membranes for pre-treatment of seawater	AQUA, APOR	1000 m ³ /d	6	8	Pilots (20m ³ /d)
	Water resources	Stormwater management: harvesting and advanced membranes to remove micropollutants and microplastics, avoiding flooding and contamination	MALM, VASYD	1,000 m ³ /d	6	8	Stormwater at pilot level. Membranes at lab scale
		Water network resiliency, risk handling by online sensors and Pressure Driven Analysis modelling, isolation of sectors	AQUA, STW	1.027 Km 10,000 m ³ /d	6	8	A few pieces have been tested, but no complete model
	Governance & Societal well-being	Assess social, economic & environmental impact for decision making, well-being and replicability.	UVAL/ANET/	100.000 PE	5*TRL, 4*SRL	7*TRL, 8*SRL	Theoretical assessments, Needs update with larger and real data through practical evaluation
		Use of Economic Behavioural analysis and Data Science	VASYD	> 5,000 houses	5*TRL, 4*SRL	7*TRL, 7*SRL	Behaviour linked to economics only at theoretical level
		Re-edited Governance models for carbon free water cycle	WE&B	9 LL (from local to EU level)	2*SRL	8*SRL	-

While the above table summarizes the main tasks for each partner, the collaborative structure of the project has identified similar needs in other applications and geographies. Systematic cross- fertilization, where the solution successful in one site will be applied in other locations, is envisioned, with Table 9 showing a preliminary analysis of multiple use of one innovative approach already in other partner installations.

Table 9: Cross- fertilization of Technologies in the Various Living Labs

Cross- fertilization of Technologies in the Various Living Labs	Sk	Os	Pz	De	Sa	Ex	Vi	Mi	Ca
Optimization models, prediction modules, artificial intelligence modules and tools	X		X	X		X	X	X	X
Leak Detection and Prevention, smart networks, robotics				X			X	X	
Smart metering and Social Behaviour	X	X		X				X	
Surface Water Quality	X					X	X		
Membranes for Rainwater Harvesting and Water Reuse	X			X			X		
Energy Recovery					X		X	X	
Nutrient and Materials Recovery		X	X		X		X		

Sk: Skaane; Os: Ostrava; Pz: Poznan; De: Denia; Sa: Salamanca; Ex: Extremadura; Vi: Vigo; Mi: Midlands; Ca: Cantabrian.

1.3.5 National or international research and innovation activities linked with the project

REWAISE takes advantage of the in-depth knowledge and previous research of the partners, and their cooperation, leveraging their participation and previous investments in specific FP 7 and H2020 projects, as listed in **Table 10**:

Table 10: previous research of the partners

Acronym/ Title	Partner¹²	Contribution to the project
FP7 Intelligent Urban Water Management	AQUA; <i>UNIZ</i>	Coordination of open data Mgt. platform and SW development (leakages, demand predictions, adaptive pricing, water usage disaggregation, etc.). Analysis of social behavior of citizens and awareness in ES and CZ.
FP7 Smart Water Santander	AQUA	City-scale smart applications and services. Development of the Smart-Water Concept, including advanced metering and mobile app for citizens.
H2020 INCOVER	<i>AQUA</i>	Development of sustainable added-value technologies with a DSS to transform municipal effluents into new added-value bio-products.
Action Plan Innovation Strategy Moravia-Silesia	SMVAK	SmVaK : Research and development of modern membrane systems for the use of water from mining and post-mining activity for future water supply.
3SMART Interreg - Danube Smart Grid	UNIZ	Smart city integration of buildings and infrastructures. Connection of electricity-water networks, prediction of required pressures and pump flows
H2020 Run4Life	AQUA; SMVAK	Decentralized resource management. Early field trials under way in replication sites (SmVaK), including a digital smart management system.
H2020 MIDES	AQUA	Demonstrator of an innovative low-energy technology for desalination, using MDC technology as pre-treatment step for RO.
LIFE MEMORY	AQUA; <i>UVAL</i>	Industrial prototype scale AnMBR for urban WWT in order to recover energy, nutrients and water for reuse.
LIFE DrainRain	<i>CETIM</i>	RunOff Water Purification from pavements: demonstration of an integrated solution for valorization of runoff water for its reuse
LIFE Green Sewer	<i>CETIM</i>	Innovative secondary WWT based on Forward Osmosis and AnMBR, able to produce reusable water and recover energy and nutrients
H2020 INDIA-H2O	<i>CETIM;</i> APOR	Bio-mimetic membrane processes and phyto-technologies for low-cost purification and recycling of water in India
H2020 SMART-Plant	<i>STW</i>	Scale-up of low-carbon footprint material recovery techniques in existing wastewater treatment plants.
H2020 NEXT-GEN	<i>STW</i>	10 full scale demos in EU to define the next generation of water systems, including smart management, recovery and circular economy solutions.
H2020 AMBROSIA	APOR	Aqua-mimetic membranes for brackish water reverse osmosis application
Innovate UK H-AM	COVU	Novel Production of Renewable Hydrogen from Animal and Human Waste
H2020 HOUSEFUL	<i>WE&B</i>	Innovative circular solutions and services for the housing sector

1.3.6 Overall approach and methodology

REWAISE will apply LEAN methodology to identify and eliminate waste, improve quality and reduce cost. The LEAN methodology is a simple business process to generate continuous improvement, and integrates the Living Lab concept as a user-centred, open co-creation approach within real life communities and settings. In practice, Living Labs place the citizen at the centre of innovation, allowing the user to participate in the three steps. By placing the user at the centre of innovation, Living Labs better mould the opportunities offered by disruptive technologies to specific user needs - in their own local contexts, cultures, and creative potentials. People will be involved in all phases of the

¹² Key (partner rol): **Bold type**: Project Coordinator; *Italics*: Project Partner; Stressed: Member of the project committees or ABs

innovation process: from idea generation to building prototypes, from design to commercialization, including continuous feedback. This methodology strongly stresses the importance of the first phase in the concept design cycle, usually referred to as analyses or requirements engineering. Since this phase creates the foundation for the rest of the process, errors here become very hard and expensive to correct in later stages. This also is the phase in which users can make the strongest contributions by actually setting the direction for the design. In addition, through iterative incremental processes for the project as a whole, through each WP and through citizen participation, rapid market uptake by early adopters is achieved. Moreover, this methodology facilitates its future exploitation and replication after the Project.

- 1) **BUILD:** Lessons learned from previous projects -section 1.3.5-, citizen interaction and market knowledge led to the idea to test resource efficient solutions [WP2] building 3 hubs demonstrators [WP4, WP5 & WP6].
- 2) **MEASURE:** Measurements made within built infrastructure supply appropriate data using smart monitoring, control and digital optimisation [WP3], to analyse KPIs, and facilitate LCA and Risk Assessment [WP7]
- 3) **LEARN:** Data analysis provides new knowledge to define governance, dissemination, communication and social engagement strategies [WP1,8&9], to propose new business models (WP8) and accelerating REWAISE market uptake.

WP1 COORDINATION, MANAGEMENT & COMMUNICATION

REWAISE Methodology is integrated in WP1, with the detailed management structure described in Section 3. The consortium is relying on 5 Advisory Boards, assisting the Management Team to review advances and guide decisions. The methodology has been honed by the coordinator in two FP7 projects of circular economy and smart water:

- www.all-gas.eu , transforming wastewater to algae biofuel on a full-scale demo
- www.urbanwater-ict.eu . implementing smart management systems in two real networks sectors. Furthermore, the coordinator is responsible for two H2020 and one BBI project under way, where demonstration activities are coordinated to implement important elements of more sustainable and smarter infrastructure:
- www.midesH2020.eu for low cost desalination using bio-electrochemical technologies, started in 2016
- www.Run4Life-project.eu in H2020 Circ 02, to demonstrate decentralised collection and recovery of nutrients
- www.deep-purple.eu to convert diluted mixed urban bio-wastes into sustainable materials and products

The consortium members are also active in other related H2020 projects that allow to leverage resources and accelerate market uptake, such as www.Scalibur.eu , [BBI B-Fers](http://www.BBI-B-Fers), www.incover-project.eu and www.eu-sabana.eu.

WP2 RESOURCE EFFICIENT SOLUTIONS

WP2 will evaluate innovative solutions to recover water, energy and resources using the 3-phase methodology:

1. Resource solutions definition. (BUILD) This phase will be dedicated to design and engineering, to confirm candidate materials (membranes, electrodes, pumps, piping, electric components), configurations (batch, continuous, semi-continuous) and operation conditions (temperature, pH, salinity). The focus will be on overcoming the main technology barriers and limitations, adapting to hub requirements, while maintaining a low cost (capex and opex). Finally, the best performing solutions will be selected.

2. Resource solutions integration. (MEASURE) This phase implements the defined solutions at a simple configuration to ensure scalability with an eco-design approach to reduce the manufacturing costs. Main parameters for each solution operation will be defined and connected to the Common Digital Platform to adjust their operation.

3. Resource solution operation. (LEARN) Start-up, demonstration and validation of the solutions will be performed at pilot scale. This operation period will assess economic, environmental and social impacts to feed the exploitation and business plans. Collaboration with end-users will be continuous to evaluate their commercialization.

WP 3. SMART MONITORING, CONTROL AND DIGITAL OPTIMISATION OF DATA AND PROCESSES

REWAISE Common Digital Platform (CDP) will be developed in **WP3** by using the LEAN agile methodology:

1. Definition of common functional and non-functional technological requirements and architecture. (BUILD) REWAISE CDP will be built combining a series of new and reusable and adaptable software modules for modelling, prediction, optimal control and matching supply and demand functions and existing knowledge from previous developments (especially EU projects), resource efficient solutions [WP2] and social and economic inputs from the project hubs [WP4, WP5 & WP6].
2. Common digital platform deployment. (MEASURE), the CDP will be implemented with different purposes at the Living Labs. Collected data allows the optimisation of the prediction modules for the optimal control.
3. Replication and Interconnectivity (LEARN). The analysis of results through a holistic water cycle vision will improve the CDP allowing its adaptation to different climatic, social and economic conditions.

WP4, WP5 & WP6 LARGE SCALE HUBS

WP4, WP5 and WP6 configure a network of local hubs with 9 living labs spread through the relevant climatic regions at European level connected with the decision support system of the CDP.

1. Process Implementation (BUILD): The demonstration of the different resource efficient solutions will be built at the local hubs. The main innovative processes go hand in hand with the resource efficient solutions (WP2) and the common digital platform deployment (WP3).
2. Living labs. (MEASURE): After start-up, demonstration and validation of the solutions will be performed in real conditions. This long-term operation will be carried out at the living labs to assess economic, environmental and social impacts to feed the exploitation and business plans. Collaboration with end-users will be continuous to evaluate their commercialization. Main parameters for each solution operation will be connected to the CDP.
3. REWAISE Replication. (LEARN) Lessons learned during the long-term validation at the 9 living labs will serve as guidance for future replications, with some potential candidates already committed.

WP7 ANALYSIS OF KPIs, LCCA AND RISK ASSESSMENT (ETV)

1. Methodology definition. (BUILD) This phase will define the best way to develop the different assessments, defining the key parameters and indicators through an RRI approach.
2. Analysis and assessment development. (MEASURE) performed with the data collected from WP2 to WP6.
3. Conclusions. (LEARN) Results of the different analysis and assessments will be used both for the REWAISE system improvement including business models and social engagement (WP2 to WP9) and future replications.

WP8 NEW BUSINESS MODELS, ALTERNATIVE FUNDING FOR MARKET UPTAKE AND DISSEMINATION

1. Business models and funding alternative definition. (BUILD) Innovative financial concepts will be defined to boost the investment potential and leverage other funding mechanisms (utilities investment plans, infrastructure funds, EU instruments), will be proposed.
2. Validation. (MEASURE) Return on dissemination will be measured and the proposed models will be validated with end users in each living lab.
3. Conclusions. (LEARN) Final business models and funding resources will be served to improve REWAISE project for its early followers and will facilitate future exploitation and replication.

WP9 GOVERNANCE AND SOCIAL ENGAGEMENT

1. Governance and social engagement models definition. (BUILD) Innovative dissemination and communication activities will engage users and citizens, analyses social behaviour and new governance models to favour creation and validation of new markets and business models. The consortium is supported by a Governance & Regulatory Ethics Advisory Panel and a Stakeholders Engagement & Equality Community on water regulation and governance, ethics, equality, market access and stakeholder engagement.

2. Validation. (MEASURE) Return on social engagement will be measured.

3. Conclusions. (LEARN) sustainable value chains will be created, promoting the adaptation of regulatory and institutional frameworks to embrace the true value of water.

The Gender Dimension

Gender dimension is one Key element of the **RRI approach** and will be addressed transversally in all activities of the project, especially in ensuring the adequacy of the CDP and its parameters of analysis. A recent EU study (SMART 2016/0025) found that, despite the growing demand of ICT specialists, there are four times more men than women in Europe with digital profiles – while the share of women taking up ICT related higher education is decreasing. Annual productivity loss for the EU economy of women leaving their digital jobs to become inactive is estimated above EUR 16 billion. With an important part of the REWASE project dedicated to digital activities, the consortium considers gender equality in this field as an essential element of its strategy.

To eradicate gender disparities, a **Gender Action and Equality Plan** will be implemented, following the guidelines of the EC. An “equal opportunities policy” is practised by the partners AQUA and STW, with specific measures against gender inequality, raising the presence of women in management, and eliminating the pay gap. COVU was awarded with an Athena Swan accreditation, demonstrating their commitment and excellence in gender equality. The Consortium systematically promotes gender equality, facilitating the career of women with high performance potential in the partner organisations, and ensuring equitable impacts of the actions. For all results of the project to benefit both genders equally, we will aim for a just distribution of the tasks and responsibilities. In addition, [WP 9] includes an **intensive diagnosis of the gender dimension in the water cycle within the Competency Groups** in selected Living Labs, and [WP 8] the **WINcubator (SME accelerator)** will also encourage **women entrepreneurship**, through proactive **financial incentives** set up by a well-balanced **Investor Partnership (InPa)**.

1.4 Ambition

The main ambition of Rewase is to implement the **WaterEurope (WssTP) Vision 2030** ‘Value of Water: A Future proof model of a European water-smart society’. As the recognised industry-led European Technology Platform (ETP), WssTP published this vision in 2016, with the input its 200 members, and other water relevant ETPs (SUSCHEM, the textile ETP, ESTEP, Food4life, and ECTP). The vision contains most elements described in H2020 call SC5-04 as WssTP strongly engages with the EIP and JPI Water, and strategic partnerships with other key stakeholders: ERRIN, EWP, EWA, EurEau, Netwerch20, Aqua Europa, EurAqua and COST.

The WssTP Water Vision 2030 is accompanied by a **Strategic Innovation and Research Agenda SIRA**, focusing on 4 Key Components of innovations to increase the Value of Water, and to maximize the benefits from a future proof model for a **water-smart and resilient society**. These key concepts are amplified in the WP of REWASE:

1. Enabling inclusive multi-stakeholder Governance - for shared stewardship [WP 9]
2. The Value of Water - capturing materials and energy [WP 2]
3. A Hybrid Grey and Green Infrastructure – rethinking and redesigning for Resource Recovery [WP 4,5,6]
4. New Digital and Smart Technologies - for User Engagement [WP 3]

This ambition leads to a **Paradigm Shift towards a circular economy**, where water scarcity and pollution of ground- and surface water in Europe are avoided, as water, energy and resource loops are largely closed. Bold and courageous decisions for investments and changes are fostered by **collective action among stakeholders** at all levels, and by dramatically higher levels of manageability enabled by the emerging cyber-physical society, “digital water”. One key aspect is the **water energy nexus**, as the total energy use for water services varies from 1 to 1.5 kwh/m³:

- Drinking water capture, treatment and distribution (averages 0,51 kwh/m³ in Western Europe EBC)
- Wastewater collection and treatment (close to 30 kwh/PE/yr or 0,55 kwh/m³ in EBC Benchmarking)

An important finding of energy analysis is that final water use within buildings (mainly heating) has a much higher energy footprint than the combined water services: more than 10 times in ES to almost 35 in SE. This shows a high

potential to influence energy consumption by raising awareness and communicating the impact of water use. Exploring **new strategies of resource recovery**, REWAISE will advance the EU towards more sustainable and smart Future Water Services, demonstrating that more than 30% of the total water demand (i.e. thousands of Mm³/yr) can be covered by alternative water sources such as brackish, saline and reused water streams, based on new desalination concepts and innovative decentralised reuse through sewer mining. New governance structures and partnerships lead to a novel water stewardship, reducing pressure on natural resources by the sector towards 50%.

The project will build on experience already gained by the partners and a wide array of stakeholders in water management (technological & digital) as well as other economic and social areas. REWAISE will comprise several advances beyond the state of the art by strengthening the synergies of innovations in a demonstration at large scale. A Scientific Advisory Board has been called to direct the project and make sure that all activities integrate novelties in the demo phases, the list of selected individuals and their letters of commitment are compiled in Annex 3.

1.4.1 Advance beyond State-of-the-Art (SoA) and ambition

Traditional water infrastructure, since **Roman** times, still uses the **linear model**, capturing fresh water up-stream of cities, often in remote reservoirs, and delivering high-quality drinking water in sophisticated networks – while the majority of water is used for flushing and washing, and only a few % for potable purposes. In conventional urban infrastructure, about 80% of investments is buried in the ground – the extensive distribution and collection networks. Traditionally, urban WW is collected in sewer networks, to be pumped remote locations for rapid disposal in receiving waters. There, to prevent contamination, big WWTP remove organic matter and nutrients without harvesting their potential, and additional treatment is necessary to remove emerging contaminants – mostly expensive oxidation and carbon adsorption. About 90 % of WWTP use activated sludge, invented in 1914 – and similar to the steam engine of that area, is slow, big, noisy, smelly - and with high energy needs – producing a sludge that nobody wants... that with some effort can be used to produce biogas and cover a large part of electricity needs.

REWAISE changes these paradigms, drastically lowering desalination energy, systematically recovering minerals from brine, turning WW into energy and nutrients, achieving a Carbon neutral water cycle.

As population and cities grow, freshwater resources are no longer easily available and new models to deliver **alternative water sources are required, with quality and location matched to needs, favouring the decentralised reuse of water and resources**, in line with the principles of circular economy, to be governed by a more coherent and better coordinated water legislation, and to be controlled by more advanced digital ICT.

REWAISE will implement this innovative concept of a smart and highly efficient water cycle management, and systematically develops new alternative water resources, and extracting their inherent value:

- At present, the EU reuses **only 1100 Mm³/year of treated WW (<3%)** although potentially a volume of >6000 Mm³/year by 2025 may be achievable with incentives and technologies.
- **Desalination of seawater** consumes high amounts of **energy (>4 kWh/m³)**. **REWAISE will demonstrate** new low-energy desalination system, avoiding discharge of **brines** with **efficient recovery** of minerals.
- New water resources are made accessible, such as **saline mine waters**, and instead of only removing pollutants to meet environmental regulations, valuable substances will be recovered.
- REWAISE also improves **rainwater regeneration and use** with the development of **membrane of ultrafiltration** able to remove **microplastics** and other pollutants, obtaining high-quality reusable water.
- Traditional WWTP convert organic matter into CO₂ with high energy use and emissions - and only a handful of plants so far have managed to have a positive energy balance (Strass in Austria, Marselisborg in Odense/DK).
- Municipal **WW** contains organic matter and nutrients, only up to 20% of P is recovered as struvite, and ammonia, the most energy-intensive fertiliser, is mostly released back to the atmosphere as N₂ with intense energy input.

1.4.1.1 VALUE IN WATER – BEYOND STATE OF ART

REWAISE sets a novel approach to recover valuable products from water, such as minerals, nutrients for agriculture, biopolymers, or renewable energy. This circular concept aims to demonstrate the true value in water and the feasibility of implementing a zero-waste approach in water sector.

1) Resource Recovery from Brine and Mining Waters:

Nearly 142 Mm³ of **brine** are produced daily on the 16,000 operational desalination plants worldwide, using 4 to 5 kWh/m³ to separate water from concentrated salts. Nevertheless, nearly 80% of this stream is directly discharged into

the sea, treated in evaporation ponds or applied in land¹³, instead of recovering value products, and avoiding possible adverse effect of high-salinity brine discharge.

Brine presents high concentrations of valuable salts and minerals such as Mg, Li, Cl, Na, Al, SO₄, etc. These compounds have different markets and end-users like fertilizers, construction, chemical and pharmaceutical, while substances like Mg²⁺ and Li⁺ are considered critical raw materials CRM and are in high demand for batteries.

For materials recovery from brines, selective precipitation and electrodialysis metathesis (EDM) was proven for sea-salt production in a few pilots in the US, and in Life+ project ZELDA (2013-2017). Zero Liquid Discharge, REWAISE demonstrates the scale-up of chemicals recovery in desalination, while keeping purity at high levels.

For Lithium, about 2/3 of the world production is extracted from brines with chemically intensive evaporation, heavily dependent on climate conditions and producing large volumes of wastes¹⁴. To face the current demand of Li, novel technologies for Li recovery with **Electrochemical capture** from brines has been tested at lab scale^{15 16} with efficiencies >90%, high selectivity and recovery rates, at virtually negligible chemical use. In REWAISE, this innovative concept will be optimised and scaled up with real brines and selective Li electrodes from spent Li batteries. To alleviate water stress, mitigating the overexploitation of groundwater in 60% of EU cities (EC, 2015), one **strategic industrial groundwater source is mining**, where the global water market is 0.7 B\$ with a CAG rate of 7.7% and causing growing industrial off-streams. While the "Analysis of Threats to CZ" indicates extreme long-term drought as a serious natural threat, REWAISE offers a new resource efficient option to gain water from industrial off-streams (mining), while recovering valuable products from brine for balneotherapy (Mg, K, CaCO₃...), and including heat recovery for central heating. REWAISE brings the mine recovery process to industrial demonstration, optimising performance and cost, to focus on the highest value products.

2) Nutrient Recovery, Including Struvite/Vivianite, Fertirrigation

Modern agriculture relies on intensive use of **fertilizers** for supplying crops with essential nutrients, mainly N, P, and K. Ammonia fertilizer needs a high energy demand (Haber-Bosch: urea from natural gas needs 10 to 15 kWh/kg N). On the other hand, P and K are obtained from mineral resources located in some politically unstable areas, mainly in 5 countries - and affected by a progressive depletion and considered as two of 27 Critical Raw Material for EU. Currently, N and P are removed in WWTP, along with organic matter, which is also a common source of nutrients in agriculture. At present, most nutrient recovery from WWTP is the direct application of sewage sludge (SS) in fields (about 30%), while only 15% is composted or subjected to more advanced nutrient management practices. Remaining fraction of SS is incinerated for energy recovery¹⁷. To promote nutrient recycling from biowastes to fertilizers, the First Circular Economy Package included measures to update current European Fertilizer regulation. REWAISE will apply different **nutrient recovery strategies along the 9 living labs** to substitute non-renewable nutrients, focusing on selective precipitation of minerals such **struvite** and **vivianite, two phosphate minerals**. Struvite recovery from WWTP has been tested at different scales, including some technologies tested under real conditions, such Phosnix®, Ostara®, Seaborne®, Prisa® or Sephos®. These technologies are mainly applied on the centrate stream obtained after sludge dewatering. REWAISE will implement a novel precipitation process for struvite and vivianite directly from sludge (ANET) in Poznan, aiming to adapt the process to the specific conditions of the plant, improving both P recovery efficiency and further sludge dewatering.

As about 80 % of Ammonia is in the liquid phase of human waste, VASYD in Malmö will develop an improved **urine separation** process to allow its safe and efficient use as fertilizer. Urine separation has been demonstrated at pilot scale, but limitations need to be overcome, such volatilization, pathogen presence and fertilizer logistics. REWAISE improves SOA of urine source-recovery by implementing in situ **separation/dehydration** using domestic waste heat available. Additionally, AQUA will implement ammonia recovery based on membrane contactors to produce a clean solution from sludge liquor suitable for fertirrigation, avoiding its release to the environment.

3) Recovered Products available in water

Due to low production cost, versatility and mechanical properties, plastics have replaced conventional materials such as wood, stone, metal, etc. in last decades, leading to great dependence on oil and environmental concerns, due to their persistence in nature and low recyclability. Biopolymers could replace same plastics, but still face difficulties in some applications, and raise concerns on the use of fertile land for its production (5 m²/kg·yr) on large scale.

In REWAISE, CETIM will develop a process to obtain poli-hidroxi-alkanoates (PHA) from WW organic matter. PHA is a biodegradable polymer produced by microorganisms with similar mechanical properties of conventional thermoplastics

¹³ Jones et al. (2018). Science of Total Environment 657, 1343-1356. Panagopoulos et al. (2019). Science of Total Environment 693, 1335-13345

¹⁴ Flexer et al. (2018). Science of the total environment 639, 1188-1204

¹⁵ Kim et al. (2019) Environmental Science: Processes Impacts, 21, 667-676.

¹⁶ Palagonia et al. (2019) Journal of The Electrochemical Society, 166(10), E286-E292.

¹⁷ EU ROSTAT (2019). Sewage sludge production and disposal

such PET or PP. To lower the high cost of industrial production of PHA, based on specific microbial strains and culture medium, PHA production from different types of wastewaters (mainly urban and from food industry) has been demonstrated¹⁸. Upscaling efforts have reached the pilot scale (reactors of few hundreds of L)¹⁹ with about 80% efficiency (per step, <40% global efficiency) of conversion of organic matter and N. However, to overcome some challenges (e.g. integration of the process in the industrial WWTP, flexibility to cope with WW variations, increasing the conversion efficiency)²⁰, and REWAISE will optimize a dynamic feeding process for PHA production and the use of an enriched mixed microbial culture with high biopolymer accumulation capacity.

Beyond SoA to extract Value in Water, promoting efficient use and reuse, recovering energy and materials

REWAISE sets a circular approach to demonstrate the true value of water, by showing the feasibility of recovering valuable products present in water. Innovative technologies (**selective precipitation, EDM, electrochemical capture, CDI**) will **efficiently extract valuable materials from brines**, and mine waters, recovering water for reuse. In addition, several alternatives will **maximize nutrient recovery** for fertilizers, and production of **biopolymers and biomethane from organic matter present in WW**, demonstrating a new zero-waste approach.

1.4.1.2 VALUE FROM WATER – BEYOND STATE OF ART

1) Smart Drinking Water Network, including environmental and coordination of water cycle entities.

According to OECD, economic loss for the inadequate delivery of water and sanitation can account for up to 1.5% of the gross domestic product (GDP)²¹. Water networks are facing challenges such as: loss of water, due to leakages; inappropriate pressure; aging infrastructure; and a lack of proactive quality assurance and system resilience. **Smart water networks** could answer these challenges, however the Digital Water domain still has a relatively low level of maturity, being currently limited to smart flow meters and, eventually, discrete pressure sensors installed along the network. Besides, existing software for leakage detection, water quality monitoring or energy efficiency is not integrated, but considers each aspect separately and without implementing predictive models.

Therefore, operational decision-making is still largely based on judgement and experience with reactive, static, and conservative approaches. REWAISE CDP will include:

- An innovative integrated system pressure and allocation regulation and water monitoring & protection. Detailed data from networks (real-time monitoring by smart sensors of water quality and quantity, pressure, flows) and other sources will be exploited to develop predictions, using machine learning to take decisions in optimizing the system.
- Economics-based coordination of water cycle entities.

Developments in connectivity and IT have enabled exponential data communication, collection and processing possibilities. There are however constraints in data access coming from privacy, legal separation of systems, financial issues and environmental requirements that need to be obeyed. To respond to these needs, new control paradigms need to be implemented enabling various facets of efficiency in the systems watched as a whole. Usage of optimal and predictive control methodology²² has become the most valuable asset to address the new challenges. Computational effort is transferred off-line allowing for more efficient on-line computation. Multi-parametric programming is used to decide how the solution of the mathematical program would change if some parameter in the optimization changes. This is the approach followed in REWAISE introducing coordination in the entire water cycle constituted of many independent entities relying on optimal and predictive control methodology²⁴. This new control technique stemming is extremely potential in systems of systems like the water cycle and will be applied as a huge step beyond the current state of the art to introduce coordination between water cycle entities in terms of trading the shapes of interaction variables between the entities, where social and environmental interests are taken into account through participation of consumers and water authorities in such a coordination mechanism.

Also, different interaction variables have a clear potential to connect the water cycle entities to other sectors like electricity or chemicals market, e.g. enabling demand response and aggregation of electricity consumption of entities in the water cycle with huge potential for regulation of the energy system in the decarbonization era.

2) Digital WWTP Management and Cognitive Analytics

Utilities are increasingly implementing technologies to ensure compliance, optimize operation and addressing challenges such as infiltration or sewage overflows (during rain, stormwater overwhelms the capacity of sewers resulting in harmful overflow). Some commercial solutions for individual problems, such as overflows or optimised pumping are available,

¹⁸ Chakravarty et al. 2010. Bioresource Technology 101, 2896–2899.

¹⁹ Bengtsson et al. 2017. New Biotechnology 35, 42–53.

²⁰ Rodríguez-Pérez et al. 2018. Journal of Environmental Management 205, 215–230.

²¹ http://www.un.org/waterforpeople/decade_water_and_sustainable_development.shtml

²² Mayne, D. Q. et al., Constrained model predictive control, Stability and optimality, Automatica 36 (2000) 789–814.

but increasingly comprehensive modelling and prediction tools, even those based on Artificial Intelligence, allow a new approach to **integrated smart control of wastewater systems**. For instance, water quality-based control in Aalborg can be considered as one of the first attempts of WWTP integrated control²³. Integrated real time control of an SBR reactor and a sewer system was achieved in Messel, Germany²⁴. A state-of-the art integrated modelling attempt aiming at controlling the urban system of Eindhoven (NL) was made by KALLISTO project²⁵. In spite of recent developments, application of integrated control in WWTPs is limited, as often various infra-structures (like sewers, WWTPs) can fall under different responsibilities. To manage energy, resources and water in the WWTP, REWAISE will develop an **integrated system for smart WWTP management** based on **state-of-the-art tools** such as: Real-time Data and Metadata Analysis and Bio-kinetic Modelling by Cognitive Analysis (draws inferences from existing data and patterns, makes conclusions based on existing knowledge bases and then inserts this back into the knowledge base for future inferences - a self-learning feedback loop).

3) Decentralised Energy Recovery, including Methane/AnMBR and H₂WW treatment on the EU (40 billion m³/year) leads to a vast energy consumption (over 2000 MW-equivalent to two nuclear reactors to supply 0.5 kwh/m³). Electricity demand of the water sector is still expected to increase by 80% over the next 25 years, reaching 1,470 TWh in 2040 for all water services. This high energy demand may comprise up to 40% of WWTP total operating costs, only surpassed by workforce and, in some cases, sludge management.

REWAISE project will demonstrate different technologies focused not only in reducing global energy consumption but producing different biofuels suitable for convert WWTP into self-sufficient energy production facilities.

Sewer mining is still limited by energy availability, as it is mainly based on aerobic MBR as the most compact option, whereas REWAISE uses the new concept of AnMBR (Fig. 6), reducing drastically the electricity need (<0.1 kWh/m³), producing biogas instead, to reach energy self-sufficiency. Recent progress in anaerobic processes and membranes boosts this circular economy solution, favouring water, energy and nutrients recovery.

REWAISE will also implement a membrane-based process for dissolved CH₄ present in AnMBR permeate. This increases biogas production and reduces CH₄ release, (25x greater GHG impact than CO₂).

In addition, UVAL and AQUA will develop low-cost biogas upgrading to remove CO₂ and undesired compounds from biogas, to obtain biomethane suitable for use in vehicles or grid injection. Biogas upgrading plants have been built based on high-pressure water or chemical scrubbing and membranes, but with a main drawback of complex operation and high energy and capital cost, especially in smaller plants (9.1-14.4 c€/m³·h)²⁶. REWAISE will use simplified adsorption processes, implementing a suitable solution for low biogas flows.

Additional energy is recovered with H₂, obtained by electrolysis of ammonia recovered from WW centrate. Due to its properties as energy carrier (renewable, carbon neutral, etc.), H₂ presents a promising alternative to fossil fuels in transport and energy applications. At present production of H₂ is carried out mainly by steam reforming of natural gas, but more sustainable biological processes, photofermentation, biomass gasification, or water electrolysis assisted with renewable energies are explored. In comparison, electrolysis from ammonia has been pointed out as a promising process for H₂ production, due to the lower energy required (0.06 V for NH₄ vs 1.23 V for H₂O). However, this technology has only been tested at lab-scale electrolyzers (>1-5L)^{27,28}, and REWAISE will bring it to large scale.

Beyond SoA to generate Value from Water, boosting business and service quality, creating jobs and growth

New products extracted from water (minerals, nutrients, biopolymers, energy), new processes to treat water and favour reuse (membranes, AnMBR, H₂ generation), new control algorithms and digital ICT tools and services, including socio-economic coordination of entities in the water cycle, will be adopted and promoted by the 5 major utilities in REWAISE Living Labs, generating new business for SMEs, and leveraging their growth by a WINcubator and investment strategies, to promote market uptake in fast follower cities and their water services.

1.4.1.3 VALUE THROUGH WATER – BEYOND STATE OF ART

Even though water is a renewable resource, it is unequally distributed and increasingly scarce as a result of population growth. Nevertheless, water is an essential element in promoting the health of a society, and the availability in sufficient quality and quantity is crucial to maintain the well-being of society and growth of the economy. **REWAISE** proposes

²³ Nielsen, B et al. (2005). 10th International Conference on Urban Drainage. Copenhagen, Denmark. August 2005.

²⁴ Wiese, J. et al. (2005). Wat. Sci. Tech., 52(5), 179–86.

²⁵ Weijers, S. et al. (2012). Wat. Prac. Tech., 7(2).

²⁶ Browne, et al. Renew. Sustain. Energy Rev. 15, (2011)

²⁷ Modisha & Bessarabov (2016). Int. J. Electrochem. Sci. 11 6627–6635

²⁸ Estejab et al. (2015). Water Research 77 133-145

a set of novel processes for the **safe and efficient** use of alternative water resources (brackish & seawater, rainwater & stormwater, wastewater...) by applying the principles of circular economy, in order to both, **avoid the pressure on existing water resources and decarbonize water sector**.

1) **Low Energy Desalination – new resources, low carbon**

Compared to conventional RO, the **desalination concept proposed by REWAISE** leads to significant energy savings (75%) in desalination from 3.5 to 0.5 kWh/m³, through the combination of different technologies:

- innovative **membrane pre-treatment** developed by POLY to solve limitations of current polymeric membranes, whose hydrophobic materials lose efficiency with chemical cleanings. New membranes will be made with permanent hydrophilic polymers, maintaining fouling resistance and filtration performance along its life (10 yrs). Also, standard pore sizes (0.02-0.1 µm) are replaced by tailor made pore sizes < 0.01 µm, to improve particle retention.

- **Capacitive deionisation (CDI)**, by VOLT, will be incorporated to RO to lower energy and improve product recovery. This solution has been tested, combining UF (Newterra) coupled to CDI for TDS removal from vegetable washwater and horticulture irrigation, as well as removal of TDS from high-temperature recycled laundry water.

- **Solar Desalination** will be used for the first time on Demo Scale to allow easier concentrations of Brine and favour recovery of the minerals contained in the seawater.

2) **Rainwater Harvesting and Microplastics Recovery – avoiding flooding and contamination**

Despite the interest in **rainwater harvesting and regeneration**, its deployment in the EU is quite limited. Some UK domestic gardens collect rainwater for irrigation. Frankfurt Airport has the biggest rainwater harvesting system in Germany, for 1 Mm³/yr from 26,800 m² of roofs, used for toilet flushing, watering plants and air conditioning. The London Olympic Park uses rainwater harvesting to reduce 73% fresh water demand. Rainwater harvesting is far more common in China, Argentina, Brazil and also in Thailand, where about 40% of the rural population uses it²⁹. On the other hand, Sustainable Urban Drainage Systems (SUDS) are being progressively adopted in EU for the management of runoff, increasing water infiltration to mitigate the storm effects and enabling the reuse of storm water.

Nevertheless, those applications **do not** usually **include technologies for water purification** and, when such treatment exists, it mainly consists on solar disinfection, or, in the case of some applications in CH, O₃ and activated carbon. While rainwater itself is a clean source of water, often better than groundwater or freshwater, the runoff on contaminated surfaces often leaves the water polluted, with **emerging organic micropollutants and microplastics**. It is estimated that between 75,000 and 300,000 t of **microplastics** are released into nature each year in the EU, and its impact on the environment and public health is of increasing concern among scientists, policy makers and public. The scale of pollution by microplastics and the negative impacts on biota such as inflammation and disruption to growth or reproduction are growing, for instance the discharge of stormwater runoff into a river close to the estuary has been identified³⁰ as one of the major inputs of Polycyclic Aromatic Hydrocarbons (PAHs) and polychlorinated biphenyls, among other pollutants, in coastal and marine waters. Runoff from coastal cities also pose a significant input of some of these hazardous substances into these water bodies.

REWAISE rainwater regeneration will enable not only the harvesting of such water source but also its purification through UF, removing a significant part of pollutants, including microplastics and other emerging pollutants.

3) **Governance and Regulatory Framework for carbon free water cycle**

The Water Sector throughout Europe accounts for 3 to 4 % of the overall electricity consumption in EU, while the estimated electric capacity to treat urban WW at 0,5 kwh/m³ for 500 M people is over 2000 MW, or two large nuclear power plants. On the other hand, the energy contained in wastewater (2.1 kWh/m³) could easily cover the energy need of the whole water cycle, if the technologies proposed in REWAISE would be widely implemented. Therefore, REWAISE will significantly contribute to fulfil the Climate & Energy framework for 2030 and the Renewable Energy Directive (2009/28/EC) by the shift towards a **resource-efficient carbon-neutral and climate-resilient economy in the water sector** by a GHG reduction close to 100% compared with actual footprint. Especially important will be the aggregation possibility for electricity consumption of the entities in the entire water cycle and for their common provision of demand response service towards the electricity grid. To facilitate the consensus in transitioning to a water smart society, REWAISE includes a specific WP (WP9) where new governance and regulatory approaches are developed, removing the barriers to innovation and favoring water wise decisions.

Beyond the SoA in generating Societal Well-Being through Water

²⁹ JMP (2016). "Joint Monitoring Programme Thailand Data"

³⁰ Tornero et al. Sci. Total Environ. 466-467 (2014): 820-820

REWAISE technologies are designed to develop alternative water resources, lowering freshwater abstraction and favouring reuse. For instance, contaminants of growing concern are removed from runoff, such as microplastics to be able to harvest rainwater, and mining groundwaters and seawater brine are recovered to extract critical raw materials before their reuse, with the help of new approaches such as solar desalination to lower energy needs. By systematically lowering energy use in water distribution and collection, with advanced digital controls, and harvesting the full potential of the energy in wastewater and residuals, a carbon neutral water cycle is achieved.

1.4.2 Innovation potential

REWAISE combines technologies at different level of maturity (section 1.3.4), but in all processes progresses significantly beyond the state-of-art, with the main innovative concepts integrated into large-scale demonstration are:

- Extraction of salts and raw materials from brines and mine water by selective precipitation, EDM, membrane technologies and electrochemical Li capture with reused Li battery electrodes.
- WW high-value products recovery: bacterial biopolymers and fertilisers (struvite, vivianite & dehydrated urine).
- Ammonia recovery (NH_4NO_3) by membranes from sludge liquor, and H_2 production by low-energy electrolysis.
- AnMBR+ biomethane upgrade for WW conversion to generate energy and nutrient rich irrigation water. Upgrade by membrane contactors and low-cost adsorption on recovered DWT sludge.
- Interconnected, integrated, interoperable and CDP, based on predictive control and mathematical optimization of operations within and between entities in the whole water cycle, from reservoirs to water supply networks. Machine Learning leading to predictive and prescriptive models for increased efficiency, water resources protection and resilience. Cryptography techniques (AAA) for the protection of CDP.
- Innovative tools for smart DW networks: Pressure Driven Analysis, Simulated Annealing, leakage detection by robot & fibre detection, no-dig leakage repair & Predictive Maintenance and WQ, contamination and concentration models for Dynamic WQ mixing.
- Smart control of WWTPs: IWAN, Bio-kinetic models & Cognitive Analysis, FIWARE modules, real-time data & metadata analysis, and WWTP digital twins for prediction, optimisation and decision-support.
- Innovative low-energy technologies in saline water recycling for reuse: membranes, CDI, solar desalination.
- UF for regeneration of rainwater/runoff water including microplastics & other micropollutants removal.

Table 12: innovations and improvements over the current level of development

	Approach	State of the art	REWAISE breakthroughs	Technology
Value in Water	Resource recovery from brine and mining water	>80% brine discharged without additional resource recovery (Mg, SO_4^{2-} ...)	Several strategies to recover all valuable products ($\geq 90\%$) on a low energy, cost-competitive ZDD	- Selective precipitation: NaCl, $\text{Mg}(\text{OH})_2$ - EDM: CaCO_3 , CaSO_4 , NaCl, MgCl_2 , $\text{Mg}(\text{OH})_2$, Na_2SO_4
		30-75% Li recovered from brine by evaporation	90% Li recovery . Spent Li batteries as sources of electrodes	- Electrochemical Li capture
		No significant recovery of minerals/salts from mining waters or brine	Recover gypsum, calcite and salt mixture ($\geq 90\%$) Enhanced membrane development	- Aeration + sand filtration + membrane filtration - RO + CDI/EDM
	Nutrient recovery	Full-scale struvite recovery from centrate stream (20-80% NPK)	90% NPK recover by struvite and vivianite precipitation	Improved precipitation process directly from WW sludge
		Separation of urine limited by NH_3 loss ($\geq 10\%$) , pathogens and further management	> 95% NH_3 recover from urine Stabilization and dehydration for safe and economical use as solid fertiliser	Separation, stabilisation and dehydration (mixed biochar & lime bed) unit
		AnMBR & CoAD effluents directly used in fertirrigation or discharged	90% NPK recovery . Low-cost struvite production by Mg dosing from brine. NH_4NO_3 biofertilizer ready to market	- Struvite precipitation with Mg from brine. - NH_3 recovery by membrane contactors
	Recovered products	PHA production: 35-40% efficiency	PHA production: 50% efficiency and high yield (> 0.4 g PHA/L h)	- Novel reactor configuration with enriched mixed culture
		DWT sludge is managed as residual sent for safe disposal	Recovery of DW sludge for H_2S removal (<20 ppm)	- Novel sludge separation and processing
		Biogas not suitable for high-end applications (CH_4 <60%, H_2S >100ppm)	Biogas upgrading (CH_4 >92 %; H_2S <20 ppm) . Suitable for grid injection and vehicles	- Membrane contactors - Low cost adsorption process

	Approach	State of the art	REWAISE breakthroughs	Technology
Value from Water	Smart drinking water network	Energy for DW distribution: 0.31 kWh/m³	DW distribution: 0.23 kWh/m³ 25% energy reduction in pumping	- Predictive demand models - Pressure Driven Analysis - Simulated annealing
		20% of DW lost on leakages worldwide	<10% losses of DW	- Robot & Optic fibre detection - Predictive maintenance
		No real-time measurements of water quality (WQ)	Algae bloom and THMs prediction & monitoring. Multi-source WQ optimisation	- WQ, contamination and concentration models - Dynamic WQ mixing
	Digital WWTP Management Systems	Energy demand for WWTP 0.55 kWh/m³ Limited development at present. No interoperability between infrastructures	Energy demand: 0.41 kWh/m³ 25% reduction of chemicals Integrated smart control by online measurements and pattern analysis	- Smart control of plant units - IWAN system - Bio-kinetic models (cognitive analysis) - FIWARE modules
Value through Water	Decentralized energy recovery	Separate software and hardware for specific units	Infrastructures Interoperability Efficient and secure Big Data management	- Real-time data & metadata analysis - Cryptography tech. (AAA)
		AnMBR losses 11-80% of CH₄ dissolved on effluent	Increase biogas production and recovery of 75 % of dissolved CH₄	- Membrane degasification system combined with stripping
		Low yield of AD of sludge from secondary treatment (190-240 biogas m ³ /t _{COB})	Co-digestion to achieve energy self-sufficiency in WWTP. Climate specific AnMBR design Increase CH ₄ production ≈2 fold	- Slaughterhouse co-digestion - AnMBR combined with DMF pretreatment (N climate) - AnMBR co-digestion (South)
		No H ₂ production at WWTP	80% conversion of NH ₃ to H ₂ 0.06 V for NH ₄ electrolysis	- Low-energy electrolysis from high ammonia liquors
	Low Energy Desalination	High consumption (>3 kWh/m ³) of RO Water recovery <60%	Improved desalination: <0.5 kWh/m ³ Water recovery >95% Mineral recovery from brine	- Membrane filtration: NF/RO - CDI - EDBM
		Not implemented for mining waters	Novel desalination process for mining: <0.5 kWh/m ³ Water + mineral recovery >95%	- Aeration + Adv. Filtration - Membrane filtration NF/RO - CDI
		Influent concentration by membrane processes	Zero-energy concentration to produce water & concentrate for desalination	- Solar pre-concentration
	Stormwater and Rainwater harvesting and regeneration for reuse	Sustainable Drainage Systems (SUDs) for basic treatments such SS removal (60-95%)	Removal of SS (>99%), microplastics (>99%) and emerging pollutants (>40%). Reusable water	- Micro- and ultra-filtration
		Roof rainwater collection Limited for garden irrigation	>90% rainwater from roofs, Removal of microplastics (>99%) and emerging pollutants (>40%). Uses: toilets & non-potable taps	- Micro- and ultra-filtration
		No Combined Rain & Storm regeneration implemented	Combined Rain & Storm harvesting Uses: irrigation & washing floor	- Vertical wetland (perennial plants), microfiltration
	Governance and regulatory framework for W-smart society	Societal context knowledge is limited and mainly at theoretical level	Deep understanding on the societal context around the 9 LL Effective engagement and dialogue	- Interactive tools: assessment, decision & engagement - Living Lab methodology +RRI
		Some software tools for custom behaviour tested	Behavioural patterns and economic behaviour knowledge	- Economic Behav. analysis -Data Science
		Conventional public and private management	New governance models for C free water cycle	- Competency Groups - SROI, SEEC

Some relevant patents have been identified, such as WO2016024881A1 & WO2004013048A2 for ED; US20180141834A1 for CDI; US20110253624A1 regarding AnMBR; and WO2014152264A1 for membrane contactors for NH₃ recovery. In all these and other relevant patents, REWAISE foresees a significant progress and, actually, new patents as a result of the project are expected. A dedicated IPR expert panel is set up within the project, formed by all the Transfer technology experts of the participating universities, to detect, protect and manage IPR.

2. Impact

REWAISE's approach will contribute to all impacts set out under the CE-SC5-04-2019 topic b. The consortium covers all important stakeholders needed to achieve such desired impacts with partners covering the water utilities, ICT, water technologies, market, social-environmental innovation, research. REWAISE covers all aspects of smart water economy. As such, REWAISE proposal targets all the relevant impacts of the call topic.

2.1 Objectives

IMPACT 1: SIGNIFICANTLY REDUCED USE OF WATER FROM FRESHWATER SOURCES

REWAISE will directly lower freshwater use by up to 35%, by reducing network losses, as well as increased water reuse and user efficiencies. Typical network losses of up to **30% non-revenue water will be reduced to the industry benchmark of between 15 and 10%**, **at least 10% of freshwater use will be replaced by reuse**, and further **10 % savings will be achieved by water use reduction and smart water network & citizens awareness**. **For the > 6 M people considered in the 9 living labs (see Section 1.3.3. about REWAISE Hubs population and water treated) on different EU River Basins, full deployment would amount to > 430 000 m³/d of freshwater saved.**

Table 13: REWAISE impact at Hubs

	Population	Water Treated (m³/d)	35% Reduction Freshwater Use (m³/d)
Continental Hub	1 820 000	512 000	179 000
Mediterranean Hub	1 020 000	147 000	51 500
Atlantic Hub	3 320 000	590 000	206 500
TOTAL	6.160.000	1.249.000	437.000

In addition, if the initial **6 target follower sites** implement the best practises observed in REWAISE, full roll-out would contribute up to **130,000 m³/d of freshwater reduction affecting 2.3 M inhabitants.**

Table 14: REWAISE impact at Follower sites

	Population	Water Capacity (m³/d)	35% Reduction Water Use (m³/d)
Burgas (BL)	200.000	40.000	14.000
Athens (GR)	660.000	99.000	34.650
Algarve (PT)	450.000	72.000	25.200
Caltanissetta (IT)	300.000	42.000	14.700
Odense (DN)	190.000	35.150	12.304
Dublin (IR)	540.000	102.600	35.910
TOTAL	2.340.000	390.750	136.764

In addition, by systematically implementing the new management concepts in the whole service area of all 5 water utilities of the REWAISE Consortium can reach >21 M people, a potential water savings of ~1.5 Mm³/d.

Furthermore, **new water sources are made available** through low cost desalination of sea and mine water, rainwater harvesting and urban & industrial WW reuse, **a yield of alternative resources up to 2,000 m³/d in the demos of the 9 living labs will be obtained (~2 Mm³ during 3 yrs of operation).** (See new water sources – Impact No.2).

Table 15: REWAISE impact per utility

	Habitants served (Mhab)	Freshwater Treated (m³/d)	35% Reduction Water (m³/d)
AQUA (ES)	11	1.717.201	601.020
STW (UK)	8	1.800.000	630.000
VASYD (SE)	0,51	122.271	42.795
SMVAK (CZ)	0,97	419.040	146.664
ANET (PL)	0,90	138.717	48.551

TOTAL	21,4	4.197.228	1.469.030

IMPACT 2: IMPROVED RECOVERY AND USE OF RESOURCES (MATERIALS AND WATER ITSELF), INCLUDING ENERGY

REWAISE closes Material Cycles to reduce the use of resources and energy, avoiding emissions and residuals:

- **Brine concentrates** of desalination, recovered as **value products: Mg and Li, Na₂SO₄, Chlorine and NaCl**.
- From **mine water**, **therapeutical products** are produced, and from **WW**, **ammonia fertilizer (concentrated NH₃ solutions)** and **phosphorus (struvite & vivianite)** as well as **biopolymers** from solid residuals will be recovered.
- **New water sources** from **rain- & stormwater harvesting**, **low-energy desalination of sea & mine water** and **reuse of urban & industrial WW**.
- **Biogas generation, H₂ production and minimization of energy consumption** in collection, treatment, transportation and distribution of waters.

Recovery Materials

Fertilizers: Significant ammonia fertilizer, phosphorous, struvite and vivianite will be obtained from WW in REWAISE, considering that 1 g of P and 5 g of N can be recovered from each person per day:

Table 16: impact on Fertilizer sector	Amount recovered in (kg/yr)*	Potential recovery in full-scale demo (t/yr)	Potential recovery (t/yr) Hubs
Ammonia	134,3	38	10.950
Phosphorous	11.900	19,5	2.190
Vivianite	18.900	50	Included above
Struvite	9.300	25	Included above
TOTAL	40.234	132,5	13.140

REWAISE expects to produce over 130 kg/yr of ammonia fertilizer, 19,5 t/yr of phosphorus, ~19 t/yr of vivianite and 9 t/yr of struvite – recovering over 40 t/yr of fertilizers. In addition, biopolymers will be extracted from WW in Vigo and Salamanca, expected to reach 300 kg/yr. If implemented on full scale, ammonia recovery could reach 38 t/yr and 19,5 t/yr of P from WWTP plants in Vigo, Salamanca and Midlands, in addition to the 75 t/yr of P-precipitates in Poznan. If deployed in all Hubs, ~11.000 t/yr of NH₄ and ~2.000 t/yr of P would be produced. **Desalination Brines:** Concentrates of desalination, instead of being discharged as brines, will be used to obtain value products (Mg (OH)₂, Li, Na₂SO₄ and Table salt NaCl), as already proven in sea-salt production. The following Table summarizes the recovery achievable by REWAISE at Denia, for full-scale implementation, as well as the potential of EU seawater desalination (considering 3.6 Mm³/d EDS) and salts (European Salts Producers Association) market.

Table 17: impact on desalination brines	Recovery rate (kg/m³ brine)	Amount recovered (kg)*	Potential recovered in full-scale in all Desalination plants in Spain (t/yr)	Today's total market in EU (t/yr)
Mg(OH)₂	5.05	200**	8,000	2.5M**
Na₂SO₄	4.2	2,700	20,250	80,000
Table salt, NaCl	17	11,000	51,000	120,000
TOTAL		13,900		

*8 h per day, 20 d per month and 6 months in operation. **Including saltworks production facilities.

From seawater, yearly production of valuable materials can exceed 13 t/yr at the Denia demo site, with full scale desalination plants of 3.6 M m³/d (in Spain) expected to produce 80,000 t/yr of critical raw materials.

Mining Water: Compounds present in mine tailings are in high demand and can be recovered in a relatively cost-effective manner (EDM from AQUA and selective precipitation from RESA). The Table below shows how much minerals can generate **value products from saline streams**, to avoid discharge of minerals into the environment, by the demo and its full scale replication in Jeremenko (CZ), as well as 12 mining sites in PL, ES, DE, FR, IT:

Table 18: impact on mining water	Recovery rate (kg/m³ brine)	Amount recovered in demo (kg/yr)	Potential recovered in full-scale (t/yr)	Estimated potential market in EU (t/yr)
Gypsum	3,8	22	22,8	342

Balneological salt	20,0	153,6	24	360
Calcite	13,6	78,7	81,6	1,224
Magnesia	1,2	6,95	7,2	108
Ettringite	0,03	1,74	1,8	270
TOTAL	38.6	263	137,4	2.304

From mine water, > 250 kg/yr of therapeutical products are expected Ostrawa – more than half in Balneological salts, ~79 kg of calcite and 7 kg of Magnesia and 1.7 kg of Ettringite. The potential minerals recovery from EU mining waters is estimated up to 500 times more – up to 7 % of the salt market (EU Salts Producers Association).

Water reuse

The application of AnMBR for sewer mining, and the recovery of rain- and storm water, as well as industrial ground water from mining, will allow to reach a production of 2,000 m³/d of alternative resource at REWASE living labs, a total of 2.2 Mm³ during three years of operation in the project.

Table 19: Impact on Water Reuse	New Water Sources (m ³ /d) Living Lab Prototypes	New Water Sources (m ³ /yr) Living Lab Prototypes	New Water Sources (m ³) In 3 yrs of operation
Continental Hub ¹	1,010	368.650	1.105.950
Mediterranean Hub ²	120	43.800	131.400
Atlantic Hub ³	950	346.750	1.040.250
TOTAL	2.080	759.200	2.277.600

¹ At Continental Hub, 950 m³/d will be produced from rain- & stormwater harvesting, and 60 m³/d from industrial water reuse of different qualities: 20m³/d potable, 20m³/d pure and 20m³/d technological water = 1,1 M m³ in 3 yrs.

² At Mediterranean Hub, 120m³/d of water will be produced from desalination – 131.000 m³ in 3 yrs. of the project.
At Atlantic Hub, AnMBR will produce 950 m³/d of recovered water in Vigo living lab, reaching 1 Mm³ in 3 yrs

Energy Recovery & Energy Efficiency

A zero-carbon water cycle service will be demonstrated in REWASE through energy generation, mainly of biogas & H₂, and the minimization of energy consumption. This multiple strategy is fully detailed in Impact No.3

IMPACT 3: CARBON FREE WATER CYCLE AND ENHANCED RESILIENCE TO CLIMATE CHANGE

DW treatment and distribution in traditional infrastructure consumes around 0.5 kwh/m³, and WW collection and disposal an equivalent amount, reaching 3 to 4 % of a countries' electricity need. The proposed changes in distribution network management using CDP will reduce electricity use by > 30% (see results of FP7 Smart Santander), whereas systematic WW process control, such as cognitive analytics, and optimised recovery of energy in AD and co-digestion can make conventional WWTP energy self-sufficient (Strass/AT, Marselisborg/DK)³¹.

REWASE proposes to optimize existing infrastructure with Digital Tools avoiding traditional aeration of WW, which converts organic matter to CO₂ with high electricity consumption (by blowers). Instead, biomethane is produced directly from raw WW with a positive energy balance in AnMBR, harvesting the energy contained in the organic matter (around 2 kwh/m³). Converting this energy to electricity, allows the new concept of sewer mining, transforming WWTP into carbon free energy and water reuse factories, reducing pumping by local reuse.

Other aspects of reduced energy		Water Treated (m ³ /d)	Energy (Mwh/yr)	t /CO ₂ /Mwh ³³	Reduction CO ₂ (kt/yr)
Cort.	Skaane (SE)	122.000	44.530	0,044	1,96
	Moravia - Silesia (CZ)	280.000	102.000	0,64	65,3
	Poznan (PL)	110.000	32.485	0,911	29,6
Me d	Denia (ES)	17.000	6.205	0,3	1,86
	Extremadura (ES)	100.000	36.500	0,3	10,95

³¹ <https://Enhancing the Energy Efficiency of WWTP Gandoglio 2017 Front. Environ. Sci. 5:70..pdf>

³² Heidrich ES, Curtis TP, Dolfing J (2011) internal chemical energy of WW. Environ.Sci.Technol 45:827–832. <https://doi.org/10.1021/es103058w>

³³ 2013 NEEFep for electricity production

Atl.	Salamanca (ES)	30.000	10.950	0,3	3,3
	Vigo (ES)	50.000	18.250	0,3	5,5
	Midlands (UK)	500.000	182.500	0,56	102,2
	Cantabrian (ES)	40.000	14.600	0,3	4,38
TOTAL		1.249.000	278.020	474.250	225,05

Fully Implementing REWASE in the 9 living labs brings a CO₂ reduction of 225 kt/yr, and for every 100 000 people in follow-up sites a reduction in emissions equivalent to 3.3 kt CO₂/yr is achieved (for an average CO₂ footprint of electricity 0,5 t CO₂/Mwh). The committed replication sites with 2.3 M people would reach 76 kt CO₂/yr.

Furthermore, each technology developed in REWASE can be evaluated for GHG reduction. One example is **Direct Membrane Filtration**, avoiding aeration for dilute wastewaters, but concentrating the organic matter for digestion. DMF impacts on European WWT for smaller sizes < 10 000 PE are estimated. In total, there are 12.328 smaller WWT plants³⁴ in 15 EU-countries. If energy-positive DMF would be implemented gradually, yearly electricity- and CO₂ savings could reach up to 3 TWh_{el} and 1,6 Mt CO₂.

Table 21: Energy savings and forecast	Electricity and CO ₂ savings		Surplus electricity production		Surplus heat
	TWh _{el}	Mt CO ₂	GWh _{el}	kt CO ₂	TWh _{heat}
2020	1.8	1.0	0.03	0.02	1.4
2025	2.1	1.1	0.04	0.02	1.6
2030	2.4	1.3	0.04	0.02	1.9
2040	3.0	1.6	0.05	0.03	2.3
TOTAL	9,3	5	0,16	0,09	7,2

Another example are new desalination methods in REWASE, which cut energy use by a factor eight, making brackish & seawater competitive with conventional resources. **Low energy cost desalination** (CDI) leads to significant energy savings (75%) compared with conventional RO. Taking into account the future trends of desalination, implementation of low energy desalination will allow an energy savings of 9.32 GW by 2030.

Table 22: Low energy cost desalination forecast	Production capacity ³⁵ Mm ³ /day	RO Energy consumption (3.5 KWh/m ³)	CDI Energy consumption (0.9 kW-h/m ³)	CDI Energy saving
2015 yr- Desalination DW	37.02	5.40 GW	1.39 GW	4.01 GW
2021 yr- Desalination DW	43.02	6.27 GW	1.61 GW	4.66 GW
2030 ar- Desalination	86.04	12.55 GW	3.23 GW	9.32 GW

A third example is concentrated ammonia from dewatering, converted to H₂, which would save the energy necessary to oxidize NH₄ in conventional WWTP. Within STW territory, about £1 M / yr is used for aeration, equivalent to 10 GWh/yr of electrical energy generating around 5 kt CO₂ / yr. Instead, about 3000 t /yr of ammonia could be collected, in turn avoiding equivalent artificial fertiliser production with Haber-Bosch (HB) process, which uses at least 10 kWh/kg. Capturing 3000 t of NH₃ would save 30 GWh or £3 M of electrical energy, and allow CO₂ savings around 15 kt CO₂/yr.

This ammonia could be converted to hydrogen in electrolyser for use as a transportation fuel, potentially generating 0.4 kt /yr. to give vehicles a range of 40 million km. The equivalent of 3 M litres of diesel would emit 8 kt CO₂/yr, as well as other polluting gases (NO_x) and particulate matter. The economic impact is a saving of £3.6 million on diesel costs (£1.20 /L of diesel), and potential Income from H₂ as a replacement for diesel @ £9,000/t. The ammonia to H₂ conversion can be applied to other residuals (food waste, intensive pig farming) to double its impact.

In Total, REWASE is estimated will allow an energy savings close to 300 MWh/yr, allowing a CO₂ reduction of 150 kt/yr. For each citizen, his carbon footprint for water use is eliminated by the new water paradigm.

IMPACT 4: MOBILISATION OF WATER-RELATED INVESTMENTS AND SYNERGIES WITH OTHER FUNDING INSTRUMENTS

³⁴ <http://discomap.eea.europa.eu/Report/1/WW/11/Reports/1able6>

³⁵ IWA-Desalination -- Past, Present and Future

REWAISE will make citizens truly recognize the “value of water”, delivering value in, from and through water to society. This by itself generates co-funding – if the right governance tools bring the acceptable water price closer to 9 €/m³ in DK (in water rich conditions) rather than 2 €/m³ in ES (for water scarcity). For instance, CHI decided, by public referendum, to dedicate a total investment of ca. 1 B€ to equip 100 WWTPs with advanced treatment to remove micropollutants, increasing annual costs (incl. electricity) by ca. 115 M€ and leveraging new taxes of 20 €/person/year. With CDP and citizens apps increasing transparency, acceptance to balance service costs with environmental needs and societal benefits is improved, to reach common decision making with shared priorities. Additional funds for the implementation and operation of the project are made available through synergies with:

- Savings generated by increased process performance of the project (with enhanced water, resource and energy efficiency and reduced and/or prevented undesirable events), and new income generated by innovative activities. For each 1,25 M m³/d, and a water cost of 1 €/m³, a yearly savings of 10 % is anticipated, reaching 45.6 M €/yr.
- Investment plans of the 5 participating water utilities will contribute financing, each leveraged by national funding programs, such as the Asset Management Programs in the UK or the National Water Plan in Spain. The average investment into asset renovation and improvement is around 100 €/person per year, summing up to 600 M €/yr.
- Institutions that foster investments in water infrastructure at the regional, national and European level, such as: - EIB has spent 17 B€ on water projects recently and has created a syndicate with 5 development banks to dedicate 10 B€ in investments for the circular economy in the next 5 yrs (2019 – 2023). BGK in PL and ICO in ES participate, as does KfW of DE, CDC of FR and CDP of IT.
 - EBRD bridges the funding gap in the water sector with a framework fund of 1,2 B €, and has formed JV with AQUA (New Europe JV) to expand water utility sector in Central Europe (HU, SK, RO, PL).
 - EFSD (2.0) provides 21 B € of financial guarantees to mobilize a more than tenfold higher investment in key growth-enhancing areas for large-scale strategic investments in infrastructure and innovation.
 - The European Regional Development Fund dedicates 280 B€ on 4 key priorities: Research & Innovation, Digital Economy, SME Support & Low Carbon Economy, all of which are strategic elements of REWAISE. - Cohesion Fund supports environmental priorities with 75 B€ in 15 EU States – BG, HR, CY, CZ, EE, GR, HU, LV, LT, MT, PL, PT, RO, SK & SI.

As a preliminary consideration about 1 B €/yr will be mobilized by international institutions for REWAISE actions.

- Other **research and demonstration funding instruments** such as H2020 or LIFE (see list of projects Table x), considering 16 projects with an annual cost of 450 k€ each, summing up to a joint innovation of 7,2 M € / yr.
- **Smart Specialization Strategies RIS3**, as project goals are aligned with the participating regions ³⁶
 - Spain (ES). Vigo: Key Enabling Technologies for new high added value processes & products; Castille and Leon: Environmental sustainability, climatic change & water; Madrid: Sustainable environment & smart grid.
 - Moravia-Silesia (CZ): Sustainable management of natural resources: water management.
 - Wielkopolskie (PL): ICT services & systems, to improve quality of life and manage complex infrastructures.
 - Skaneateles (SE). Smart Sustainable Cities & Smart Materials.

Each RIS fund is around 100 M €/yr, and REWAISE partners will mobilize 10 % of this amount in each region
- **Water Innovation fund**: just launched by STW in 2019, the WWIF is supported by 10 water companies from around the globe to foster open innovation for greater water efficiency. Initial budget is about 5 M €/yr.
- Innovative financing concepts such as crowdfunding, cooperatives, barter, etc.

Moreover, an **Investor Partnership** will focus during the project (WP 8) on the identification of **funding synergies** to mobilize co-funding and to develop **innovative financing concepts** (crowdfunding, cooperatives, barter, etc.) and a **WINcubator** will be established to accelerate the market growth of SME and to promote the uptake of the products into agile market channels, focused on targeted replication sites. It is expected to mobilise 15 M €/yr.

Estimation of the amounts expected in water-related investments listed above and other funding instruments in REWAISE are presented at a glance in Table 23, summing up to **9 B € over 5 years**.

³⁶ <http://splatform.jrc.ec.europa.eu>

Table 23: Investments forecast

	Expected Investments (M€) REWAISE 5 yrs	Expected Investments (M€) 5 yrs	Expected Investments (M€) 10 yrs
Project Savings	5 x 46,5 = 232,5	250	275
Water Utilities Investment Plans	5 x 600 = 3.000	3250	3575
Water Infrastructure Funds	5 x 1000 = 5.000	5350	5900
R&D Budget of Rewaise partners	5 x 7,2 = 36	39	43
RIS3	5 x 60 = 300	321	360
Water Innovation Fund (5 M€/yr)	5 x 5 x 1,07 = 23	40	60
Innovative Funding	5 x 0,5 = 2,5	2,7	3
Investors Partnership	5 x 15 = 75	80	90
TOTAL	8669	9333	10306

IMPACT 5: THE CREATION OF NEW BUSINESS OPPORTUNITIES AND INCREASED COMPETITIVENESS OF EU INDUSTRIES

A key impact arising from REWAISE project will be the creation of relevant and numerous new business opportunities in water sector but also in fertilizers, chemicals, polymers, ICT & energy sectors, among others.

Table 24: REWAISE impact in various sectors

1. Fertilizers
Fertilizers Europe estimates that up to 20-30% of the 5 Mt of phosphates that the EU imports each year can be replaced with P recovered from sources such as WW. The EU fertilizer industry in 2018 represents an important industry in terms of turnover (€10.9BN), employment (78.500 employees) and, most importantly, its value to the agri-food sector. EU Organic Fertilizer market is projected to reach \$3,260 million by 2023 & Fertigation market, globally is expected to register a CAGR of 8.1% from 2019 to 2024 and reach \$9.08 billion by the end of 2024.
REWAISE Impact: To market ammonia, P, struvite & vivianite extracted from WW, and avoid barriers to market entry, the partners are already involving the main users, fertilizer distributors (such as Sologas Vigo) and farmers (Asociación Galega de Cooperativas Agrarias, National Farmers Union West Midlands, etc.), working together with similar H2020 projects such as www.scalibur.eu and b-ferst. REWAISE is expected to recover 180 t/yr of fertilizers and over 70,000 t/yr in a full-scale implementation, which will represent an income of 27 M €.
2. Magnesium & Lithium
Mg and Li ⁴ , are classified in the EU as a CRM ³⁹ because risks of shortage impact the economy. Mg is expected to grow at a CAGR of 6% during 2018-2022. The global production of Magnesia is 7M t, being China (71%) the main producer. Mg(OH) ₂ demand in EU reached 128,000 t/yr with a market value at 200M€ and its market size is expected to increase by > 2 %/yr, while the value increases faster (> 7 %/yr) with growth coming from high value applications, such as flame retardant and pharmaceuticals (1/3 of the Mg(OH) ₂ demand in EU). Li is anticipated to register a CAGR of 10 % during 2019-2024. Main demand are by Electric Vehicles (EV) and energy storage, the demand for this product is forecast to triple by 2025 due to the high demand from batteries production.
REWAISE Impact: Mg product meet the quality specifications of these sectors, and is competitive with other sources, provisional sales are forecast at 45 M€/yr by 2030 within reach of Mediterranean Desalination, where 2.5 Mt MgO/yr equivalent could be produced. The full-scale implementation would reach an annual revenues of 100 M€ from Mg(OH)₂ and 10 M€ from Li production.
3. Biopolymers
Bioplastics represent about 1 % of about 320 Mt/yr of plastic produced. Its demand is rising and more sophisticated biopolymers, applications, and products are growing the market continuously. Market data by EU Bioplastics, show global production set to increase from 2 Mt in 2017 to 2.4 Mt in 2022. Bioplastics are used increasingly in packaging, catering products, consumer electronics, automotive, agriculture/horticulture and toys to textiles and other segments. Packaging is the largest field of application for bioplastics with almost 60% (1.2 Mt) of the total.
REWAISE Impact: PHAs are an important polymer that now finally enters the market at commercial scale, with production capacities estimated to triple in the next 5 years. With a growing number of materials, applications, and products, the number of manufacturers, converters and end-users also increases steadily. The new business created by REWAISE products from WW is estimated in 10 M€, considering an average cost of 2,75€/kg of PHA.
4. Desalination

In 2017 the global water desalination market represented USD 15.43 billion, nearly 90 Mm³ of water is desalinated and around 18,500 desalination plants operating across the globe.

REWAISE Impact: REWAISE will implement **low energy solar desalination, reducing the energy needs** which would enable to increase the economic value of DW produced, **estimated in a costs savings of 100 M€.**

5. Methane

The global biomethane market was USD 1.68 billion in 2018 and is expected to reach USD 2.61 billion by 2025, at a CAGR of 6.5% between 2019 and 2025. At present, about 71,000 WWTP are operational in the EU-28, Iceland, Norway & Switzerland. Regarding to biogas, only in EU there are over 2,800 biogas plants treating sludge at a WWT and over 23,500 WWT facilities, which might incorporate AD technology if a more profitable product is obtained (biomethane). Additionally, there are over 17,800 biogas plants in EU that might incorporate this upgrading technology, especially in Germany and Italy, which accounts for over 60% of the plants. The total Installed Electric Capacity of biogas plants in EU increased by 5% in 2017, reaching a total of 10,532 MW.

REWAISE Impact: REWAISE biogas production will suppose 50 M€ of revenues.

6. Hydrogen

The H₂ market grew steadily during 2012-2016 at a value CAGR of 6 %, and from a market of about US\$ 130 Bn in 2017 will reach more than US\$ 200 Bn by 2025. H₂ is a vital carrier of energy that can support the future requirement for clean energy across the globe. The increasing adoption of H₂ across various industries in EU has presented potential opportunities for the growth of the global market.

REWAISE Impact: renewable H₂ will be produce to be used as transportation fuel, covering the requirements livestock farmers & water utilities, of making them independent. The **production of renewable H₂ from ammonia, an annual income of 3.6 M €³⁷** as a replacement for diesel. **expected to be 0.4 kt/yr would reach**

7. Water Irrigation

In OECD countries, **irrigation accounts for 63% of water use** (three times more than cooling for power generation (19%) or public water supply (16%) (OECD, 2015)) - representing a **very significant potential market for water reuse**, mainly in areas as Denia Region where water scarcity and agriculture are closely linked. At present in EU, about 1,100 Mm³/yr of treated urban wastewater is reused, which accounts for approximately **2.4% of the treated urban wastewater effluents** and **less than 0.5% of annual EU freshwater withdrawals**.

According to EC proposal for a regulation on water reuse, uptake of water reuse in agriculture could significantly alleviate water scarcity. The EU report on Water Reuse (2013), indicates that **Spain could cover in 2025 up 26% of its water needs by recycling, more than doubling its current practice**. In the EU, water reuse potential is estimated in the order of 6 billion m³–6 times the current volume.

REWAISE Impact: To address this situation and considering a competitive price of water irrigation of of 0.3€/m³, a full-scale implementation **REWAISE will generate ~ 13.6M€ by water irrigation business.**

8. ICT Technologies and O&M business

Implementation of smart and digital water concepts will open new markets for **ICT and O&M business** linked to pressure management, meter data analytics, network monitoring, leakage detection, smart sensors, interactive applications, on-line communication, etc. As **global water demand** increases significantly – expected **55% – until 2050, new technological tools are needed to manage the increasing complexity of water management**. Frost and Sullivan estimates the market in smart water (meters and data management) at 7.8 Billion US\$ by 2020.

REWAISE Impact: It is expected the monitoring and control of pressure results in reduced water use and can lead to 30% of reduction of energy. Lower pressures limit risk of pipe bursting, resulting in less repair costs. (Each digging/ reconditioning averages 8.000€). Concretely, in REWAISE, 50.000 people distributed on about 5.000 be water meters in Denia, leakage can reduced by > 20%, saving 2.5M€/yr

9. Job Creation

³⁷ 1kg H₂ has a range of 100km.

Socially, an essential impact of REWAISE will be job creation. Utilities, LEs and SMEs will upgrade job profiles towards more qualified tasks descriptions involving new skills. Staff members at the five utility partners will improve education levels and skills, getting trained on new services and technologies of REWAISE. SMEs will grow their human resources based on the expansion of market and knowledge, while RTOs and Universities will increase their experience and resources in new technologies and methodologies.

The total direct **job creation during REWAISE** will be a total of 160 **people**, such as PhD students and postdoc on water treatment, resources recovery and membrane technologies, ICT, technicians and project managers. **Five years' after concluding REWAISE, the forecast of new jobs is a range of 960 people, doubling again in 10 years.** All personnel selection for new jobs will encourage equal access to women and men and social inclusion.

Furthermore, **REWAISE will enhance the innovation capacity of the partners, to improve competitiveness and growth of companies**, which brings other important benefits for society.

	LEs	SMEs	RTOs	TOTAL	Expected Job Creation (No.) 5 yrs	Expected Job Creation (No.) 10 yrs
Job Creation REWAISE	95	51	20	160	960	1920

IMPACT 6: SUPPORTING THE EU WATER POLICIES AND THE TRANSITION TO A MORE CIRCULAR ECONOMY (CE)

The overall objective of EU Water Policy is to ensure access to good quality water in sufficient quantity for all Europeans, to ensure the good status of all water bodies across EU and to prevent and mitigate water scarcity towards a water-efficient economy. **REWAISE will strongly support the EU Water Policies, through the stakeholder involvement, creating guidelines, best practices, recommendations and standards that will contribute to the harmonization of current fragmented legislation and further implementation.**

The **GREAP and SEEC high level boards** of the project will **orient, redefine, promote the adaptation and foster the implementation of the main regulatory frameworks** to embrace the true value of water – Fertilisers Regulation (EC) No. 2003/2003, Urban Waste Water Directive 91/271/EEC, Nitrates Directive 91/676/EEC, Water Framework 2000/60/EC, EU Proposal on Water Reuse, Flood Directive 2007/60/EC, Marine Strategy Framework Directive 2008/56/EC and EU Raw Materials Initiative will be pushed, **strengthening EU Water Policy Strategies.** Furthermore, **REWAISE will mainstream water policy into other EU policy sectors such as Energy and Plastics. The zero carbon water service**, based on the use of renewables, bioenergy production and smart energy efficiency, **will contribute directly to the Roadmap to a Resource Efficient Europe and the Resource Efficiency Flagship of the Europe 2020 Strategy (20% reduction of GHG emissions by 2020 and 80-95% GHG reduction by 2050).**

Between 75,000 and 300,000 t /yr of microplastics are estimated to be released into the environment in the EU. REWAISE's microplastics removal **favours the EU Strategy for Plastics in a Circular Economy**, which emphasizes innovative solutions to prevent their dispersal, and to **improve the capture of microplastics in WWTP.**

The core of water smart innovations in REWAISE favour the **EU Circular Economy Action Plan and the goals of SPIRE PPP, supporting the transition towards a more circular economy at in relevant sectors (public, private and non-profit), at different scales (regional, living lab and hub levels) and economic and social conditions**, generating the creation of green jobs and valuable new business in a carbon free water cycle.

The reduction & reuse of energy and material streams in a synergistic way, production of resources & sustainable products by reusing materials, closing loops of recovered materials, water reuse, waste reduction, digital solutions, pollution prevention, engagement of citizens in changing consumption patterns and strong stakeholder commitment creates a shift to seek value from water, accelerating implementation of Circular Economy in EU.

Table 25: REWAISE impact on EU Water policies

Regulation	How affects REWAISE innovations	REWAISE Actions

Fertiliser Reg. (EC) No. 2003/2003	- Free movement in the market for fertilisers extracted from DWT and WWT.	- Nutrient Recovery for high value Fertilizer: Struvite & Vivianite and Open market to recovered fertilisers from DW & WW in line with Circular Economy. - Contribute to 20%-30% of EU's demand of recycled nutrients set by EC. - Involve stakeholders of fertilizers industry & policy makers (SEEC).
UWWT Dir. 91/271/EEC	- Protect the environment from adverse effects of urban WW discharges. - Reuse treated WW whenever possible. - Recycling of sludge	- Reuse of water for irrigation - Recycle of WW sludge from AnMBR
Nitrates Dir. 91/676/EEC	- Protect water pollution by preventing nitrates from agricultural sources reaching water bodies.	- Recovery of N and P to protect water bodies. - Promote the use of recycled N-based fertilisers in agriculture.
Water Framework Dir. 2000/60/EC	- Promote cost-effective alternatives to manage WW and DW. - Protect and restore clean water to ensure a long-term and sustainable use. - Ensure good ecological and chemical status of water bodies.	- Consider BCA of the proposed innovative technologies. - Reduction of N and P loads to EU waters - Public authorities and citizens engagement (SEEC & GREAP)
EU Proposal on Water Reuse	UWWTD recognized treated WW reuse, but EU regulations for water reuse are currently under draft to boost water reuse within Circular Economy. Partners are working in EIP-Water thematic priority "water reuse and recycling" to unlock its full potential.	- Environmental & health risks analysis - Evaluation existing regulations - Public authorities & citizens engagement (SEEC & GREAP) - Recycle of WW from AnMBR
EU Raw Materials Initiative	- Sustainable supply of raw materials from EU sources. - Boosting resource efficiency and promoting recycling. - Mg & Phosphate rock include in the list of CRM and Li is expected to be considered as a CRM.	- Mg produced from brine, reducing its extraction. - P-fertilisers will be produced from WW, reducing the extraction of P from phosphate rock, a CRM. - Selective precipitation, EDM and electrochemical Li capture.
Flood Dir. 2007/60	- Flood risk management	- Stormwater harvesting avoiding flooding - Flood risk control by in-sewer soft sensor and flow control devices.
Marine Strategy Framework Dir. 2008/56/EC	Protection of Marine waters and coastal	- Micro-litter monitoring: WWTP and storm-water effluents - Smart network management & reservoir for pollution prevention - Stormwater filtration for control pollution. - Sensors for water quality - Removal of microplastics and emerging pollutants - Environmental & health risks analysis

IMPACT 7: WATER SECURITY AND ENHANCED WATER USE EFFICIENCY

The **Water Sector** is one of the lifeline sectors as its functions are essential to core operations in nearly every other critical sector. **When water services are lost for relatively short periods (< 8 hours), the functioning of multiple sectors is significantly degraded**³⁸. Urban Water Network are tightly linked to other interconnected urban CIs (energy, mobility, communication, health) and has a central role in the quality of citizen's daily lives and economy.

Governments increasingly recognize the critical connection between water security and economic growth. It has recently been estimated that 32 billion m³ of treated water is lost from urban systems around the world each year through leaks in the pipes (Damania et al., 2017). REWAISE targets the reduction of losses to less than 10 %.

REWAISE covers the gaps between and security, monitoring of water quality and early response to hazardous events that may critically affect the water supply. The 3 Hubs considered, with 3 clearly differentiated climatologies, enhances the concept of water security.

³⁸ Water Sector Resilience. Final Report and Recommendations (2016). National Infrastructure Advisory Council United States

In addition to improving efficiencies in water use – water reuse, leakages control and risk management, REWAISE CDP includes *a catalogue of modelling tools* to assess the impacts of hazards and risks on water infrastructures due to climatic extremes, contaminations, accidental failures and malicious threats, adopting early warning measures as well as customizable DSS enhancing the protection of systems and citizens from adverse events. Moreover, user dialogue and value-based decision making, interconnecting various plants and distribution networks proposed in REWAISE will allow smart management services to match supply and demand at optimal operation cost.

REWAISE CDP is based on concepts of **cybersecurity, traceability, trustworthy and robustness of data**, and will **take explicitly into account the** Action Plan for a Digital Single Market, **relevant global standards for water safety & security** such as **ISO 31000 and ISO 73:2009, ISA84 standard (also IEC 61511) on safety instrumented systems (ANSI 2004), and ISA99 (also called IEC 62443) on control system security (ANSI 2007).**

IMPACT 8: ACHIEVEMENT OF THE RELEVANT UN SUSTAINABLE DEVELOPMENT GOALS (SDG)

REWAISE significantly contributes to the achievement of the relevant UN SDGs, in particular:

- **SDG6 | Ensure access to water and sanitation for all:** REWAISE will contribute to a remarkable reduction of fresh water use (35 %) as it will systematically reduce losses and promote **sustainable water reuse**, to strongly increase availability and **access to water and sanitation**, and promote other economic and social sectors. Pro-active stakeholder participation through SEEC & GREAP and interactive digital tools increase public involvement and citizen satisfaction in water services.
- **SDG7 | Ensure access to affordable, reliable, sustainable and modern energy:** Energy is the dominant contributor to climate change, accounting for around 60% of total global GHG emissions. REWAISE will foster the **use of renewable energy** and promote investment in **sustainable & renewable energy sources**. Efforts to minimize energy consumption, recover energy and biofuels, and use modelling tools for smart energy management will assure affordable and clean energy services, increasing substantially the share of renewable energy and improving the energy efficiency in water sector.
- **SDG9 | Build resilient infrastructure, promote sustainable industrialization & foster innovation:** REWAISE is focused on innovation for resource and energy-efficiency, developing sustainable infrastructures that are resilient to climate change, as essential base to achieve sustainable and future proof economic activity. The project mechanisms to enhance proactive governance, citizens' engagement and increased access of SMEs to financial services creates new market opportunities, fostering social development and human well-being. ETV verification is another base to encourage greater adoption of clean & environmentally sound processes.
- **SDG12 | Ensure sustainable consumption and production patterns:** REWAISE enforces SDG 12 by developing innovative patterns to close the material loops, by fostering water reuse, resource recovery from residuals and reutilizing them to their fullest degree. LCA and cost analysis, connected to digital control tools, ensure minimum environmental impact and sustainable returns in economic and social contexts. To analyse and select decision parameters, and optimize infrastructure investments, **citizens are engaged and involved in the whole value chain of water**. To promote sustainable facilities, zero waste such as **ZLD in desalination**, reduce substantially the generation of residuals, closing the loops of materials.
- **SDG13 | Take urgent action to combat climate change and its impacts:** REWAISE will **transition the water smart economy** to a zero carbon water cycle, **combating climate change and its impacts**, supporting the SDG13 implementation in line with **COP21 Paris Agreement**. By systematically eradicating energy inefficiencies, the renewable bio-energy contained in WW will generate a self-sufficient water cycle. **REWAISE CDP will allow to adapt different water sources to the climatic conditions, implementing corrective actions to alleviate climate change, based on machine learning, AI tools and users' inputs.**

In addition to these SDGs, **REWAISE also meets SDG5 (Gender Equality)**, described in *Section 1.3*, and **SDG8 (Economic Growth)**, detailed previously (*see Impact 5 – creation of new business opportunities*).

IMPACT 9. IMPLEMENTATION OF OBJECTIVES OF EIP WATER AND EU ENVIRONMENTAL TECHNOLOGY VERIFICATION

REWAISE, by fulfilling the mission of SC5-04 of a water smart society, follows the EIP Water vision for “creative innovation to tackle water challenges, while stimulating sustainable economic growth and job creation”. The eight

priorities of EIP Water are addressed, as specified in Table 26, to reach the objectives of EU policies and to capitalize on previous innovations and existing initiatives, while offering opportunities to create synergies with WssTP and other platforms and sectors such as energy and materials, using Smart technology as an enabling factor.

Table 26: REWAISE EI Water priorities addressed

Water reuse & recycling	Rain- and storm water harvesting from roofs, regeneration by UF, recycle urban effluents & sewer mining as reuse water for industries or agricultural use, minimization of water losses through leakage prevention, matching water needs and qualities with prediction models and on-line proactive control.
Water & WW treatment, resources recovery	Sea-, ground-, rain- and surface water from rivers & reservoirs and municipal & industrial WW treatment, microplastics and micropollutant removal, extraction of Mg & Li, production of iron-sulfates, calcium-carbonate, chloride & other salts, biopolymers & fertilizers production.
Water-Energy nexus	Biogas generation and H ₂ production, low energy solar desalination, reduction of pumping energy by automatic & dynamic pressure allocation adjusted to demand and advanced control of treatment plants with cognitive analytics reducing energy needs and leading to self-sufficiency with renewable energy.
Flood & drought risk management	Assess vulnerability of water systems & increase resistance to risks through modelling tools, increase water network resiliency by online micro-sensors, Pressure Driven Analysis, optimisation of sectors. Rainwater harvesting and smart sewer management to avoid flooding and minimize discharges.
Ecosystem services	REWAISE smart water ecosystem integrates an intelligent digital framework for decentralized water services and decision making, involving all relevant stakeholders to embrace the true value of water, within a network to share data across platforms, creating new services for coordination of ecosystems.
Water governance	Redefine regulatory frameworks and governance procedures to remove legal barriers for innovations, including innovation deals, by integrating a proactive GREAP with main users and policy agents.
Decision support systems & monitoring	CDP for real time monitoring, control and optimization of data and networks, enabling smart management and decision making across legally separated entities, adaptable to different users, to improve socio-economic decision making by shared criteria, using AI and interface protocols to promote inter-connectivity with local green infrastructure and networks of other sectors (Telecom, energy)
Financing for innovation	Development of innovative financing concepts, such as crowdfunding, cooperatives, barter; and SME acceleration with a WINcubator and dedicated investor partnerships, developing specific business plans for each innovative product, systematic scouting for co-investments in the asset management plans of each water utility, and using the incentives of the infrastructure funds and banks for sustainable projects
Smart technology	Smart technologies for leakage detection, avoiding supply interruptions & reducing customer consumption, smart communication & network management for pollution prevention and water reuse, smart algorithms to match supply & demand at optimal operation cost & minimal social impact, smart management of water infrastructures to reach Water Smart Economy and Society.

To promote and shape EIP, **project partners are participating** in relevant **Action Groups of the EIP Water – UVAL** (leader), AQUA and STW in the **AG Water Circle 036 (Anaerobic MBR for Water Resource Recovery in Circular Economy: WATER CIRCLE)**, COVU belongs to **AG052 (ESE: Ecosystem Services for Europe)** and AQUA to **AG126 (Cloud Technologies & Real time monitoring + Smart Water Network)**.

Full alignment of REWAISE with EU policies is also obtained through the SEEC/GREAP Members Advisory Councils, who have been selected from various key stakeholders to form strategic partnerships with other key interest groups – EurEau, ERRIN, EWP, EWA, IWA, Netwerch20, Aqua Europa, EurAqua and COST.

To **accelerate market uptake and increase replication** of REWAISE innovations, reliable technology assessments will be performed by the Institute for Ecology of Industrial Areas (IETU), one of the unique ten EU Verification Bodies accredited for Water Treatment & Monitoring. This methodology allows **leapfrog ahead to the EU Environmental Technology Verification Pilot Programme and enhance the Eco-Innovation Action Plan of the EC** bringing cutting edge solutions rapidly to the users and boosting their impacts and benefits.

From each of the 3 REWAISE Hubs, the **most mature technologies will be verified** within the project, increasing substantially the actual 11 water treatment & monitoring technologies verified under **ETV Pilot Programme. Three technologies** – Recovery of PO₄³⁻ & nutrients (Continental Hub), energy recovery by AnMBR (Mediterranean Hub & also Leakage control technology (Atlantic Hub), will be validated in their performance according to procedures of EU Norm EN-ISO 14034: 2018 Environmental Management: Environmental Technology.

Reducing the risk of adopting new technologies and encouraging sound investments, facilitating an easier market access to innovations, ETV verifications will also support adapting and complying with water-related legislation and further implementation of the EU water policies and eco-innovation. Citizens, policy-makers and regulators Will benefit from this reliable information on the performance achievable by REWAISE solutions, facilitating the definition of more

accurate policies, the formulation of better informed opinions by citizens organisations and a more cost-efficient implementation of legislation by regulators, optimizing the Social Return on Investment.

2.1.1 Advance beyond State-of-the-Art (SoA) and ambition

The successful achievement of above detailed impact is affected by a series of uncertainties with negative consequences. The following table shows the details of these barriers and other operational obstacles that may determine to what extent the expected impacts will be achieved and the proposed mitigation measures.

Table 27: REWAISE barriers and mitigation measures

Barriers/obstacles & framework conditions	Effect on the achievement of the REWAISE impacts	Mitigation measures
Social: Low awareness about value of water & benefits of water reuse, negative public perception of water reuse & desalination	Reluctance of local communities to install desalination and circular schemes and use reclaimed water. Delay in the market acceptance I L	The project will develop a long-term and consistent stakeholder engagement and communication strategy with public authorities and consumers to demonstrate the benefits and value of the new circular approaches, using local competency groups and dissemination tools
Governance: Complexity in the societal contexts	Delay in implementation and replication of the solutions developed I M	Multi-actor approach, RRI and Innovation approach included in the conceptualisation of the REWAISE Competency Groups.
Legislative: various national regulations with different levels of policies regarding water use and reuse including treated water use and production of fertilisers from recycled nutrients.	Issues for the replication and wide application of the solutions developed. Delay in the market uptake. I M	REWAISE reflects local priorities of different policies and will analyse legal frameworks in EU through WP8 and WP9, proposing innovation deals to facilitate new policies and enhance the uptake of products, and transition to circularity at 9 different sites. REWAISE includes key governmental representatives in the GREAP to address main legal barriers.
Technical: Technologies/IT developments fail to reach the predicted efficiencies.	Energy recovery & water consumption reduction, water reuse and products extraction will be lower, and specific costs will be higher I L	The project counts with scientists and technologists highly experienced in Water sector to recommend improvements. Modelling and cognitive Analytics can detect shortcomings and help propose new solutions, assessment and continuous iteration with end-users.
Market: Low financial resources and knowhow of SMEs to enter in new markets. A lack of trust hampers wide application of New solutions	Difficult to reach some of the key markets (coagulants, fertilizers, water irrigation, investment, advisory, etc.) I L	Activities include: - Cooperation & communication with agencies and investors for organising trade missions. - New go-to-market strategies and recommendations. - panel implemented - Campaigns to foster water reuse & nutrient recovery - ETV -

L: Low Effect I M: Medium Effect I H: High Effect

2.2 Measures to maximise impact

REWAISE includes a significant set of actions to overcome the aforementioned barriers and maximise the impact, involving the stakeholders and main target audience. These actions are aimed at:

- Design and implement an outreach strategy to increase the effectiveness and timeliness of the project impacts.
- Ensure high participation rate, awareness and involvement of all pertinent target groups (academy, policy makers, users, end-users, general public, regulatory and standardisation bodies and any other relevant stakeholder) using the adequate communication channels and messages, with WP8 WP9 procedure.
- Facilitating the commercial exploitation of the project results and the business development [WP 8].

Dissemination and communication activities, definition and analysis of exploitation plans, as well as management of research data and handling of IPR are the main activities, maintained throughout the entire project under WP1 [AQUA], WP 8 [BLUE] and 9 [WE&B], with the support of INNCO and other Task Leaders and Participants. The following two instruments will be used to harmonize the activities, according to measurable goals:

- A **Plan for Exploitation and Dissemination of Results (PEDR)** will be created and executed, monitored and updated by AQUA (WP1), integrating project outcome. A first draft of this plan is included in Section 2.2.1.3.
- **N**(As part of the PEDR, a **WINcubator** will accelerate the market growth of SME, supported by an **Investor**
- **Partnership**, to promote uptake of the products into agile market channels, focused on targeted replication sites. A Communication Plan aims at establishing an efficient and engaging dialogue with the public and the media. It will be regularly monitored and updated (INNCO). A first draft of this plan is included Section 2.2.3.

As integral part of these Plans, in addition to activities of the EU, EIP and Water Europe/WSSTP, 3 key elements guarantee the mobilisation of the stakeholders, to create synergies and share resources:

1. The 3 local Competency Groups [WP 9]
2. The 5 Advisory Councils of the project: Scientific Advisory Board (SAB), Governance & Regulatory Ethics Advisory Panel (GREAP), Stakeholder Engagement & Equality Community (SEEC), Investors Partnership (InPa) & IP Advisory Group (IPAG) (Fig. 6).
3. To benchmark SoA, multiply the findings and provide orientation on priorities, 3 key industry vectors are used:
 - **EurEau** federates 32 **associations of Water Service** Providers from 29 countries, its members employ close to 500 000 people and supply almost 500 M people with 45 billion m³ /yr of Drinking water and connect almost 450 million people are to over 18.000 WWTP (<http://www.eureau.org/about-our-sector>)
 - The European **Benchmarking Cooperation EBC** brings together, since 2007, about 40 leading water utilities from 20 countries, serving over 100 M people in Water and WW services - with the REWAISE partners ANET, Vasyd, STW and Aqualia regular participants, among a total of 220 utilities (<https://www.waterbenchmark.org/>).
 - The **Technology Approval Group (TAG)** managed by Isle Utilities, associates more than 50 utilities in Europe. AQUA, STW and ANET are active members, as are WIN/VASYD. 3 times a year, new technologies in both DW and WW applications, including smart services, are jointly evaluated and coordinated pilot tests are launched. Similar TAG exists in Australia, with 30 water utilities, and in the US with 60 participants, and activities are deployed in Brazil, Singapore and the Philippines.

The overall concept underpinning REWAISE's measures to maximise impacts is outlined in Fig. 7, leading from providing a compliant water service, to Excellency, followed by collective action and optimized governance with maximum stakeholder participation, allowing the market uptake of the solutions and a resilient smart water society.

2.2.1 Plan for exploitation and dissemination results (PEDR)

2.2.1.1 TARGET USERS

A preliminary identification of 6 target groups is listed in Table 29, specifying dissemination activities, objectives and results. A consistent strategy is established in PEDR at the beginning and updated to facilitate future exploitation.

2.2.1.2 DISSEMINATION MEASURES

Dissemination and Exploitation are critical for REWAISE to achieve the targeted impact, and specific plans will be elaborated in [WP8-WP9] towards an effective and efficient strategy to exploit project results. Their key points, based on a four-stage model, are:

- Stage 1: Clear selection of objectives for dissemination and target audiences.
- Stage 2: Identify the results to disseminate and its sustainability for the selected audience.
- Stage 3: Match the responsibilities of the partners with the tools for dissemination
- Stage 4: Monitor and evaluate the impacts of the project Stage 4 with clear business plans

The dissemination measures will focus on:

- Disseminating the scientific and technical results of the project to the scientific community
- Disseminating the practical results of the project to the general public.
- Creating consensus in the water community around the new project paradigms
- Generating awareness in the general public, end users and stakeholders to favour take-up

To disseminate REWAISE results to a broad and diverse audience, all EU Members and the international (worldwide) water community will be targeted to ensure the widest possible take up, exploiting existing networks and contacts in EurEau, TAG and EBC. A preliminary balance of the project participants and 4 Advisory Boards includes 22 EU countries, as well as NO, 11, - and 5 non-European countries (CA, OM, SG, US, ZA...).

STAGE 1: CLEAR SELECTION OF OBJECTIVES OF DISSEMINATION AND TARGET AUDIENCES

Objectives and goals are as follows:

1. **Raise awareness** of target audiences, and **get their support**: to refine the objectives, benefits and applicability;
2. Get the necessary **feedback** to investigate the needs of the market, refine them and adapt to new needs, ,
3. Identify end-users willing to **validate** the project outcomes and **support the exploitation** with potential clients
4. **Promote** agreements with **commercial** partners and investors (see letters of Investor partnership in Annex I) and
prepare the ground for product launching and **market uptake** (farmers associations, municipalities)

Target audiences: 9 core groups have been identified (See Table 29) and contacted for the dissemination actions:

All REWAISE living labs are supported by the city councils, and up to 36 institutions have sent Letters of Commitment to support project development and implementation (see Annex 3) from 29 countries. To leverage resources, REWAISE will cooperate with other related projects including in EIP, H2020 or Life to exchange experiences, to share communication and dissemination campaigns for related topics, and engage the advisory boards in networking.

STAGE 2: IDENTIFICATION OF RESULTS TO DISSEMINATE AND ITS SUITABILITY FOR THE AUDIENCES ENSURING ITS REPLICABILITY

For an effective coordination of innovation management and exploitation in REWAISE, an adequate correlation between content, the dissemination channel, the format and the targeted audience is defined by 4 dissemination levels:

- **Level 1:** Raise awareness about the project and its objectives, targeting the identified audiences and stakeholders.
- **Level 2:** Promote the results of the project, starting from the second half of Year 2 to the end of the project.
- **Level 3:** Use Competency Groups to define messages and prepare exploitation of project results (WP 8 and 9)
- **Level 4:** Active Market and Customer Relation to be tailored for each target audiences and enhance replication. To achieve maximum replicability of REWAISE, a proactive plan is developed in each WP, coordinated by WP 1 and 8, to promote and exploit the results, based on the modularity of solutions, and the following elements:
 - Interlinkage of various technology applications (Table 9 cross-fertilization) to share experiences and identify the modules that can be transferred to fast followers due to rapid returns and positive SROI. Replication candidates are committed (BU, DK, GR, IT, PT, PL...), generating their own plans while embedded in project execution.
 - A proactive replication strategy is a key element for tailoring products and developing business models for future deployment of the results. The replication sites will participate in the definition and monitoring of indicators (WP 7) as the basis for effectively covering the needs and challenges of the water service and adapting solutions.

STAGE 3: MATCH RESPONSIBILITIES OF CONSORTIUM PARTNERS WITH TOOLS FOR DISSEMINATION

Effective dissemination requires careful management of expectations of the audience, with permanent monitoring of project progress, validating success, or corrective actions. As part of WP1 and 9, INNCO will coordinate communication and dissemination, to make sure that the innovation strategy achieves the planned impact and exploitation goals. The Dissemination Plan targets four different stakeholder types: 1) The Research and Innovation community (Scientific), 2) The Business Community (Market) and 3) The Political Community (Governance) and 4) The Citizens and User Communities (Social).

To measure the effectiveness of dissemination on the target audience, three values will be fixed: H, for highly effective; M, for medium effective and L, for low effective. The table 29 summarizes the dissemination activities.

Table 29: REWAISE Dissemination activities

Dissemination measures	Objectives	Expected results	Target audience - effectiveness impact					
			Citizens & User Communities	Public Authorities	Business Community	Scientific Community	Sectoral Platforms	General Public

Replication measures	Demonstrate in real environment operation & technical advantages of REWAISE; Open markets; Increase the future exploitation of project results	I- Increase citizen satisfaction in water services II-Increase citizen participation in water services - Interconnection between the water system & social sectors	H	M	H	M	L	M
Info Day REWAISE & brokerage events	Engage technical policy making community and relevant stakeholders	Increase public involvement in water management, mobilize replication sites	M	M	M	L	H	H
Conferences, exhibitions, meetings	Achieve awareness of the project results and find future collaborations	Promote project development and results and H2020 program funding, increase co-financing	--	--	M	H	M	L
Final Conference REWAISE	Broaden dissemination of the project and its results; Increase market uptake and future exploitation of project results	Increase public involvement in management Increase the future exploitation of REWAISE approaches.	L	M	L	H	M	H
Scientific and specialised Journals (See Table 30)	Promote and achieve awareness of the main project results to scientific and specialised journals	Increase aware-ness among the scientific community	--	M	M	H	L	--
Networking with EU initiatives	Promote and technical project results and market uptake	Creation of networks to leverage project results	--	--	--	M	M	--
Press releases & newspapers & magazines	Disseminate the project and its main technical & scientific results; raising awareness of future water services and REWAISE benefits; convey the most remarkable information from the project and its results to a general audience	Increase public awareness and involvement in water management	M	M	L	L	M	H
e-Newsletters			M	M	L	L	M	H
Logo, graphical identity, posters & brochures			M	M	L	L	M	H
Project website			M	M	L	L	M	H
Social networks			M	M	L	L	M	H
Project Video			M	M	L	L	M	H

Table 30 below shows selected conferences and journals considered for dissemination. Smooth and efficient communication among the consortium is addressed by internal dissemination [WP8] and local Competency Groups.

Table 30. REWAISE potential fairs, conferences and journals for dissemination purposes

Nature ³⁹	EVENT/JOURNAL	Website or Type of Access	Interval
S&T P	Biennial: IWA World Water Congress "Water for smart liveable cities"	https://www.danva.dk/iwa2020	Copenhagen '20 Toronto 2022
S&T	Biennial: Singapore International Water Week	https://www.siww.com.sg/	2020, '22, '24
S&T	Yearly: Global Water Intelligence Summit	www.watermeetsmoney.com	Madrid 2020
S&T	Yearly: Aquatech + Amsterdam Water Week	www.aquatechtrade.com	November
S&T	Yearly: SIWI Stockholm Water Week	www.worldwaterweek.org	August
S&T	Biennial: IDA Desalination World Congress:		October 2021
S&T	Annual: WEFtec Water Environment Federation Technical Exhibition + Conference	https://weftec.org/	N.Orleans 2020 Chicago 2021
P	SWAN Forum	https://www.swan-forum.com/	Yearly
P	European Benchmarking Meetings	www.waterbenchmark.org	Yearly

³⁹ S&T: Scientific and Technological Conference; P: Professional Workshop/Exhibition; J: Journal;

J	Water research; Water Science & Technology; Science of the Total Environment; Journals of Membrane Science, Desalination, Water Policy, Environmental Science & Technology	Peer review / Open Access	
J	Bioresource recovery; Bioresource Techn.; Nutrient Cycling in Agroecosystems	Peer review / Open Access	
J	International Journal of H2 Energy, Journal of Cleaner Production, Journal of Applied Electrochemistry, Electrochimica Acta	Peer review / Open Access	
S&T	Biennial: World H2 Energy Conferences	http://whcc2020.org/	Shanghai 2023
S&T	International Society of Electrochemistry 29 th Topical Meeting on Energy and Water	https://www.isec-online.org/isec-conferences/	Mikulov, CZ, 2021
S&T	4 th IWA Resource Recovery Conference 2021	https://iwa-network.org/all-events	Biennial
S&T	IWA ecoSTP (Ecotechnology, for WWT)		2020 - Biennial
S&T	European WW Management Conference	http://ewwmconference.com/	Annual
S&T	IFAT - World's Leading Trade Fair for Water, Sewage, Waste and Recovery	https://www.ifat.de/index-2.html	Biennial: Munich 2022

STAGE 4: TO MONITOR AND EVALUATE THE IMPACTS OF THE PROJECT

Finally, as dissemination must reach implementation of results, to replicate New Water Services and promote uptake of all the modular elements they contain, detailed Exploitation Plans are developed in WP8, with a first list identifying the exploitable results given below. These results will be evaluated to assess the market potential, and, together with the IP generators, main paths for exploitation (licensing, IP sale, creation of Spin-offs) will be explored:

- **Business and Exploitation Plans (D9.1):** Each living lab will develop their respective **BEPs** in WP8, once technologies reach TRL7-8, to clearly identify the target customers, their needs and define strategies to fulfil them.
- **Measure and extract conclusions:** One major barrier found by investors in water technologies and services is the lack of coherent and consistent indicators. The generation of a sound reference system, built on traceable indicators and including cost data, easily shown in a dashboard, developed in WP7, will serve as basis for future standards.
- **Coordination with other projects and actions at European level** will be actively promoted to share open data, favour standardisation, enhance interoperability to de-risk invests and reduce entry barriers. The three vectors identified above, **EurEau Water Associations, TAG and EBC** will help to integrate feedback of water utilities worldwide and tailor the products, business and exploitation plans to the needs of potential customers.

2.2.1.3 EXPLOITATION MEASURES

The **Plan for Exploitation and Dissemination of Results (PEDR)** is defined in [WP8] (BLUE), collecting and analysing data of market tendencies, legislative changes and competitive intelligence, including an IPR strategy for each product and service. PEDR will be periodically updated during the project, reflecting product progress as well as new exploitation opportunities and strategies, depending on competitive assessments. In [WP8], preliminary considerations of business models and exploitation strategies will be further developed based on exploitable results and commercialisation agreements. A first summary of products and markets targeted is in Table 31.

Table 31. Summary Exploitation plan for selected REWAISE Products

Partner	Exploitable Results/Interest	Routes to Exploitation	Potential Uses/Applications	Potential Users and Sectors
AQUA	Minerals extraction from brine	Portfolio of AQUA solutions for existing and new DWTP, WWTP and Desalination Plants; Improvements offered to existing clients (about 1000 municipalities) and new tenders (both DBO and O&M contracts). Dissemination in EBC and TAG	Desalination Plants	Municipalities, Industries
	Refining of selected nutrients		WWTP	Municipalities, Industries
	CH ₄ upgrade for fuel cell		WWTP; industries	Municipalities
	Demand, quality, control & optimization models		DWTP	Municipalities
SMVAK	Co-digestion of Industrial Residue	Inclusion in its portfolio of services; deployment into other plant of Group	DWTP	Water Utilities, Municipalities
	Smart methods for leakage and network energy optimisation	Inclusion in its portfolio; transfer of technology to all networks in Group. Sharing in European Benchmarking EBC	DWTP	Water Utilities, Municipalities
VASVD	Technology for Rainwater Harvesting	Inclusion in its portfolio; Internal Service; Dissemination to other Cities in Oeresund	DWTP	Water Utilities, Municipalities
	Direct Membrane Filtration Technology	Sales through established membrane supplier marketing channels.	WWTP	Water Utilities, Municipalities

STW	Predictive models & Prescriptive models	Internal Service; Collaborative transfer to other UK Water Companies (Isle TAG)	DW networks	Water Utilities, Municipalities
	Robotics for Network management	Internal product development, collaborative transfer via EBC and EurEau	DW networks	Water Utilities; Municipalities
EMS	WW network models	Direct Sales to Other Water Companies via EBC and TAG; Commercial Agreements	WW networks	Water Utilities; Municipalities
POLY	PVDF membranes	Collaborative Research; Internal product development; Agreements	Desalination Plants; mining	Water Utilities, Municipalities, Mining
SOIWA	Evaporation Domes	Selected Desalination Plants (IDA, EDS)	Desalination	Desal Operators
APOR	Biomimetic Membranes	Sales through existing membrane supplier marketing channels		
VOLT	CDI Tech.	Internal product and Sales development; Distribution Agreements with Agents	Desalination Plants; Industrial Plants	Municipalities, Industry, Mining
RESA	Selective precipitation – Mg Recovery	Joint ventures with brines producers (desalination plants and salt production facilities); Commercial Agreements	Desalination Plants	Desalination
ANET	Struvite and Vivianite recovery	Commercial Agreements with Technology Providers (Xylem, Evoqua, Danaher/Trojan)	Water Utilities; Industries	Water Utilities; Industries
WE&B/ENOLL	Social Engagement Methodology	Dissemination to other water utilities through EurEau, TAG and EBC	Water Utilities; Industries	Water Utilities; Industries
UVAL	AnMBR	Internal Deployment for Sewer Mining in Group Networks, New industrial service creation; Commercial Agreements	WWTP	WWTP; industries: Papermills, Breweries; Agrofood industries
UNIZ	Software tools for economics-based coordination on optimal and predictive control	Collaborative research,	Utilities, Water authorities, End-consumers, SMEs for software engineering	Utilities, Governance, Industry, SME
CETIM	LCA	Collaborative research; Internal service creation	WWTP and DWTP	Industrial & Municipal; WWTP; DWTP
	RA	Collaborative research; Internal service creation	WWTP and DWTP	Industrial & Municipal WWTP; DWTP

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Plans, as outlined below using a Canvas Model.

Key Partners	Key Activities	Value Proposition	Customer Relationship	Customer Segments
-Rewaise partners -Large AQUA SMYAK, VASY, ANET STW -SMEs: Polymem, Voltea, EMS Resources, Solwa, RTOs: UVAL, TUOS, PTU, CITIM Developing and providing Micro and ultrafiltration membranes, AnMBR IoT communication and data integration, Water Sensors, monitoring stations ICT Platform, water network and prediction models Low energy desalination, CDI Extraction minerals of brine Integrated membrane systems for products recovery, Refining of products Hydrolysis and bio-thermal disinfection, Methane recovery Gas upgrading for fuel cell Partners of other EU-funded Projects that support Rewaise Stakeholder Community Rewaise Scientific Advisory Board European Commission	• Demonstration at large scale the Rewaise technologies and concepts in different environments – Validation of technologies of: Low energy desalination, Recovery of minerals, nutrients, rain- and reuse water for further use • Energy production from WWT plants • Reduction of energy and consumption and CO2 emissions of water management plants • Integration of relevant data on a single platform, Dashboard to reach public involvement • App and polls from the early beginning to increase citizen satisfaction & public involvement • Development of new business models • Improve Legal Framework – • SROI, LCA, Risk assessment	Modular solution, adaptable to different socioeconomic & environmental conditions 1. Increasing Efficiency by increasing water reuse & producing fertiliser from WW residuals and recover up to 100% NPK nutrients Reducing energy for desalination up to a factor of 4, non-revenue water and utility performance (50%) 2. Increase Expansion reach new utility customers in emerging markets of by- products (magnesium (>99%) and iron-sulfates, calcium carbonate (>90%) nutrients, humic acids (>99%), iron and alumina (>90%)) 3. Addressing Environment: carbon neutral water services 100% reduction in CO2 emissions and water reuse 4. Achieving Engagement: social involvement and transparency including interconnectivity	Patented processes, products and technologies together with the know-how built in the years of the project Project can be tailored to the need of the customer depending on their existing infrastructure/budgets, main challenges and local conditions Operation and Control Monitoring, -Maintenance services, Infrastructure building (replacement, upgrade or new construction) Provider of secondary products Warranty	Public admin (tenders) and public water bodies Public institutions, authorities Industries: food, pulp & paper, brewery Fertilizer companies Hotel and resorts Spas Utilities, desalination plants, DWT and WWT plants Farmers Technology providers, Citizens Consumers, irrigation communities, rural areas
Cost Structure Economic costs IP management legal including licensing Product development (HR engineering) Materials and Components cost (MFG) Integration of technical components according to the characteristics of the site Operation and maintenance Business development, contact the customers, marketing	Environmental & Social Impacts: Public involvement in the water management in circular economy, Prevention of water shortage, contamination events, and improvements to interconnected systems (e.g. transport, energy, etc.) Advance legal framework and governance issues, administrations involvement	Revenue Streams Payment flows according to specific contracts for: - Construction of DWT, WWT and desalination plants - Consulting services (plant construction, management...) - Operation and maintenance of DWT, WWT and desalination plants • Sales of technologies for DWT, WWT and desalination plants • Revenue/Savings from secondary products and savings from plant management (Energy production, Alternative Water Sources, Drinking Water Treatment Technologies, Wastewater Reuse Technologies, Network and Leakage Control, or WW Sewer Models, REW-ASE CDP, WWT Models and Cognitive Analytics and Socio-Economic Evaluations) <i>Estimations of installation capacity: 2025: 1 plant 2029 (5yrs): 12 plants 2039 (10yrs): 30</i>		

2.2.1.4 WINcubator AND REPLICATION STRATEGY

To speed up the change within water innovation and create business opportunities from the REWAISE products, a specific mechanism developed by WIN Water in Sweden, will be adapted to connect SME with the marketplace of the partner utilities. WIN cross-connects 35 smaller start-ups with almost 30 larger utilities, municipalities and companies. Using open innovation, specific challenges are identified and solutions proposed, coaching the SME to realize their growth potential, and assisting with financing. BLUE, WPL 8, will organize this **WINcubator**, to shape an open SME innovation marketplace and business network into an integral part of the REWAISE EcoSystem.

The living labs of REWAISE partners facilitate market access and provide test beds, in addition to personal and financial contributions, a good view of trends and business intelligence, allowing innovation companies to get early feedback and support directly from the market. The investor partnership of REWAISE can also coach SMEs to help develop their new products and services as well as their business. With close connections to venture capital, test beds, universities and corporations, the WINcubator systematically encourages new technologies to replace old ones. A preliminary list of new concepts proposed by SMEs that will be examined in WP 2 and 3 to be evaluated in the Hubs is given in Table 32, with TAG detecting about 10 more every 4 months.

Table 32: Preliminary list of new concepts proposed by SMEs that will be examined in WP 2 and 3

SME	Product	SME	Product
Advizzo	Software for Customer behaviour an engagement	Kando	Smart wastewater sensors
Altered	Water saving nozzles	Kisters	Real time monitoring netwo meteorological forecast
AXsensor	Smart Sonic Level Sensing (SLS)	Orbis Intelligent	Pipeline Infrastructure Moni
Enviroplan	Low Energy Flotation	Scubi	Smart Network Managemen
HydroKonek SMART	AMR watermeter with remoted cont valve	S::Can	Water Quality Monitoring
Hyds	Early warning system for floods	Skuma	enzymatic médium + micror for methane production
iHackLabs	Cybersecurity experts	WATEN	Pumping optimization
Inflowmatix, Sy	Transients monitoring	Watchtov	Network Robotics
Irriot	Irrigation IoT automation platform		

To accelerate the replication of REWAISE solutions in other utilities, the 3 vectors of TAG, EBC and EurEau will be proactively used, reaching out to hundreds of water companies and utilities integrated in these networks. In addition, a few utilities with large replication potential have already been targeted, all around the periphery of the 9 Living Labs in Ireland, Denmark, Bulgaria, Greece, Italy and Portugal. Aqualia operates in the latter two countries, while major utilities from Odense, Athens and Algarve have already shown their commitment to collaborate in the dissemination and market uptake of REWAISE results, with a project budget earmarked to incentivize the implementation and benchmarking of the new paradigms.

2.2.2 Management of knowledge and IP strategy

2.2.2.1 KEY KNOWLEDGE (IPR) ITEMS AND IP PROPERTY MANAGEMENT

Each beneficiary ensures that results are disseminated as swiftly as possible, once protection of IPs, confidentiality obligations and legitimate interests of the owner(s) of the results are properly handled, as reflected in the GA. As core part of the MT, a dedicated director (IIPRE), supported by a group of experts, is responsible to exploit knowledge and intellectual property rights (IPR) and to comply with the obligation to disseminate results as well as open access rules, whilst safeguarding the rights of the consortium partners to protect their IP.

Based on the background of the partners and monitoring of the potential new IP generation, **the IIPRE elaborates a detailed IP protection plan**, as a relevant input for the exploitation plan, and a **policy of protection of the project's results** whenever they are industrially exploitable and protection is possible, reasonable and justified.

To enhance the chances of an effective commercial exploitation of the project's results, the IIPRE balances a coordinated strategy to protect the generated knowledge with communication and dissemination actions. IP generated within the project will be protected when appropriate, through different means, such as patents, utility models and other mechanisms (e.g. trade secrets). IPR Management Guidelines are implemented from the proposal stage to the end of the project, to be regulated in compliance with the final CA and the IP agreement among the partners.

Throughout the project, the consortium will generate new knowledge that will be instrumental for shaping the project outcomes, which may qualify for IP protection, and will be followed by a detailed Exploitation plan for selected Products (WP 9). To fulfil its obligation of open access, and maintain the interest of the consortium to widely disseminate the proposed new methods and tools, two types of activities susceptible of being protected are foreseen: (1) IPR applications for new systems and solutions that are prepared by consortium partners; and (2) Information disseminated within the project and to external bodies, such as publications, presentations and regulatory and standards bodies, after protection.

The strategy and procedures for the management of IP take into account the principles set in the GA and in the CA:.

- **Ownership of results:** in full compliance with the Model Grant Agreement and the Consortium Agreement, **results are owned by the beneficiary that generates them.**
- **Joint ownership by several beneficiaries:** whenever results have been **jointly generated by two or more beneficiaries** and it is not possible to establish the respective contribution of each beneficiary, or separate them for the purpose of applying for, obtaining or maintaining their protection, such results shall be **jointly owned by the beneficiaries which generated them.** Owners must agree (in writing) on the allocation and terms of exercise ('joint ownership agreement') and may grant non-exclusive licences to third parties to exploit jointly-owned results (without any right to sub-license), if the other joint owners are given at least 45 days in advance notice and fair and reasonable conditions. Once the results have been generated, joint owners may also agree (in writing) to apply another regime than joint ownership (e.g. transfer to other owner/s with access rights).
- **Agreement on background:** beneficiaries will clearly identify and agree (in writing) on the background for the action ('agreement on background'), within the CA before the GA is signed.
- **Access rights:** beneficiaries will give each other access – under fair and reasonable conditions, which can include royalty-free basis- to background needed to implement their own tasks under the action, or needed to exploit their own results, unless the beneficiary that holds the background has – before acceding to the GA – informed the other beneficiaries that access to its background is subject to legal restrictions or limits.

2.2.2.2 MANAGEMENT OF RESEARCH DATA GENERATED AND PROTECTION STRATEGY

Most project deliverables and scientific research data are planned to be released as Public to allow easy access. Deliverables that may contain a commercially competitive advantage will be Confidential until the end of the project and will be integrated into the IPR strategy. In addition, as an key issue of the project and following recommendations of the EU, a **Data Management Plan (DMP)** will be established by the IIPRE and dedicated team (including all partners), to provide the data management policy governing all datasets generated by the project. The MT will provide a system to allow easy administration of knowledge, internal knowledge management, facilitated through a web-based secure professional collaborative space for information and document sharing where each partner will have a section to upload key documents and papers. For greater consistency, IPR and deliverables will be monitored by the IIPRE, to ensure, in coordination with the MT, that valuable results are adequately protected, before dissemination.

2.2.2.3 MEASURES TO PROVIDE OPEN ACCESS

As to scientific publications, according to the Guidelines on Open Access of Data in Horizon 2020, the project will provide on-line access to scientific information that is free of charge to the end-user and that is re-usable. The detailed strategy on the appropriate model ("gold open access" vs. "green open access") will be included within the Data Management Plan, as one of the project deliverables. These publications will be stored in an Open Access repository, during and after the life of the project. ZENODO (specifically targeted to data and publications from EU projects), CITEULIKE, MENDELEY or BIBSONOMY will be the open access repositories options to be used. REWAISE will ensure open access to the bibliographic metadata that identifies the deposited publication.

2.2.3 Communication Plan

A detailed **Communication Plan (CP)** [WP1] will ensure the design, implementation and follow up of an efficient communication strategy, starting with the mapping of Key Messages and target audiences (Table 34), and adapted

by continuous fine tuning made during implementation of the different actions.

a) Communication measures for promoting the Project

REWAISE communication objectives will be achieved through the following tools presented in Table 34:

Table 34. Communication measures of the REWAISE Project

Measure	Description	Audience	Effective Impact
Project Website and linked newsletter	User-friendly interface will orientate the potential user to the appropriate facility depending their needs. Diverse sections give an overview of the project, partners, resources and to public results and deliverables. An "end-user and stakeholder" section gives limited access to subscribe to project news. An external e-newsletter will be issued each 6 mo to present the latest results, success stories, news, upcoming events, etc.	Consortium members, general public, target users	Active promotion of project results, business opportunities, investment opportunities and public awareness
Social media	REWAISE will create different accounts for social communication allowing interactions with the public thought different tools depending on the objective: (Twitter, Facebook, LinkedIn and YouTube).	General public, target users	Active two-way promotion of results, business / investment opportunities
Promotion materials	General project promotional brochures presenting REWAISE objectives, and expected results will be designed and distributed in relevant events and in electronic version. Promotional video explaining project objectives, outcomes and testimonials, to show scientific and practical benefits of results	Distribution at events, conference, workshops, etc.	Generation of awareness and visibility
Articles in non-scientific publications	General articles about the project will be published in non-scientific web journals and possibly blogs.	General public and industry	Promotion of the Project among the general public
Media-related actions	Press releases coordinated at a project level, interviews to strengthen the impact of the project and to reach the widest possible audience within the end-user and the general public.	General public and industry	Promotion of the Project and water sector among the general
Liaison with related research	REWAISE will work together and will be aligned with other funded similar projects to widen the dissemination of its results.	EIP, other H2020 projects	Cross-fertilization, synergistic replication
Dialogue with stakeholders,	GREAP and SEEC will enhance exchange to demonstrate benefits for the society and users.	Govern. and society	
Workshops and events	Organization of workshops and events, coordinated with EIP, EurEau, TAG and EBC to share outcomes	General public.	
Short-Film	Open a call for submission of the production of a shortfilm about circular economy in the water value chain.	General Public,	Promotion of the projects and its values.

All Partners participate in implementation of the communication strategy, coordinated and monitored by WP1.

b) Ensuring the optimum efficiency of the communication activities – Key Performance Indicators

- **Website and Social media activities:** monitoring of REWAISE website hits will be done together with an analysis of the impact of events like any new article. Using web tools like Google Analytics allows analysing visitor traffic and giving a complete picture of visitors no, visited pages including the audience's needs and interest.
- **Articles in non-scientific publications:** each partner will keep track of the number of publications disseminated.
- **External contacts:** a form on the project website allows outside people to contact the consortium. A specific form field asking for how they have heard about REWAISE and analysing the type of request will help identify where or how our communication has been efficient and reinforce it in other areas wherever needed.

This set of indicators will be regularly checked and used to identify REWAISE's communication's strengths and weaknesses in relation with the objectives set. This periodic evaluation will be communicated to the whole consortium and will allow updating the CP whenever needed as well as redirecting further actions if needed

Table 35: KPIs for dissemination activities

Quantification	Activity	Key Performance Indicators	Expected Results
Effectiveness	Dedicated website	No. of accesses per year	>3,500 accesses per year
		No. of downloads	>300 downloads per year
		No. of individuals / organisations signed up to receive email updates on project achievements and results	>300 individual organisations each year
	Social Media Channels	No. of Twitter followers	>3000 Twitter followers
		No. of Facebook followers	>500 Facebook followers
		No. of LinkedIn followers	>500 LinkedIn
		No. of Project videos	>10 project videos
		No. of views on YouTube	>6,000 views on YouTube
		No. of social media interactions from across the EU	>20 interactions per
Networking with communities, networks and associations		No. of communities or associations reached including UE projects and networks	>250 communities/associations per year
Quality	Visual Identity	Identifiable/recognisable visual identity, attaching format, eye-catching pictures, dynamic graphic	Project logo has been finalised before development of project

3. Implementation

To achieve the goals of the WssTP Vision, and the nine objectives of Call SC5-04, REWAISE is structured in **four main activities**, developed **through nine interrelated WP (Fig. 7)** to be implemented in nine living labs:

- WP2 and 3** will evaluate **Technologies** to recover water, energy and resources, connected to the **CDP** for monitoring and control, maximizing value from reusable water of different qualities, energy and valuable materials. **WP2**, divided into 3 tasks, focuses on: 1) water regeneration for reuse, 2) energy recovery for carbon neutral services and 3) valuable materials recovery, to match final product quality with acceptable economic and social returns. **REWAISE CDP** is developed in **WP3**, combining existing knowledge from previous efforts (EU projects such as www.urbanwater-ict.eu), with innovative sensors and softwares, particularly AI tools (e.g. machine learning and cognitive analytics, socio-economics-based coordination using predictive control). CDP integrates a series of Apps to connect FIWARE, to enhance optimal control including functions for matching supply and demand.
Interoperability will be ensured by data integration of heterogeneous sources (KPIs, weather, relevant data from Copernicus, WISE Data Centre) and by following CEN and EU guidelines to achieve standardisation of water semantics and common ontologies. Data connectivity will follow WISE recommendations, INSPIRE principles through online data links and redundancy support; and ISO 8000 framework.
- WP4, 5 and 6** are dedicated to **Large scale applications** of innovative solutions in the nine living labs (Fig. 3) spread through the relevant climatic regions, and integrating the whole value chain from resource capture, treatment, distribution, collection and resource recovery – as well as the logistics of product handling, and user interface.
- WP7 and 8** are devoted to the **Technical and economical assessment**, with the analysis of environmental and social performance and risks (KPIs, LCCA, ETV, etc.), and the definition of new business models, market uptake and funding strategies, including co-financing mechanisms and innovative co-funding concepts (utilities plans, infrastructure funds, EU instruments) and SME accelerators (WINcubator) to boost the investment potential. Business strategies are guided by an Intellectual Property Advisory Group, and an Investor Partnership (InPa).
- Transversal activities of **coordination, governance and social engagement** are enhanced by **WP1 and 9**, developing innovative water governance concepts to improve stakeholder engagement and society awareness through social science, communication and the **RRI approach**. To coordinate the hubs, manage the project and the Living Labs, the consortium uses a Stakeholders Engagement & Equality Community (SEEC), to seek collective action. To adapt or create governance models that favour creation and validation of new markets and business models, a Governance & Regulatory Ethics Advisory Panel helps to get a grip on water regulation and governance, ethics, equality, market access and social return on investment. Using Innovation Deals, sustainable

value chains will be created, promoting the adaptation of regulatory and institutional frameworks to embrace the true value of water

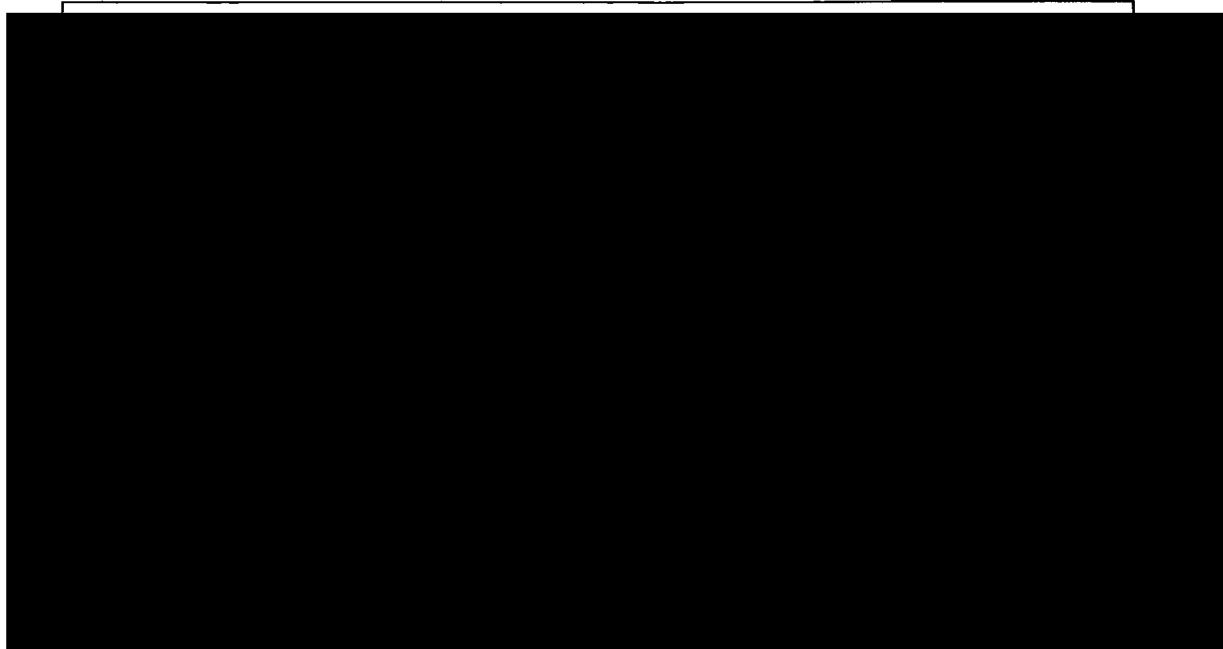


Fig 7. PERT diagram

3.1 Work plan

See annex A.

3.2 Management structure and procedures

3.2.1 Management of knowledge and IP strategy

The Management structure defined in REWAISE (Figure 8) facilitates the cooperation between partners while maintaining a strict control of achievements towards project objectives. To enable an effective and lean project management, the structure has been defined following the 3 connected aspects: Technology (in orange), Market (in green) and Social (in yellow), distinguishing between the decision-making and organisation of daily operations: Strategic Level and Operational Level. The relevant bodies and specially their composition, are described below in further detail.

3.2.1.1 THE MANAGEMENT TEAM (MT)

The MT is formed by the PC and 5 executive Directors as key figures for successful project management. The table below shows these roles and the partner responsible with the selected person. The MT will coordinate the project, acting as an intermediary between the partners and governing and consultancy bodies with specific functions and responsibilities.

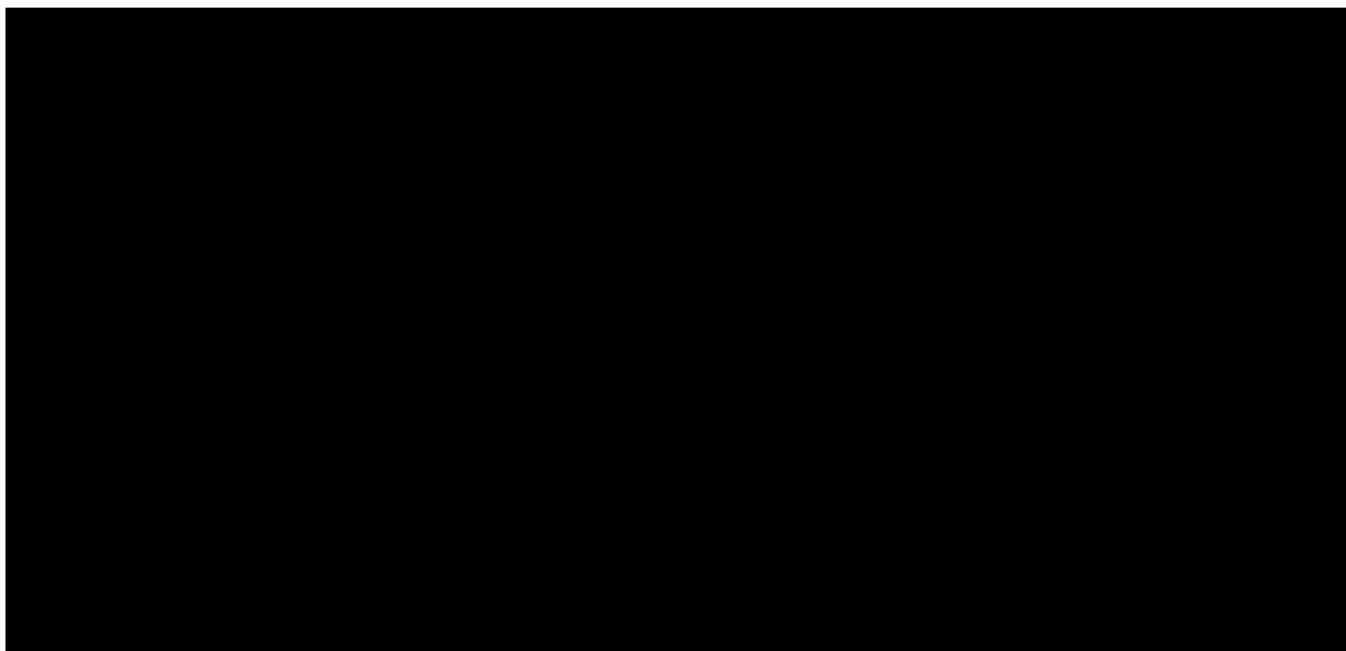


Fig 8. Managment Team

- **Project Coordinator (PC):** reports to the EC and keeps a continuous and fluid ommunication with the directors. Functions i) control and monitor the work progress on the basis of reports by the MT and the individual WPL; ii) decide about project schedule; iii) monitor and control deviations with contingency measures and corrective actions; iv) assure planning and coherence of the results; v) direct reports on progress v) conduct the GA and MT and vi) prevent conflicts and moderate and propose fair solutions to any arising issue.
- **Administrative & Budgetary Manager (A&B):** takes decisions on day-to-day management under the PC supervision and presents a half-yearly progress report to the MT.
 - Administrative and management duties: i) overall project administration; ii) consolidate progress reports to be reviewed by the PC, the A&B will rely on the PC and MT to monitor the technical implementation of the project; iii) collect, compose and send evaluation reports on all activities per partner and per WPL for each period; iv) execute and oversee general project policies; v) prevent conflicts between partners and propose agreements; vi) trace and correct deviations of work programme, helped by the PC vii) organise and prepare GA and MT meetings.
 - Financial duties: i) overall budgetary management; ii) manage, deliver and follow-up on administrative and financial documents; iii) transfer documents and information between partners; iv) ensure that required resources are provided by each partner and that work is consistent with the expenses and v) follow up on project expenses and track deviations, ensuring that all changes are approved and recorded accurately. With PC recommendations the A&B can propose solutions to partners and mitigation/contingency plans in case of deviations.
- **Innovation, IPR & Exploitation, IIPRE:** i) proposing actions to MT maximising exploitation opportunities for project outcomes; ii) chair the IP Advisory Board and serve as link to project partners; iii) coordinate the knowledge portfolio, collect and maintain innovation generated, patents filed, licenses granted and protection obtained; iv) agree, with owners, about granting access and its conditions. The knowledge portfolio will be a key tool for dissemination and exploitation of results v) coordinate, and support IP protection when required (patent, copyright, etc.).
- **Investment & Finance, I&F:** i) detect exploitation opportunities for the project; ii) chair de Investors Partnership and link it with project partners; iii) coordinate and collect relevant information on Investment and finance opportunities; iv) coordinate the Exploitation Plan and Business Models of the project; v) coordinate

actions to foster market uptake of results and vi) coordinate, and support on investment and finance aspects when required.

- **Scientific & Technical, S&T:** i) chair the Scientific Advisory Board; (ii) assess project performance from the scientific point, (iii) assure quality of project innovations and technical deliverables and v) assess and manage ETV.
- **Governance and Regulatory Approach, GRA:** i) chair the Governance, Regulatory and Ethics Advisory Panel and link it to project partners; ii) give advice to project partners on governance and regulatory aspects; iii) ensure quality of project governance and regulatory deliverables iii) create synergies with other relevant projects and coordinate with Standardisation Bodies iv) identify and manage project contribution to standards
- **Social & Community Engagement, S&CE:** i) chair the Stakeholder Engagement and Social Equality Community and link it with project partners; ii) Coordinate and monitor the dissemination and communication quality.

Table 36: Key Roles of the project	Partner	Representative
Project Coordinator. PC	AQUA	
Administrative & Budgetary Management. A&B	INNCO	
Innovation, IPR & Exploitation. IIPRE	STW	
Investment & Finance. IF	BLUE	
Scientific & Technical. ST	UVAL	
Governance and Regulatory Approach. GRA	VASYD	
Social & Community Engagement. S&CE	ENOLL	

3.2.1.2 THE GENERAL ASSEMBLY (GA)

The GA is chaired by the PC supported by the A&B and the MT. It will meet every 12 month or whenever needed, in person or by teleconference. It consists of one representative per partner and represents the highest level of decision-making. Its mission is to: i) Evaluate the technical and scientific progress ii) Define the strategy, proposing changes or new procedures when necessary; iii) prevent and resolve conflicts on issues impacting on results, objectives, resources and the project roll-out; iv) Validate the common exploitation, dissemination and communication actions; iv) Decide upon financial allocation, new partners, reviewing or amending the GA.

3.2.1.3 WP ORGANISATION

The WP leaders (table 37) will: i) control and monitor the work within each WP; ii) monitor and control deviations with contingency measures and corrective actions; iii) generate reports on progress on a 6 month basis to the MT.

Table 37. REWAISE WP leadership.

WP1: Coordination, Communication and Management
WP2: Resource Efficient Solutions
WP3: REWAISE platform. Control and Optimisation of Data and Processes
WP4: Continental Hub
WP5: Mediterranean Hub
WP6: Atlantic Hub
WP7: Analysis of KPIs, LCCA and Risk Assessment (ETV)
WP8: New Business Models, Alternative Funding for Market Uptake and Dissemination
WP9: Governance, Dissemination and Social Engagement

3.2.1.4 THE ADVISORY BOARDS: IP ADVISORY GROUP (IPAG), INVESTORS PARTNERSHIP (INPA), SCIENTIFIC ADVISORY BOARD (SAB), GOVERNANCE & REGULATORY ETHICS ADVISORY PANEL (GREAB) & STAKEHOLDERS ENGAGEMENT & EQUALITY COMMUNITY (SEEC)

The Advisory Boards (AB) have been created in order to include a representation of end-users, public water authorities, water utilities, economic and scientific actors and other stakeholders. Information within these AB Will

be regulated by Non-Disclosure Agreements. Their function is to i) give independent opinion on the Project developments, ii) Assessment of project performance and recommendations, iii) Assurance of the quality of the innovations, iv) Creation of synergies with other relevant projects. The 5 AB cover all key aspects of REWAISE: Technology, IPR, Markets, Investments and Social Returns. The members of these AB are already committed (See letters in annexes) to participate in REWAISE and come from 22 countries of the EU, from Norway and Israel, and 5 countries in other 3 continents (N. America, Asia and Africa), and are listed in Annex 3.

3.2.2. Decision making process

The escalation of decisions will depend on nature and responsibilities of the persons involved. **Technical matters** will be communicated to the Task/WPL who will transmit them to the PC if necessary. The PC will arbitrate any conflict or will consult MT which might escalate it to the GA if necessary. For **market up take issues** the same will be applied: the Task/WPL decides to escalate if necessary, to the MT that will arbitrate and resolve or escalate them to the GA if necessary. Management, financial and administrative issues will be subject of the MT, GA will have the last word on strategic issues. Decisions will be made by consensus but if this is not possible the decisions will be taken according to the majority threshold defined in the Consortium Agreement (CA), the PC will have quality vote.

3.2.3. Voting rules, quorum and veto rights

Deliberations and binding decisions of both the MT and GA are subject to a quorum of two-thirds (2/3) of its Members being present or represented. Decisions are taken by a majority of two-thirds of votes, weighted according to budget. A Member who shows that legitimate interests (work, liabilities, intellectual property rights) would be severely affected by a decision may exercise a veto, but members will make every effort to resolve the matter to the general satisfaction.

3.2.4. Progress monitoring

To assure an effective and efficiency project management, in technical-scientific and administrative-financial matters, regular meetings will be organised. Each partner will report to WPLs about technical progress and results and to the A&B about the administrative and financial aspects. Such reports will be integrated by the WPL and the A&B respectively to submit them to the PC before the GA meetings. Deliverables and milestones will be reviewed at each GA. The consortium will elaborate annual reports on work carried out and the conclusions achieved, (WPI).

3.2.5. Communication flow mechanism and procedures

The communication flow between the consortium members will be based on the following tools: i) Project website, ii) Video and telephone conferences, iii) e-mail and iv) project meetings and WP working groups. All information circulated will be treated as consortium confidential unless stated otherwise.

REWAISE website will be divided in a public and an internal (intranet) part. The intranet section will be used, among others, for exchanging and archiving all the project documentation. This project tool will track the progress, to make available permanently updated information about the advance of each WP, to exchange documents, to collect financial data, to collaboratively prepare reports, to assist in official and intermediate reporting, to summarize meetings, achievements and time schedules, and to discuss new approaches and activities planned. All partners will be responsible to update, control and monitor the intranet according to the project progress, while INNCO will be responsible of updating website public contents always in collaboration with the PC.

Informal day-to-day communication will be done by e-mail, telephone or Videoconferences. Regular Project meetings and telecommunications will be organized between partners and WP participants. Periodically, on a twelve-monthly basis, larger project reviews will monitor the project progress. The 5 utilities will manage their hubs between the large meetings, where other partners will attend selected by relevance and needs of the work progress. Besides, each WPL will be responsible to organize a work group, and for solution of any problems that may arise.

3.2.6. Quality assurance measures

The project will operate within well-determined administrative and management processes, to be defined both in the CA and project manual, covering reporting, documents, review, general quality assurance, standards, among other procedures. Quality Control checks that all contributions and conclusions are consistent and meet the requirements for the deliverables, reports and other documents. A common format will be used for all documents, deliverables and

activity reports to be submitted for review to the PC. A specific procedure for unpredictable changes will be followed to achieve project objectives. If progress of the work undertaken does not follow the agreed work plan or implies an inconsistency that endangers the achievement of the project goals, the A&B and the PC will make every possible effort in order to solve the problem. If this is not enough the following measures will be taken:

1. The PC will notify the MT and the GA members with all the required information and call for a special meeting to present and discuss the situation, with possible ways and procedures for solving the problems.
2. The GA will decide which procedure to follow for corrective measures. The participants concerned will declare if they accept the decision. If not, the participants are declared “not-in-line” with the project execution.

In both cases an appropriate revision of the work plan will be decided and communicated to the EC.

3.2.7. Confidential disclosure agreement

A Confidential Disclosure Agreement (CDA) has been established, circulated, agreed and signed by the partners before the project submission. Such CDA describes procedures related to confidentiality and the preparation of the future CA. For further activities the CA will regulate the confidential issues between members with the basis that all information circulated will be treated as consortium confidential unless stated otherwise. Members of the Advisory Boards will also sign a CDA, before any information is disclose to them.

3.2.8. Consortium agreement

In case of project selection, a CA based on the DESCA model and on previous CA managed by PC in H2020 will regulate consortium and project governance and management, background and foreground information, management of IPR, basis for the distribution of grant and admission of new partners, confidentiality aspects, etc.

3.2.9. Risk management

The critical risk for the project in its entirety and their mitigation measures have been identify below. We will make an initial Risk Assessment and Contingency plan (updating if necessary), and a Quality Assurance Plan (D1.1).

3.3 Consortium as a whole

The REWAISE consortium is carefully balanced to implement the future-proof Smart Water Society, uniting 5 water utilities from Northern Europe (VASYD/SE), Southern Europe (AQUA/ES), Western Europe (STW/UK) and Central Europe (ANET/PL and SMVAK/CZ) serving more than 6 M people. Each water company has selected specific demo sites, to form living labs comprising different governance models, both public and private, climatic regions, industrial activity and social fabric, to include a wide variety of configurations to validate the new technologies and service models.

These large entities are supported by 8 SMEs and 8 research organisations/ universities, as well as the European Network of Living Labs, representing 12 countries, as shown in Fig. 9. The project is supported by 4 selected advisory boards, comprising experts from 22 EU countries, and 7 others (CA, IL, OM, NO, SG, US). Replication is enhanced by 3 high impact multiplier organisations (EBC, TAG and EurEau), representing utilities from all EU countries, to adapt the solutions according to stakeholder needs. 6 fast follower sites have been selected to enhance market uptake, and increase impacts. All partners have a strategic interest directly related to their respective roles in REWAISE, linked to their commitment in corporate responsibility and sustainable business practices, and their complementarity and diversity will bring the necessary skills and knowledge to reach the ambitious project objectives. Gender Balance is a key element of project implementation, and each partner is committed to eliminate inequalities and overcome the gap in ICT and Business start-ups.

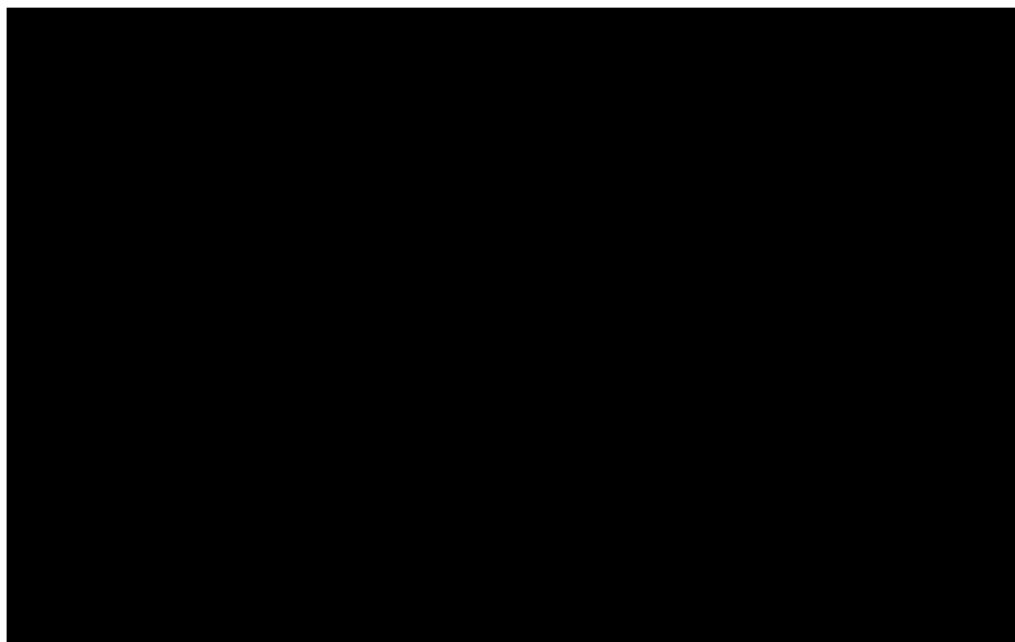


Fig 9. Geographic repartition of REWAISE consortium

3.4 Resources to be committed

3.4.1 Personnel effort

REWAISE mobilises a total of 1745 person-months. The role of each partner is fully explained in Annex A.

3.4.2 Other direct cost' items (travel, equipment, other goods and services, large research infrastructure)

1/ AQUA	Cost (€)	Justification
Travel	65,654	Travel to consortium meetings: 5 travels x 1.8 k€ x 2 people = 18 k€ Travel within Living Labs (Cantabrian 5, Vigo 5, Salamanca 5, Denia 5, Badajoz 5): 25 travels x 7500 € x 2 people = 37.5 k€; KO in Brussels and EC meetings, dissemination travels 10,650 €
Other goods & services	1,288,542.84	WP1: Hosting 2 meetings = 10 k€/ WP2: analysis for microcontaminants 20 k€ / WP3: climate models 45 k€/ WP5: algae bloom devices: 70 k€; Sensors (valves, flowmeters,transients) 80 k€, Control devices 75 k€; water quality sensors 80 k€; smart metering in Denia 72 k€; Reagents 15 k€/ Minor civil, mechanical and electric works for installation of the demonstration units. Transportation, load and upload of demo units. Minor works for desalination and brines valorization prototypes design validation and assembly 75 k€/ WP5: Treatments of brackish and permeate water from desalination plants activities (WP5): 214542,84; WP6: Civil works and AnMBR 355 k€/ Monitoring smart devices: 55K / WP8: Publications 5 k€, dissemination materials 6 k€. Support for the development of a methodological tool based on the integration of a Multi-Regional Input Output (MRIO) framework, 49 k€; Support for modelling 32 k€; Technology Watch 25 k€ / CFS 5 k€.
TOTAL	1,354,196.84	
2/ STW	Cost (€)	Justification
Travel	23,080	Travel to consortium meeting 5 travels x 1.8 k€ x 2 people = 18 k€; Travel Midlands Living Lab: 5 travels x 508€ x 2 people = 5.08 k€

Other goods & services	773,920	WP6: Chemicals 100 k€, Cartridge filters 5 k€, iSM Engineering Services – design, consultancy, install and commission 200 k€; iSM Hardware – 20km iSM Analyser 269 k€, Sensing cable 188.92 k€/ CFS 11 k€,
TOTAL	797,000	
3/ VASYD	Cost (€)	Justification
Travel	27,000	Consortium meeting travel: 7 x 900€ x 2 people = 12.6 k€ + 2x 1 k€ = 2k€; Travel Skane Living Lab: (5 x 525€ x 2 people)+(1 x 525€ x 6 people) – 8.4 k€
Other goods & services	361,000	WP2, WP4: Advances microbiological detection methods 40 k€/ WP2: Storm prototype equipment 85 k€, urine separation toilets equipment 60 k€, Equipment (prototype) and installation 15 k€, Consumables and laboratory cost 10 k€, Open source publications, conference fees 1 k€. / WP4: Interior installations in show room 10 k€. SWH/MLU modules-Sege Par 5 k€, Digital water monitoring systems 40 k€, SWH/MU module with heat 20 k€/ CFS 5k€
TOTAL	388,000	
LTP/SMVAK	Cost (€)	Justification
Travel	3,100	Travels Moravia Silesia Living Lab: 2 travels x 775€ x 2 people= 3.1 k€.
Other goods & services	275,000	WP4: Mines+Smart meters 95k€/WP8: Replicates Evaluation 180 k€
TOTAL	278,100	
4/ ANET	Cost (€)	Justification
Travel	19,880	Consortium meeting travel: 4 travels x 900 € x 2 people and 2 travels x 900 € x 3 people = 12.6 k€ Travel within Poznan Living Lab: 4 travels x 560 € x 3 people + 1
Other goods & services	466,000	WP2, WP4: chemicals 100 k€, laboratory analysis and tests 60 k€, / WP4: Equipment for modelling 12 k€, Pilot scale unit lab stand 30 k€; GPSX 14 k€, application training 5 k€, hosting serves 5 k€, maintenance 28 k€, concentrate CFS/CF installation 18 k€, purification pilot 75 k€, recovery methods 100 k€, Behavioural studies 4 k€ / WP1: Hosting 1 meeting 10 k€/ CFS 5 k€
TOTAL	485,880	
6/ HIDRO	Cost (€)	Justification
Travel	24,440 €	Consortium meeting: 4 travels x 1.8 k€ x 2 people =14.4 k€/ Travels Cantabrian and Denia Living Labs: 10 travels x 500€ x 2 people = 10 k€
Other goods & services	116,500	WP2: Modelling program hosting and serves 60 k€, Digital software design and testing 40 k€ / WP6: Automated valves 12 k€/ CFS 4.5 k€
TOTAL	140,940	
7/ MALM	Cost (€)	Justification
Travel	7,000	Consortium meeting travel: 3 travels x 900 € x 2 people = 5.4 k€/ Travels Skane Living Lab: 2 travels x 400 € x 2 people = 1.6 k€
Other goods & services	25,020	WP4: Installation & maintenance: 16.02 k€ / WP9: Venue & seminars 9k€
TOTAL	32,020	
8/ POLY	Cost (€)	Justification
Travel	5,000	Progress meetings & pilot follow-up: 5 travels x 500 € x 2 people = 5 k€
Other goods & services	59,650	WP4,WP5,WP6: Chemicals 10k€, pilot plant transport+operation 9.65 k€; WP2: Autonomous Ultrafiltration pilot treating 40 k€
TOTAL	64,650	
11/ APOR	Cost (€)	Justification
Travel	5,000	Progress meetings + pilot follow-up: 5 travels x 500€ x 2 people=5 k€
Other goods & services	34,000	WP2: Performance 10 k€, Chemical agents 24 k€
TOTAL	39,000	
13/ EMS	Cost (€)	Justification
Travel	9,000	Consortium meeting travel: 3 travels x 1.5 k€ x 2 people = 9 k€
Other goods & services	74,800	WP6: 2 monitoring stations 26.3 k€, 3 automated flow control gates 42.6 k€, Programmable Logic control Kiosk 5.9 k€
TOTAL	83,480	
14/ SOLWA	Cost (€)	Justification

Travel	10,000	Consortium meeting travel: 2 travels x 1250 € x 2 people = 5 k€ Travels within Denia Living Lab: 5 travels x 500 € x 2 people = 5 k€
Other goods & services	40,000	WP2, WP5: Parabolic mirrors 30 k€, Glass panels 10 k€
TOTAL	50,000	
15/ IETU	Cost (€)	Justification
Travel	19,950	Consortium meeting travel: 7 travels x 900 € x 2 people = 12.6 k€ Technology providers meetings: 5 travels x 490 € x 3 people = 7,350 €
Other goods & services	4,500	WP6: Workshop organization 3 k€, test witnessing 1.5 k€
TOTAL	24,450	
16/ UVAL	Cost (€)	Justification
Travel	15,000	Consortium meeting travel: 7 travels x 900 € x 2 people = 12.6 k€ Progress meetings travels: 2 travels x 600 € x 2 people = 2.4 k€
Other goods & services	111,000	WP2: Laboratory analysis and tests 80 k€, Sounding lines 3 k€, Membranes for biogas recovery and biogas enrichment 25 k€/ CFS 3 k€
TOTAL	126,000	
17/ TUOS	Cost (€)	Justification
Travel	10,800	Consortium meeting travel: 3 travels x 1800 € x 2 people = 10.8 k€
Other goods & services	20,500	WP2-4: analysis material 10 k€, membrane separation products 10.5 k€
TOTAL	31,300	
19/ CETIM	Cost (€)	Justification
Travel	20,000	Consortium meeting travel: 7 travels x 1.2 k€ x 2 people = 16.8 k€ Technical meeting: 4 travels x 400 € x 2 people = 3.2 k€
Equipment	12,000	WP2: GC-FID Equipment 4.8 k€/ WP5: GC-FID 3.6 k€/ WP6: GC-FID 3.6 k€
Other goods & services	221,900	WP2: two bioreactors 12 k€; Glass material, reagents, pumps, electrodes, glass reactors, pilot pumps 22 k€, Electrochemical Cell 10 k€/ WP5-6 Reagents, glass material 11.4 k€; / WP7: LCA License 6.5 k€; WP8: Dissemination materials 10 k€, Web, maintenance, social networks 35 k€, Videos (9 Living Labs+ 1 promotional) 40 k€/ Advisory Board Expenses 72 k€/ CFS 3 k€
TOTAL	253,900	
20/ COVU	Cost (€)	Justification
Travel	15,200	Consortium meeting travel: 7 travels x 900 € x 2 people = 12.6 k€, Travels Atlantic Hub: 4 travels x 325 € x 2 people = 2.6 k€
Other goods & services	87,100	WP1: Hosting 1 project meeting 4 k€/ WP2, WP6: Membranes; electrode Materials, Hydrogen analysis 26.6 k€; Autolab potentiostat; hydrogen safety and compressor; lab compressor, pump. Zero gap electrolyser cell 23.5 k€/ WP8&9: Gold Open access & Patent Costs 3 k€, 3 Competency Groups + 6 ULLs 27 k€; / CFS 3 k€
TOTAL	102,300	
21/ LUND	Cost (€)	Justification
Travel	11,900	Consortium meeting travel: 7 travels x 850 € x 2 people = 11.9 k€
Other goods & services	54,500	WP4: laboratory analysis 20 k€, monitoring 3.5k€, micropollutant analysis 24k€/ WP7: costs related to adoption of stormwater reuse technology 1k€/ WP8&9: open source publications 1.5k €, conference fees 1.5 k€/ CFS 3 k€.
TOTAL	66,400	
24/ UNIPA	Cost (€)	Justification
Travel	5,600	Consortium meeting travel: 8 travels x 700 k€ = 5.6 k€
Other goods & services	60,900	WP2 and WP5: Crystallizer, magnesium recovery system (52.2 k€) and site and facilities (8.7 k€)
TOTAL	66,500	
LTP/MKB	Cost (€)	Justification

Other goods & services	206,000	WP4: Rainwater harvesting and UF installation and operation 256 k€; Consumables 40 k€ / WP8: Incentivizing uptake by urban planners and property developers 8 k€; communication to residents on water savings and RWH 2 k€.
TOTAL	206,000	
LTP/ CoL	Cost (€)	Justification
Travel	4,000	Consortium meeting travel: 2x 1 k€ x 2 people = 4k€
Other goods & services	40,600	Consumables 32.6 k€, Venue and seminar costs 8 k€
TOTAL	44,600	
LTP/ P-MALMO	Cost (€)	Justification
Travel	2,000	Consortium meeting travel: 2x 1 k€ = 2k€
Other goods & services	44,700	Installation and operation of rain and stormwater harvesting infrastructure in Parking Garage of Sege Park 29.7 k€; consumables and other costs 15 k€
TOTAL	46,700	

3.5. DEMO activities

CONTINENTAL	SITE		ACTIVITY		TECHNOLOGY		TASK		SCALE		Flow (m ³ /h)		TECHNOLOGY		TASK	
Poznan, Poland	Phosphorus (PO ₄) recovery and nutrient management at CWWTP		Strosvite and vivianite recovery		4.1.1	Large Scale		100	Fertilizers and Fertilizer for Process Technology and Agriculture and SME to Utility							
	WWTP	Model Validation and Reporting	Run and Analysis	Cognitive analysis, real time data		4.1.2	Desk Top		Model Control		SME					
						4.1.3	DI MO	100,000	Live Simulation							
	Rain & Storm Water recovery		UF modules in dead-end filtration		2.1.1	DI MO		100,000	Prototype		Process		Membrane SME			
Skaane, Sweden	Urine Separation		Separation, dehydration, toilet units based on new dry and safe fertiliser		2.3.1	DI MO	Large Scale	100	Pilot		Process		New Toilet			
					4.3.2	DI MO	Large Scale	100,000	Prototype		Housing		SME			
					4.3.3	DI MO	Large Scale	100,000	Prototype		Model		SME			
	Digital Twin		IoT and ML sensors, smart meters		4.3.4	DI MO	Large Scale	100	Prototype		Control		SME to Utility			
Moravia - Silesia, C.Z.	Recovery of industrial ground water from Jeremenko mine		Membranes, CDI unit, Reverse osmosis		2.3.3	Pilot		100	Prototype		Process		Membrane SME			
	Minerals Mining	Recovery from	EDBM	Reverse osmosis	4.2.1	DI MO	Prototype	100,000	Pilot		Membranes		SME			
					2.3.2	Pilot		100	Prototype		Rabietary Salt		SME			
	Recovery of bromethane		Upgrading of biogas		4.2.3	DI MO	Prototype	100,000	Prototype		Construction		Biomethane			
Smart metering		NB-IOT				4.2.4	DI MO	Pilot			Smart Meters		Services			

MEDITERRANEAN		ACTIVITY	TECHNOLOGY	TASK	STATUS	Associated with document Ref. Ares(2020)1951614 - 06/04/2020	
MEDITERRANEAN	Denia, ES (Islands)	Low energy desalination (Tenerte)	Solar Dome, Imdea CDI Im3/d	2.1.3	Pilot	1-2	Process SMI
			In seawater brine solar pre-concentration, ED/DM Selective precipitation, 3C Process, nanofiltration, electrochemical, Li recovery	2.3.2	Pilot	1-2	Minerals for SMI Industry, Chemical SMI industry and fertilizer sector
		Value extraction from desalination streams (Tenerte)		8.1.2-DEMO	Large Scale Selective precipitation NF (S4V)	1-10	
			Dynamic mixing prediction modules, consumption patterns, smart distribution system, virtual DMAs, water quality, smart meters, Nb IoT, Optimal control, Supply demand coordination, holistic analysis	3.3.3.6	Prototype	10-50	Smart Services for SMI Water companies
	Salamanka, ES	Smart water system		8.1.3-DEMO	Large Scale	1-10	Smart services SMI
		Energy recovery	absorption adsorption process	5.2.1-DEMO			Biomethane Biofuel
		Nutrient Recovery	Nutrients (struvite vivianite) and precipitation of phosphorous with magnesium salt	5.2.3-DEMO	Prototype	10-50	Fertilizers Agriculture
		Ammonia conversion	Electrolyser Reactors	5.2.3-DEMO	Pilot	1-2	Fertilizers SMI
	Extremadura, ES	Biopolymer production	CI TIM Biopolymer	2.3.3	Pilot	1-2	Bioplastic SMI
				8.2.4-DEMO	Prototype	10-50	Bioplastic SMI
		New strategies in process DWTP THM	biofilters, sand filters NF UF	8.3.1-DEMO	Pilot	1-2	WTP
		New strategies in control DWTP	quality model control strategies, desorption system	3.3	Prototype	10-50	Network Control SMI
			8.3.2-DEMO	Large Scale	1-10	Network Control	
	Reservoir management	Intelligent algae prevention and control	3.3	Prototype	10-50	Reservoir Control SMI	
			8.3.3-DEMO	Pilot	1-100	Reservoir Control SMI	

Region	Activity	Technologies	AI/ML	Scale	Flow	Smart Production	Impact
ATLANTIC	Leakage detection modules	fiber, smart meter and robotics	6.1.1	Large Scale	100	Network Control	SME
	Smart Wastewater Management	Multi-objective control algorithms and models of multiple TCDs	6.1.2 DEMO	Large Scale	100	Sewer Control	SME
	Ammonia recovery and hydrogen generation	Ammonia scrubbing and electrocatalyst	2.2.1	Pilot	1.2	Process	SME
	Nutrient Recovery for High Performance Fertilizer	AnMBR for Sewer Minne	6.1.3 DEMO	Prototype	10.50	Fertilizer	Agriculture
	Optimization of UI in potable water	AnMBR for Sewer Minne	2.1.4 2.2.2	Pilot	1.2	Process	Utility
			6.2.1 DEMO	Large-Scale	100	Industrial sector	Utility
		Vigo: polymeric New membranes	6.2.3 DEMO	Pilot	1.2	Population	
	Digital twin Models for control strategies	Digital twin, sensors, IoT, models	3.4	Prototype	10.50	Simulation	SME
			6.2.2	Large Scale	100	Modelling and Control	Utility
		Enhanced decentralized on primary treatment by pple cloth media microsieving and ozonized microfiltration, advanced tertiary treatment (MABR and AOP) to remove soluble components		Prototype	10.50	Process	Process, SME to Utility
Cantabria: (Santander) Asturias (Oviedo)	Discrete WW filtration and Digestion	micro-sieving and ozonized microfiltration, advanced tertiary treatment (MABR and AOP) to remove soluble components	2.1.2				
	Prediction modules, IoT, smart strategies optimal control supply demand coordination (Hware Santander)		3.3 3.4 3.5	Prototype		Smart Control	SME
	Smart network and control strategies		6.3.2 DEMO	Large Scale	100	Leakage and Energy Reduction	Utility
	Biopolymer production	two-reactor configuration and a first-famine dynamic feeding process	2.3.3	Pilot	1.2	Bioplastics	SME
			6.3.4 DEMO	Prototype	10.50	Bioplastics	SME

3.6. Project schedule – Gantt Chart

		Year 1	Year 2	Year 3	Year 4	Year 5
WP 1. Coordination, Management & Communication						
11.1. Strategy management, Quality, Assurance and Risk Prevention	AQUA					
11.2. Communication	INSCO					
11.3. Administrative and Budgetary Management	AQUA					
11.4. Scientific and Technical management	IAA					
11.5. Innovation, IPR and Data Management	AQUA					
11.6. Ethics and Gender dimension	ENIGI					
WP 2. Resource Efficient Solutions						
12.1. Water alternative resources, regeneration and reuse	VASTD					
12.2. Energy recovery for development of carbon neutral services	STW					
12.3. Valuable materials recovery	AQUA					
WP 3. REWASE platform: Control and Optimisation of Data and Processes						
13.1. Definition of requirements	HDRO					
13.2. RW-MMI platform architecture	HDRO					
13.3. Development of mathematical models for Artificial Intelligence-based model	UNIZ					
13.4. Prediction modules	HDRO					
13.5. Optimal control strategies of water cycle entities	UNIZ					
13.6. Supply-demand coordination mechanism	UNIZ					
13.7. Holistic analysis of the water cycle results	AQUA					
WP 4. Continental Hub						
14.1. Porzamo Pilot Living Lab	ANET					
14.2. Skeravall Sweden Living Lab: Industrial Innovation	AQUA					
14.3. Skane/Sweden Living Lab: Reutilization of multiple water sources	VASTD					
WP 5. Mediterranean Hub						
15.1. Derna/Syria Living Lab: Efficient Networks Highlight	AQUA					
15.2. Salinas de Sanja Living Lab	AQUA					
15.3. El Estremado/Spanish Living Lab	AQUA					
WP 6. Atlantic Hub						
16.1. Smart Midlands of UK Living Lab	STW					
16.2. Smart Vigo/Spanish Living Lab	AQUA					
16.3. Cantabria/Spanish Living Lab	AQUA					
WP 7. Analysis of APIs, ECCA and Risk Assessment (ETV)						
17.1. API Monitoring including the RRI approach	CEIM					
17.2. Environmental Assessment and Monitoring	CEIM					
17.3. Management of water related risks & vulnerabilities	CEIM					
17.4. ECCA economic performance	CEIM					
17.5. Environmental Technology Certification ETV	ETV					
WP 8. New Business Models and Alternative Funding for Market Uptake						
18.1. New Business Models: Market Opportunities & Value Chain	BLUE					
18.2. Investment Advisory Panel: Funding Strategies and Price Mechanisms	BLUE					
18.3. Government Financing Identification	INSCO					
18.4. Replication Strategies for Sustainable Value Chain	BLUE					
18.5. Promotion of Market Uptake and Change in Satisfaction through Demonstration and Application Activities	INSCO					
18.6. Early Adopters and Lead Followers	WINETOP					
18.7. Analysis of legal, social and technical barriers to overcome for wide application (Innovation Deal)	IAA					
WP 9. Governance, Dissemination and Social Engagement						
19.1. Achieving social context for the Living Labs	W&B					
19.2. Stakeholder Engagement Strategies through Competency Groups (RRI approach)	W&B					
19.3. Developing two main strategies for water communities	COV					
19.4. Living Labs methodology establishment	ENIGI					
19.5. Living Labs evaluation and optimisation	ENIGI					
19.6. Social Return Investment (SRI)	ENIGI					

4. Members of the consortium

4.1 Participants

COORDINATOR

Full Legal name:	FCC Aqualia SA	
Short name:	AQUA	
PIC number:	986124020	
Type (SME, RTD, etc.):	LE	
Country:	Spain	

Description

Aqualia, as the third-largest water management company in Europe (Global Water Intelligence), is part of the environmental services group FCC, providing public services infrastructure group, present in 5 continents, and employing around 70,000 people in 52 countries. Aqualia covers the whole water cycle, managing water and wastewater services more than 1,000 towns and cities. Aqualia serves more than 25 million people in more than 20 countries. Aqualia 's activity comprises 3 major areas among which it creates synergies in knowledge, methodology, research and development, working with local partners and administrations:

- Management of public water services
- Design and construction of hydraulic infrastructures and treatment plants.
- Global solutions for the use of water in industry.

For R&D, Aqualia has its own Innovation and Technology Department, in charge of over 15 industrially oriented demo projects, and has international activities focusing on Portugal, Italy and the Czech Republic as well as Latin America. Design-Build-Operate Contracts for major water and wastewater infrastructure are currently being executed in Rumania, FYR Countries, North Africa (Algeria, Egypt, Tunisia), Colombia, Chile and Mexico. Moreover, Aqualia has a long experience developing innovative solutions for wastewater treatment as its main is the management of municipal water services.

AQUALIA is founding members of the:

- EIP Action Group "MEET-ME4WATER" (focused on overcoming the barriers to scale-up and demonstration of microbial electrochemical technologies (METs) and to bring them faster to market)
- EIP Action Group AnMBR led by Aurora Seco (UV): Anaerobic Membrane Bio-reactors (No. 036): work on assessing an alternative wastewater treatment based on AnMBR technology and
- EIP Action Group Ctrl+SWAN, led by Anna Di Mauro, also participant in the project through ME.HY (devoted to the intelligent monitoring and control of water networks).

Role of Partner in the Project:

Aqualia is the coordinator of the project and therefore it will manage the Project Communication with EU commission. The main role of Aqualia within REWAISE project is:

- To lead WP1 and many tasks involved in this WP the strategic management, the administrative and budgetary management as well as the innovation, IPR and Data Management (WP1).
- To contribute in WP2 focusing on one hand on the development of efficient water solutions for alternative resources and regeneration and reuse by means of Low energy desalination and mining

ground water recovery and on the other hand, on the recovery of bioenergy from Dilute WW filtration and Digestion and on the recovery of valuable materials.

- Contribute in WP3, for the analysis of results of holistic water cycle (T3.7).
- To contribute in the implementation of technology and in the development of Living Labs, leading the WP5 focused on the Mediterranean Hub, which integrates Denia Living Lab (T5.1), Salamanca Living Lab (T5.2) and Extremadura Living Lab (T5.3). It also contributes to WP6, leading Smart Vigo Living Lab (T6.2), Cantabrian Living Lab (T6.3). In addition, it is also involved in Moravia-Silesia Living Lab (T4.2).
- To contribute in WP7 leading the cost analysis of the REWAISE solutions and social return on investment.
- To take part in WP8 and WP9 providing its expertise as operator of the integral water cycle in order to contribute to the development of new business models, governance, dissemination and social engagement.

Key personnel

██████████ (male) is the Director of the Department of Innovation and Technology. He has been working for 30 years on technology transfer, managing large projects for major water companies and engineering consultancies in France, US, UK, and Brazil (Veolia, Severn Trent Services, Metcalf & Eddy, and Black & Veatch). Holder of many patents in advanced water and wastewater technology. Leader of around 25 people involved in R&D Programs/Projects in synergy with the regional and international activities of FCC Aqualia being responsible for a budget of circa 25 M€ in external funding for projects co-financed by the European Union (FP7 and Life programs), the Spanish Ministry for Economics and Competitiveness and Regional Funds from various sources.

██████████ (female): Responsible for the Smart Services Area of the R&D department of FCC Aqualia. Environmental Engineer working for 15 years on environmental projects and technology transfer, has managed, first in Germany and later in Spain, large energy, climate and biotechnology research projects (FP7, LIFE, Eureka), coordinating a number of them. As leader of strategy development, she has extensive experience in innovation, leading and conducting business with public and private entities in the field of water, environment and sustainability. Coordinator of the project FP7 ICT UrbanWater and active member of the cluster ICT4Water.

██████████ (male): Coordinator of the Quality Area of the I+T department of FCC Aqualia, leading 8 innovation projects. Outstanding Ph.D. award by the Univ. Santiago de Compostela (2013), with more than 10 years of experience in anaerobic digestion, aerobic and anaerobic membrane bioreactors operation, micro-algae harvesting, valorisation of residues from agro-food industry and autotrophic nitrogen removal processes. Inventor of the European (EP2740713 A1) and Spanish (ES 2466090 B2) patents for autotrophic nitrogen removal, a technology registered as ELAN®. Author of 20 articles in international peer-reviewed journals, 7 articles in Spanish journals and 7 book chapters.

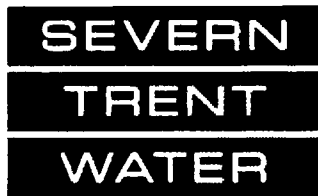
██████████ (female) is a European Projects Manager of the Department of Innovation and Technology. Master in Business Administration (MBA) at University Camilo José Cela and Master's Degree in Forest Engineering at Madrid Polytechnic University. She worked for 14 years as manager of a Spanish Entrepreneur Association dealing with stakeholder activities, as sector representative in other Spanish and European Institutions, forums, High level groups, etc. She also has 17 years experience working on international projects, co-financed by the European Commission, in various programs (H2020, FP7, Life, LEONARDO, INTERREG) and national projects the funded the Spanish Ministry for Economics and Competitiveness, Environmental Ministry, Education Ministry and other various sources. As I+D senior consultant she has also developed the Smart Specialisation Strategy Galicia-Northern Portugal (RIS3T), the R&D Galician Strategic Plan 2014-2020

Relevant publications and achievements to the call

• [REDACTED], Heaven, S., Lara E.S. (2014). Algae Biofuel: Symbiosis between Nutrient Removal and Water Reuse - the EU FP7 All-Gas project. <i>Water Science and Technology</i>. 7333R1 in press. • [REDACTED] Morales, N., Gutierrez, R., Fernandez, R., Rogalla, F., Barrio, J.P., Campos, J.L., Mosquera-Corral, A. and Mendez, R. (2014). Implications of full-scale implementation of an anammox-based process as post-treatment of a municipal anaerobic sludge digester operated with co-digestion. <i>Water Science and Technology</i>, 69(6), 1151-1158. • Al-Omari A., Han M., Lemaire, R.; Morales N.; [REDACTED]; Stewart H.; Val del Rio A. and Wett B., (2015) Chapter 6: Mainstream Deammonification, in: Shortcut Nitrogen Removal—Nitrite Shunt and Deammonification Ed. <i>Water Environment Federation</i> (Ed.) Alexandria. • Rodriguez-Garcia G., Frison N., [REDACTED], Hospido A., Garrido J.M., Fatone F., Bolzonella D., Moreira M.T., Feijoo G. (2014) Life cycle assessment of nutrient removal technologies for the treatment of anaerobic digestion supernatant and its integration in a wastewater treatment plant. <i>Science of the Total Environment</i> 490, 871–879.
Relevant previous projects or activities Aqualia has a solid experience in wastewater treatment and management, always aimed at presenting sustainable solutions to problems arising in the field of water treatment, allowing the technical department to design water treatment facilities with the latest and most modern technologies. AQUALIA through pilot programs testing plants has provided necessary knowledge to solve wastewater treatment problems with very different technologies. Aqualia has its own Innovation and Technology Directorate, in charge of over 20 industrially oriented R&D projects, co-funded by national and regional (Cantabria, Galicia, and Valencia) authorities. Of special relevance are the FP7 demonstration All-Gas "Industrial scale demonstration of sustainable algae cultures for biofuel production" and 3 LIFE projects. Aqualia is also coordinator of the FP7 Urban Water project: Intelligent Urban Water monitoring, where a pilot in Almeria (Spain) and Janovice (Czech Republic) is validated. The activity focuses on improved water quality and advanced control, advanced metering in smart cities, membrane processes for water reuse and micro-pollution removal, all with rapid market impact. Aqualia is active in Joint Project Initiatives (JPI) and the European Innovation Partnership (EIP). Aqualia is member of AEAS ("Asociación Española de Abastecimientos de Agua y Saneamiento"), SWAN ("Smart Water Networks Forum"), and the European cluster ICT4 Water, among other organisations. Related projects: • Run4Life (HORIZON 2020): Recovery and utilization of nutrients 4 low impact fertilizer • MIDES (HORIZON 2020): Microbial desalination for low energy drinking Water (www.midesh2020.eu) • INCOVER (HORIZON 2020): Innovative Exo-Technologies for Resource Recovery from Wastewater (www.incover-project.eu) • ALL-GAS (FP7): Energy Industrial scale demonstration of sustainable algae cultures for biofuel production (http://www.all-gas.eu) • URBANWATER (FP7): Intelligent urban water monitoring (http://urbanwater-fp7.eu) - Software tool that will enable a better end-to-end water management in urban areas • LIFE+ MEMORY (LIFE+): Membrane for ENERGY and WATER RECOVERY (http://www.life-memory.eu) • ITACA (Mineco/CDTI-FEDER): Research on Treatment, Reuse and Control Technologies for Future Sustainability in Waste Water Treatment (http://itaca.adasistemas.com) • SMARTIC Water monitoring system in real time with intelligent technology Spanish Ministry of Economy/CDTI (FEDER)

• Integrated Research about Sustainable Islands; IISIS, http://www.iisis.es; Spanish Ministry of Economy/CDTI (FEDER). • Integrated processes for monitoring and treatment of emerging contaminants for water reuse; MOTREM, http://motrem.eu; WATER JPI (EU) CLEANWATER (CIP ECO-INNOVATION): Safe water disinfection by an innovative ion-exchange membrane (http://www.cip-cleanwater.eu)
Relevant infrastructures and networks Aqualia's Municipal Water Concessions involve a municipality granting to Aqualia the responsibility not only for the operation and for maintenance of the water assets but also for financing and managing all of the required investment. Aqualia engages in several business activities in connection with private water management, including: • Municipal Water Concessions, which involve a municipality granting to Aqualia the responsibility not only for the operation and maintenance of the water assets but also for financing and managing all of the required investment; and • BOT Concessions, which involve the execution of "build-operate-transfer" projects, whereby the applicable entity grants to Aqualia the right to develop and operate a long-term public works concession or facility for a certain period; - EPC Activities, which involve the execution of "engineering-procurement-construction" projects, whereby the applicable entity grants to Aqualia the right to develop and construct water infrastructures, - O&M Activities, which involve the execution of "operation & maintenance" projects, whereby the applicable entity grants to Aqualia the right to provide technical assistance, operations or maintenance services in connection with an existing water asset or infrastructure Aqualia also counts with: • 5 Water Analysis Labs with certification UNE-EN ISO /IEC 17025 • Pilot and Prototype plants: - Aerobic MBR equipped with Microdyn membrane module (50 m² of filtration surface) - Membrane Aerated Biofilm Reactor Pilot Plant (1 m³) - Anaerobic MBR Prototype (50 m³, 2 m³/h) in Alcazar - Algae Cultivation and Biofuel production prototype (1000 m² with 50 m³ digester) in Chiclana - Pilot-Scale Anaerobic reactor (2.4 m³) - Pilot-Scale Granular reactor (1 m³) - Containerized reverse osmosis desalination prototype (15 m³/h) - Containerized RO membranes cleaning/recovery pilot plant (6 membrane units) - Pressurized ultrafiltration polymeric membranes pilot plant (1-4 m³/h) - Containerized microfiltration ceramic membranes prototype (4-12 m³/h) • Operating water distribution networks serving water for more than 1100 municipalities in Spain and abroad. More than 7000 km of networks managed Anaerobic inoculum is available from full scale sludge digesters and granular biomass enriched in anammox microorganisms is also available from a Full-Scale ELAN© unit (sidestream nitrogen removal in Guillarei WWTP, Pontevedra).

PARTNER 2

Full Legal name:	Severn Trent Water	
Short name:	STW	
PIC number:	986318893	
Type (SME, RTD, etc.):	LE	
Country:	United Kingdom	

Description

Severn Trent Water (STW) was founded in 1974 as a regional, state-owned water authority based in the Midlands and privatised in 1989. Specifically, it is located in the catchment areas of two Britain's largest rivers, the Severn and the Trent. Severn Trent provides water and wastewater treatment and operating services to utilities, municipalities and commercial customers. It is one of the largest of the 10 regulated water and sewage companies in England and Wales, supplying water to circa 8 million people and collecting and treating wastewater from circa 9 million people in the East and West Midlands and the mid-Wales regions of the UK. It provides high quality services to more than 4.3 million homes and businesses in the Midlands. Severn Trent Water is a regulated business which works within five-year planning cycles, known as Asset Management Plan (AMP) periods. It also works with the English Government and other agencies in order to make sure the highest customer services and environmental standards.

Role of Partner in the Project:

The main role of Severn Trent Water within REWAISE project will be to lead WP6, where large scale applications will be implemented, by coordinating the Atlantic Hub and implementing Smart Midlands Living Lab (T6.1). To do this, it will contribute previously to WP2 by developing an integrated approach to leakage minimization and pumping optimization as well as solutions for hydrogen recovery from ammonia and minerals recovery.

In addition, due its expertise, STW will have an active participation in WP1 to achieve the management success, in WP3 for the CDP development (leakages and intelligent smart wastewater network), in WP8 for KPIs analysis, LCCA and ETV, in WP7 for KPIs analysis, LCCA and ETV, in WP8 for new business models development and dissemination activities and in WP9 for social engagement activities.

Key personnel

 (male). Technical Lead in Severn Trent Water's Innovation TeamPete with MSc C.WEM CIWEM qualification. He has a degree in Environmental Science from the University of Sheffield, UK and a Master's degree in Water and Wastewater Engineering from Cranfield University, UK. Pete has over 20 years' experience in the water industry, working as a process engineer and research scientist. He is a Chartered Water and Environmental Manager, and he sits on the Wastewater Management Panel of the Chartered Institute of Water and Environmental Management. Pete contributes to the academic programmes of a number of UK universities and his research work has been extensively published in leading academic journals. Pete currently leads the technical input into Severn Trent's wastewater, biosolids and renewable energy research programme. Pete has played a major role in developing and implementing Severn Trent's nutrient removal and recovery strategy. He led much of the research that resulted in the widespread adoption of biological nutrient removal processes in Severn Trent Water, including the installation of novel process flowsheets. Over the last few years he has worked extensively on projects associated with developing and implementing a circular economy approach to wastewater management, including, phosphorus recovery and nitrogen shortcut technologies that have now been implemented at full scale in Severn Trent. An area of current focus is developing and evaluating energy

neutral/positive anaerobic treatment technologies; Severn Trent have ambitious plans to trial a number of relevant technologies at demonstration scale over the next few years.

Pete is Severn Trent's representative on the H2020 SMART-Plant project that is focused on adapting sewage treatment works to facilitate conversion of waste to value added products that can then be used in the chemical, construction, agriculture and renewable energy sectors. Pete is Severn Trent's representative on a national collaborative programme evaluating low phosphorus technologies and the challenge of removing priority substances from wastewater

██████████ (male) is the Business Planning Controller (covering sewerage and water distribution) at Severn Trent Water. With over 10 years of experience in the UK Water Industry, he leads on the development of short, medium- and long-term plans and strategies that form the bedrock for the delivery of Severn Trent's operational and financial performance. Prior to the current role Alex has held other strategic and regulatory policy roles in Severn Trent Water, Southern Water and the Environment Agency. In addition to his Severn Trent role, Alex is also a Programme Lead (covering sewerage) for the UK Water Industry Research organisation (UKWIR). Alex's role with UKWIR involves promoting and managing programmes of research with a specific focus on the strategic challenges facing the industry.

██████████ (male), (Drainage and Wastewater Management Planning Manager, Severn Trent): has over 30 years' experience working in the wastewater industry and has been at Severn Trent involved with sewer capacity initiatives since 1999. He is head of a team of is responsible for pulling together long-term catchment strategies to improve performance and maintain a resilient wastewater network.

██████████ (male) (Waste Infrastructure Design Lead, Severn Trent) has 34 years' civil engineering experience and has been working solely in the wastewater industry for Severn Trent since 2000. Wayne has been involved in the delivery of wastewater infrastructure projects leading a team of design engineers focused on the optioneering and design of cost-effective solutions to improve asset performance and reduce environmental and customer impact. Wayne currently leads Severn Trent's wastewater network monitoring project which delivers near real time data providing intervention opportunities to prevent potential pollution and flooding incidents.

Relevant publications and achievements to the call

- ██████████ L., & Cartmell, E. (2015). Biological carbon dioxide utilisation in food waste anaerobic digesters. *Water Research*, 87, 467-475.
- ██████████ SMART Plant: Applying a circular economy model to wastewater treatment, WWT Wastewater 2017, 31st January Birmingham UK (conference presentation).
- ██████████ Sustainable Sewage Treatment in the UK, UK – 22nd March, Brazil Forum: Investment and Innovation in Water, 22nd March 2017 Sao Paulo Brazil (conference presentation).
- ██████████ Energy and Nutrient Recovery in Severn Trent Water, UK, Ecomondo, 9th November 2016 Rimini, Italy (conference presentation)
- Samanya, J., Hornung, A., Apfelbacher, A., & ██████████ (2012). Characteristics of the upper phase of bio-oil obtained from co-pyrolysis of sewage sludge with wood, rapeseed and straw. *Journal of Analytical and Applied Pyrolysis*, 94, 120-125.

Relevant previous projects or activities

- **Next Gen** €500K grant as part of a £9.5M programme from the EU's Horizon 2020 Innovation Fund. Severn Trent will design, build and operate a demonstration scale anaerobic membrane bioreactor to establish operational requirements, process design criteria and performance at the model area test bed in Redditch.
- **Smart Plant** is a 4 year, €9.3 million, EU Horizon 2020 funded programme involving collaboration between 9 countries. We are applying advanced techniques to recover valuable materials as part of the circular economy that would otherwise be lost in the wastewater treatment process.

- **Packington P trial site** Severn Trent is currently evaluating six technologies – two of which are world firsts – at its Packington sewage treatment works in Leicestershire. The six technologies are: pile cloth media filtration; membrane filtration; ballasted coagulation; nano-particle embedded ion exchange; immobilised algal bioreactor; and absorption media reed beds.
- **Novel Production of Renewable Hydrogen from Animal and Human Waste.** Funded by Innovate UK, the project's aim is that the feasibility study will overcome scientific, technical and cost barriers which are limiting the commercialisation of a process to convert agricultural and sewage waste to renewable hydrogen.
- **Granular Anaerobic MBRs for Energy Neutral Sewage Treatment** Severn Trent is currently funding a PHD student to develop an energy neutral AnMBR for sewage treatment and understand its potential role in future wastewater treatment flow sheets.

Relevant infrastructures and networks

STW's physical assets include:

- 1,023 sewage treatment works.
- 126 water treatment works.
- 92,000 kilometres of sewers.
- 47,000 kilometres of water mains.

Everyday Severn Trent Water supplies approximately 1,900 million liters of water and treats around 2,500 million liters of wastewater. The company operates 181 water works and 1,017 sewage treatment works and has 46,000 km of water mains and 54,000 km of sewers.

All of the proposed trials will be carried out on our live network. Its smart metering programme is being focussed in 2 county areas which are predicted to be the most water stressed areas of our region: Nottinghamshire and Staffordshire, serving a population of approx. 1.5m. The company will be considering its model area of Trimpey for the other trials but it would then seek to deploy first alongside our smart meters to maximise the use of technology. The Trimpey model area has been developed over the last 2 years to provide a test area for water technologies. Severn Trent has been engaging and gained support from our operational colleagues to test new innovation in the area and it allows to understand the catchment wide impact of any changes.

Overall with Severn Trent is responsible for 55,000km of water mains and has a broad spectrum of material types including 45% plastic; 35% cast iron; 12% ductile iron and 8% asbestos cement. This ensures that products can be tested across a range of type and size of asset to provide the most rounded trial results.

This company also has dedicated leakage detection teams in the field; a centralised network control operational centre and an internal IS Data Lab, all of whom are key stakeholders in these projects.

PARTNER 3

Full Legal name:	VA SYD	 
Short name:	VASYD	
PIC number:	950734346	
Type (SME, RTD, etc.):	LE	
Country:	Sweden	

Description

VA SYD supplies fresh drinking water, managing storm water, purifies wastewater and take care of household waste in a responsible manner.

VASYD is a non-profit regional wastewater organization working in the Southwest Scania (Sweden) and is also in charge of waste management in Burlöv and Malmö. VA SYD is a municipal association, which means it is a politically driven organization comprised of its member municipalities and wastewater operations. Its member municipalities, Burlöv, Eslöv, Lund and Malmö.

VA SYD (an acronym for 'Southern Water') is a public agency that deals with water and wastewater systems and waste collection and disposal services in southwestern Sweden. VASYD's area of intervention is the Region of Skåne, which contains two large cities: Malmö (286,500 hab.) and Lund (75,000 hab.). Skåne is one of the few regions in Sweden with water provision difficulties.

VASYD was formed on 1 January 2008 in Malmö as a statutory joint authority to promote transmunicipal cooperation in order to make water and wastewater services operate more efficiently and increase quality levels through scale-based innovations, restructuring the organisation of service provision, and developing the skills of its personnel. While doing so, VASYD has tried to create a specific and successful 'style of governance' which could dialogue with the society and the territory, merging several tools of external and internal social dialogue (involving workers and customers at the same time). Rather than operating through a 'concentrated participatory structure' requiring specific arenas (i.e., spaces and/or moments devoted to participatory practices) to foster dialogue, VA SYD has operationalised a 'diffuse model of social dialogue' that takes the form of a 'management style' that reproduces itself at different levels of the organisation.

VASYD's annual turnover in 2016 was 109 million Euros, whereas almost 50% is reinvested for example in maintenance and in more than 500 different projects.

Role of Partner in the Project:

VASYD will contribute to REWAISE by coordinating WP2, where resource efficient solutions will be designed and developed. In addition to the coordination of this WP, it will contribute to the task focused on alternative resources and regeneration and reuse of water and to the recovery of nutrients. It will also contribute and lead the implementation of large-scale applications managing Skåne Living Lab (T4.3) and guide the Consortium to be successful in governance and regulatory approaches (T1.6).

In addition, due its expertise, VASYD will have an active participation in WP3 for the CDP development (definition requirements and optimization), in WP7 for KPIs analysis, LCCA and ETV, in WP8 for new business models development and in WP9 for dissemination activities and social engagement activities.

Key personnel

VA SYD has in total 352 employees whereas a third belongs to the wastewater section consisting of different profession categories: maintenance-, process-, electrician-, automation- and instrument engineers.

[REDACTED] (male) is a Ph.D. in Water and Environmental Engineering and M.Sc in Environmental Engineering. He has worked at VA SYD since 2006, where he has been the project leader of two large full- and pilot-scale research projects (3-4 year projects) on enhanced biological nitrogen removal. He has also been highly involved in operation of the Sjölanda Wastewater Treatment Plant, Malmö, as a process engineer. Since 2015 he is also focusing on nutrient recovery from municipal wastewater. He is the project leader of URILAB, which aims for large-scale demonstration of the next generation of wastewater systems including source separation and dehydration of urine.

[REDACTED] (male). He has a Ph.D in in Chemical Engineering from Lund University. He has a demonstrated history of working in the environment industry. Skilled in Sustainable Development, Urban Water Management and Solid Waste Management. He has worked at VA SYD since 2008 at different manager positions. Apart from his position at VA SYD, he is an adjunct professor at Lund University and since August 2019, the CEO of Sweden Water Research (SWR).

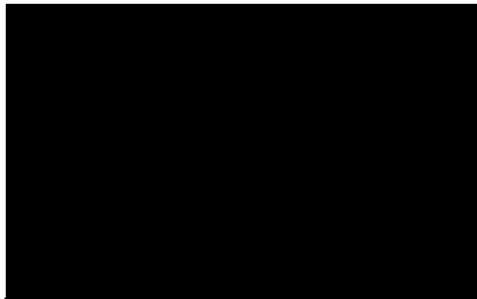
Relevant publications and achievements to the call
• [REDACTED] (2019). Drivers of changing urban flood risk: A framework for action. <i>Journal of environmental management</i>. • [REDACTED] K. (2018). Conceptualization and Schematization of Mesoscale Sustainable Drainage Systems: A Full-Scale Study. <i>Water</i> Vol 10, Issue 8, <i>The Challenge of Water Management and Governance in Cities</i>. • [REDACTED] önnsson K. (2016). Integrated urban design and open storm drainage in our urban environments: merging drainage techniques into our city's urban spaces. <i>Water Practice and Technology</i>. No 11(1), 118-126. • [REDACTED] (2014). Opportunities for microbial electrochemistry in municipal wastewater treatment – an overview. <i>Water Science and Technology</i>, 69(7), 1359-1372. • [REDACTED] (2013). Carbon footprints of Scandinavian wastewater treatment plants. <i>Water Science and Technology</i>, 64(8), 887-893.
Relevant previous projects or activities
• URILAB: VA SYD is responsible for the development and establishment of test facilities regarding urine separation connected to the city developmental area Sege Park in Malmö, Sweden. http://www.swedenwaterresearch.se/en/projekt/uricycle-2/ • Future City Flow - developing data system for management of the different water-flows within the city. Dealing with data collection, modelling, predictions. The data collected from different sources are finally presented on maps for better overview. Funded by the Swedish Innovation Agency Vinnova. www.futurecityflow.se. (2015-2019) • Fanplesstic-sea project - working with preventing and decreasing the pollution of microplastics in water and the Baltic Sea. The project will increase knowledge and understanding about dispersal pathways and sources through measurements in different flows in society, as well as cost-effective methods to reduce microplastics. Funded by the EU Interreg Baltic Sea Region. http://www.swedenwaterresearch.se/en/projekt/fanplesstic-2/ (2019-2021) • The Warm and Clean City (2014 – 2016) The project, “The Warm and Clean City” is developing and testing new total solutions for the world's wastewater treatment plants. The solutions are resource-efficient and facilitate utilizing substances in the wastewater for generating saleable products, while at the same time closing the water and nutrient loops. Sponsor: Vinnova (Horizon2020 national Focal Point for Sweden) • The Weather Radar project (2018-2019) (http://www.svensktvatten.se/forskning/svenskt-vatten-utveckling/pagaende-svu-projekt/vaderradarteknik-inom-va-området--test-av-metodik). Partners: Lund University, Sweden Water Research, SMHI and VA SYD. Sponsor: Svenskt Vatten Utveckling (Swedish Water Development/Formas) • Household Participation in Waste Management (HPWM) – 2010-2013. The project partners Sysav and VA SYD have, together with the municipal housing company in Malmö (MKB Fastighets AB), conducted a study in a residential area of apartment buildings. The pilot study has been thoroughly evaluated by a researcher from Lund University. The project was partly-financed by the European Union through the European Regional Development Fund. • SURF – Sustainable Urban Flood Management (2016–2019) Aim: Develop strategies for sustainable urban storm water management in cities Funding: FORMAS
Relevant infrastructures and networks
VA SYD has in total 15 wastewater treatment plants in the range from 150 to 500.000 population equivalent. To pump the wastewater to the respective wastewater treatment plant 259 pumping stations

are in operation and the total length of (wastewater) pipeline is 1285 km. The total amount of wastewater treated was 69 million m³ and 9.4 million Nm³ of biogas was produced on site. For this project, VASYD counts with following infrastructures:

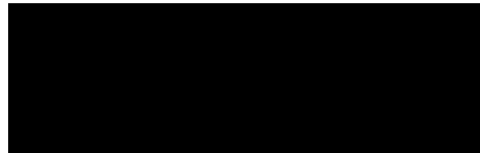
- Sege Park, which is Malmö city's "experimental workshop for sustainability". The site was originally developed during the 1930's as hospital and includes a beautiful hospital park. Today, when Sege Park is to be transformed into a sustainable residential district presenting innovative solutions for renewable energy and where urban farming plays an important role. Most of the old hospital buildings will be preserved and renovated, but the field will also be condensed. The cultural historical environment will be preserved and combined with modern architecture and solutions for a sustainable lifestyle. Sege Park will be one of Malmö's prioritized development areas until the year 2025. In total there will be up to 800 dwellings in the area.



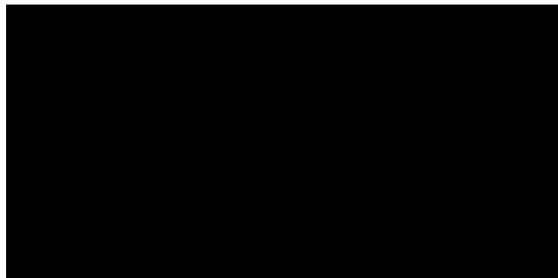
- Sjölanda Wastewater Treatment Plant, world-wide famous for its pilot and full-scale research projects. An overview of the plant is shown below (figure in the middle). Currently beeing transformed to Sjölanda Eco-cycle Plant.



- The facility Kretseum, which is a showroom for sustainability in the city of Malmö, partly owned by VA SYD.



- Urban area of Brunnshög in the City of Lund, a new neighbourhood growing up in one of Northern Europe's with an attractive environment for enterprise, research and education. Similarly, to Sege Park, Brunnshög is to be transformed into a sustainable district presenting innovative solutions and shaped in order to deal with a changing local climate.



PARTNER 4

Full Legal name:	AQUANET	
Short name:	ANET	
PIC number:	913615841	
Type (SME, RTD, etc.):	LE	
Country:	Poland	

Description
AQUANET S.A (ANET), is a public body and one of the leading water supply and sewage entities in Poland. Managing the entire water cycle in the urban area of Poznań and its 17 surrounding municipalities, the company sees the value of water from its early stage of extraction and preparation to the wastewater treatment. Therefore, guided by the principles of corporate social responsibility, the Company's activities are driven by care for the natural environment – in order to band the linear path of resource management into a circular one. Aquanet is constantly taking steps to prepare itself for meeting the social, environmental and economic challenges of its operation area. Being the main Poznań's urban water cycle creator, Aquanet S.A. is aware of the importance of each action taken towards a more sustainable water management model implementation in Greater Poland (Wielkopolska) region. Therefore, the aim of the company is to start banding the old-fashioned linear water usage in order to indicate the implementation of circular smart water economy in the area of Aquanet's operation. To make this statement happen, Aquanet want to see wastewater treatment plants (WWTPs) as a place with the highest potential to start a long-term closure of water loop in the city of Poznań, making the city's water footprint smaller. Aquanet wants to change the out-of-date perception of sewage as an unwanted kind of waste to a novelty approach to urban water effluent as a valuable and, what is even more important, continuous stream of energy and materials waiting to be reused.
Role of Partner in the Project:
The main contribution to the project will be to start banding the old-fashioned linear water usage in order to indicate the implementation of circular smart water economy REWAISE concept in the area of Aquanet's operation. The company will investigate a process to struvite recovery from sludge and crystallization methods (WP2) and will implement the large-scale applications in Poznan Living Lab, leading this Living Lab (T4.I). At the implementation stage, it will carry out the Phosphorus recovery and nutrient management at Central WasteWater Treatment Plant in Poznan and WWTP model. ANET will also play an important role in WP4 in the modelling combined with Real-time Data Analysis, In addition, it will also in WP1 to ensure a success management, and participate in KPI analyses, LCCA and ETV (WP7) as well as in the marketplace evaluation and social engagement (WP8 and WP9).
Key personnel
██████████ (male) graduated with honours from Poznan University of Technology (PUT) in 2017 with a Master's degree in Environmental Engineering in the area of water and wastewater treatment. Soon after studies, in 2017, she became a Junior Technologist at Aquanet S.A. Currently Paulina is AQUANET's Research and Development Specialist and a Ph.D. candidate at PUT's Institute of Environmental Engineering. Her main lines of research are new wastewater treatment technologies developed in the concept of circular economy and the LCA of WWTPs.

(male) is the manager of the R&D department in Aquanet. He is responsible for the development of the company's strategy in this area. He has experience in areas related to data aggregation process visualization systems. Over 15 years of experience in the area of operation. He was responsible for energy management and the development of industrial automation in the company. (female) received the Master's Degree in Environmental Protection from Poznan University of Technology in 2001. Since 2015 she has been working as a Chief Research and Development Specialist in Aquanet S.A. She is a Ph.D. student at Institute of Environmental Engineering at the Poznan University of Technology. Her research interests mainly concern the intensification of the sludge fermentation process. For over 7 years she worked at Aquanet S.A. as the main technologist in the field of wastewater treatment, she was responsible for operation and technological optimization of 7 wastewater treatment plants, she also conducted research works aimed at improving technological processes (mainly sludge dewatering, sludge fermentation, controlling the biological purification process etc.).
Relevant publications and achievements to the call • Stróżyna, M., Eiden, G., Abramowicz, W., Filipiak, D., Małyszko, J., Węcel, K., 2018, A framework for the quality-based selection and retrieval of open data - a use case from the maritime domain, <i>Electronic Markets</i>, 28, s. 1-15. • Filipiak, D., Stróżyna, M., Węcel, K., Abramowicz, W., 2018, Anomaly Detection in the Maritime Domain: Comparison of Traditional and Big Data Approach, NATO: Big Data and Artificial Intelligence for Military Decision Making, s. 1-13. • Rybinski, K., 2019, Forecasting power of the multi-language narrative of the sell-side research. A machine learning evaluation, paper accepted at <i>Finance Research Letters</i>. • Lewańska E., 2017, Towards Automatic Business Networks Identification, in: Business Information Systems Workshops BIS 2016 International Workshops, Leipzig, Germany, <i>Lecture Notes in Business Information Processing</i>, vol. 263, Springer. • Stróżyna M., 2019, Modelling of Risk and Reliability of Maritime Transport Services, in: BIS 2018 International Workshops, Berlin, Germany, July 18–20, 2018, Revised, <i>Lecture Notes in Business Information Processing</i>, vol. 339, Springer.
Relevant previous projects or activities • HANSA: Retrospective Analysis of Historical AIS Data for Navigational Safety through Recommended Routes, ERA-NET Cofund MarTERA Program • SIMMO: System for Intelligent Maritime Monitoring, JIP-ICET 2 Program, European Defence Agency • Semantic Monitoring of Cyberspace: financed by the Polish National Centre for Research and Development • e-UM: e-services and electronic exchange of correspondence in Marshal Offices of the Greater Poland and Kujavian-Pomeranian Voivodships in Poland, Human Capital Program of the EU.
Relevant infrastructures and networks Aquanet can access the following facilities and relevant equipment for the project development: - Water supply networks: 2462, 54 km - 16 water treatment plants - 2 water pumping stations - 41 pump rooms - 2243.70 km of sewerage systems - 6 sewerage treatment plants - 456 sewerage pumping stations

- 17 water intakes
- 1 sewage sludge thermal treatment station

PARTNER 5

Full Legal name:	European Network of Living Labs	European Network of Living Labs
Short name:	ENOLL	
PIC number:	984556306	
Type (SME, RTD, etc.):	EU NPO	
Country:	Belgium	

Description
The European Network of Living Labs (ENoLL) is a global network of open innovation ecosystems (Living Labs) that place people at the centre of product and service development and innovation. The network and its members provide innovation services for small and medium-sized international companies, the public sector, organisations, and citizens. ENoLL promotes the development of business and industry and the creation of tax revenue and jobs. ENoLL has recognised nearly 400 living labs from around the world maintained by municipalities, universities, regions and companies acting also as the development and piloting partners. Of these, 150 make up the core for piloting European industry and innovation policy and are involved in in-depth cooperation with regions and the European Commission's Directorates-General. The ENoLL network aims at creating pan-European experiments and prototypes for new markets, based on the Digital Single Market. It is an open engagement platform where new business models can be co-design, experimented with and developed all based on a quadruple helix approach, creating safety nets for experiments and prototypes with new roles of the public sector as enabler and catalyser. ENoLL combines European vertical specialisation domains (health, smart cities, creativity, education etc.) with horizontal and territorial specialisation. The ENoLL international non-profit association as the legal representative entity of the network, was founded in 2010 and is headquartered in Brussels, at the heart of Europe. ENoLL supports the evolution and the uptake of the Living Lab paradigm throughout Europe and worldwide, contributes to the creation of a dynamic, multi-layer and multidimensional European Innovation Ecosystem, and facilitates the cooperation and the exploitation of synergies between its members and external stakeholders Living Labs refer to user-centred, open innovation ecosystems based on a systematic user co-creation approach, integrating research and innovation processes in real life communities and settings. In practice, living labs place the citizen at the centre of innovation and have thus shown an ability to better mould the opportunities offered by new ICT concepts and solutions to specific needs and aspirations of local contexts, cultures, and creative potentials. Living Labs develop activities and provide services such as ideation, analysis, design, deployment, use, evaluation, research and management of innovation in real-world convergence of different forms of research and practices. They can have different typologies (top-down vs bottom-up, driving party roles: Living Labs as providers, users, utilizers, and enablers), and deliver activities in many different topics and domains, from health to culture, manufacturing and many others. The living lab approach offers benefits to companies, users, developers, public administrations and financiers, and from a territorial perspective living labs can help European Regions identify and valorise their respective economic niches and competitive advantages in the perspective of Smart Specialisation. ENoLL is a network of innovation networks or ecosystems represented by a legal entity, a living lab "host organization". The ENoLL members (host organisations of the living labs or ecosystems) are mainly research institutions, public local and regional authorities and agencies, public-private innovation actors or private companies. They all represent a community of change makers that have contributed

over the years to generate business and societal positive impact through open and user driven innovation. ENoLL is active in 20 of the 28 EU member states, and in 2 of the candidates (Serbia and Turkey). It is present in all the continents with a 20% of members based out of the European Union. The whole list of ENoLL members can be found at http://openlivinglabs.eu/livinglabs. As a legal entity, ENoLL international association focuses on facilitating knowledge exchange, joint actions and project partnerships among the members, promoting living labs and enabling their implementation worldwide, and, influencing policies. ENoLL also participates in projects to help contribute to build ENoLL assets, support joint activities in-between ENoLL members, and to strengthen the connections between ENoLL and local, regional and international user communities, governments, policy makers, research institutions, and other relevant organisations and communities. Directly, as well as through its active members, ENoLL provides co-creation, user engagement, test and experimentation facilities targeting innovation in many different domains such as energy, media, mobility, healthcare, agrifood etc. As such, ENoLL is well placed to act as a platform for best practice exchange, learning and support, and Living Lab international project development. The ENoLL Secretariat consists of trained personnel with diverse professional background, having solid experience in European Project development and management. The ENoLL personnel represents a multicultural, energetic and determined team, enriching the community's diversity. Due to the nature of the non-profit association, it often relies on the capacity and richness of its international expert base present in the labelled and qualified living labs. These experts possessing specific and wide expertise, can be engaged in various projects and programmes via in-house consultancy and secondment contract working under the network.
Role of Partner in the Project: As a network of innovation networks (ecosystems), with worldwide outreach (approx. 80% European), ENoLL's main potential is its network, its partnerships and the expertise developed in managing such a network. The role of ENoLL is key to the success of the Living Labs. For this reason, ENoLL will contribute to REWAISE by developing the Living Lab Methodology and RRI Activities and carrying out the Living Lab Evaluation and Optimisation in WP9. In addition, due to its expertise, it will carry out the Ethics and Gender dimension management in WP1 and will be involved in all the tasks developed in WP7.
Key personnel The ENoLL Secretariat consist of trained personnel with diverse professional background, having solid experience in European Project development and management. The ENoLL personnel represents a multicultural, energetic and determined team, enriching the community's diversity. Due to the nature of the non-profit association, it often relies on the capacity and richness of its international expert base present in the labelled and qualified living labs. These experts possessing specific and wide expertise, can be engaged in various projects and programmes via in-house consultancy and secondment contract working under the network. [REDACTED] (female) is Association Director, leads the ENoLL Office, supports the ENoLL President and Council. She has French MBA-MAE degree in Management and Business Studies (Université Jean Moulin - Lyon). Previously she obtained M.Sc. in Engineering and Management degree at the Technical University of Budapest. Has 10+ years' experience as Project manager. She has led a team of 16 people in multinational environment, developed business strategy studies and also participated in several national and European projects. She has contributed during website and platform developments, made software ergonomics studies and coordinated projects including gamification and Open Innovation methodology. She is dedicated to programmes and projects among others on Future Internet; Circular Economy; Smart Cities and Mobility; Cross-border, Cross-sector Collaboration, Game design & serious gaming and STEM Learning Analytics.

██████████ (female), she holds a Master Degree in Media & Communications and a Ph.D. in Economics (Innovation Technology Management) from the University of Rome La Sapienza (2015), Italy. In her Ph.D. work Francesca focused on the socio-economic impact assessment of cloud computing technologies for the Italian Ministry of the Economic Development. Francesca has worked as project manager and coordinator in several national and EU projects for governments, research centers and SMEs in different fields (social innovation, sustainable development, environment, cultural heritage, big data, living labs, eScience, eInfrastructures, cloud computing and smart cities). She has been also the coordinator of the European Researchers' Night in Italy from 2014 to 2017, coordinating the activities on science communication and outreach. In ENoLL she is acting as in-house senior consultant, providing her expertise on impact assessment methodology, policy recommendations, citizen-centred methodologies for co-creation and researching methodologies to enact open innovation in cities. Her most recent publication is: *The Paradigm Shift of Living Labs in Service Co-Creation for Smart Cities: SynchroniCity Validation*. Springer series: *Lecture Notes in Information Systems and Organisation* (LNISO). Book: *"Organizing in the digital economy"*. (Forthcoming). Spagnoli F., van der graaf S., Brynskov M.

██████████ (female) is an Executive International Project Assistant at ENoLL since June 2017. She has completed her Master's degree studies in Communications, New Media, and Society at Vrije Universiteit Brussels and also has a background in Communications, Business Management and ICT for innovation. Leidy has studied in 4 different continents, including South America, North America, Europe and Asia. Her work experience has been related to support non-profit organizations in communications and media, along with the creation and implementation of educational materials for training students within the (TAACCT) grant program from the U.S. Department of Labor. Her interests are linked to the use of ICT for teaching and learning. Her plans are focused on the learning of Project Management, user-engagement methodologies and the analysis of tools that can boost learning in different environments. Leidy supports the organization's Director closely by managing the network and being the primary contact ENoLL's members. She is in charge of the planning and developing of events at the network and is part of the communications team for the SynchroniCity project.

██████████ (male) joined ENoLL in May 2018 as Programme Manager and since September 2018 as Network Manager. In this function, he is in charge of the review and delivery of ENoLL's services portfolio to its members including the organisation of the OpenLivingLab Days. He also supports the management and development of advocacy activity towards European and international institutions, and overall process optimisation of the network. Prior to joining ENoLL, Miguel spent several years as part of work teams in the public and private sector in Japan, Argentina, Hungary and Belgium. He has worked on research, advocacy, and management roles across policy areas including international trade, SME policy, education, and environmental impact of extractive industries. He holds an Erasmus Mundus Double master's degree in public policy and Administration from the University of York (UK) and the Central European University (Hungary).

Relevant publications and achievements to the call

- Mazzitelli G., Arnone S., Bramato M., Capra I., Ciocca G., Dalla Ceca A., Giovanditti R., Grasso C., Maselli D., Sanzone G., Sereni D., ██████████ (2018), "12 years of data, results and experiences in the European Researchers' Night project". INTED 2018 Proceedings. 12th *International Technology, Education and Development Conference*. ISBN: 978-84-697-9480-7, pages 1772-1780.
- Santonen, Teemu; Griffon, Axelle; Creazzo, Laura; ██████████ Aversano Paolo (2017) "Cities as Living Labs Increasing the Impact of investing in circular economy for sustainable cities."
- Eskelinen, Jarmo; Garcia Robles, Ana; Lindy, Ilari; Marsh, Jesse; Munte-Kunigami, Arturo; (2015). World Bank, Washington, DC, and European Network of Living Labs "Citizen-Driven Innovation: A Guidebook for City Mayors and Public Administrator".
- Passani A., ██████████, Bellini F., Prampolini A., Firus K. (2015), "Collective Awareness Platform for Sustainability and Social Innovation (CAPS). Understanding them and Analysing their Impacts". Springer Series: *Lecture Notes in Information Systems and Organisation* (LNISO). Book: *Managing*

Information and Technology for Organizational Innovation and Change, ISBN: 978-3-319-229-20-1. • Passani, A., Monacciani, F., van der Graaf, S., [REDACTED], F., Bellini, F., & Dini, P. (2014). SEQUOIA: A methodology for the socio-economic impact assessment of Software-as-a-Service and Internet of Services research projects. Research Evaluation. Oxford: Oxford University Press. vol. 23, number 2, 133-149.
Relevant previous projects or activities ENoLL's main expertise from a project perspective is in dissemination, event and workshop development, knowledge transfer and training, community building, community management, brokering and networking activities and experts, stakeholder engagement, and support to exploitation. ENoLL also works as a single entry point to outreach different cross-cultural communities at the European scale. ENoLL has been involved in the following European projects, in all the cases playing an important role in dissemination, community building, stakeholder engagement, knowledge transfer, as well as exploitation and project capitalisation. ENoLL has been involved in the following initiatives so far: • SISCODE (https://siscodeproject.eu/) aims to understand co-creation as a bottom-up and design-driven phenomenon that is flourishing in Europe (in fab labs, Living Labs, social innovations, smart cities, communities and regions); to analyse favourable conditions that support its effective introduction, scalability and replication; and to use this knowledge to cross-fertilise RRI practices and policies. • iSCAPE (https://www.iscapeproject.eu/) aims to develop and evaluate an integrated strategy for air pollution control in European cities grounded on evidence-based analysis. The project will develop the tools required to obtain an air pollution free/low carob society by addressing air quality and climate change concerns together through the application of new smart and sustainable technologies for integration into urban design and guidelines. • EU-MACS (www.eu-macs.eu) - explores the transformation of climate-related data to customised products which can better equip decision makers in climate-sensitive sectors – otherwise known as Climate Services - for the sectors of Urban Planning, Tourism and Finance. Matching Climate Services Supply with Demand by identifying constraints and enablers in the climate services market. • UNaLab (https://unalab.eu/) - The UNaLab project sets out to provide a framework for future upscaling of nature-based solutions in the demonstration cities, as well as replicate the solutions in seven replication cities. ENoLL's role in the project is to monitor co-creation activities, provide training in Urban Living Labs to UNaLab cities and to compile in an interactive way a set of tools and methods used for co-creation activities • FIWARE (fiware.org) and in particular the CONCORD project (www.fi-ppp.eu/concord), FIspace project (www.fispace.eu) and CreatiFI (www.creatifi.eu). FIWARE initiative is to build an open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards that will ease the development of new Smart Applications in multiple sectors. • SynchroniCity IoT Large-Scale Pilot (www.synchronicity-iot.eu) - delivering a digital single market for IoT-enabled urban services; ENoLL responsible for the project marketing and communication task, co-chair of the communication activity group of the IoT Large-Scale Pilot programme • U4IoT coordination and support action for IoT Large-Scale Pilots providing co-creation and end-user engagement expertise and support for pilot projects • TALIA (Territorial Appropriation of Leading-edge Innovation Actions) – a horizontal project promoting the coherence and impact of social and creative innovation initiatives in the Interreg MED programme. • Fusepool (www.fusepool.eu) - a special call for SME Digital content and Languages • InnoMatNet - Networking of materials laboratories and innovation actors in various industrial sectors for product or process innovation, funded under the NMP theme of the FP7 • CIP Smart City projects: EPIC (www.epic-cities.eu/), SMARTIP (www.smart-ip.eu/), CitySDK (www.citysdk.eu/), SPECIFI (www.specifi.eu/), MyNeighbourhood (my-neighbourhood.eu/), ECIM (ecim-cities.eu/). Projects under Competitiveness and Innovation Programme (CIP) with

- objective of fostering open innovation for future Internet-enabled services in smart cities.
- **Periphéria:** to deploy convergent Future Internet (FI) platforms and services for the promotion of sustainable lifestyles in and across emergent networks of “smart” peripheral cities in Europe, dynamic realities with a specific vocation for green creativity.
 - **ACE** project with the aim to deliver targeted cross border services to highly innovative entrepreneurs, start-ups and SMEs in the ICT sector in order to accelerate their growth.
 - **Design for Europe platform** (designforeurope.eu/) to increase the use of design for innovation and growth across Europe, financed by the European Commission.
 - **JamToday project** – serious gaming for improving ICT skills, adopting healthier lifestyles and supporting learning of mathematics (<http://www.jamtoday.eu/>)
 - **PELARS for STEM** education and practice-based learning (www.pelars.eu)
 - 1. **Europeana Creative** (<http://pro.europeana.eu/get-involved/projects/project-list/europeana-creative>) to enable and promote greater re-use of cultural heritage resources by creative industries.

PARTNER 6

Full Legal name:	HIDROTEC TECNOLOGIA DEL AGUA SL UNIPERSONAL	
Short name:	HIDRO	
PIC number:	920247634	
Type (SME, RTD, etc.):	LE	
Country:	Spain	

Description
Hidrotec is a subsidiary of the water utility Aqualia. The main activities of the company are: 1. The provision of advisory services in occupational risk prevention procedures, quality systems, marketing, IT and communication procedures and brand management and the transfer of knowledge related to them; 2. The development and commercialization of all types of systems, methods, mechanisms, representations and patents. All of them related to the treatment and purification of any contaminating element and the water supply and sanitation. 3. The provision of services to Customer Service Centers through functional designs, technical designs, software development, validation of developments, systems implementation, equipment and systems maintenance, user training, operation and management control of Customer Service Centers Client who may cover the management through face-to-face, telephone and Internet and sms channels, to resolve all types of customer relationship management such as contracting of products and services, query management, claims resolution and collection systems, all related to the treatment and purification of any contaminating element and the water supply and sanitation
Role of Partner in the Project:
Hidrotec will carry out the development of the REWAISE platform, leading the WP3. It will be involved in all the tasks carried out in this WP, specially in the design and development of a secure data technology, in the architecture, infrastructure and smart visualization of the platform as well as in the implementation of prediction models and optimal control problem formulation and solving. Hidrotec will also participate in the implementation of the platforms in the Living Labs (WP4, WP5 and WP6).
Key personnel

██████████ (Male) is head of Analytics and IoT at Aqualia (Hidrotec) with more than 8 years of working experience in data management. Mechanical engineer at the Polytechnic University of Madrid, MBA at and IEN Polytechnic University of Madrid and Master in Commercial Management at CEU University. He is responsible for leading the build of Analytics a IoT solutions, managing the team roadmap and backlog, and delivering actionable data insights to business. Professionally, he has expertise designing data management strategy for business, implementing big data solutions and building AI/ML models for advanced analytics ██████████ (Female) is Responsible for applications in the client management department of Aqualia, she coordinates different projects and is in charge of front office systems, leading and managing the implementation of CRM software solutions. She graduated in Mathematics from Complutense University of Madrid, with more than 15 years of experience as a Project Manager in the IT area.
Relevant publications and achievements to the call
Internal projects related to the call: • Implementation of the CRM-based Customer Service and Virtual Office module • SMartMeters: Telemeasure information, network management and consumer analytics • Reading Mobility • Development and testing of a Business Intelligence tool for the water management and supply user • New parameterizable and flexible solution model for business-customer interaction
Relevant previous projects or activities
• H2020 RUN4LIFE (Third party): Recovery and utilisation of nutrients 4 low impact fertiliser: Development of decentralized platform • FP7 URBAN WATER (Third party): Development of Intelligent Water Systems.

PARTNER 7

Full Legal name:	City of Malmö Municipality	 Malmö stad
Short name:	MALM	
PIC number:	993964045	
Type (SME, RTD, etc.):	Other	
Country:	Sweden	

Description City of Malmö is one of Sweden's fastest growing metropolitan centres. Driving this growth is immigration, both from abroad and from other parts of Sweden, and the fact that many families choose to remain in the city after having children. The city's inhabitants come from around 170 countries and speak some 150 different languages. This diversity is one of Malmö's key assets and creates the basis for a rich cultural life. It also equips Malmö to perform well in an ever-more globalised world. Malmö aspires to be a sustainable city – socially, economically and environmentally. Businesses, researchers, local people and the city authorities are working closely together to reduce health-related inequality. Progressive eco-friendly development projects and multi-stakeholder social initiatives to

promote health and well-being have put Malmö on the map as one of Northern Europe's most sustainable cities. The City of Malmö is a large regional employer with a strong profile in social welfare and sustainable development and a commitment to providing high-quality services. Total number of salaried employees is 24,000. 34% of employees are foreign-born.
Role of Partner in the Project: MALM will participate in WP4 tasks, both focusing on Rain and Storm Water harvesting and reuse in collaboration with VASYD. The Environment Department of City of Malmö will facilitate coordination of property developers and key partners in Sege Park and their design, installation and evaluation activities of RWH and MU on residential houses. The Real Estate, Streets and Parks Department will provide a compliance and coordinating function with regards to the municipality's land. Malmö Stad arranges the "exhibition Shareful in Sege Park", which is part of the international conference "Sharing Cities Summit". Part of the exhibition will be a digital 3D map, and it will be reused and moved to another exhibition place after the conference.
Key personnel ██████████ (male). He has university studies in biology, chemistry and geology. He is secretary at the Real Estate, Streets and Parks Department. More than 30 years of working with environmental aspects in city planning. ██████████ (male). He has a M.Sc. in Environmental Science from Lund University. He is the Project manager at the Environmental department of City of Malmö. Rasmus has 9 years experience of project management and coordination of projects within the field of sustainable city development.
Relevant previous projects or activities • GreenClimeAdapt - Green tools for urban climate adaptation. LIFE07 ENV/S/000908 2009-2013. The GreenClimeAdapt project aimed to demonstrate appropriate climate adaptation technology for urban areas. Experiences from Canada and the UK were applied in a number of innovative environmental management tools, such as open storm water systems, green facades and a new type of 'green roof'. A 45 ha industrial area in south-east Malmö served as a "Green Climate Adaptation area" in which the appropriate technologies were tested.
Relevant infrastructures and networks Bo01 (also known as the "City of Tomorrow") was a housing expo in the southern Swedish city of Malmö. It was created as part of the European Housing Expo in 2001 and is notable for its sustainable character. Augustenborg is known as the "Eco-city Augustenborg"- a unique and successful example of socio-economic transformation in combination with ecological rehabilitation. The story of the housing area Augustenborg in Malmö is in many ways a story about Swedish housing history and how sustainability is increasingly becoming an integral part of local urban development. Starting with the development of public housing and neighbourhood units at the end of the 1940s, to a period of socioeconomic decline in the 1970s, followed by ecocity initiatives in the late 1990s, the housing area of Augustenborg is still being transformed through the innovative "Greenhouse" housing development project which aims towards greener, more climate-smart everyday living.

Sege Park in northern Malmö offers a green lifestyle close to the city center. The area is going to be transformed into a sustainable district presenting innovative solutions for renewable energy and where urban farming plays an important role. The cultural historical environment will be preserved and combined with modern architecture and solutions for a sustainable lifestyle.

The facility Kretseum (<http://www.kretseum.se/>), is a show-room for sustainability in the city of Malmö, and is owned by VA SYD, EON, SYSAV and the city of Malmö.

PARTNER 8

Full Legal name:	POLYMEN SA	
Short name:	POLY	
PIC number:	999739910	
Type (SME, RTD, etc.):	SME	
Country:	France	

Description

POLYMEM SA (3 rue de l'Industrie, 31320 Castanet Tolosan) started its business in 1997, specializing in the development and manufacturing of membranes based upon hollow fibres. POLYMEM develops and manufactures equipments based upon membrane filtration.

The Company sells its products to the most important actors on the water and wastewater markets: Veolia, Ondeo, Saur, and smaller national and international SMEs. Polymem modules family has obtained in 2005 the NSF/ANSI61 certificate. Now in 2017, 50 people are employed by POLYMEM, achieving a turnover around 4 million of Euros. Between 6 and 8 peoples are employed at full time in the R&D department of the company.

POLY has pilot spinning lines and industrial hollow fiber spinning lines, which could be used for R&D projects. The entity has laboratory facilities for membrane characterization and performance evaluation tests either in liquid and gas filtrations. Finally, POLYMEM has a design office where, in relation with R&D department membrane, modules could be designed.

POLY is working on hydrophilic and hydrophobic membrane development for liquid and gas separation. The company is partner of several French and European projects for the development of innovative membranes and innovative filtration processes.

Role of Partner in the Project:

POLYMEN will be mainly involved in T2.1 "Water - alternative resources, regeneration and reuse" where the company is going to evaluate its new durable hydrophilic PVDF membrane for RO pre-treatment.

The company is working on PVDF membrane since 2010 and has launched in 2017 a new generation of PVDF membranes, which are a real breakthrough in membrane manufacturing. These high-performance innovative membranes will be also adapted to treat surface water in the Vigo living lab (ES) in WP6, mining ground water in the Moravia-Silesia living lab (CZ) and saline streams in Denia Living Lab (ES).

Key personnel

Lorain Olivier (male), Head Research Manager: Experience and background: Doctor in Chemical engineering from Chemical Engineering School of Toulouse. 15 years' experience in the research and development of new membrane materials, membrane modules and processes applied to drinking water production, seawater desalting, wastewater treatment, and gas separation.

(male), Chairman and Executive Officer of POLYMEN: Experience and background: Chemical process engineer, Ph.D. on Outside In hollow fibre membrane cartridge design ; 25 years' experience in hollow fibre membrane manufacturing and membrane filtration systems design and construction. (male), Research Engineer: Doctor in Analytical Chemistry of the University of Lyon in 2009. Joint Polymem in 2011. He's in charge of the hollow fibres spinning development for liquid and gas treatment. (female): Technician of the University of Pau. Technician in POLYMEN since 2006. Specialist in membranes characterisation. (male): Technician of the University of Perpignan in the speciality of chemical Engineering. R&D Technician in POLYMEN since 2015. Specialist in membranes for gas separation.
Relevant publications and achievements to the call • Evdokia K. Oikonomou, Szilvia Karpati, Sana Gassara, André Deratani, François Beaume, Olivier Lorain, Sylvie Tencé-Girault, Sophie Norvez "Localization of antifouling surface additives in the pore structure of hollow fiber PVDF membranes". <i>Journal of Membrane Science</i>. Volume 538, 15 September 2017, Pages 77–85. • O. Lorain, I. Duchemin, J.M. Espenan "Benefits of Ultrafiltration in tertiary filtration treatment for re-use purposes: field experiences with pilot trials.". "IWA Regional Conference on Wastewater Purification and Reuse. WWPR2012. March 28-30, 2012. Heraklion, Crete, Greece. • O. Lorain, F. Saux, I. Duchemin, and J.M. Espenan "Size enlargement of ultrafiltration pressurized modules in water treatment by membrane: Gigamem®". <i>11th World Filtration Congress and Exhibition</i>. April 16-20, 2012. Graz Austria.
Relevant previous projects or activities • NEOPHIL1: the project objective is the development and industrial production in France of a new generation of nanoporous hollow fiber membranes having permanent hydrophilic character intended for urban wastewater filtration and recycling markets. • NEOPHIL2: The Neophil-2 project is a large demonstration plant trials of the technology Neophil in the WWTP of Ginestous-Garonne in Toulouse Metropole. • SMS: the aim is to install a demonstrator in a WWTP in order to separate and treat micropollutants to control health risks and preserve the environment. • GASPOM: This project aims at creating a new generation of hollow fiber polymeric membrane, hydrophilic and temperature resistant, for the treatment of produced water in offshore platform.
Relevant infrastructures and networks POLYMEN has pilot spinning lines and industrial spinning lines, which could be used for R&D projects. The company has laboratory facilities for samples characterization and performance evaluation tests either in liquid and gas separation. POLYMEN has pilots float, which could be used for REWAISE project. Finally, the entity has a design office where, in relation with R&D department membrane, prototypes could be designed.

PARTNER 9

Full Legal name:	ResourSEAs S.R.L	
Short name:	RESA	
PIC number:	911733071	
Type (SME, RTD, etc.):	SME	
Country:	Italy	

Description	
ResourSEAs (RESA) is a spin-off company from the University of Palermo. It builds on the experience of the Chemical Process and Plant design research group, which has been working over the past 15 years on desalination processes and their integration with sea-salt production facilities, on the separation and exploitation of valuable minerals from brines and on electricity generation from the salinity difference between saline waters and brines. RESA offers technologies and services that allow the integration of these industrial sectors in the spirit of the circular economy approach in order to maximise their efficiency and minimise their environmental impacts. Seawater is the common denominator of this integrated concept: it is an inexhaustible resource able to provide freshwater, salt, valuable raw materials and energy. RESA aims to play a crucial role in the implementation of the seawater integrated cycle vision through the technology we have developed and patented for the recovery of Magnesium from exhausted brines. Our technology can extract efficiently high purity magnesium hydroxide from bitters by using largely available reactants thus resulting into a significant competitive advantage. The company's potential has been recognised by receiving in October 2016 the UniCredit's award as the most innovative start-up in Sicily (UniCredit Start Cup Sicilia) and in December 2016 won the first prize in the Industrial category at the prestigious PNI competition (Premio Nazionale per l'Innovazione), where more than 1000 Italian start-ups were competing.	
Role of Partner in the Project:	
The main role of ResourSEAs is the development (T2.3 – Valuable materials recovery) and demonstration at the Levante living lab (T5.1 – Denia (Spain) Living Lab: Efficient Seawater Treatment) at the pilot scale of the sea-salt and magnesium extraction from seawater desalination brines. ResorSEAs will also conduct market research for the exploitation of the recovered magnesium products. The company team is very suitable for the role that has been allocated to it in the project. Over the past few years, the team has demonstrated in Trapani (Italy) how the use of brines from the local desalination plant can boost the productivity of salt production facilities by up to 30% and how the processing of the salt production facility waste stream can produce magnesium hydroxide of the highest quality.	

Key personnel ██████████ (male) is a Chemical Engineer, one of the founders of ResourSEAs and has 3 years of practical experience in working on the circular use of brines for the generation of energy and recovery of raw materials. His engineering background and his hands-on experience with reactors for the recovery of magnesium from brines makes him an ideal candidate for the set-up, operation and when troubleshooting of the salts and magnesium recovery process. ██████████ (male) is a physicist with post-graduate studies in technical and policy aspects of the energy field. He has 14 years' experience in raising funds, managing development of new technologies and supporting their introduction into the market, mainly in the clean energy and water fields. He was the coordinator of the REAPower project, leading to the development, installation and testing of the world first and largest Reverse Electrodeialysis prototype plant generating electricity from brines and saline waters operating in a real environment. He is a co-founder of ResourSEAs and will be responsible for the market analysis. ██████████ (male) is an Assistant Professor of Chemical Process and Plant Design. He is the initiator and co-developer of the technology that ResourSEAs is using and is among the co-founders. He is heavily involved in research activities on water desalination and renewable energy technologies as well as Salinity Gradient Power processes, with particular focus on Computer Aided Process modelling and optimisation, fluid flow characterization and prototype design, commissioning and operation applied to desalination and membranes-based SGP technologies. He has been involved in many international research projects and has published more than 100 works as journal papers or conference contributions in the field of water treatment, brines valorisation and salinity gradient power technologies. He will be providing overall guidance and supervising the work of the ResourSEAs team.
Relevant publications and achievements to the call • A. Cipollina, A. Misseri, A. Galia, O. Scialdone, G. D'Ali Staiti, G. Micale, "Integrated production of fresh water, sea salt and magnesium from sea water", <i>Desalination and Water Treatment</i>, 49, 2012, 390-403. Doi: 10.1080/19443994.2012.699340. • A. Cipollina, M. Bevacqua, P. Dolcimascolo, A. Tamburini, A. Brucato, H. Glade, L. Buether, G. Micale, Reactive crystallisation process for magnesium recovery from concentrated brines, <i>Desalination and Water Treatment</i>, 2015, Vol.55, pp. 2377–2388. doi: 10.1080/19443994.2014.947771. • R.Schwantes, A. Cipollina, F. Gross, J. Koschikowski, D. Pfeifle, M.Rolletschek, V. Subiela, Membrane distillation: solar and waste heat driven demonstration plants for desalination, <i>Desalination</i>, Vol. 323, 2013, pp. 93–106. Doi: 10.1016/j.desal.2013.04.011. • M. Tedesco, C. Scalici, D. Vaccari, A. Cipollina, A. Tamburini, G. Micale, Performance of the first Reverse Electrodeialysis pilot plant for power production from saline waters and concentrated brines, <i>Journal of Membrane Science</i>, 2016. Doi: 10.1016/j.memsci.2015.10.057. • M. Papapetrou, A. Cipollina, U. La Commare, G. Micale, G. Zaragoza, G. Kosmadakis, Assessment of methodologies and data used to calculate desalination costs, <i>Desalination</i> 419 (2017) 8–19, http://dx.doi.org/10.1016/j.desal.2017.05.038.
Relevant previous projects or activities Below is a list of 5 projects and is explained the role that the personnel of RESA had in them (they were acting in these projects through the University of Palermo): • EU-FP7 MEDIRAS (238938 - MEMbrane DIstillation in Remote AreaS): Developing and installing a waste-heat powered membrane distillation pilot system within the power plant of the small Mediterranean island of Pantelleria (Italy), 3-years project finalized in 2011.

- **EU-FP7 REAPower** (256736 - Reverse Electrodialysis Alternative Power production): Development of the reverse electrodialysis technology, construction and operation of a 1kW prototype within Trapani saltworks (Italy) powered by brine, 4-years project finalized in 2014.
- **H2020 REvived Water** (685579 - Low energy solutions for drinking water production by a REvival of ElectroDialysis systems): Development of innovative desalination systems based on the use of electrodialysis process stand alone or integrated with the reverse electrodialysis technology, 4-years project start in 2016.
- **H2020 ReWaCEM** (723729 - Resource recovery from industrial wastewater by cutting edge membrane technologies): Use of innovative membrane separation processes for the treatment and recovery of spent pickling brines or other industrial waste waters, through the regeneration of industrial water and raw materials, 3-years project start in 2016.
- **H2020 ZeroBrine** (730390 - Re-designing the value and supply chain of water and minerals: a circular economy approach for the recovery of resources from saline impaired effluent (brine) generated by process industries): Responsibility for magnesium recovery activities from process industry brines, 4-years project start in 2017.

Relevant infrastructures and networks

The company has access to a fully equipped laboratory where the selective crystallisation units for magnesium recovery will be assembled and tested before shipment to the demonstration sites. ResourSEAS has also formed a strategic alliance with the company SOSALT SpA that produces sea-salt in the salt-ponds of Trapani in Sicily. ResourSEAS has already fully tested the magnesium recovery system (Figure A) with the brine of the SOSALT production facility in Trapani.

PARTNER 10

Full Legal name:	BlueTech Research	
Short name:	BLUE	
PIC number:	925678373	
Type (SME, RTD, etc.):	SME	
Country:	Ireland	

Description

BlueTech Research is a leading consultancy specialising in providing water technology market intelligence. It works with innovative start-up companies, venture capital investors and leading water technology companies to support technology commercialisation, market analysis and technology assessment.

BlueTech Research is focused on analyzing where the water technology market is going and where the opportunities are likely to be in the future and provide:

- Clarity and critical analysis on emerging water technology market areas.
- Mapping and analysis of the water technology innovation landscape.
- Analysis of technologies, company strategies, market drivers, and the regulatory environment.

The company is focused on what is changing, and how new approaches, new technologies, and new needs are re-shaping the water technology market. The BlueTech intelligence platform provides the theory, model and data, that underpins our work. BlueTech has invested heavily in building out a model to understand and study the water space, mapping drivers to themes and linking this to technology and

end-use market applications. Is has studied timelines for technology diffusion in the past and from these built empirical models, identifying accelerators and decelerators. The use of time-series data on emerging trends and technologies allows this to be used as a model and a theory to support our research work. This, combined with the deep domain expertise of the team and an international network, is a differentiator that allows us to provide blue chip service to our clients.

BlueTech has worked with almost all of the key players in the water industry, globally and right across the value chain, from researcher, to investor to major water corporates, and we are highly respected in the industry.

Role of Partner in the Project:

As a specialized company in water technology market intelligence, with Technology Market Research Analysts and an Environmental Technology Assessment Group, BlueTech will develop business models and alternative sources of funding that create new market niches and boosting business related to the new technologies. In this context, it will contribute to REWASE project by leading WP8 and most of the tasks that will be carried out in this WP such as those related to new business models, market opportunities and value chains, investment mechanisms and funding synergies and replication strategies for sustainable value chains. In addition, and due to its expertise, it will contribute to the KPI analysis in WP7 and investment and finance management in WP1.

Key personnel

██████████ (male) has a Master Degree in Applied Sciences. He is currently Vice President of Business Development and Professional Services for BlueTech Research. Jeff Guild leads the client relations and market expansion portfolios and enjoys providing corporate foresight to support the needs of BlueTech members. He has a wealth of water industry commercial and technical experience gained from engagements with start-ups, investors and large corporations in the dynamic global water space. A business strategist and water industry leader who knows how to impact the bottom line, Jeff has advised businesses with wastewater treatment technologies, has led technology acquisition and integration projects, and can structure and negotiate strategic alliances, joint ventures and licensing agreements that leverage an organization's resources. Jeff has managed technology scale-ups, executed technology commercialization projects, and has held senior process engineering and project management roles in both the municipal and industrial market sectors. He has also assisted clients in making major investment decisions, and was responsible for driving a partnership, licensing arrangement and efficient project execution in the Chinese wastewater treatment market.

██████████ (male) is the CEO of BlueTech. Obtained a B.Sc. in Biochemistry and a Master Degree in Water Resource Management. Paul O'Callaghan is the founding CEO of O₂ Environmental, a leading consultancy providing expert analysis on global water technology market opportunities. Paul also founded BlueTech® Research, a subsidiary of O₂ Environmental that provides intelligence services to clients to identify key opportunities and emerging trends in the global water industry. With more than 25 years of experience in the water sector, Paul is widely recognized for his expertise in market analysis and success in providing business development support to venture-backed water companies, including Ostara, SCFI, UV Sciences (now NeoTech AQUALIA) and Microdynamics UV. Paul also worked with companies, such as The Body Shop, Atkins and Noram Engineering, Ostara and Microsludge, before founding O₂ Environmental. In addition, Paul has assisted a number of funds such as Leaf Clean Energy, XPV Capital, and Emerald Ventures, providing market analysis and helping identify water sector investment opportunities. He worked with Fortune 500 companies on developing their overall water strategy, determining acquisition opportunities, and assisting with the launch of new water business divisions. He has authored and presented numerous papers on emerging water and wastewater treatment technologies, guest lectured at Harvard Business School, provided commentary on the Discovery Channel, and delivered keynotes at numerous international events including the Singapore International Water Week TechXchange Workshop. Paul completed a cutting-edge analysis of BlueTech investment opportunities for a leading international water industry publication, entitled "Water Technology Markets – key opportunities and emerging trends." The report provided a critical analysis of the game-changing

technologies and identified the best growth opportunities in the water sector. Among Paul's more recent accomplishments is the establishment of the annual Innovation Showcase at WEFTEC in collaboration with the Water Environment Federation (WEF) and Imagine H₂O. In addition, his firm BlueTech Research hosts a yearly conference, the BlueTech Forum, to further promote the identification of innovative and disruptive technologies within the water sector. Paul has lectured on Sustainable Energy at the BC Institute of Technology, Vancouver. He has authored and presented numerous papers on emerging treatment technologies and together with the O³ Environmental Technology Assessment Group (TAG) carries out technology assessments for venture capital investors and water companies.

(male) obtained a B.Sc. in Civil Environmental Engineering and a M.Sc. in Engineering in Pollution Control and Waste Management. Tyler Algeo is the Research Supervisor with BlueTech Research, a consultancy that provides water technology market expertise and strategic advice on technology development and commercialization to start-up firms, the investment community and larger water corporations. He has been involved in several technology commercialization assessments for emerging water technologies. Tyler has worked on market analysis for the US biosolids gasification market, the global disinfection market, the ceramic membranes market and the shale gas produced water treatment market. Tyler provides BlueTech Research clients with insight and analysis on industry trends, and evaluates innovative water tech start-ups for the Innovation Tracker. He organizes web conferences on key industry topic areas and facilitates acquisition pipeline work with clients.

(female) has a B.Sc. in Civil Engineering and a M.Sc. in Water and Wastewater Engineering. Divya Inna is the Client Relations Manager at BlueTech Research. Prior to this, Divya was a water technology market analyst for BlueTech Research, who worked in the Energy and Resource Recovery Practice Area (which includes low energy wastewater treatment, sludge digestion and nutrient removal & recovery, amongst other topics). Divya holds a Masters Degree in Water and Wastewater Engineering from Cranfield University.

Divya has focused the majority of her career on the water utility sector, working within the areas of Operations, Process Optimization, Strategic Asset Planning and Regulation. Most recently, Divya has worked on Insight Reports in the following areas:

- Biotechnology Opportunities in Wastewater Treatment
- Phosphorus Removal and Recovery Technology
- Nitrogen Removal and Recovery Technology

In her current role, Divya ensures that our clients get the most out of their Bluetech experience, by delivering quality, relevant industry intelligence in a timely manner. Divya is also active in researching innovative companies and technologies for inclusion into the BlueTech Innovation Tracker, a database that tracks cutting-edge technologies within the water technology space.

(female). She holds a B.Sc. in Chemistry, a M.Sc. in Water Technology and a Ph.D. in phosphorous removal in wastewater. Dr. Murujew has joined BlueTech Research in 2018 as a Market Research Analyst while completing her doctoral thesis on phosphorus removal from wastewater at Cranfield University in the UK. Other research projects included alginate recycling from an immobilized algae technology in Melbourne, Australia and rural sanitation concepts in Patna, India. Prior to moving to the UK, Olga completed an MSc in Water Technology at Wageningen University in the Netherlands and before that a BSc in Chemistry at RWTH Aachen in Germany.

Relevant publications and achievements to the call

- **Water Technology Commercialisation Study** - BlueTech Research worked with the client to prepare a Commercialization Plan for a water treatment technology outside of their asset base. The technology was reviewed and assessed, a competitive technology analysis conducted, and potential routes to commercialisation were evaluated
- **Water Market Segmentation Analysis** - Identification of attractive market segments for water disinfection products in terms of market size and growth rates. Determined market size of these market segments across four different target geographies. Provide Client with insights into the key market drivers and technology trends within different sub-sectors to allow Client to make an

informed decision on business development strategy for its water disinfection technology portfolio. • Technology Market Analysis - BlueTech Research conducted a commercialisation study for a world- renowned Research Centre developing three separate nutrient removal/recovery technologies. • Market Analysis Report - Preparation of a detailed market analysis of the opportunities for advanced primary treatment, nutrient removal and sludge gasification technologies in North America. • Market Analysis Report - Preparation of a detailed analysis of the biosolids management market in North America, China and Europe. This report analysed market drivers, competing technologies and helped the company formulate its go to market strategy and close a round of funding for \$35M.
Relevant previous projects or activities • Competitive Landscape & Market Analysis Report on the Global Biosolids Market. The main goal of this project was to provide our client with a clear overview of the biosolids market in several strategic industries and regions around the globe (with market analysis on the municipal and industrial sludge markets). The study assessed the biosolids market potential in the regions analyzed, outlining key drivers (regulatory, public perception, sludge quality, odour and reliability of disposal options), sludge volumes produced, predominant technologies being utilized in processing and an overview of disposal/beneficial reuse practices. Client: Private Equity Firm, USA • Commercialisation Support for Innovative Membrane Coating Technology. This project was used to support the commercialization strategy for an innovative membrane coating technology. The project involved detailed value chain analysis within various sectors of the water industry, analysis of a range of options for technology commercialisation were analysed including launching a dedicated business unit, JV, licensing, spin-out and technology sale. Various business models were considered, including coating as a service-oriented business based on performance related guarantees, consumable sales and coating of third-party membranes. Different market segments were analysed to determine where the technology innovation would deliver the greatest value, including drinking water treatment, MBR, municipal wastewater reuse, industrial water re-use, industrial applications in oil & gas. Economic modelling was carried to determine the savings the technology could provide. A recommendation on strategy options was provided to the company indicating key market segments to consider and next steps and connections with potential partners. Client: Water Technology Instrumentation Company, USA. • Commercialisation Support for Innovative Low Energy MBR Nutrient Removal Technology. The client had discovered a low energy path nutrient removal technology suitable for use in MBR systems. The study evaluated the data provided to determine the value proposition in wastewater treatment applications. Competitive analysis to identify any competing solutions was carried out. The study analyzed a range of options for bringing this technology to the market, including conversion of existing MBR treatment facilities based on an annual fee derived from shared savings in operational costs. Recommendations were provided on steps that could be taken to build a defensible IP position around the technology. Potential partners were identified as part of the study. Client: Private Water Utility Company, USA. • Water Disinfection Map. Identification of attractive market segments for water disinfection products in terms of market size and growth rates. Determined market size of these market segments across four different target geographies. Provide the Client with insights into the key market drivers and technology trends within different sub-sectors to allow the Client to make an informed decision on business development strategy for its water disinfection technology portfolio. Client: Global Water Solutions Leader, USA. • Evaluation of Market Value of the Stormwater Treatment Market. Identification of attractive market segments for water disinfection products in terms of market size and growth rates. Determined market size of these market segments across four different target geographies. Provide the Client with insights into the key market drivers and technology trends within different sub-sectors to allow the Client to make an informed decision on business development strategy for its water disinfection technology portfolio. Client: Global Water Solutions Leader, USA.

PARTNER 11

Full Legal name:	AQUAPORIN A/S	
Short name:	APOR	
PIC number:	944532263	
Type (SME, RTD, etc.):	SME	
Country:	Denmark	

Description

AQUAPORIN A/S is a global water technology company located in Kongens Lyngby, Denmark. It is dedicated to revolutionizing water purification through the use of industrial biotechnological techniques and thinking. The company focus on solving water-related challenges by providing innovative water technologies to households and industries on a global scale. The main goal of AQUAPORIN is to develop the AQUAPORIN Inside® technology, capable of separating and purifying water from all other compounds. This technology can be implemented in different water sources: residential, commercial, industrial process, industrial wastewater and desalination. The AQUAPORIN Inside® platform uses biotechnological principles in a technological context which is a novel upcoming field with large commercial perspectives. This is a field where Denmark has taken an early global lead.

Role of Partner in the Project:

APOR will participate actively in T2.1 – Water - alternative resources, regeneration and reuse by developing a new generation of high-performance NF and RO membranes. Bench scale tests will be carried out under a well-control environment to test different membranes manufactured using novel configurations and advanced materials (including the insertion of aquaporin proteins within polyamide layer). During the development stage (WP2) membranes will be fed with synthetic and real water to emulate i. brackish surface water, ii. seawater, and iii. mining ground water.

Leading membrane candidates will be produced to be evaluated on site to reduce freshwater consumption making available alternative water sources. The following demonstration activity will be carried out: brackish surface water and seawater in WP5: Denia (Spain) Living Lab: efficient seawater treatment (T5.1). The objectives are to reduce energy needs for water desalination and values extractions from desalination streams It will also contribute with its expertise in membranes to WP6.

Key personnel

- [REDACTED] (male). He is Vice President of Technology Development in Aquaporin. He has a industrial Ph.D. During his research work he worked on the design fabrication and testing of support structures for biomimetic water filters. He is the main responsible for all membrane testing within Aquaporin A/S including tests and analysis with external partners. Also, responsible for the pilot production of the FO flat sheet membrane and the FO module development. In addition, also responsible for biomimetic hollow fibre module optimization and upscaling towards pilot production.
- [REDACTED] (female) She is a Chemical engineer from the polytechnic University of Valencia, Spain. She is an expert in membrane technology since she did a master thesis in comparing reverse osmosis and nanofiltration systems for reuse of industrial wastewater from industry. After that she worked in Germany as a R&D engineer on microfiltration-ultrafiltration ceramic membranes systems for wastewater treatment, and she has published studies about microfiltration, ultrafiltration for the application of membrane technologies for the production of

concentrated fertilizers and clean water. In addition, she has experience investigating about osmosis using Aquaporin based membranes.
Relevant publications and achievements to the call
Desalination by biomimetic aquaporin membranes: Review of status and prospects C.Y. Tang, Y. Zhao, R. Wang, C. Hélix-Nielsen, A.G. Fane, Desalination, 2012. DOI 10.1016/j.desal.2012.07.007
Development of an aquaporin-based biomimetic reverse osmosis membrane for brackish water desalination, J. Benecke, B. Holmberg, G. Sun, A. Azman, S. Braekvelt, J. Vogel. Conference abstract, Engineering with Membranes, Sweden, 2019.
Relevant previous projects or activities
• MEMBAQ: Incorporation of Aquaporins in Membranes for Industrial Applications. The MEMBAQ project aimed to investigate the potential for industrial exploitation of proteins through the incorporation of recombinant aquaporin (channels transporting water) molecules in different types of industrial membranes for water filtration. • AMBROSIA: Aquaporin-Inside™ Membranes for Brackish water Reverse Osmosis Application. The main objective of this project is to test and market our Brackish Water RO (BWRO) membrane products for commercial launch to the market.
Relevant infrastructures and networks
The AQUAPORIN A/S headquarters are located in Kongens Lyngby, north of Copenhagen. The headquarters covers a surface area more than 7,000 square meters and it hold plenty of space for both offices, laboratories, membrane testing, showroom, production and storage. AQUAPORIN A/S's headquarters is a unique facility, since it is large enough to house all the different business areas of AQUAPORIN A/S under one roof. Being able to move from offices and laboratories directly to the production facilities will ensure a close collaboration and integration between the different business and focus areas of AQUAPORIN A/S. From the headquarters, Aquaporin A/S will produce and develop the patented Aquaporin Inside™ membrane technology. The full scale production of membranes is scheduled for Q3 2016 and membrane products will be available on the market in Q4 2016.

PARTNER 12

Full Legal name:	Water, Environment and Business for Development, WE&B (WssTP)	
Short name:	WE&B	
PIC number:	929744807	
Type (SME, RTD, etc.):	SME	
Country:	Spain/Belgium	

Description
Water, Environment and Business for Development (WE&B) is a consulting company focused on the economic and social aspects of the water and environmental sectors. WE&B implements water and

environmental solutions, innovative business practices and builds capacity to assist communities, companies and public authorities to sustainably develop. WE&B innovates in business practices and social and political aspects to ensure that products, processes and services can reach the market quicker than they currently do. WE&B are members of the European Water Supply and Sanitation Technology Platform (WssTP), founding members and vice chair (together with IHE- Water) of the WssTP working group on "Water Beyond Europe" and Administrators of the public authority network: Network for Water in European Cities and Regions (NetwerCH2O). WE&B are also members of the International Water Association and more specifically as active members of the specialist group Ecosystem Services. In addition, WE&B is part of the business networks The Practitioner Hub for Inclusive Business, Global Network on Sustainable Innovation and Entrepreneurship and Global Network on Sustainable Lifestyles. WE&B are also a core member in the regional initiative for circular economy "Valles Circular". WE&B are implementing a number of Water, Climate Change and Environmental projects in Europe, Africa and Latin America on behalf of the World Bank, Interamerican Development Bank, GGGI, European Commission, H2020, IUCN, EuropeAid amongst others.

Role of Partner in the Project:

Within REWAISE project, the strong experience of WE&B in the economic and social aspects of the water and environmental sectors will engages the stakeholders, analyse social behaviour and acceptability to propose governance models that favour creation and validation of new markets and business models through a smart water society. In this context, it will lead the management of the social and community engagement in WP1, the user interaction demonstration for social and economic impact in Poznan Living Lab in WP4 and the promotion of market uptake and citizen satisfaction in WP8. However, its most relevant role is leading WP9, making a significant contribution to the definition and implementation stakeholder engagement strategies (Responsible Research and Innovation Approach, RRI) and to the social return on investment and participating in the rest of the activities of this WP.

Key personnel

██████████ (male) is the Director of Water, Environment and Business for Development. He is Ph.D. Candidate in Environmental Technology by Autonomous University of Barcelona, graduated in M.Sc. in Water and Environmental Management (2015) by Loughborough University (WEDC) and graduated in B.Sc. (2000) and B.Sc. Honours (2001) degree by the University of Cape Town, South Africa. David's expertise in economic and social development is focused on environmental management, integrated water resource management, water technology, business models, economic viability for water and sanitation treatment, ecosystem services¹ and capacity building. David was elected as a board member of the WssTP from 2012 - 2014. He is also the vice President and co-founder of NetwerCH₂O. He is currently a core member of the IWA Ecosystem Services Specialist group. David has also worked for four and a half years as a project coordinator at the research center CTM in Spain, where he sourced and managed funding for consortiums of several water and environmental projects. David has worked for 5 years (2003 – 2008) for the water and wastewater treatment company Thames Water Utilities Ltd, in London England.

██████████ (female) is graduated in Environment and Health Communication B.Sc. by Universidad Pompeu i Fabra (Spain) and in Environmental Sciences M.Sc. and B.Sc. by University of Alcalá de Henares (Spain). Beatriz is a partner and consultant at WE&B with expertise in the field of socio-environmental studies. Her experience is related to the field of science communication and knowledge brokering, public participation processes and analysis of risk perceptions in environmental issues. The projects where she has gained experience are at Latin American level: WaterClima LAC by Europeaid, EcoQuito by AECID and Green Growth Potential Assessment in Peru as well as in R&D and Innovation projects funded the European Commission: OBRA, PACHELBEL, MUSTANG, WaterDiss2.0, DEMOWARE, DESSIN, Water RtoM, INSITRATE, AfriAlliance, Run4LIFE. Additionally, she has published articles related to this above mentioned topics and book chapters in scientific documents. Moreover, Beatriz has been a research associate in the Sociology Department in the Autonomous University of Barcelona (UAB), working in the context of HONEST project, which focuses

on gaining understanding on how societies have engaged with nuclear energy, and how the nuclear energy sector has engaged with societies over the course of the past 60 years, focusing on the Spanish case study. Specially, collaborating in understanding perceptions and mechanisms of societal engagement.

(male) has a Bachelors degree in Biology (2013) from the Autonomous University of Barcelona, a Masters Degree in Global Change Ecology (2016) from Bayreuth University (Germany) and is currently undertaking a Master Degree in Education at the Autonomous University of Barcelona. Mathias has published two articles in Q1 peer-reviewed journals. Currently Mathias is Junior Consultant at, Water, Environment and Business for Development. His expertise is focused on environmental management. Green Growth, integrated water resource management, ecosystem services, climate change adaptation and mitigation and rural development. He has worked for one and a half years as a Ph.D. candidate in, CREDA in Spain, where he coordinated his own project research on rural development. Mathias has undertaken international stays during his education at the San Francisco University of Quito, the Environmental Ministry of Bavaria and the Biodiversity and Climate Research Centre of Frankfurt.

Relevant publications and achievements to the call

- **Medina, B.** (2014). Research to Market, can we speed-up the knowledge transfer process? In: Herve-Bazin, C. (ed.) *Water Communication Analysis of Strategies and Campaigns from the Water Sector. International Water Association Publishing, IWA*, ISBN: 9781780405216
- Amorsi, N.; **Medina B.**; Midgley, S.; Nickel, D.; Stein, U.; von Toggenvurg, J. (2016). Analysis and uptake of FP water research results in Martinuzzi, R-A., Sedlacko, M. (eds.) *Knowledge Brokerage for a Sustainable Europe - Innovative Tools for Enhancing the Connectivity of Research and Policy Making on Sustainable Development Issues* (Greenleaf).
- **Espluga Trenc, J., B. Medina, A. Presas, M. Rubio-Varas y J. De la Torre.** (2017). "Las dimensiones sociales de la percepción de la energía nuclear. Un análisis del caso español (1960-2015)". *Revista Internacional de Sociología* 75 (4): e075 [PDF].
- Espluga, J., Konrad, W., Enander, A., **Medina, B.**, Prades, A., Cools, P. "Different but similar. Public perceptions of nuclear energy in a cross-country perspective " in: Kaijser, A., Lehtonen, M., Meyer, J.-H., Rubio-Varas, M.d.M. (eds), *Engaging the Atom. The History of Nuclear Energy and Society in Europe from the 1950s to the Present (Energy and Society Series)* (Morgantown: West Virginia University Press, forthcoming 2019).

Relevant previous projects or activities

- **DEMOWARE H2020** (2016-2021): Innovation and demonstration for a competitive and innovative European water reuse sector. (
- **GGGI NEPAL** (2016): Green Growth Potential Assessment (GGPA) in Peru and Nepal.
- **WATERCLIMA LAC** (2014-2017): Watershed and coastal management in Latin America and the caribbean
- **AFRIALLIANCE H2020** (2016-2021): Africa-EU innovation alliance for water and climate. Stakeholder Mapping and Engagement Strategies for Water and Climate actions between Africa and Europe
- **IDOM EuropeAid** (2015-2016): Low carbon business action in Mexico
- **RUN4LIFE H2020** (2017-2021): Recovery and utilisation of nutrients 4 low impact fertiliser.
- **LIFE+DREAMER**: Demonstration of an environmentally-friendly desalination system concept: transforming seawater into valuable resources.
- **HOUSEFUL H2020**: Innovative circular solutions and services for the housing sector.

Relevant infrastructures and networks

Offices: Barcelona, Spain. Based in an innovative business community in the city of Sant Cugat del Valles, companies and researchers can be based here and interact with other researchers and companies. Software and other web applications with license to develop activities: MaxQDA, Atlas Ti, Leximancer, Survey Monkey.

PARTNER 13

Full Legal name:	Environmental Monitoring Solutions Ltd	
Short name:	EMS	
PIC number:	950910110	
Type (SME, RTD, etc.):	SME	
Country:	United Kingdom	

Description

Environmental Monitoring Solutions Ltd (EMS) is a SME providing products and services to help businesses meet and maintain environmental compliance. EMS has grown 5-fold over the last 7 years with innovation a key part of this growth.

EMS has a track record of delivering innovative AI based software and hardware solutions for the water industry, taking technologies from concepts through to industry solutions. For example, the development of "SMART Sewer" – a Fuzzy Logic (FL) based sewer blockage detection system - was part funded by Innovate UK during 2014 and 2015. It is now in use in 3 UK water companies.

IWAN will utilise the technology platform developed during the CENTAUR product. "CENTAUR" is a flood-risk reduction technology which utilises localised data driven real-time-control based on FL. The system has been rolled out in Coimbra, Portugal for Aguas de Coimbra, and in Toulouse, France for Veolia. EMS developed the monitoring and control system for CENTAUR under an H2020 project. EMS was responsible for the installation, trialling and refining of the system at full scale, the commercialisation, developing the early market and selling. EMS is currently working on implementation of CENTAUR systems with several UK water companies

Role of Partner in the Project:

The main role of EMS in REWAISE project will be to demonstrate the power of IWANs in addressing hydraulic capacity issues in wastewater networks; to demonstrate their efficacy as an asset stretching technology (squeezing the maximum operational capacity and service from existing assets) and avoiding capital-intensive, disruptive and long-in-the-planning civil engineering solutions. To do this, it will be carried out in Midlands Living Lab in WP6.

Key personnel

[REDACTED] (male): Pete is a proven business leader who develops profitable business models from new commercial offerings. From 2002 – 2009 he was MD of SEAMS Ltd, an asset management optimisation software company. Pete is also Non-Exec Chairman of Ecus Ltd, a nationwide environmental consultancy, and a Visiting Professor at Leeds Sustainability Institute. Prior to 2002, Pete was an academic and is widely published and cited in asset management and water network performance. He was the recipient of the ICE's Telford Prize for work on artificial intelligence modelling. Pete's

technical expertise in AI and optimisation, and his commercial expertise in bringing new AI-based products to market will be an asset to the project.

(female): She is Innovation Consultant in EMS. Sonja's key expertise is in data-driven software. Her Ph.D. was on Fuzzy Logic based control of pumping stations incorporating Genetic Algorithm based optimisation. This technology was subsequently transferred to the water industry via a KTP and is in full-scale operation in Anglian Water. Whilst at EMS, Sonja has worked on the development of FL/GA based monitoring and control systems for flood management and sewer blockage detection. Sonja has in-depth knowledge of machine learning, data science and extensive water sector domain knowledge with particular expertise in analysis and scoping studies, proof-of-concept work, knowledge discovery and bespoke prediction and classification applications. With PS, SO will head up the project on behalf of EMS, bringing her problem evaluation, data-driven software and optimisation skills and knowledge to bear. Dr Ostojin and Dr Shucksmith are co-supervising a STREAM Ph.D. student in the area of real time control since June 2018. Before joining EMS, Dr Ostojin worked for an engineering consultancy (RPS) as a member of their sewer network modelling team.

(male): he is Technical Manager in EMS. Gary is responsible for special and innovation projects to provide environmental monitoring solutions to a wider range of customers. He has extensive software development experience in using both low and high level programming languages. Gary has 20 years' experience in system integration including extensive experience in developing operational systems, project management strategy and providing engineering and product support. He has 20 years' experience with design and installation, managing, testing and maintaining a wide range of electronic equipment. With Liam Dearden (Innovation Engineer, EMS), who has a degree in Electrical and Electronic Engineering and similar hands-on experience, Gary will be responsible for aspects of software authoring and for the trial project management, installation, integration, commissioning and maintenance.

(male): he is Business Development Director in EMS. Kieran has research and commercial experience working in the Innovation Department of a large water company, in a University and for the last 6 years for EMS. He is head of a team of 6 BD professionals and has extensive experience in shaping and introducing solutions for industry and will help guide formation of the products and their market introduction.

Relevant publications and achievements to the call

- Abdel-Aal, Mohamad, Shepherd, Will, Ostojin, Sonja, Mounce, Stephen, Shucksmith, James, Schellart, Alma, **Pete Skipworth**, Joerg Steinhardt, Tait, Simon. (2017). Developing and testing a Fuzzy Logic algorithm to alleviate the risk of flooding by controlling a flow control device in a laboratory setting. *Zenodo*. <http://doi.org/10.5281/zenodo.890882>
- Maluf, L., Shepherd, W., **Ostojin, S.**, Simões, N., Sá Marques, A., Mounce, S., **Skipworth, P.**, Leitão, J.P. (2017). Real time flow control to utilise existing in-sewer storage. *Zenodo*. <http://doi.org/10.5281/zenodo.891133>
- William Shepherd, Stephen Mounce, **S. Ostojin**, M. Abdel-Aal, Alma Schellart, **P. Skipworth**, Simon Tait (2017). Optimising a Fuzzy Logic Real-Time Control System for Sewer Flooding Reduction using a Genetic Algorithm. 10.15131/shef.data.5363572.v1
- Shepherd, Will, **Ostojin, Sonja**, Mounce, Stephen, **Skipworth, Pete**, & Tait, Simon. (2016). CENTAUR: Real time flow control system for flood risk reduction. *Zenodo*. <http://doi.org/10.5281/zenodo.400969>
- Abdel-Aal, Mohamad, Shepherd, Will, Mounce, Stephen, Ostojin, Sonja, Schellart, Alma, Shucksmith, James, Skipworth Pete, Tait, Simon. (2016). Alleviating The Risk of Sewer Flooding using Fuzzy Logic in a Real Time Control System – An Experimental Study. *Zenodo*. <http://doi.org/10.5281/zenodo.399119>
- Skipworth Pete**, Ostojin Sonja (2017). Artificial Intelligence for Wastewater, CIWEM Urban Drainage Group Autumn Conference & Exhibition 2017 (CIWEM UDG 2017)

- W Shepherd, S Ostojin, S Mounce, P Skipworth, S Tait (2016). CENTAUR: Real time flow control system for flood risk reduction, - CIWEM Urban Drainage Group Autumn Conference - S Ostojin, SR Mounce, JB Boxall (2011) An artificial intelligence approach for optimizing pumping in sewer systems. <i>Journal of Hydroinformatics</i>.
Relevant previous projects or activities
Examples of Experience as an Innovation Project Lead MultIMEMS, Aug 14 - July 17; part-funded by Innovate UK; collaborative research project, 2 academic, 2 industrial partners; project value ~£1m; outcome – prototype nutrient monitor. SMART Sewer, July 14 - Dec 15; part-funded by IUK; project value ~£400k; outcome – blockage detection system now rolled out to industry. Project Delivery for Industry - EMS delivers large (several hundred £k typically ~3 mths) flow and water quality surveys collaborating with consulting engineers, water companies, local authorities, Environment Agency. This requires disciplined, collaborative project management. International Experience - EMS has delivered projects in mainland Europe up to a single project value of ~€800k. They were a key partner in the H2020 CENTAUR project.
Relevant infrastructures and networks
EMS offers short term and permanent water and wastewater monitoring services, products and equipment hire for trade effluent monitoring, flow and load surveys, MCERTS solutions and flow verification.

PARTNER 14

Full Legal name:	Solar Water Plc	 SOLAR WATER PLC
Short name:	SOLWAT	
PIC number:	905019119	
Type (SME, RTD, etc.):	SME	
Country:	United Kingdom	

Description
Solar Water Plc is a company working on innovative, carbon neutral and sustainable technology for sea water desalination on an industrial scale, created by Malcolm Aw and developed from concept to reality over a number of years. The company's project, a world-first for carbon neutral hydro-infrastructure, envisages sea water being drawn inland through glass-enclosed aqueducts to giant domes where it is recovered through evaporation. The technology is based on the natural hydrological cycle processes of evaporation, condensation and precipitation, and runs entirely on sunlight utilising a dome made of steel and glass. The energy generated to evaporate the water and create a constant water cycle within the domes is the equivalent of up to 20,000 suns, produced by focusing concentrated solar radiation from surrounding reflectors.

Solar Water Plc is the only business worldwide promoting this disruptive patent-protected technological concept for generating fresh water. The technology technical and operational feasibility and laboratory testing have been carried out in close cooperation with Cranfield University, considered to be the UK leaders in the field of Concentrating Solar Power. This technology will be used to produce clean, cheap water for a range of uses at industrial scale, including farming, agriculture and industrial, that rely on pure clean water for their operations, without reliance on fossil fuels. In addition, Solar Water Plc is the proud winner of the prestigious Rushlight award for water treatment in 2018, announced in a ceremony held at the Royal Geographical Society, London. This was in recognition of the project being a world-first for carbon neutral hydro-infrastructure. The Rushlight Awards are a celebration and a promotion of new technology, innovation and best practice across the whole environment spectrum for organisations throughout UK, Ireland and internationally. These prestigious Awards are designed to highlight innovation, initiatives and the holistic environmental benefit of technologies that are most likely to or are already creating a real impact in the market, they are a means of disseminating the successes to support further development.
Role of Partner in the Project: SOLWAT will take part of T2.1 "Water - alternative resources, regeneration and reuse" to develop the solar dome adapted to different scenarios and treating different saline feeds (ST2.1.2): low energy seawater desalination (Levante) and mining ground water recovery (Moravia-Silesian). The solar dome will be up-scaled to reach a production capacity of 10 m³/d. It will have an active participation in Denia (Spain) Living lab to treat sweater and brine concentration to get an efficient seawater treatment (T5.1). The objectives are to reduce energy needs for water desalination (ST5.1.1) and brine preconditioning to obtain value compounds from desalination streams (ST5.1.2).
Key personnel ██████████ CEO of SOLAR WATER Plc (male). Appointed Director and CEO of Solar Water in May 2019 to drive the company's strategy towards the realisation of its vision and aims, he leads an experienced and expanding executive team. David is an experienced executive who has held board positions in the UK and internationally in public companies within the telecoms industry. His responsibilities have included developing and implementing sales and marketing strategies and establishing global distribution networks. As CEO of a management consultancy, he devised and delivered staff development programs internationally. He is a frequent speaker at conferences, a published author in The Institute of Telecommunications Professionals, and a visiting lecturer at University College London. ██████████ CTO and Founder of SOLAR WATER Plc (male). Mr Aw is the founder of the company and Inventor of the dome and its technologies. He used his own private capital to finance the business through the initial research and development phase. Passionate about the application of Solar Water's potential to make world changing impacts by the plentiful provision of freshwater, he has a background as an inventor, lateral thinker, geo-political economist and entrepreneur in many countries. His responsibilities include technical supervision, intellectual property management, relationships with the water industry and building the technology portfolio. ██████████ (male). Mr Koh is the operations manager of SOLAR WATER Plc. He has been with Solar Water Plc since its inception, in the daily management of the company operations, being familiar with its stakeholders and with a deep knowledge of its core technology. Liam has more than 35 years of experience from the IT industry and has occupied several management positions such as International Director at Arosa Consultores SL, IT Director at Grupo Redur, Director at Asiga SL-Grupo Eptisa,. Liam's focus in the IT industry includes project management, business

development consultancy, telecommunications, software, GIS projects, international engineering projects, European logistics and e-commerce. Liam has strong connections with the Spanish desalination industry and is a promoter of the Iberia/ASEAN Chamber of Commerce. He has a Bachelor of Science (1st Hons) in the Computer Science from City University in London, and a Master of Science in Management from the Imperial College, London University. He has a broad range of IT, technical and organizational skills and is fluent in English and Spanish and furthermore speaks both Malay and Chinese. ██████████ CFO of SOLAR WATER Plc (male). He has a working lifetime of experience in corporate finance and business development, with a history of building and managing entrepreneurial businesses in the UK and US, assisting client companies in all aspects of corporate development and business strategy, including acquisitions, divestitures and fund raising. His career has largely been in financial services, having commenced his career in merchant banking with S.G. Warburg & Company Limited. Then, he served as Director of Business Development of The ECU Group Plc, foreign currency advisers; as a founder principal of Ferghana Partners Inc. and Ferghana Partners Limited, strategic transaction advisers to the life sciences industries; and as a founder principal of stockbrokers David Allsopp and Partners. Currently, he is a principal of corporate finance consultants Ilex Associates Limited, and CFO at Solar Water Plc. ██████████ (female). She is analyst at SOLAR WATER Plc. Beata has a master degree in Politic Science and Pstgraduate studies in Public Relations from Poznan University (Poland). She worked as Communications Manager and spokesperson for PGNiG Group and in Fibrao, in Poland. She fluently speaks Polish, English and Spanish. In 2018 she joined Solar Water Plc at the UK Office.
Relevant publications and achievements to the call Solar Water Plc is the proud winner of the prestigious Rushlight award for water treatment in 2018, announced in a ceremony held at the Royal Geographical Society, London. This was in recognition of the project being a world-first for carbon neutral hydro-infrastructure.
Relevant previous projects or activities • Prototype model developed in cooperation with Cranfield University: Solar Water Plc and Cranfield University developed a laboratory prototype model for proof of concept and made a detailed report. The laboratory scale model developed with Cranfield was crucial to evaluate productivity and investigate the design, materials and costing for a larger field demonstrator. • Design of a Field Demonstrator (delivered in H2020 Phase 1 project): As a result of our H2020 SME Instrument Phase 1 project, we have reached agreements with local suppliers for an excellent demonstration site for SWCSP Field Demonstrator in the Canary Island, specifically in the Desalination Living Lab of the Canary Islands Institute of Technology (ITC). We have also delivered a complete design of the Field Demonstrator installation, including deployment cost and time estimations, which is the basis for this Phase 2 project. • Creating sustainable fresh water from desalinating seawater using Concentrating Solar Power (CSP) (H2020 SME Phase 1): the main objective of the project is to use solar power in order to produce fresh water, suitable for drinking.
Relevant infrastructures and networks Solar Water Concentrating Solar Power (SWCSP) solution is a disruptive, low cost and carbon neutral technology for seawater desalination at industrial scale, based on the natural hydrological cycle processes of evaporation, condensation and precipitation, which runs entirely on sunlight. SWCSP core element is a Solar Dome into which seawater is drawn and heated by the rays of the sun concentrated by a heliostats field of 300+ parabolic mirrors. The seawater evaporates, condenses and is precipitated as

freshwater which is piped to reservoirs and wetland areas as needed for uses in the local region. While the brine gathers at the bottom of the basin and is drawn off for reuse.

PARTNER 15

Full Legal name:	IETU Inst. for Ecology	
Short name:	IETU	
PIC number:	998693862	
Type (SME, RTD, etc.):	SME	
Country:	Poland	

Description

Established in 1972, IETU is an R&D unit acting under the Ministry of Environment. IETU carries out research and development projects as well as provides consulting services for local and state authorities, regulators and businesses focused on environmental challenges posed by industrialised and urbanised areas in the context of circular economy, resource efficiency, adaptation to climate change and mitigation of its effects. Experience of IETU includes also environmental assessments of innovative technologies. It refers to assessment of overall environmental impacts of innovative technologies using the Life Cycle Thinking approach, LCA tools and carbon footprint as well as environmental technology verification (ETV). Since 2016 an Environmental Technology Verification Body has been operating at IETU. It is accredited by the Polish Centre for Accreditation for compliance to ISO 17020 inspection body type A (certificate no AK 026) certificate to perform verifications of water treatment and monitoring technologies. The accreditation scope is currently under extension to technologies related to materials, resources and recycling. ETV Body IETU uses skills and competence of 10 independent experts in water technology area. IETU has been involved in the development of the EU ETV Pilot Programme at the EU as well as national level. IETU staff also contributed to the harmonization and mutual recognition of the ETV approaches at international level by contributing to the development of the International Standard ISO 14034 Environmental Management: Environmental Technology Verification and the Technical Report to the standard.

Role of Partner in the Project:

The main role of IETU in REWAISE project is related to the Environmental Technology Verification in order to support market uptake in WP7, therefore leading the ETV task.

Key personnel

[REDACTED] (female). She is expert on ETV. Co-author of the ISO 14034 ETV standard and the technical report, General Verification Protocol of the EU ETV Pilot Programme and Guide for Proposers for the EU ETV Programme. Involved in the FP7 AdvanceETV project that served as a basis for the EU ETV Pilot Programme. Certified internal auditor of ISO 17025. Currently she is the manager of IETU ETV Body responsible for supervision of all ETV performed by the Body. Izabela is former expert of the Ministry of Environment on ETV, the EU ETV Steering Group and the Steering Group of the Ontario Province ETV Pilot Programme for water technologies. Member of the Technical Working Group of the Eu ETV Programme. Involved in H2020 project CINDERELA to perform feasibility studies for ETV of new construction products. Her main role in the project consist of overall supervision and management for compliance to ISO 14034, ISO 17020 and Eu GVP of verifications performed under REWISE.

(female), expert in environmental biotechnology with focus on water treatment technologies, bioreactors and membranes and biodegradable waste treatment. Certified internal auditor of ISO 17025. She is Chief verification expert of ETV Body IETU responsible for the technical implementation of verifications of water technologies. Head of the Institute of Environmental Engineering of the Technical University of Częstochowa. She has Many -year experience in research and development dedicated to innovative technologies enabling implementation of the circular economy principles in water and wastewater sector. Author of numerous publications on the topic of intensification of biological wastewater treatment methods. Her role in the project will be offer technical supervision of verifications performed under REWISE including development of specific verification protocols and verification reports.

(male). He is expert in quality management systems, quality control processes in production processes and systems, statistical methods for quality management, auditing and diagnosing quality management systems. Certified internal auditor of ISO 17025, ISO 9001. Michal is quality manager at ETV Body IETU responsible for quality control and assurance of the verifications in line with ISO 17020, ISO 14034 and ISO 17025 requirements. Senior researcher at the Technical University of Silesia, Department of Organisation and Management. He is the responsible of quality management at ETV body IETU since 2016, quality assurance and control of 3 verifications including test system audits. His principal task in the project will be act as a technical supervisor of verifications performed under REWISE including development of specific verification protocols and verification reports.

Relevant publications and achievements to the call

- **Michal Molenda, Izabela Ratman-Klosinska**, Enviromental Technology Verification: The European Scheme as a New Quality in Validating The Performance of Ecoinnovation 17th International Multidisciplinary Scientific GeoConference SGEM 2017. Conference Proceedings Volume 17. Ecology, economics, education and legislation, Issue 51. *Ecology and Environmental Protection*. Bulgaria, Albena, 2017.
- Grosser A., **Neczaj E.**, Madela M., Celary P., 2019, Ultrasound-Assisted Treatment of Landfill Leachate in a Sequencing Batch Reactor, *Water*, 11, 516,
- Madela M., Grobelak A., **Neczaj E.**, 2018, Impact of Selected Nanoparticles on Wastewater Treatment Efficiency, *Desalination and Water Treatment*, 134, 115-120,
- Grosser, A., **Neczaj, E.**, 2018 Sewage sludge and fat rich materials co-digestion - Performance and energy potential, *Journal of Cleaner Production*, 198, 1076-1089
- **Michal Molenda**: Risk management as a part of intelligent quality management system in the environmental technology verification body (ETV), 2016 *Systemy Wspomagania w Inżynierii Produkcji* Volume : 4(16), pp 160-171.

Relevant previous projects or activities

- **FP7 AdvanceETV**: Coordination Action on Environmental Technology Verification ETV – Building a Framework for International Cooperation (IETU as partner, co-author of the General Verification Protocol of the EU ETV Programme, leading author of the Guide for Proposers, communication and dissemination WP leader)
- **ETV4Water**: Facilitating the use of ETV to increase energy efficiency in water sector (IETU as coordinator, project implemented under Norway Grants and dedicated to capacity building for ETV in Norway)
- **H2020 CINDIRELLA**: New Circular Economy Business Model for more sustainable urban construction (IETU responsible for setting up an ETV scheme and a feasibility study for innovative construction materials, leader of promotion and dissemination WP)
- Curently IETU is involved in 3 verifications of water technologies: 2 treatment and one monitoring technology under the EU ETV Programme.

Relevant infrastructures and networks

Accreditation of the Polish Centre for Accreditation for compliance to ISO 17020 for Type A inspection body to perform verifications of water treatment and monitoring technologies under the EU ETV Pilot Programme (Accreditation Certificate AK 026).

PARTNER 16

Full Legal name:	Universitat de Valencia	 VNIVERSITAT DE VALÈNCIA
Short name:	UVAL	
PIC number:	999953019	
Type (SME, RTD, etc.):	RTO	
Country:	Spain	

Description

Universitat de Valencia is a five-century old university research-oriented and teaching in all scientific fields (social, economic and legal sciences, experimental sciences, engineering, health sciences, educational sciences and the humanities) and University levels of Education (Bachelor, Masters, PhD Programs, etc). More than 45,800 undergraduate students and 8,600 postgraduate students take classes taught by more than 3,300 professors, lectures and researchers at our campuses (Blasco Ibáñez, Burjassot-Paterna and Tarongers) with the support of over 1,700 administration and service staff. Currently, the University of Valencia, stands out as one of the main public research organisations in Spain. In fact, as per URAP 2014, the UVEG ranks third among all Spanish Universities, first in Valencia region and 193th in the world. Support from an office for European research projects (OPER), an office for technology transference (OTRI), and several central services are available for staff developing European-funded research projects. UVEG has participated and is participating in several European projects under the subsequent RTD European Framework Programmes and other European programmes: Erasmus, Leonardo, Life+, Cost, Third Health Programme, EEA Grants, Daphne III, Creative Europe... acting as several roles: coordinator, contractor, associated contractor, member, host institution... having experience in the development and management of more than 300 European Projects. UVEG also takes part in VLC/Campus, an action that has been distinguished as a Campus of International Excellence, a stamp of quality awarded by the Spanish Ministry for Science and Innovation.

The CALAGUA Research Group has twenty years' experience in studying the whole range of biological, physical and chemical processes involved in WWTPs, such as biological nutrient removal, primary sludge fermentation, anaerobic sludge digestion, phosphorus recovery in the form of struvite, SHARON process for nitrogen removal via nitrite, membrane reactors applied to urban wastewater treatment or nutrient removal by microalgae cultures. The Group's fundamental aim is to apply and transfer results to the industrial sector and provide technical assistance for the design, operation and optimisation of urban and industrial WWTPs. Most of the results already transferred by CALAGUA have been obtained from research projects won either in public tenders or financed by business companies or other organisations. This has made it possible to develop the model currently on the market, as well as an automatic parameter calibration device for ASM type models, urban wastewater membrane analysis,

fuzzy logic-based WWTP aeration control, and a control system for nitrification-denitrification processes. CALAGUA has also developed the DESASS program, a WWTP simulator used by a number of universities and companies involved in the sector.

Role of Partner in the Project:

It will contribute to the project with its technological background, know-how and expertise in the application of anaerobic wastewater treatment processes, together with the application of membranes and the water reuse systems analysis and management. Activities developed by the research group are related to wastewater treatment processes: biological nutrient removal, primary sludge fermentation, anaerobic sludge digestion, and phosphorus recovery. During the last years, the research has been focused on the anaerobic membrane bioreactor technology (SAnMBR) to treat urban wastewater at ambient temperature. This research line also includes effluent post-treatment technologies and maximisation of resources recovery: biological nutrient removal using methane as carbon and energy source, and nutrient recovery by microalgae cultivation (as renewable energy resource). This expertise will be used in REWAISE to coordinate the it scientifically and technically in WP1 and to lead several tasks in WP2, such as those related to the design and development of AnMBR for sewer mining and the biomethane recovery design and the implementation stage in Vigo Living Lab (WP6). In addition, due to its expertise, it will lead the IPR and Exploitation Management in WP8 and the analysis of legal, social and technical barriers to overcome for wide application in WP8 due to Innovation Deal knowhow. In addition, the Development and Technology Transfer Office of the University of Valencia will play a relevant role because it is a member of the Intellectual Property Advisory Work Group.

Key personnel

██████████ (female) is a full professor at the Chemical Engineering Department of Universitat de Valencia. She has over 30 years of experience in research activities with emphasis on nutrient removal and recovery from wastewater, anaerobic sludge digestion, monitoring of priority pollutants in WWTP effluents and coastal waters and more recently nutrient and energy recovery from urban wastewater by using an AnMBR and microalgae cultivation. She is a founding member and coordinator of CALAGUA research group. She has collaborated in 23 competitive research projects and more than 75 research contracts for technology transfer with companies related to wastewater treatment. She has participated in 110 papers published in different peer-reviewed international journals and has supervised 26 Ph.D. students. Based on all these researches, two patents have been published. She is leader of the Action Group "Anaerobic MBR for WATER Resource Recovery in CIRCULAR Economy: WATER CIRCLE" under the EIP on Water and she is also leading one of the only two Innovation Deals for a Circular Economy selected by EU, entitled "Sustainable wastewater treatment using innovative anaerobic membrane bioreactors technology (AnMBR)".

██████████ (female) is a full professor of Analytic Chemistry at Universitat de Valencia since 2002. She has supervised more than thirty research projects sponsored by public or private organizations related to: several industrial processes and environmental studies as regards pollutants, clinic studies in drug design and tumor markers (more than 230 published papers and 20 supervised Ph D). She has also experience on university management, she was the Vice-rector of research and scientific policy of the University of Valencia since April 2014 to 2018. She founded in 1986 the miniaturization and total analysis methods (MINTOTA) research group. MINTOTA works in collaboration with other research groups and sectors, it has expertise in knowledge-innovation process (five patents). MINTOTA combines knowledge from chemical reactions, (nano)materials, transduction, calibration, accuracy, quality, metrology, multi-residue analysis, solid phase (micro)extraction, chromatography, and in-situ analysis in several fields. In reference to European financial support she coordinates the project "Responsible reduction of nitrates in the comprehensive water cycle: LIBERNITRATE" (LIFE 16 ENV/ES/000419) at the University of Valencia. She is also the PI of the project "Nanomaterials with

organic content and bio: characterization, separation and quantification" (IDIFEDER/2018/049 (EU-Generalitat Valenciana))

[REDACTED] (male) is an Associate Professor at the Chemical Engineering Department of Universitat de València. After completing his Chemical Engineering degree at the University of Valencia (1999) he carried out his Ph.D. on Hydraulic and Environmental Engineering at the Polytechnic University of Valencia (2003). From that moment he has been working in several research activities dealing with wastewater and biokinetic characterization for optimization of energy consumption in WWTPs; anaerobic sludge digestion, nutrient removal and recovery from wastewater; monitoring of priority pollutants in WWTP effluents and coastal waters; and anaerobic MBRs for urban wastewater treatment. All this research experience has been developed within the CALAGUA research group. The development of the scientific activities listed above has resulted in several scientific publications in indexed journals (23), in national and international conferences (42) and in the participation in numerous projects and research contracts with both public agencies and private companies (64). He has also supervised 4 Ph.D. students.

[REDACTED] (male) is an Assistant Professor at the Chemical Engineering Department of Universitat de València. After completing his M.Sc. in Chemical Engineering at the Universitat de València (2008) and his M.Sc. in Environmental Engineering at the Universitat Politècnica de València (2010), he carried out his Ph.D. on Engineering of Water and Environment at the Universitat Politècnica de València (2013). From that moment he has been working in CALAGUA research group on several research activities within the wastewater treatment field, dealing with nutrient removal and recovery, anaerobic MBRs, membrane filtration, microalgae cultivation, life cycle assessment, modelling, and control. The development of the scientific activities listed above has resulted in 32 scientific publications in indexed journals (h-index of 14), above 70 contributions to national and international conferences, and 7 intellectual properties. He has participated in 20 projects and research contracts with both public agencies and private companies. He has supervised 1 Ph.D. student and is supervisor of other 2 ongoing Ph.D. thesis.

[REDACTED] (female) is an Assistant Professor at the Chemical Engineering Department of Universitat de València. María holds a Ph.D. in Chemical Engineering and she has been teaching since 2007 in different degrees (Chemical Engineering, Environmental Engineering, and Environmental Sciences). She has over 13 years of experience in research activities dealing with nutrient removal and recovery from wastewater, aerobic and anaerobic MBRs for wastewater treatments and more recently on nutrient and energy recovery from urban wastewater by using AnMBR and microalgae cultivation. The main research activities focus on process modelling and simulation and control systems development and implementation. The development of the scientific activities listed above has resulted in several scientific publications in indexed journals (41) with an h index of 17, in national and international conferences (67), and intellectual properties (5). She has participated in many R&D projects, transfer agreements with several companies to implement control systems in many wastewater treatment plants (WWTPs) and consultancy projects about design, operating and optimization of WWTPs. All this research experience has been performed within the CALAGUA research group. She has supervised 2 Ph.D. students.

[REDACTED] (male) is Associate Professor at the Chemical Engineering Department of Universitat de València. After completing his Chemical Engineering degree at the University of Valencia (2002) he carried out his Ph.D. on Hydraulic and Environmental Engineering at the Polytechnic University of Valencia (2008). From that moment he has been working in numerous research activities dealing with wastewater and biokinetic characterization for optimization of energy consumption in WWTPs; nutrient removal and recovery from wastewater; microbiology of EBPR systems and other wastewater treatment systems; and anaerobic MBRs for urban wastewater treatment. All this research experience has been developed within the CALAGUA research group. The development of the scientific activities listed above has resulted in several scientific publications in indexed journals (21), in national and international conferences (52) and in the participation in numerous projects and research contracts with both public agencies and private companies (61). He has supervised 2 Ph.D. students.

██████████ (female) is an Associate Professor at the Chemical Engineering Department of Universitat de València. After completing her Chemical Engineering degree at the University of Valencia (2002) she carried out her Ph.D. at the Chemical Engineering Department at the University of Valencia (2007). From that moment she has been working in several research activities dealing with wastewater and biokinetic characterization for optimization of energy consumption in WWTPs; anaerobic sludge digestion, nutrient removal and recovery from wastewater; monitoring of priority pollutants in WWTP effluents and coastal waters; and anaerobic MBRs for urban wastewater treatment. All this research experience has been developed within the CALAGUA research group. The development of the scientific activities listed above has resulted in several scientific publications in indexed journals (12), in national and international conferences (30) and in the participation in numerous projects and research contracts with both public agencies and private companies (45). She has also supervised 1 Ph.D. student.

Relevant publications and achievements to the call

- **Seco A, Aparicio S, González-Camejo J, Jiménez-Benítez A, Mateo O, Mora JF, Noriega-Ilevia G, Sanchis-Perucho P, Serna-García R, Zamorano-López N, Giménez JB, Ruiz-Martínez A, Aguado D, Barat R, Borrás L, Bouzas A, Martí N, Pachés M, Ribes J, Robles A, Ruano MV, Serralta J and Ferrer J. (2018) Resource recovery from sulphate-rich sewage through an innovative anaerobic-based water resource recovery facility (WRRF). *Water Science and Technology* 78 (9), 1925-1936.**
- **Robles Martínez, A; Capson-Tojo G; Ruano García, MV; Seco Torrecillas, A; Ferrer, J. (2018) Real-time optimization of the key filtration parameters in an AnMBR: Urban wastewater mono-digestion vs. co-digestion with domestic food waste. *Waste Management* (8) 299-309.**
- **Seco A, Mateo O, Zamorano-López N, Sanchis-Perucho P, Serralta J, Martí N, Borrás L, Ferrer J. (2018) Exploring the limits of anaerobic biodegradability of urban wastewater by AnMBR technology. *Environmental Science-Water Research & Technology* 4,1877-1887.**

Several patents have been developed in the group, amongst which related to this project are (described below): a Crystallization Reactor, a nitrification-denitrification processes control system and a wastewater treatment system based on SAnMBR technology. Also in collaboration with the UPV research group, a plant wide simulator software (DESASS) has been developed and implemented.

- **Utility model ES1156783U "Crystallization Reactor"** for phosphorus recovery in the form of struvite through crystallization in WWTP from the sludge line supernatant (owned 33.3% by DAM, 33.3% by Claude Bernard University (Lyon), 16.7% University of Valencia (UV) and 16.7% Polytechnical University of Valencia (UPV)).
- **Software LODIF Biocontrol** versions 1.0, 2.0 and 3.0. The software includes, amongst other, different control Systems for WWTP operation optimization (owned 50% by UV and 50% by UPV). The control system are as follows: Supervisory control for maximizing phosphorus concentration in the supernatant from the thickener prior to crystallization; Minimization of Energy consumption in nutrient removal systems; Sludge level control in settlers and thickeners; Supervisory control system for pH regulation in crystallization reactors; Aeration control system in in wastewater treatment oxidation processes; Supervisory control system to minimize operational costs in all mentioned control systems.
- **Patent ES-2315178-B2: "Wastewater treatment method and the corresponding needed installations"**, which describes the application of membrane bioreactors for urban and industrial wastewater treatment as well as the design of the wastewater treatment plant.

Relevant previous projects or activities

- **LIFE MEMORY-LIFE13 ENV/ES/001353:** Membrane for Energy and Water Recovery.
- **LIFE PHORWATER- LIFE12 ENV/ES/000441:** Integral management model for phosphorus recovery and reuse from urban wastewater.
- **MAB2.0 (The Climate-KIC Initiative):** Integrating algae production into wastewater treatment.
- **BIONUTEN- CTM2014-54980-C2-I-R:** Combination of anaerobic processes, microalgal cultivation and membrane technology for obtaining bionutrients and energy from urban wastewater.
- **MEM4REC- CTM2017-86751-C2-I-R:** Application of Membrane technology for the transformation of WWTP into WRRF.

Relevant infrastructures and networks

The research group has a fully equipped laboratory for analysis and monitoring of major pollutants (conventional and emerging) present in the WWTP, the most relevant are:

- Asymmetrical Field Flow Fractionation (AF4) coupled on-line to detectors: UV-Vis molecular absorption, molecular fluorescence and dynamic light scattering (DLS, this detector can also operate in off-line mode)
- Ultrahigh performance liquid chromatography (UHPLC) coupled to mass spectrometry (MS) with both, API-ESI ionization and direct analysis ionization (DART), and QTOF as analyser.

On the other hand, it also owns and operates a series of pilot plants, of which the following is relevant:

- The AnMBR plant consists of an anaerobic reactor with a total volume of 1300 L (900 L working volume) connected to two membrane tanks (MT) each one with a total volume of 800 L. Each MT is equipped with one industrial-scale hollow-fiber ultrafiltration membrane unit (PURON® KMS PUR-PSH31, 0.03- μm pores, 31- m^2 filtration area).

PARTNER 17

Full Legal name:	Ostrava Tech. University	
Short name:	TUOS	
PIC number:	999868144	
Type (SME, RTD, etc.):	RTO	
Country:	Czech Republic	

Description
VSB – Technical University of Ostrava, Institute of clean technologies for mining and utilization of raw materials for energy use (TUOS) is state university that is very well established in education, research and development field in the Czech republic. University and institute TUOS are historically connected with research in specific area of raw materials characterisation, water and wastewater treatment. TUOS is unique in Czech Republic researching problems in the area of extraction and utilization of energy resources and further exploitation of the geological environment. The research priorities and objectives of TUOS are: • Research on methods of obtaining raw materials with minimal environmental impact • Research on extraction and utilization of energy resources and further exploitation of the geological environment • Sustainable development and maximum self-sufficiency in raw materials TUOS deals with relevant research outputs: • 1 Protected R&D results (according to R&D Council methodology) • 177 Scientific publications (according to R&D Council methodology) • 71 Applied research results (according to R&D Council methodology)
Role of Partner in the Project:
On the basis of the expertise of TUOS - R&D in extraction and utilization of resources as energy, water, secondary materials for further use and in the application of new methods for extraction of specific compounds from secondary products, mine waters, utilization of membrane methods, the entity will participate in the implementation of Moravia-Silesia Living Lab in WP4.
Key personnel
[REDACTED] (male), Head of Department and Head of Work Group in TUOS. Academic staff member of University of Ostrava (Faculty of mining and geology). Prof. Ing. Vladimír Slivka deals important experience and knowledge in R&D of extraction and utilization of resources (energy, water, secondary materials) for further use and also in the application of new methods for extraction of specific compounds from secondary products, mine waters, utilization of membrane methods.
Relevant publications and achievements to the call
• Slivka, V., Vidlář, J., Thomas, J., "Mine waters in the Czech Republic - Current situation and trend development", 2010, "Desalination and Water Treatment "

- Dvořáček, J., Slivka, V., "Interventions of state in favour of mining industry in EU countries", 2008, "Minerals and Energy - Raw Materials Report" Patent No. 306365 Special aggregates for separation of heavy metals from water, Heviánková, S.; Thomas, J.; Kyncl, M., Praha, 2016. (P)
Relevant previous projects or activities
FR-TII/453 Research and development of modern membrane technologies for demineralization of mining waters (2009-2011) QJ1620148 – Research of infiltration for water sources in draw period (2016-2018, MZe/QJ, prof.Dr.Ing. Miroslav Kyncl).
Relevant infrastructures and networks
Technical University of Ostrava can access the following facilities and equipment relevant for the project: - Sector system of spectrometer for characterization of the isotope ratios $^{13}\text{C}/^{12}\text{C}$, $^{15}\text{N}/^{14}\text{N}$, $^{18}\text{O}/^{16}\text{O}$, $^{34}\text{S}/^{32}\text{S}$. - Membrane technologies – ED dialysis, MF - Online – PVM and FBRM methods - SEM microscopy - XRF, XRD spectrometry - AAS, ICP-MS - Water Analytical Equipment

PARTNER 18

Full Legal name:	University of Zagreb Faculty of Electrical Engineering and Computing	 
Short name:	UNIZ	
PIC number:	999876486	
Type (SME, RTD, etc.):	RTO	
Country:	Croatia	

Description
University of Zagreb Faculty of Electrical Engineering and Computing (UNIZ) is the largest technical faculty and leading educational and R&D institution in the fields of electrical engineering, information and communication technology and computing in the Republic of Croatia. UNIZ is a constituent of the University of Zagreb -- the oldest and biggest university in South-Eastern Europe founded in 1669. Ever since its foundation, the University has been continually growing and developing and now consist of 29 faculties, three art academies and the Centre for Croatian Studies. With its comprehensive programmes and over 60,000 full-time undergraduate and postgraduate students the University is the strongest teaching institution in Croatia. It offers a wide range of academic degree courses leading to Bachelor's, Master's and Doctoral degrees in the following fields: Arts, Biomedicine, Biotechnology, Engineering, Humanities, Natural and Social Sciences. It is also a strongly research-oriented institution,

contributing with over 50 percent to the total research output of the country. UNIZ has its roots in the Technical Faculty, founded in 1919. In 1956, the departments of Technical Faculty grew into four new faculties, Faculty of Electrical Engineering being one of them, and finally in 1994 it got its today's name. The Faculty offers today substantial educational and R&D facilities including 35 lecture halls, more than 60 laboratories, Congress centre, tele-conference centre, central library and 12 department libraries, student restaurant, sport and recreation facilities on 43,308 m². The Faculty is organised in 12 departments that represent the focal points of education, research and development in various fields. The present research and educational staff comprises 180 professors and 210 teaching and research assistants and around 3800 students at the undergraduate and graduate level and 450 Ph.D. students. The Faculty has developed valuable international cooperation with many research institutions around the world, either directly or through inter-university cooperation. Currently UNIZ participates in more than 70 projects financed by EU through various grant schemes (30 H2020, 29 ERDF, 6 Interreg, 10 ESF etc.) where on about 20% of them it acts as coordinator. The number of international projects makes UNIZ one of the most internationally active institutions in Croatia. Laboratory for Renewable Energy Systems (LARES, <https://www.lares.fer.hr/>) is the research laboratory of UNIZ to be involved in execution of REWAISE. LARES has been involved with the state-of-the art R&D in the domain of energy and resources management in complex systems (buildings, microgrids, electricity and water distribution grids, rail transport), that resides on optimal control and estimation techniques for linear and hybrid systems, since early 2000s. The group members have participated in numerous international projects (e.g., H2020 project ACROSS; FP7 projects: DYMASOS, UrbanWater, ACROSS, AEOLUS; Interreg projects: 3Smart, Store4HUC) and national projects (e.g., PC-ATF Buildings, 3CON, ENHEMS-Buildings, CEEStructHealth, Will4Wind) where both theoretical and practical aspects of control of complex systems have been investigated. LARES has recently through the 3Smart project established 5 pilots on smart buildings in 5 different countries of the Danube region. It operates the entire skyscraper building of UNIZ (10.000 m², 250 offices) as a smart building by using own-developed software modules for optimal control and interaction with smart grids. Through these endeavours UNIZ and LARES have gained a significant experience with organization of optimal control based management software on top of databases for information exchange through which the software modules function as a non-invasive add-on to the existing system for performing the optimization. The optimizations are two-fold – one group based for optimal operation planning, and another for real-time operation. The same principle is planned to be applied in REWAISE for water cycle entities optimization and their economics-based coordination.

Role of Partner in the Project:

UNIZ will be involved in WP3 where it will focus on the information flow organization of the platform for economics-based coordination of entities in the water cycle, and then further on: (i) development of software modules for identification methods to obtain grey-box models of water cycle entities suitable for optimal control, (ii) optimal control formulation in a practical and tractable form for its solving via convex programming solvers, and its coding in respective software modules, (iii) extension of software modules for optimal control for computation of supply and demand functions with respect to interaction variables between water cycle entities, and (iv) creation of convex-programming based software modules for fast matching of supply and demand functions of different entities and through that economics-based re-shaping of predicted interaction profiles between water cycle entities. In WP4, WP5 and WP6 it will apply the concepts from WP3 on pilot sites in Mediterranean, Atlantic and Continental hub, regarding identification of suitable models of pilot-involved water cycle entities for optimal control, design of optimal control for selected water cycle entities, and its extension to compute supply and demand functions of interacting variables between water cycle entities. Finally, it

will be involved in implementation of central platform instance for water cycle entities coordination based on computed supply and demand functions.
In the dissemination WP, as a representative of the academy sector with a significant research publications record, UNIZ will contribute to dissemination of project results.
In addition, the Development and Technology Transfer Office of the University of Zagreb will play a relevant role because it is a member of the Intellectual Property Advisory Work Group.

Key personnel

██████████ (male,) is a Full Professor at the Department of Control and Computer Engineering of UNIZ and heads its Laboratory for Renewable Energy Systems (LARES). He graduated on UNIZ at 2003, and defended his Ph.D. in 2007. His research interests are in domain of predictive control of dynamical systems with applications to systems from the low-carbon energy sector: wind turbines, energy-efficient buildings, microgrids, water distribution systems and electrified railway transportation. He is the main inventor of the US patent for fault-tolerant control of wind turbines subject to generator faults. He has created the concept of hierarchical and modular energy management in buildings with integrated microgrids for enabling their economically optimal interaction. He led or cooperated on several research projects funded through EU funds or national resources related to implementation of this concept and its verification from the level of control of consumption in different buildings to the level of coordination of electricity and water distribution systems in the framework of a smart city (ERDF ENHEMS-Buildings, CSF 3CON, FP7 UrbanWater, FP7 DYMASOS, ERDF FER-KIET). He is the coordinator of project 3Smart (Smart Building – Smart Grid – Smart City) financed from ERDF through the Interreg Danube Transnational Programme. Also currently on UNIZ he leads projects PC-ATE Buildings and Store4HUC related to energy management in buildings and public infrastructure. He authored 20 papers in international scientific journals and overall more than 100 international conferences papers, with overall more than 300 citations excluding self-citation in Web of Science. He was president of the Control systems chapter of the IEEE Croatia section in two mandates, from 2014 to 2017.

██████████ (male) is a Researcher at the Department of Control and Computer Engineering of UNIZ and the member of LARES. In 2009 he enrolled in the Engineering and Information Technology study programme at UNIZ GFER. He finished his bachelor degree in Electrical Power Engineering in 2012. In 2014 he obtained his master degree with great honors in Electrical Power Engineering. In 2019 he obtained his Ph.D. degree with highest honors with the thesis title „Coordinated multi-level model predictive control of energy in electric railway traction systems“. From November 2014 he was employed as a research assistant on an international research project UrbanWater -- Intelligent Urban Water Management System funded by the European Commission through the FP7 programme, where he worked on the integration of water demand prediction system based on dynamic neural networks, household water consumption identification based on classification techniques and on day-ahead adaptive water pricing. In parallel, he was employed on a Croatian Science Foundation project 3CON - - Control-based Hierarchical Consolidation of Large Consumers for Integration in Smart Grids where he started his work on optimal energy management of the electric railway traction system and set the basis for his doctoral thesis. From May 2017 he is contributing to the 3Smart (Smart Building -- Smart Grid - - Smart City) project, financed from ERDF through the Interreg Danube Transnational Programme and from March 2019 he joined PC-ATE Buildings (Development of a System for Predictive Control and Autonomous Trading of Energy in Buildings) project, also ERDF financed. Projects 3Smart and PC-ATE Buildings are focused on development and commercialization of the hierarchical and modular energy management system in buildings with integrated microgrids aimed towards enabling their economically optimal interaction. His research interests are in the area of hierarchical predictive control of dynamic systems for integration in smart cities and smart grids. He is an active alumni member of student association SUPEUS (Student Association for Promoting Energy Efficiency and Consulting). During his master studies he was awarded with the "Hrvoje Požar" scholarship.

██████████ (female) is a Researcher at the Department of Control and Computer Engineering at UNIZ. She graduated from UNIZ in 2013 in the area of automatic control. The same year she starts to

work at UNIZ as a research assistant at the Department of Control and Computer Engineering and starts her PhD studies. From April 2013 she was employed on a research project Enhancement of Research, Development and Technology Transfer Capacities in Energy Management Systems for Buildings (ENHEMS-Buildings) as one of the lead researchers. Within this project research and development infrastructure for comprehensive and energy-efficient control of comfort in buildings was established on UNIZ through the implementation of energy efficient optimal control on two floors of UNIZ skyscraper. Her work was oriented on the development of advanced estimation and control algorithms for optimal comfort control in buildings. Currently, she is working on international project Smart Building -- Smart Grid -- Smart City (3Smart) which follows the main idea of ENHEMS-Buildings by integrating the building comfort control into a general system for building energy management. The operation of the developed building energy management system, able to coordinate all the building subsystems including thermal energy production, microgrid, distribution grid or any other consumer, is currently being tested on 5 pilot buildings in Danube region. In parallel, she is a part of UNIZ team working on the project Development of a System for Predictive Control and Autonomous Trading of Energy in Buildings (PC-ATE Buildings) focused on production and commercialization of services for predictive control of energy in buildings connected to energy grids and subject to dynamic energy market conditions. She has more than 5 years of R&D experience in software design for building energy management via advanced control which resulted in one journal article and more than 10 research articles on international scientific conferences.

██████████ (male) is an Assistant Professor at the Department of Control and Computer Engineering and a member of LARES. He received B.Sc., M.Sc. and Ph.D. degrees from UNIZ in 2008, 2010 and 2014, respectively. He has co-authored more than 30 journal and conference papers and holds a patent. He is an active volunteer of IEEE Region 8. His focus is on control theory and its application to renewable energy systems and smart city technologies and more particularly, in model predictive control for buildings and transport energy efficiency and microgrid operation.

██████████ (male) is a Full Professor at the Department of Control and Computer Engineering of UNIZ and a member of LARES. He received B.Sc. and M.Sc. degrees in electrical engineering from UNIZ in 1997 and 2000, respectively. He received the Ph.D. degree in electrical engineering from ETH Zurich, Switzerland, in 2005. From June 1997 he is working at the Department of Control and Computer Engineering at UNIZ GFER. In October 2016 he was promoted to Full Professor and currently holds 6 different teaching courses, from undergraduate to post-graduate programmes, and is a mentor of several graduate and PhD students. His professional and scientific interests, rich and pronounced international collaborations, and research exchanges, especially the ones with ETH Zurich, make Prof. Baotić internationally recognized expert in optimal control, mathematical programming, intelligent control systems and renewable energy. Prof. Baotić has published 23 scientific papers in international journals (14 of which in highly renowned CC journals and 5 in SCI journals) and 48 international conference papers. The value and influence of his work and research in worldwide scope can be best observed from citations of his papers: in March 2019 he had 819 citations according to the SCI base (with h-index 14), and 1428 citations according to the SCOPUS base (with h-index 19). Prof. Baotić is a member of IEEE - The Institute of Electrical and Electronics Engineers and KoREMA - Croatian Society for Communication, Computing, Electronics, Measurement and Control. Currently he is the leader of the workpackage related to control and estimation of cyberphysical systems within the project DATACROSS – Centre of excellence in data science and cooperative systems. He also participates as a collaborator and senior researcher on the project PC-ATE Buildings – Development of a system for predictive control and autonomous trading of energy in buildings, funded from European Union Regional Development Fund.

██████████ (male) is a Full Professor at the Department of Control and Computer Engineering of UNIZ and a member of LARES. He received B.Sc., M.Sc. and Ph.D. degrees in electrical engineering from UNIZ in 1973, 1980 and 1989, respectively. He is the founder of LARES. He has been professionally working for the last thirty-five years as a researcher in the area of automatic control and automation of complex processes and systems. His scientific and professional work can be grouped into two distinct phases. During the first phase he was working at the Končar's Institute of Electrical Engineering (1973-1993) with emphasis on development of the automation systems for complex

processes. The second phase of his work is connected to the employment at UNIZ (from 1993 onwards), where he has initiated a broad research activity in advanced control of complex and large-scale technical systems. His research results are published in scientific journals (more than 40 papers), proceedings of international conferences (more than 200 papers), and in numerous research studies/reports (more than 60 reports). Prof. Perić served as the president of Croatian Society for Communication, Computing, Electronics, Measurement and Control (KoREMA). He is also a member of many international professional associations and a full member of Croatian Academy of Engineering. Distinguished national contribution and extensive international collaboration made Prof. Perić highly renowned and worldwide recognized scientist and professional with deep knowledge of energy system and process industry, and with a vision of future trends in engineering.

Relevant publications and achievements to the call

- **Martinčević, Anita; Vašak, Mario; Lešić, Vinko.** Identification of a control-oriented energy model for a system of fan coil units. // *Control Engineering Practice*. 91 (2019); 104100. IF=3.232, Q2 (JCR 2018) in Automation & Control Systems.
- **Vašak, Mario; Novak, Hrvoje.** Optimal control for daily operation planning of a water distribution system with pumped storage. Proc. of the 5th International Conference on Power Generation Systems and Renewable Energy Technologies (PGSRET) 26-27 August 2019, Istanbul, Turkey.
- **Novak, Hrvoje; Lešić, Vinko; Vašak, Mario.** Hierarchical Model Predictive Control for Coordinated Electric Railway Traction System Energy Management. // *IEEE Transactions on Intelligent Transportation Systems*. 20 (2019) , 7; 2715-2727. IF=4.051, Q1 (JCR 2017) in Engineering, Electrical and Electronic.
- **Lešić, Vinko; Martinčević, Anita; Vašak, Mario.** Modular energy cost optimization for buildings with integrated microgrid. *Applied Energy*. 197 (2017); 14-28. IF=7.900, Q1 (JCR 2017) in Energy & Fuels.
- Banjac, Goran; Vašak, Mario; Baotić, Mato. Adaptable urban water demand prediction system. // *Water Science and Technology-Water Supply*. 15 (2015), 5; 958-964. IF=0.532, Q4 (JCR 2015) in Engineering, environmental.

Most relevant results:

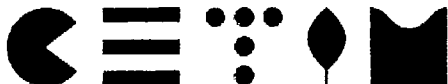
- Developed control method of hierarchical coordination of complex systems including provision of demand response service, implemented via a modular software platform, with defined database structure for easy add-on to the existing automation systems, proven in application to buildings (through 5 pilots in 5 countries), railway and water distribution system (via case studies), with significant savings achieved.

Relevant previous projects or activities

- **Store4HUC:** Integration and smart management of energy storages at historical urban sites, Interreg Central Europe Transnational Programme, project no. CE1344, 04/2019-03/2022, <https://www.interreg-central.eu/Store4HUC>, role: WP leader, leader on partner institution
- **PC-ATE Buildings:** Development of a system for predictive control and autonomous trading of energy in buildings, European fund for regional development, project no. KK.01.2.1.01.0069, 03/2018-03/2022, role: leader on partner institution
- **3Smart:** Smart Building – Smart Grid – Smart City, Interreg Danube Transnational Programme, project no. DTP1-502-3.2, 01/2017-12/2019, <http://www.interreg-danube.eu/3smart>, role: project coordinator
- **ENHEMS-Buildings:** Enhancement of R&D&TT Capacities in Energy Management Systems for Buildings, IPA III.c Science and Innovation Investment Fund, project no. IPA2007/HR/16IPO/001-040510, 04/2013-07/2015, <https://www.enhems-buildings.fer.hr/en/enhems-buildings>, role: project coordinator

- **3CON:** Control-based Hierarchical Consolidation of Large Consumers for Integration in Smart Grids, Croatian Science Foundation (CSF) Installation grant, project no. 6731, 12/2014-11/2017, <http://www.fgt.hr/3con>, role: project coordinator
- **DYMASOS:** Dynamic Management of Physically Coupled Systems of Systems, EU FP7 ICT STREP, Project No.: 611281; 10/2013-09/2016, <http://www.dymasos.eu/>, role: senior researcher
- **UrbanWater:** Intelligent Urban Water Management System, EU FP7 ICT STREP, Project No. 318602 12/2012-11/2015, <http://urbanwater-ict.eu/>, role: leader on partner institution.

PARTNER 19

Full Legal name:	Fundación Centro Tecnológico de Investigación Multisectorial	 Technological Centre
Short name:	CETIM	
PIC number:	929547315	
Type (SME, RTD, etc.):	RTO	
Country:	Spain	

Description

CETIM is a private non-profit Technology Centre located in A Coruña, Spain, which mission is to promote research, technological development and innovation in different economic sectors and economic activities. The Centre is focused on industrial support through applied collaborative R&D focused in the areas of Eco Bio Technologies, Advanced Materials and Digital Industry. The Centre is recognized by the Spanish Government as Technological Centre, in addition to its acknowledgement as Foundation of Galician Interest for Regional Government.

The main area involved in this project – **Eco Bio Technologies** – holds experience in R&D of resources recovery in the field of bio-technology and process engineering by developed of biorefinery and circular economy models throughout waste and sub-products valorisation in order to obtain added value compounds, biopolymers, bio-fertilizers, fertilizers, energy, etc.. It also has a great deal of experience in water and wastewater treatments, wastewater resource recovery and reuse (AOPs such as Photocatalysis, Electrochemical and Membrane Technologies as Forward and Reverse Osmosis, Recirculating Aquaculture Systems (RAS) and UV-LEDs Disinfection Systems), **Life Cycle Analysis (LCA) and economic impact assessments (LCC) of products and whole process (cradle to gate).**

Furthermore, the Centre has wide experience in R&D projects and are supported by CETIM's **European Project Office**, which has experience in the coordination, management and financial administration of proposals as well as in the communication and dissemination activities by allocating resources and involving professionals over the entire projects.

Role of Partner in the Project:

CETIM will lead WP7 and be in charge of KPI, environmental performance (namely LCA, GHG and C footprint), Biopolymers, apart from collaborating with AQUALIA in LCC/economic assessment.

CETIM has a wide experience in carrying out different types of analysis of products and processes in different industrial sectors. Depending on the specific needs, these analyses may have different purposes, such as determining the environmental impact of new products/processes, establishing comparisons with existing processes/products, or obtaining reliable information for the development of emission reduction strategies, process optimisation, brand image improvement, eco-design, circular economy and, in short, decision making in aspects related to the environment, risks or economic performance. CETIM has the latest version of the SimaPro software (v9) and the Ecoinvent v3.5 database for modelling processes and carrying out different types of environmental analysis (water footprint, carbon footprint, Life Cycle Analysis, etc.). The main area involved in this project – Eco Bio Technologies – holds experience in R&D of PHA production from food industry effluents and subproducts, as well as PHA-based bioplastic production from different types of wastewaters. In addition, CETIM has also previous experience on KPI assessment and techno-economical assessment of innovative technologies in the water sector in diverse projects (including LIFE projects, e.g. LIFE GREEN SEWER).

For what concerns the field of this project, CETIM based on its highly qualified, dynamic and multidisciplinary research team with a wide knowledge in Eco and Bio Technologies, focused in the extraction of value products such as biopolymers, critical raw materials, fertilizers, ... and water and wastewater treatments. Furthermore, the R&D Team has a strong background in the development of Life Cycle Assessments of processes & products (bioprocess, bio-based products, ...) and also in coordinating national and European R&D projects.

In addition, its technical specialized laboratories, supplied with specific equipment, will make CETIM contributes to REWAISE through the following activities:

- **Research and development of Biopolymer recovery from wastewater – poli-hidroxi-alkanoates (PHA) from WW organic matter (WP2):** Optimisation of microbial consortium and parameters for biopolymer production and pilot plant design and construction.
- **Research and development of Electrochemical Lithium recovery from brines: lab-scale research, optimisation, prototype design, construction and testing (WP2)**
- **Electrochemical Lithium recovery from brines: Validation of prototype (WP5)**
- **Biopolymers recovery from wastewater – validation and operation of biopolymer plant at Salamanca Living Lab and at Cantabrian Living Lab (WP5 and WP6)**
- **KPI monitoring, development of an interactive Life Cycle Assessment from the development of the different technologies to its implementation in the Hubs, evaluation of the risks and vulnerability of water systems, regulatory risks and reputational risks, LCC and economic performance (WP7).**

Collaboration in the development of **new business models** and alternative funding for market uptake and **dissemination (WP8) and IPR, communication and project management (WP1)**

Key personnel

██████████ (female). Head of the R&D Eco Bio Technologies Department in CETIM, Cristina Martínez holds a Master Degree in Environmental Science and Technology and a Ph.D. in Aqueous Photodegradation of Persistent Organic Compounds of Pharmaceutical Origin. Both degrees obtained at the University of A Coruña (Spain). Cristina has been involved in the development of several national and international R&D projects related to her research activities. Since 2013 she is developing her career in CETIM in charge of the R&D Eco Bio Technologies Area. Degree in Chemistry, she has acquired experience in new technologies in the area of circular economy: resources recovery, CRMs through biotechnologies, waste recovery, by-products of animal and vegetable origin for the production of biostable compounds (biopolymers, biocides natural, etc.), fertilizers, functional ingredients, valorization of inorganic waste to obtain high value commercial compounds, etc. Furthermore, Cristina has expertise in the development of Life Cycle Analysis of several products and processes (water treatment, bio-based products, DWORs; ...)

██████████ (male). Senior Researcher of the R&D Eco Bio Technologies Department in CETIM, Julio Fierro has a Ph.D. in Environmental Science and Technology and Process

and an MSc in Renewable Energies, both from the University of León (Spain). Degree in Agronomic Engineering, he has significant experience in the field of organic waste valorisation through his research activity in biological production of biogas, H₂, bio-fertilizers, and gas stream treatment by biofilters. He worked as Research Assistant at the Natural Resources Institute of the University of León (Spain) and since 2014 he develops his research and scientific career in CETIM, leading the Waste Valorisation research line, biopolymers production and LCA Services in CETIM (Life Cycle Assessment of several water treatment technologies bio-based products, DWORs; fertilizers, ...). He has participated in numerous national and international R&D projects dealing with organic waste valorisation, biopolymers extraction and related environmental issues and also he counts con knowledge and relevant experience in the development of LCA of products and processes. He has published several papers on these themes.

(male). Chemical Engineer and Ph.D. in Chemical and Environmental Engineering by the University of Santiago de Compostela, with an Extraordinary Doctorate Award. Senior Researcher of the R&D Eco Bio Technologies Department in CETIM, his research career has been focused on water treatments and he has worked in prestigious groups at University of Santiago de Compostela (Spain), Universidade do Porto (Portugal), Royal Institute of Technology (Stockholm, Sweden), Autonomous University of Barcelona and University of Barcelona (Spain). With more than 10 years of experience as a researcher, he has participated in several R&D projects. This research activity has resulted in a score of publications, of which 16 are articles in international top-level journals, and many other participations in congresses. Therefore, Isaac has experience in the development of bioprocess and in the field of process engineering.

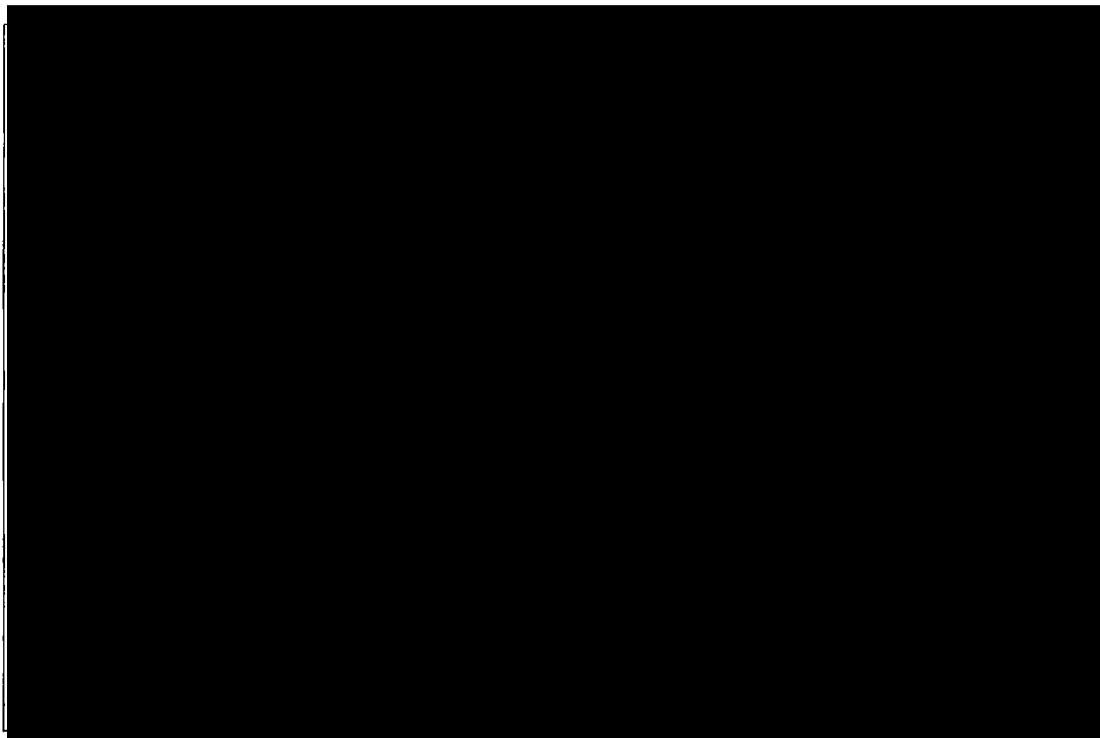
(female). Manager of the European Project Office in CETIM, Lucía Vázquez holds a Master Degree in Environmental Science and Technology and a Degree in Chemistry, both from the University of A Coruña (Spain). During her professional career, Lucía has coordinates several national and international R&D projects. As well Lucía holds experience as cluster manager and in the development of strategic plans for industrial companies. She has extensive experience, over 10 years, in the definition, planning, management and coordination of R&D activities at national and European level.

Relevant publications and achievements to the call

- **Julio Fierro, Cristina Martínez.** Environmental analysis of the best available finishing products to provide water, oil and dirt repellency in the textile sector. A Life Cycle Assessment approach.. Organisation(s): Centro Tecnológico de Investigación Multisectorial (**CETIM**), Spain. **Life Cycle Management Conference 2017**
- **C. Martínez, M. Canle, M.I. Fernández, J.A. Santaballa, J. Faria.** Aqueous Degradation of Diclofenac by Heterogeneous Photocatalysis Using Nanostructured Materials. *Applied Catalysis B: Environmental*, 107 (2011), pp. 110-118.
- **C. Martínez, M. Canle, M.I. Fernández, J.A. Santaballa, J. Faria.** Kinetics and Mechanism of Aqueous Degradation of Carbamazepine by Heterogeneous Photocatalysis Using Nanocrystalline TiO₂, ZnO and Composites of Multi-Walled Carbon Nanotubes-Anatase. *Applied Catalysis B: Environmental*, 102 (2011), pp. 563-571.
- **Fernández I., Dosta J., Mata-Álvarez J.** (2016). A critical review of future trends and perspectives for the implementation of partial nitrification/anammox in the main line of municipal WWTPs. *Desalination and Water Treatment*, 57, 27890-27898.
- **Fernández I., Bravo J.I., Mosquera-Corral A., Pereira A., Campos J.L., Méndez R., Melo L.F.** (2014). Influence of the shear stress and salinity on Anammox biofilms formation: modelling results. *Bioprocess and Biosystems Engineering*, 7(10), 1955–1961.

Relevant previous projects or activities

• Project BIORECOVER - Development of an innovative sustainable strategy for selective biorecover of critical raw materials from Primary and Secondary sources GA No. 821096 H2020 EU Project Among others, CETIM is the project coordination, and develops the R&D of extracellular Mg biosynthesis and the Life Cycle Assessment to quantify the environmental impact of the different approaches of the project, the KPIs and the Economic Impact Assessments. • Project LIFE GREEN SEWER - Innovative Secondary Wastewater Treatment with REsource Recovery LIFE17 ENV/ES/00341 European LIFE Project CETIM contributes through its technical and scientific expertise to develop, implement and monitor the innovative wastewater treatment system based on the Bioprocesses of Anaerobic Membrane Bioreactor (AnMBR) in combination with other technologies, as well as the development of its environmental performance (LCA). Moreover, CETIM coordinates this EU initiative. • Project LIFE DRAIN-RAIN - RunOff Water Purification from Pavements: A Novel Integral System of Pervious Concrete Pavement & Insitu LIFE15 ENV/ES/000394 European LIFE Project Among other activities CETIM develops the KPIs, LCA and LCC of the project and the products (related with water area); • Project BIOPOL - Biopolymers extraction from by-products of the dairy industry and application in sectors of interest Spanish Research National Project Among other activities, CETIM develops the R&D for biopolymers extraction from dairy industry wastes and its application as new sustainable materials such as adsorbents for heavy metals retention and aromatic encapsulates of controlled release and LCA and LCC of the project and the products. • Project BIOVINO - Development of a Cross-Border Strategy for the eco-sustainable valorization of wine residual biomass for Integral Biorefineries for the production of Biofuels and Bioproducts EU INTERREG VA POCTEP Project CETIM develops the R&D for the production of biopolymers from wine industry biomass - obtaining PHB, and LCA & LCC of the project biorefinery model.
Relevant infrastructures and networks CETIM is located in the Technology Park of the University of A Coruña (Spain), being part of the Centre for Advanced Scientific Research Building. Our facilities are distributed in five specialized technical laboratories (Eco Bio Technologies, Microbiology, General Chemistry, Advanced Materials and Construction), supplied with specific scientific-technical equipment to develop its R&D activities. CETIM headquarters also has space reserved for technical office. Specially related to this project, CETIM will make available its laboratories. <u>Infrastructures and significant equipment relevant to the proposal:</u> - Eco Bio Technologies Laboratory: Bioreactors (thermostatization chamber, stirring system, control system for water inlet and outlet, sensors for automatic control of pH, pO₂ and redox potential, ..), anoxic/aerobic bioreactor, Microbial Stack Pilot Plant, Photocatalysis Pilot Plant, Forward Osmosis Pilot Plant, UV-LEDs disinfection system, membrane contactors for resources recovery, Incubator, Kjeldahl N₂ equipment, Ozone Generator, Centrifuge equipment, Thermostat Baths, Magnetic stirrers, Refrigerators, Heaters, ... - Microbiology Laboratory: Optical Microscope, Stereoscope, Centrifuge, Electronic balance, Magnetic stirrer, Natural convection incubator, Autoclave, .. - General Chemistry Laboratory: Multiparameter Equipment, Spectrophotometer UV/VIS, Atomic Absorption Equipment, Laboratory Oven, Rotary Evaporator, Analytical Balances, Water purification equipment, Ultrasonic bath, Magnetic stirrers, ... - Advanced Materials Laboratory: Microextrusion Equipment, Microinjector Equipment, Forced Air Oven, Sieving lines, Electronic Scales, Magnetic stirrers, Hot air Guns, Equipment for processing of thermostable materials, Reactors of stirred tank with pressure and temperature control; Tests under controlled climatic conditions and corrosion parameters, Homogenizers,



PARTNER 20

Full Legal name:	Coventry University	
Short name:	COVU	
PIC number:	999612161	
Type (SME, RTD, etc.):	RTO	
Country:	United Kingdom	

Description

Coventry University (CU) has a long tradition as a provider of education with roots going as far back as Coventry College of Design in 1843. Founded as an industrial university focused on the skilling of the local community to meet the needs of major multinational companies in Coventry and the Midlands, the University now prides itself for its tradition of industry facing research that is developed through close collaboration with companies and meets international excellence standards. The university faculties range from science, technology, engineering, to health, design, business and education. It was the modern university in the United Kingdom in 2014, 2015 and 2016 and is placed in the top 4% worldwide for international activities. The University has also been ranked 15th nationally in the UK in The Guardian's rankings which is a testimony to the standard of teaching and research excellence. Coventry University has made significant investments with the injection of £100m into our new research strategy, 'Excellence with Impact'.

Institute for Future Transport and Cities

In CU, it takes a fresh approach to the challenges facing society by bringing together world-class experts from art and design, human factors, engineering, computer systems and business studies into one focused Institute. Its work covers automotive, aerospace, maritime and rail transport modes and allows us to take the lead in cross cutting research developing new forms of transport, new forms of manufacturing and new forms of information provision and security. CU has a unique position in UK universities – with over 140 research staff and 120 Ph.D. research students in the Institute capitalizing on its links with Coventry City and its status as a European Living Lab for transport and its close collaboration and joint initiatives with major stakeholders such as Unipart, FEV and Horiba MIRA.

Coventry University is working in exciting times with major challenges being presented by the move towards increased automation, the increasing age and urbanization of our population, new materials and manufacturing processes and by the need to move towards sustainable non-polluting transport as quickly as possible. Current hot topics for CU include developing new materials for wearable technology, driverless unmanned and vertical take-off vehicles, mobility as a service, systems security and new business models for the future supply chain.

To address these challenges, the University has taken three major initiatives in 2017. In May, the new National Transport Design Centre that provides state of the art design tools and studios for developing future vehicles and provides a fantastic opportunity to work directly with commercial companies taking concepts through to real products was opened. In June, it was opened a new joint initiative with Horiba MIRA called the Centre for Connected and Autonomous Automotive Research (CCAAR) that puts CU at the forefront of research into the changing nature of highly automated and intelligent vehicles. In March, it was opened the Centre for Applied Low Carbon Propulsion Systems C-ALPS.

These new developments complement the existing research facilities within the Institute (e.g. driving and aircraft simulators, control engineering laboratories, electric motor test beds, fuel cell thermodynamics) and its real-world environments and vehicles.

The Institute also includes multi-award winning Advanced Manufacturing and Engineering Institute (AME), otherwise known as the “Faculty on the Faculty Floor”. Partnered with Industry, and set up in 2013, CU has a proven track record of 100% employment for its industry-ready manufacturing graduates, and commercialization of several new technologies for lightweight and low/zero carbon powertrain applications.

Building on its strong automotive heritage, reputation for enterprise and innovation, and its commitment to the low carbon economy, Coventry University is at the forefront of developments in ‘green’ vehicle technologies.

Hydrogen fuel cell vehicles are being designed and built in Coventry through the university’s cutting-edge spin-out company Microcab, which sits as part of the Institute for Future Transport and Cities.

The company’s fleet of H2EV fuel cell vehicles are powered by a state-of-the-art 3kW fuel cell, which combines hydrogen from the pump with oxygen from the air to create electricity (which drives the car’s electric motors) and water (the car’s only emission) in a reaction known as ‘reverse electrolysis’.

Microcab’s zero emissions vehicles have a top speed of 55 mph and a range of 180 miles on a full tank. But unlike a pure electric vehicle, whose only power source – a battery – can take hours to charge, the H2EV can be refilled with hydrogen in a matter of minutes.

Shortlisted for transport design awards alongside major automotive players like BMW, Microcab complements Coventry University’s wider programme of teaching, research and development within the transport sector. And by plugging into nationwide and continental initiatives promoting the benefits of low carbon transport, Microcab is playing an active role boosting interest in and increased funding for green vehicle technology in the UK.

The Functional Materials Group

The Functional Materials Group sits within the Institute for Future Transport and Cities. The Group has recently relocated to the Alison Gringell building: a £50 million state of the art science, health and sport facility at Coventry University. The Group brings a wealth of expertise and knowledge in the research of electrochemistry, sonochemistry, surface modification, metallization processes, and patterning of materials. The core expertise of the Functional Materials Group is in surface modification and metallization of non-conductive materials, ammonia electrolysis for hydrogen generation, electroplating techniques including pulse and pulse reverse plating, sono-electroplating, composite electroplating, and advanced microscopic techniques including SEM, EDX, EBSD, FIB, TEM, WLS etc. In March 2017, the Functional Materials Research Group worked with Severn Trent Water Ltd, Midland Pig Producers Ltd, WRK Design & Services Ltd and Green Fuels Research Ltd in a highly successful Innovate UK project to develop an innovative process to convert agricultural and human waste to renewable hydrogen via electrochemical oxidation.

Centre for Agroecology, Water and Resilience (CAWR)

The Centre for Agroecology, Water and Resilience (CAWR) is driving innovative, transdisciplinary research on the understanding and development of resilient food and water systems internationally. Food and water security is increasingly threatened by factors such as climate and environmental change, loss of biodiversity, conflict and market volatility. New knowledge, policies and technologies are needed to develop systems that are more resilient to change, and which ensure the health of our food and water supplies. Resilient systems are better able to withstand and recover from stresses caused by short-term change or long-term events, including natural processes like flooding, or human impacts such as war or water pollution incidents. Through its focus on food and water, the Centre's research develops and integrates new knowledge in social, agroecological, hydrological and environmental processes, as well as the pivotal role that communities play in developing resilience. Unique to this Centre is the incorporation of citizen-generated knowledge – the participation of farmers, water users and other citizens in transdisciplinary research, using holistic approaches which cross many disciplinary boundaries. CAWR also aims to advance resilience science through creative work on a new generation of key issues linked to the governance of food systems, hydrological change, urban agriculture and water, biodiversity, stabilization agriculture, river processes, water quality and emerging pollutants.

Role of Partner in the Project:

Coventry University will contribute to the main project activities and goal by participating in Smart Midlands Living Lab to achieve the recovery of ammonia and generate hydrogen (ST6.1.3). It has demonstrated experience in the following tasks:

- Proof of concept micro-flow cell evaluation
- Laboratory evaluation of prototype flow cell (250 cm²)
- Supporting operation of skid mounted electrolyser flow cell at Spennall test facility

It will also participate in WP7, WP8 and WP9, in which will lead Developing Governance strategies for water smart communities' task.

In addition, the Intellectual Property Commercialisation Office of the Coventry University will play a relevant role because it is a member of the Intellectual Property Advisory Work Group.

Key personnel

[REDACTED] (in Electrochemistry) (male). Dr. John Graves was the Principal Investigator for the successful EPSRC / Innovate UK funded project investigating the Novel Production of Renewable Hydrogen from Agricultural and Municipal Waste (£300,000). He is an Associate Professor in the Institute for Future Transport and Cities Research Centre and has a passion for the generation of

hydrogen from non-fossil fuel sources to support the hydrogen economy. He received his Ph.D. in Electrochemistry from Southampton University and joined a specialty chemicals company where he became the European Research Manager for metallization products. John has spent time working at the Wolfson School of Mechanical and Manufacturing Engineering at Loughborough University, he has been an assessor for the European Commission and the British Council. He was also a member of the Advisory Board of the Midlands Hydrogen and Fuel Cell Network. He has been the Academic Supervisor for two Knowledge Transfer Partnership programmes with industry and he has extensive experience of project management. John has published 24 papers and 11 patents, is a longstanding Fellow of the Royal Society of Chemistry and has presented at a number of International conferences.

[REDACTED] in Electrochemistry) (female) has been working on energy materials for ten years, including catalysts for ammonia-oxidation, fuel cells, and electrochemical synthesis of ammonia. Rong is interested in the Ammonia Economy, especially the use of ammonia and related chemicals as potential indirect hydrogen storage materials. She has a Ph.D. in electrochemistry and has held positions in Research Groups at the University of Strathclyde and Warwick University. Rong is currently a Research Fellow in the Institute of Future Transport and Cities at Coventry University and has published extensively throughout her career in high impact journals.

[REDACTED] Ph.D. in Electrochemistry) (male). Dr. Wu completed the practical work for the Innovate UK funded project (H-AM) focusing on the conversion of agricultural and municipal waste to renewable hydrogen. He has extensive experience of preparing and characterising electrodes, operating laboratory micro-flow cells for preparative electrolysis, characterizing flow regimes in new electrolyzers and working with ammonia and hydrogen. Dr Wu has a strong track record in implementing improvements to electrochemical process, developing electrodes and electrolytes, improving surface pre-treatment methods (mechanical grinding and polishing, chemical etching, electrochemical etching, and ion milling), pulse plating, and using a number of post-electroplating treatments. Dr Wu has excellent materials characterization skills, including microstructure, composition, surface analysis, and mechanical properties tests by proficiently using a number of techniques; e.g. AFM, FIB, XPS, FTIR, XRD, ICP, FESEM, EBSD, EDX, TEM and optical microscope, and also mechanical tests such as tensile, impact and hardness tests. He is also proficient in the use of a number of electrochemical analysis techniques that include potentiometric techniques, linear sweep voltammetry (LSV), cyclic voltammetry (CV), chronoamperometry (CA) and sequential electrochemical reduction analysis (SERA). Dr Wu has worked as an RA for the H2020 project BeLEADFREE leading the task on developing pulse electrodeposition to enable high speed electroplating of engine bearings which directly led to the publication of two Q1 papers. In total, Dr Wu has published 8 peer-reviewed journal papers and has presented at several conferences throughout the world.

[REDACTED] (male) is an Associate Professor at CAWR, CU. He is a Geographer and Social Scientist. His research interests include developing new methods for fostering science-society dialogue around food and water issues and researching political economies of water provisioning. Adrian has published over 40 peer-reviewed articles, book chapters and research reports. Adrian has participated in several European and ESRC-funded research projects (including the Welfare Quality project, the Sustainable Practices Research Group, the Science in Society Project and the DIALREL project). Adrian is currently a work package leader and member of the Executive Board for the EU-funded OrganicPLUS project, which researches scientific and societal concerns about contentious inputs in organic agriculture.

[REDACTED] (female) is an Associate Professor at CAWR, CU. A social sustainability scientist, her research interests include collaborative governance, shared practice, rural development, multi-stakeholder decision-making and place-based resource management. Alex specialises in qualitative research techniques, with much of her work informed by a participatory action research approach to study design. During 2012–2015 she was a co-editor of the international Journal of Environmental Policy and Planning, and currently serves as an editorial board member of Sociologia Ruralis. For the period 2018–2022 Alex will act as Coordinating Beneficiary for an H2020 MSCA-ETN on 'Resourceful and Resilient Community Environmental Practice (RECOMS)'.

██████████ (female) is an Assistant Professor at CAWR, CU who has conducted community-level focused, social science research in various international settings including Canada, South Africa, Sweden, and the UK. As a human geographer, she has employed both quantitative and qualitative social science research approaches and published on a range of project-relevant topics including equity in access to services, and communities' perspectives on and risk perceptions of energy technologies. She is currently leading a work package on stakeholder engagement for the Belmont-Forum funded 'Waste: Food-Energy-Water Urban Living Labs (Waste FEW ULL)' project.
Relevant publications and achievements to the call • UK Patent Application GB1820678.9. Methods of Manufacturing Hydrogen • Wei Xu, Dongwei Du, Rong Lan, John Humphreys, David N. Miller, Marc Walker, Zucheng Wu, John T.S. Irvine, and Shanwen Tao, Electrodeposited NiCu bimetal on carbon paper as stable non-noble anode for efficient electrooxidation of ammonia, <i>Applied Catalysis B Environmental</i>, 2018, 237, 1101-1109. • Wei Xu, Rong Lan, Dongwei Du, John Humphreys, Marc Walker, Zucheng Wu, Huanting Wang and Shanwen Tao, Directly growing hierarchical nickel-copper hydroxide nanowires on carbon fibre cloth for efficient electro-oxidation of ammonia, <i>Applied Catalysis B Environmental</i>, 2017, 281 470-479. • Rong Lan, John T.S. Irvine, Shanwen Tao, Ammonia and related chemicals as potential indirect hydrogen storage materials, <i>International Journal of Hydrogen Energy</i>, 37 (2012) 1482-1494 (review).
Relevant previous projects or activities • FTC: Novel Production Process for Renewable Hydrogen from Animal and Human Waste EPSRC/ Innovate UK project reference: EP/P03070X/1 • FTC/Microcab: 2017 EcoBulkH2020 12.3M Euro Circular Economy materials -2021 • FTC/Microcab: 2016 APC/NVN Smart Electric Drivetrain £250,000 project • FTC/Microcab : 2014 Fuel Cell Recovery, TSB, £450,000 project • CAWR: Biochemical Enhancement of Ammonia Fertiliser Production with Sustainable and Low Carbon Principles (C200K)
Relevant infrastructures and networks Coventry University will bring into the project several facilities which will be fully accessible to the consortium and available to be used in experiments throughout the full duration of the project. These include: • Fully equipped hydrogen safe chemical laboratories with fume extraction. • Laboratory micro-flow electrochemical cell equipped with electrodes (25 cm²), pumps, gas flowmeter, manometer and ammonia ion selective electrode (ISE) for electro-oxidation of ammonia and hydrogen generation • Autolab electrochemical potentiostats and accessories for in situ electrochemical characterisation of electrochemical processes, e.g. by cyclic voltammetry (CV), linear sweep voltammetry (LSV), Tafel analysis, chrono-amperometry etc. Associated electrochemical cells, rotating disc electrodes, reference electrodes, luggin capillary cells etc. • Physical vapour deposition (PVD), electrochemical deposition equipment, high temperature furnaces and vacuum ovens for preparing electrode thin films and coatings.

- Scanning Electron Microscope (SEM), Energy Dispersive X-Ray (EDX), Electron Backscatter Diffraction (EBSD), X-ray Fluorescence (XRF), X-ray Powder Diffraction (XRD) and White Light Scanning (WLS) for analytical characterisation of electrodes
- Hydrogen Lab Micro cab facilities to be added if necessary

PARTNER 21

Full Legal name:	Lund University	
Short name:	LUND	
PIC number:	999901318	
Type (SME, RTD, etc.):	RTO	
Country:	Sweden	

Description
The membrane group in the Department of Chemical Engineering at Lund University has more than 40 years of experience in research on membranes and membrane processes. The activities of the group cover both fundamentals and applied research in particular the Optimisation, integration and scale-up of membrane processes. Part of the membrane group is the Industrial Membrane Process Research and Development Centre which has a wide range of suitable membrane equipment for laboratory to pilot scale tests and scale-up.
Role of Partner in the Project:
• Leader of Rain and Storm Water Recovery and Microplastics: Malmö Membranas task (WP2) • Prototyping membrane ultrafiltration (MU) for treatment of stormwater, combined rain- and stormwater and rainwater • Pilots for improving the quality beyond membrane filtration. • New "detection methods" using DNA/RNA techniques for detecting toxics and real-time monitoring to ensure suitability for use in the agricultural sector. • Participate in WP4 with membrane ultrafiltration performance monitoring and technical evaluation will be performed by LUND, focusing on WQ and captured micropollutants. LUND will be engaged in the WQ monitoring to assess scalability and diversification of non-potable uses and barriers to micropollutants and bacteria. • In addition, the Scientific Office of the University of Lund will play a relevant role because it is a member of the Intellectual Property Advisory Work Group.
Key personnel
██████████ (male) is professor at Lund University (Separation and Membrane Processes, Department of Chemical Engineering). He has over 20 years in industrial and academic membrane research and development. 16 years industrial experience in roles as Business and Product Manager plus associated R&D manager in the Product Centre Membranes at Alfa Laval. Prof. Frank Lipnizki leads Membrane Group in the Department of Chemical Engineering and

heads the industrial membrane process research and development centre at Lund University. Frank has more than 20 years of experience with membrane processes and his main research focuses on the integration and optimisation of membrane processes among others for membrane bioreactors for wastewater treatment plus fouling and cleaning of membranes. Before joining Lund University, he was Business and Product Manager plus associated R&D manager in the Alfa Laval Business Centre Membranes (previously Danish Separation Systems) and in this role he tried to build bridges between research and development and requirements from customers and industry. Frank is also Vice President of the European Membrane Society and council member of the Nordic Filtration Society.
Role in project: Prof. Frank Lipnizki will act as an internal project leader at University of Lund and the scientific lead of the piloting and evaluation of membrane ultrafiltration (MU) for improved stormwater management.

(male) is Professor and the head of the Division of Applied Microbiology at Lund University. He has a Ph.D. in Pharmaceutical Sciences (Microbiology). He obtained his PhD in Pharmaceutical (PhD) Sciences (Microbiology) in 1991 at the University of Uppsala. These studies addressed the discovery and characterization of integrons, mobile genetic elements with the ability to capture antibiotic resistance genes by site-specific recombination, as well as other genetic mechanisms involved in the dissemination of antibiotic resistance genes. Thereafter, he has initiated and established four different research programs at Applied Microbiology addressing: 1. carbohydrate metabolism in lactic acid bacteria (Functional foods); 2. pre-PCR processing (Diagnostic PCR and Forensic DNA analysis); 3. neurotoxin formation in *Clostridium botulinum* and *Staphylococcus aureus* (Food safety); and, 4. microbial biofilms in drinking water (Water quality). The food microbiology research is focused on rapid detection methods, biofilms, and virulence-determinant expression by food-borne pathogens in food matrices, as a step towards formulating new strategies for food safety and risk assessment.

Relevant publications and achievements to the call

- B. Al-Rudainy, M. Galbe, **F. Lipnizki** and O. Wallberg, Galactoglucomannan Recovery with Hydrophilic and Hydrophobic Membranes: Process Performance and Cost Estimations. *Membranes*. 2019 Aug 10;9(8):99. doi.org/10.3390/membranes9080099
- G. Rudolph, T. Virtanen, M. Ferrando, C. Güell, **F. Lipnizki**, M. Kallioinen. A review of in situ real-time monitoring techniques for membrane fouling in the biotechnology, biorefinery and food sectors. *Journal of Membrane Science* (2019), 588, doi.org/10.1016/j.memsci.2019.117221
- J. Thuvander, **F. Lipnizki** and A.-S. Jönsson: On-site recovery of hemicelluloses from thermo-mechanical pulp mill process water by microfiltration and ultrafiltration. *Journal of Wood Chemistry and Technology*, (2019), doi: 10.1080/02773813.2019.1565865.
- G. Rudolph, H. Schagerlöf, K.B. Morkeberg Krogh, A.-S. Jönsson and **F. Lipnizki**: Investigations on alkaline and enzymatic membrane cleaning of ultrafiltration membranes fouled by thermomechanical pulping process water, *Membranes*, 8 (2018), 91 (Special Issue Fouling and Cleaning in Membrane Processes) doi: 10.3390/membranes8040091.
- A. Gonzalez-Perez, K. M. Persson and **F. Lipnizki**: Functional channel membranes for drinking water production, *Water*, 10 (2018), 859; doi:10.3390/w10070859.

Relevant previous projects or activities

- **MemClean** (2018): Sustainable membrane performance for drinking water preparation and wastewater treatment. Vinnova Challenge-Driven Innovation - Stage 1
- **BONUS Cleanwater** (2017–2020): Develop treatment methods (MBBR and ozonation) and identify pathways for micropollutants and micro plastic. BONUS, funded jointly by the EU and Innovation Fund Denmark, Sweden's innovation agency VINNOVA and the German Ministry for Education and Science (BMBF).
- **SURF** – Sustainable Urban Flood Management (2016–2019): Develop strategies for sustainable urban storm water management in cities. FORMAS
- **Less is more** (2018–2021): Develop treatment methods based on separation (membrane) and sorption (activated carbon) for separation of micropollutants and antibiotic resistance. EU Intereg

project – South Baltic • LIWE LIFE (2018–2023): Develop a circular sewage treatment system by demonstrating advanced wastewater treatment technology and improve the wastewater treatment plant's resource and energy efficiency. EU LIWE life. • The Warm and Clean City (2014 – 2016): The project, "The Warm and Clean City" is developing and testing new total solutions for the world's wastewater treatment plants. The solutions are resource-efficient and facilitate utilizing substances in the wastewater for generating saleable products, while at the same time closing the water and nutrient loops. Vinnova (Horizon2020 national Focal Point for Sweden)
Relevant infrastructures and networks
For the laboratory tests and even initial pilot test the group has all relevant equipment including fully automated micro-and UF units and multi-functional membrane plants for micro-, ultra-, nanofiltration and reverse osmosis from litre to m³-scale using flat, tubular and spiral membranes.

PARTNER 22

Full Legal name:	Poznan University of Technology	
Short name:	PUT	
PIC number:	999659691	
Type (SME, RTD, etc.):	RTO	
Country:	Poland	

Description
Poznan University of Technology (PUT) grew out of the State School of Mechanical Engineering which was established in 1919. University, currently with its about 21 thousand students and more than 13 hundred academic staff, is one of the leading technical universities in Poland. By the time of last 100 years, it has become one of the most recognized landmarks of the region and even the whole country. As a public university PUT, effectively combines conceptual impetus, the pragmatism of being a scientist with a practical problem-solving approach - a true engineer with high interpersonal skills. Taking all these into consideration and striving for the ideals day by day, PUT observes the following rule: Science for people. On behalf of this belief, PUT's technological development is accompanied by the greatest respect for human beings, protection of the natural environment and sustainable economic development. With the open-minded approach to science, PUT plays an important role in international scientific life: takes an active part in scientific exchange and international projects and cooperate with many companies and research institutions. Contacts with numerous business partners are an essential part of university life, all in order to make Poznan a city of the future.
Role of Partner in the Project:
PUT will contribute to WP2 and WP4 in tasks related to the struvite system development and the struvite production large scale demo in Poznan Living Lab, respectively, by providing expert level knowledge

and experience. PUT will also participate in WP3 in order to modelling combined with Real-time Data Analysis.

In addition, the Innovation and Technology Transfer Office of the University of Poznan will play a relevant role because it is a member of the Intellectual Property Advisory Work Group.

Key personnel

[REDACTED] (male) is specialist in environmental engineering, especially water and wastewater treatment technology. He is graduated from the Faculty of Civil and Environmental Engineering at Poznan University of Technology (M.Sc.Eng. 1993, Thesis "Sewage Treatment Plant Alkmaar – Analysis and Optimization of the Biological Process", Ph.D. 2001, Thesis "Examination kinetics of contaminants transformations for the needs of mathematical modelling high-effective wastewater treatment activated sludge processes"), Habilitation 2015. He is the author and co-author of numerous refereed papers and articles in water and wastewater treatment technology and several books. He has worked as an engineer in the design enterprise AQUA sp. z o.o. (1994-1997) in wastewater treatment plants group and in sewer group, internships in Hoogheemradschap van Uitwaterende Sluizen in Hollandse Norderkwartier, Edam, The Netherland. He is International Water Association member, IWA-Poland co-founder and national governing body member, member of Sanitary Engineering Section in Civil and Water Engineering Committee (Polish Academy of Science) and he has participated in several research projects in the area of environmental engineering. Currently, he is an assistant professor at Poznan University of Technology, Institute of Environmental Engineering at Faculty of Civil and Environmental Engineering. Since 2016 Head of Division of Water Supply and Environment Protection.

[REDACTED] (male) graduated from the Faculty of Working Machines and Transportation (M.Sc. (Eng.) in 2002, Ph.D. (Eng.) in 2006) of the Poznan University of Technology. He is the author and co-author of more than 90 scientific papers and books the field of mechanical and environmental engineering. He has contributed many articles on life cycle assessment (LCA) methodology and practical use to Polish scientific papers and International Journal of Life Cycle Assessment (2018 IF 4.868). Currently, is a researcher scientist (LCM-LCA) at Poznan University of Technology, Poznan, Poland (Faculty of Transport Engineering) since 2006. He has worked as researcher, specialist and consultant on ended and running projects involving the LCA methodology practical use in design and production, also in SMEs management processes, has been expert of Panel for Technical and Technological Security of the National Foresight Program Poland and now he is reviewer at The International Journal of Life Cycle Assessment and expert of KSI/KSU (National Innovation Network/National Services System) - in the field of identification of technologies being possibly implemented in enterprises.

Relevant publications and achievements to the call

- Joachimiak-Lechman, K., Selech, J., & Kasprzak, J., 2018, *Eco-efficiency analysis of an innovative packaging production: case study*. Clean Technologies and Environmental Policy, pp. 1-12
- Witczak J., Kasprzak J., Klos Z., Kurczewski P., Lewandowska A., Lewicki R., 2014, *Life cycle thinking in small and medium enterprises: the results of research on the implementation of life cycle tools in Polish SMEs - part 2: LCA related aspects*. Int J Life Cycle Assess 19: 891.
- Kasprzak J., 2017, *Środowiskowe implikacje zagospodarowania wybranych grup odpadów z przemysłu mięsnego*. Inżynieria i Aparatura Chemiczna, 2017, 56, 5, s. 168-169.
- Kasprzak J., 2015, *Ocena oddziaływań środowiskowych w procesach ogłuszania drobiu*. Inżynieria i Aparatura Chemiczna, 2015, 54, 5, 251-252.
- Kulczycka J., Kurczewski P., Kasprzak J., Lewandowska A., Lewicki R., Witczak A., Witczak J., 2011, *The Polish Centre for Life Cycle Assessment—the centre for life cycle assessment in Poland*, Int. Journal of Life Cycle Assessment, 16, s. 442-444.

• DYMACZEWSKI Z.: The activated sludge process simulation – a preparation stage for Poznan WWTP. // Environmental engineering: proceedings of the second national congress of environmental engineering. Lublin, Poland. 4-8 september 2005 / ed by. Lucjan Pawlowski. Marzenna Dudzińska and Artur Pawlowski. – London: Taylor & Francis Group, 2007. – s. 281-287 • Jeż-Walkowiak J., DYMACZEWSKI Z.: Effectiveness of oxidative filter materials for manganese removal from groundwater. // <i>Journal of Water Supply: research and technology-AQUA</i>. – 2012, Vol. 61, Iss. 6, s. 364-371 • Wyrwas B., DYMACZEWSKI Z., Zgoła-Grzeszkowiak A., Szymański A., Frańska M., Kruszelnicka I., Ginter-Kramarczyk D., Cyplik P., Lawniczak Ł., Chrzanowski Ł.: Biodegradation of Triton X-100 and its primary metabolites by a bacterial community isolated from activated sludge. // <i>Journal of Environmental Management</i>. – 2013, Vol. 128, p. 292-299 ISSN 0301-4797 • Jeż-Walkowiak J., DYMACZEWSKI Z., WE&Br Ł.: Iron and manganese removal from groundwater by filtration through a chalcedonite bed. // <i>Journal of Water Supply Research and Technology AQUA</i>. – 2015, Vol. 64, Iss. 1, s. 19-34 • Jeż-Walkowiak J., DYMACZEWSKI Z., Szuster-Janiaczek A., Nowicka A. B., Szybowicz M., Efficiency of Mn Removal of Different Filtration Materials for Groundwater Treatment Linking Chemical and Physical Properties, MDPI Water 2017, Vol.9, Iss. 7, s.1-12
Relevant previous projects or activities • 2011 – 2014: U-POIG.05.02.00-00-030/10-00 „Construction and implementation of pro-innovation optimization services for SMEs based on an integrated expert system” (Budowa i wdrożenie proinnowacyjnych usług optymalizacji dla MŚP opartych na zintegrowanym systemie eksperckim). Action 5.2 POIG „Supporting business environment institutions providing pro-innovative services and their networks of supra-regional importance „ (Wspieranie instytucji otoczenia biznesu świadczących usługi proinnowacyjne oraz ich sieci o znaczeniu ponadregionalnym) – priority axis 5 „Diffusion of innovation of the Innovative Economy Operational Program” (Dyfuzja innowacji Programu Operacyjnego Innowacyjna Gospodarka 2007 -2013) – consultant/specialist, head of environmental analyses section (author of ca 90 reports and documentations of environmental optimization analyses) • 2018 – now: POIR.04.01.04-00-0060/18 „Design and construction of a prototype of an autonomous catamaran yacht for people with limited sailing skills, visually impaired and blinds” (Zaprojektowanie i budowa prototypu jachtu autonomicznego typu katamaran dla osób o ograniczonych umiejętnościach żeglowania oraz słabowidzących i niewidomych) – project approved, starting March 2019 – R&D manager • 2018 – now: RPWP.01.02.00-30-0136/17 „Development of a PEF-COM computing platform for environmental footprint research of products” (Opracowanie platformy obliczeniowej PEF-COM na potrzeby badań śladu środowiskowego produktów) – project approved, prepared to be started – LCA specialist
Relevant infrastructures and networks PUT has modern laboratories for research on water and wastewater treatment, biotechnology, chemistry and environmental biology. Equipment for the study of such processes like granular filtration (GF), wastewater treatment process (AS-SBR, AGS-SBR, MBBR), membrane filtration (UF, NF, RO). Equipment for standard and enhanced chemical analyses (eg. GC, HPLC, TOC, Fluorescent spectrometers, standard spectrophotometers etc.)

PARTNER 23

Full Legal name:	PKF Attest INNCOME	
Short name:	INCO	
PIC number:	928036443	
Type (SME, RTD, etc.):	LE	
Country:	Spain	

Description
PKF ATTEST INNCOME is a subsidiary of PKF ATTEST SERVICIOS PROFESIONALES. It is an innovation consulting firm working for their clients at the regional, national and international level. To access these markets companies, need advisory and to have an agent who has experience to succeed in presenting the proposal. INNCOME helps companies to get incentives for R&D and Innovation, internationalization, investment, competitiveness, energy efficiency and environment. INNCOME works together with the companies in defining a global funding plan and offering a comprehensive management of grants, financial aid and tax benefits for corporate activities (regional, national, European). INNCOME also elaborates and submits proposals to European tenders including Public Procurement of Innovation and Pre-Commercial Procurement or looking. INNCOME brings together a specialised team of more than 15 engineers and Ph.Ds with expertise in different fields that will help reducing technical and financial development risks in several areas and markets including Smart Cities (energy, water treatment and management, environment, transport, public services, digital services), Energy, Environment, Defence, Security, Transport, Health and Pharmacy, Agriculture and Food, Space, Aeronautics, Advanced Manufacturing and global and specialized ICT applications such as robotics.
Role of Partner in the Project:
INNCOME will closely collaborate with AQUALIA throughout the entire project, coordinating and supporting communication (T1.2) and dissemination tasks (T9.1), as well as the administrative and budgetary management (T1.3). Due to its expertise, it will participate in T8.3 by guiding members of the consortium to obtain public funding. In particular, INNCOME will contribute to adequately present the project progress to the end-users and general public and establish the communication channels with the end-users for regular update on the project deliverables; to increase the awareness of the project-related subjects among the interested stakeholders; to synchronise dissemination and exploitation plans within partner's institutions and to support the best information flow between the consortium partners (internal dissemination).
Key personnel
██████████ (female) brings 10 years of experience in R&D and innovation grants and tax incentives. She has a Ph.D. in Chemistry by Universidad Autónoma de Madrid. She has worked in Security, Energy, Oil and Gas, Chemical, Health, Pharmaceutical and Agrofood industries. Her experience is mainly focused in European Grants of different programmes such as H2020 (FP7, FP6), Life+ or CEF. María has previously worked for UAM University and for Zabala Innovation Consulting where she worked for 9 years as a consultant coordinating the submission, management and dissemination activities of European Projects under different programmes. She has directly participated as a resource of projects as AEROCEPTOR (SEC- FP7). Currently she is a Founder Partner of PKF ATTEST INNCOME, S.L. an

innovation consulting firm subsidiary of PKF ATTEST Servicios Profesionales, being responsible for the preparation of projects within the framework of the H2020 Programme and national public incentives

(female) has a Ph.D in Chemical and Environmental Engineering, a Ms.C in Chemical Engineering and a Bs.C in Chemical Engineering from Castilla La Mancha University. Her Ph.D research was focused on demonstrating the recovery of energy from wastewater and the wastewater treatment simultaneously by means of biocells. She has received 6 awards because of her research. In addition, she has worked as a researcher in national projects related to the regeneration and reuse of urban wastewater and the recovery of products from industrial wastewater by electrochemical technologies as well as in a European project related to membranes for hydrogen cells. She has 8 years' experience in water treatment field, which involved other fields such as bioenergy, biotechnology, dynamic fluid and pharmaceutical, R & D projects and has carried out her research profile in Spain and in United Kingdom. She is the author and co-author of numerous refereed publications in water and wastewater treatment technology. In addition, she is the president of the Official College of Chemical Engineering Professionals of Castilla La Mancha. Currently, she works as R&DConsultant at PKF ATTEST INNCOME, S.L.

(female) is a Chemical Engineer from the Grand École Supérieure de Chimie Physique Electronique de Lyon (CPE Lyon, France), where she obtained the bachelor's in chemistry & Process Engineering and master's in chemical engineering diplomas; this training was complemented with an Erasmus + Programme at the Polytechnic University of Madrid, where she studied the master's degree in Energy Engineering. She has extensive experience in laboratories and R & D projects after participating in the 6-month project at Laboratorios LAGEP in Lyon, France under the supervision of Dr. Yves Chevalier and in the process optimization project at Cue Construcciones Urbanizaciones Y Edificaciones in Mexico under the supervision of Engineer Omar Marroquín Salazar. In PKF ATTEST INNCOME she is responsible for the elaboration of European, regional and national proposals, highlighting its participation in the project "INBOTS - Inclusive Robotics for a Better Society", as well as the elaboration and management of proposals within the EUROSTARS framework as "High Performance Thermosolar Plants based on PV-Hybrid Autonomous Heliostats and Tailored Receivers" for the company Thermal Power Engineering, S.L.

(male) is a marketing professional with a double bachelor's degree in Business Administration and Management and in Advertising and Public Relations, a master's degree in Digital Marketing and knowledge of Customer Experience. Specialized in the strategic planning of new solutions for an increasingly technological and digital market. His extensive experience in the development of business plans, the search for innovative solutions and the dissemination of contents allow to cover feasibility analysis and future projection. He has worked in various sectors always from the side of business strategy looking for new solutions to everyday problems such as the design and implementation of technological solutions that facilitate the transmission of information, having worked on the definition of a search engine and the redefinition of contents, architecture and functionalities of the intranet of an important digital bank (ING). He has four years of experience in innovation consultancy, most of the half of it in PKF Attest InnCome, managing projects of various kinds, with a predominance of European projects and those in which the technological solution is closer to the market. He is specialized in the development of business plans and feasibility analysis of various proposals, being able to cover almost all the managerial phases of the project. This has been accompanied by design and communication tasks, preparing newsletters, writing articles and updating web content. For the last two years he has been participating in two EU funded projects (INBOTS a CSA - G.A. 780073 & EUROBENCH a RIA - G.A. 779963) being in charge of the communication and dissemination activities.

(female) has completed her Ph.D thesis in Chemical and Environmental Engineering in July 2019. She holds a degree in Chemical Engineering and a Ms.C in Chemical Engineering from University of Castilla La Mancha. During her Ph.D she worked mainly on wastewater treatments, being the main topic of her research the combination of biological and electrochemical processes to remove pesticides from polluted effluents. She also performed an internship

in the Ecole Nationale Supérieure de Chimie de Rennes (ENSCR). As a researcher, María Belén has participated in different research projects such as Sustertech4CH and Electrotec4pest. She is the author and co-author of numerous refereed publications in water and wastewater treatment technology. Prior to her Ph.D, she has worked in the Water Quality Laboratory of Aguas de Albacete (AQUONA). Her current profession is Consultant at PKF ATTEST INNCOME.

PARTNER 24

Full Legal name:	Università degli Studi di Palermo	 UNIVERSITÀ DEGLI STUDI DI PALERMO
Short name:	UNIPA	
PIC number:	999734284	
Type (SME, RTD, etc.):	RTO	
Country:	Italy	

Description

The University of Palermo is one of the largest universities in Italy with more than 40.000 enrolled students. The Conceptual Design of Chemical Processes group at the Dipartimento di Ingegneria di Università di Palermo (Italy) will be mainly involved in WP2 and WP5 of REWAISE project. The group is composed by 4 permanent staff, 6 post-docs and 10 PhD students currently involved in several research projects. It has a strong track record in the fields of water technology, non-conventional energy sources, electrochemical processes, and brines valorisation, with focus on experimental analysis, process modelling and Computational Fluid Dynamics (CFD), and prototyping activities.

The research so far carried out and the expertise gained in the last 15 years has largely benefitted from a number of international research projects and collaborations. The Group participated in the past to 6 EU-funded projects (MEDIRAS, PRODES, STAGE-STE, REAPower, RED Heat-to-Power, ReWaCEM,) on solar-powered desalination, salinity gradient power technologies, and industrial brines valorisation via membrane processes and currently works in 3 on-going EU-H2020 projects (REVIVED, BAoBaB, ZERO BRINE) on novel hybrid technologies for water desalination and energy storage, and and minerals separation via chemical reactions.

The high level of research carried out and the number of international cooperation activities have allowed the group to gain significant academic achievements, such as the invitation to edit books on Desalination and Salinity Gradient Power technologies (titled "Solar Desalination for the 21st century", 2007, and "Seawater Desalination – Conventional and renewable energy processes", 2009, both published by Springer-Verlag; and "Sustainable Energy from Salinity Gradients", 2016, published by Woodhead Publishing-Elsevier), a number of invited speeches on desalination and salinity gradients power technologies, and eventually also to the award of the IChemE Senior Moulton Medal 2013 for the paper "Development of a Membrane Distillation module for solar energy seawater desalination" published on the Journal Chemical Engineering Research and Design.

In all the above-mentioned research projects, UNIPA has contributed with modelling activities, laboratory investigations, process & plant design, pilot units design, construction & installation

in real environments, and, eventually, long-run monitoring activities. In particular, worth mentioning a track-record of first world pilot systems operated by UNIPA for energy production from brines (REAPower pilot, being actually the first and unique prototype in the world successfully operating with highly concentrated brines and brackish waters as feed solutions at the Trapani saltworks site in Italy), for conversion of thermal energy into electricity via Reverse Electrodialysis (RED Heat-to-Power prototype) and for industrial waste brines valorisation (ReWaCEM pilot).

Role of Partner in the Project:

The main role of UNIPA is the development (T2.3 – Valuable materials recovery) and demonstration at the living lab (T5.1 – Denia (Spain) Living Lab: Efficient Seawater Treatment) at the pilot scale of the sea salt and magnesium extraction from seawater desalination brines.

The UNIPA team is very qualified and with a consolidated knowledge gained in the past 10 years during a number of activities and projects concerning brine valorization in which it has been involved. His members have a strong collaboration with the MED-TVC desalination plant in Trapani and with the owner of the nearby saltworks. Thanks to that, they have already experienced strategies and methodologies for the valorization of both brines (the one outgoing from the desalination plant and the one coming from the saltworks after salt collection).

Key personnel

██████████ (male) is Assistant Professor of Chemical Process and Plant Design. He has carried out research activities focused on the experimental and numerical analysis of complex systems including multiphase stirred tanks and membrane-based units. He has published more than 100 works as journal papers or conference contributions in this area. His main expertise concerns fluid dynamics studies involving the adoption of innovative image analysis techniques and advanced computational fluid dynamics methodologies. He has participated in many EU-funded and national projects on water desalination and renewable energy technologies as well as Salinity Gradient Power processes. He was awarded with the Senior Moulton Medal 2013 by the Board of Institution of Chemical Engineering (UK). Prof. Giorgio Micale (M) is a Full Professor of Chemical Process and Plant Design. He has been responsible of many of the above-mentioned EU projects. Core research topics are the study of Conventional and Renewable Energy Desalination processes, Salinity Gradient Power processes, Computational Fluid Dynamics, Mixing and Multiphase Flows, Computer Aided Process Engineering. He has been leading his research group within the 5 EU projects reported below. He was awarded with the Senior Moulton Medal 2013 by the Board of Institution of Chemical Engineering (UK).

██████████ (male) is a Full Professor of Nuclear Engineering. In the 1980s he has taken part in the early development and testing of advanced CFD codes (Harwell-FLOW3D, ancestor of the current ANSYS-CFX), and since then he has worked on experimental and computational fluid dynamics, with special reference to the modelling and numerical simulation of turbulence. He is currently working on CFD simulations of mixing and turbulence in spacer-filled channels for membrane processes, curved pipes, stirred tanks and other complex systems. In 2005 he was awarded with the Senior Moulton Medal by the Board of Institution of Chemical Engineering (UK).

██████████ (female) is Associate Professor of Unit Operations and Chemical Plant Design. In the 1990s she had been working for about ten years as a chemical engineer at SARAS Refinery technical offices in Milan. In 2002 she got back to research at the Chemical Engineering Department in Palermo. Her research activity mainly focus on the experimental investigation and modelling of single phase and multiphase complex systems, with particular respect to solid-liquid and gas-liquid mixing phenomena. She has recently worked within EU-H2020 projects on the development of electromembrane processes for water and energy applications. In 2005 he was awarded with the Senior Moulton Medal by the Board of Institution of Chemical Engineering (UK).

(female) is a research fellow in Chemical Process and Plant Design. Her research is focused on the experimental and numerical analysis of complex systems including electrochemical reactors and membrane-based units. She has published more than 40 works as journal papers or conference contributions in this area. In the last years she has been leading some of the research activities of the ReWaCEM project for the recovery and valorisation of industrial brine effluents. She was awarded with the De Nora Foundation PhD award.

Relevant publications and achievements to the call

- Giacalone, F., Vassallo, F., Scargiali, F., Tamburini, A., Cipollina, A., Micale, G. "The first operating thermolytic reverse electrodialysis heat engine". Journal of Membrane Science 595, 2020, Article number 117522. DOI: 10.1016/j.memsci.2019.117522
- Micari, M., Cipollina, A., Tamburini, A., Moser, M., Bertsch, V., Micale, G. "Combined membrane and thermal desalination processes for the treatment of ion exchange resins spent brine". Applied Energy 254, 2019, Article number 113699. DOI: 10.1016/j.apenergy.2019.113699
- Micari, M., Moser, M., Cipollina, A., Fuchs, B., Ortega-Delgado, B., Tamburini, A., Micale, G. "Techno-economic assessment of multi-effect distillation process for the treatment and recycling of ion exchange resin spent brines". Desalination 456, 2019, 38-52. DOI: 10.1016/j.desal.2019.01.011
- Culcasi, A., Gueccia, R., Randazzo, S., Cipollina, A., Micale, G. "Design of a novel membrane-integrated waste acid recovery process from pickling solution". Journal of Cleaner Production, 236, 2019, Art. Number 117623. DOI: 10.1016/j.jclepro.2019.117623.
- A. Tamburini, G. Gagliano, G. Micale, A. Brucato, F. Scargiali, M. Ciofalo, "Direct numerical simulations of creeping to early turbulent flow in unbaffled and baffled stirred tanks", Chemical Engineering Science, 192, 2018, 161-175. <https://doi.org/10.1016/j.ces.2018.07.023>
- F. Scargiali, A. Tamburini, G. Caputo, G. Micale. "On the assessment of power consumption and critical impeller speed in vortexing unbaffled stirred tanks". Chemical Engineering Research and Design, 123, 2017, 99-110. <https://doi.org/10.1016/j.cherd.2017.04.035>

Relevant previous projects or activities

- H2020 BAoBaB (Blue Acid/Base Battery: Storage and recovery of renewable electrical energy by reversible salt water dissociation). Goal for UNIPA: 1) support technology development with advanced modelling activities and experiments; 2) develop and operated a pilot plant to be installed in the small Mediterranean island of Pantelleria (Italy) – 2017-2021 - www.baobabproject.eu
- H2020 ZERO BRINE (Re-designing the value and supply chain of water and minerals: a circular economy approach for the recovery of resources from saline impaired effluent (brine) generated by process industries). Goal for UNIPA: 1) implement one of the laboratories of the Brine Excellence Centre (BEC); 2) develop and build continuous crystallisers (conventional and membrane-based) for removal of Calcium and Magnesium from salty industrial effluents – 2017-2021 - www.zerobrine.eu
- H2020 REviveD water (Low energy solutions for drinking water production by a REvival of ElectroDialysis systems). Goal for UNIPA: Support via modelling and simulations the development of electrodialysis pilot system for brackish and seawater desalination powered with solar energy and in hybrid schemes with multi-stage, RED-ED and RED-ED-RO couplings – 2016-2020 - www.revivedwater.eu
- H2020 ReWaCEM (Resource recovery from industrial waste water by cutting edge membrane technologies). Goal for UNIPA: 1) simulation and design of 3 demo plants for the valorisation of spent industrial brines containing inorganic acids and heavy metals; 2) develop, commission and

operate a demo plant for the valorisation of spent pickling solutions in a hot-dip galvanizing industry located close to Palermo (Italy) – 2016-2019 - www.rewacem.eu EU-FP7 REAPower (Reverse Electrodialysis Alternative Power production). Goal for UNIPA: the development by modelling and experiments of the RED technology fed by concentrated brines and brackish/sea water as feed solutions, aiming at the final construction and operation of a 1kW prototype within Trapani saltworks (Italy) – 2010-2014 - www.reapower.eu
Relevant infrastructures and networks - The Brine Excellence Centre laboratory, implemented within the ZERO BRINE project for research activities on brines valorization, is available for Mg(OH)₂ recovery analyses and tests. - A multi-purpose laboratory equipped with pilot test-rigs for testing EDBM units is available. - A fully equipped analytic chemistry laboratory will allow the analysis of process solutions and precipitated solids in terms of composition/purity, particles granulometry and crystal size. - A High Performance Computing laboratory, which can be used for aid the design of the apparatuses. - IRIS, institutional repository for open access publications and open data, directly linked with OpenAIRE (Open Access Infrastructure for Research in Europe).

4.2 Participants Third parties involved in the Project (including use of third parties resources)

- FCC Aqualia SA**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
- Subcontracting for the Automatic Virtual DMA which is required for the implementation at the Mediterranean Living Lab-	Task 5.1 Subtask 5.1.3.
- Copernicus expertise for the integration of data from sentinels	Task 3.2 Subtask 3.2.1
Total Cost: 118,000 €	
Does the participant envisage that part of its work is performed by linked third parties	YES
SMVAK will coordinate mainly the Moravia-Silesia Living Lab with industrial integration (T4.2) in order to implement REWAISE concept in Czech Republic. Furthermore, in WP4 it will implement new IoT communication with advanced metering in order to provide solutions identifying non-consumption, fighting against isolation, increasing transparency and reducing the use of water by providing data to consumers. SMVAK will contribute also to WP1 to ensure the success of REWAISE with a continuous collaboration, to WP3 (definition of requirements and optimal control), WP7 for KPIs analysis, LCCA and ETV, in WP8 for new business models development and in WP9 for dissemination activities and social engagement activities. Total cost: 529,975 €.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners ² (Article 14a of the General Model Grant Agreement)?	NO

• **Severn Trent Water**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
Too find smarter ways of preventing and detecting leaks using a variety of different methods which will be complimentary to each other and the asset base. There are existing products such as fibre that need to be tested but STW need to seek to understand its true potential for potentially detecting water quality issues: monitoring pipe condition and using the fibre for data transfer. The following tasks will be subcontracted: - Trial epoxy based / pig train product - Trial management system that records valve operations: optimises valve operations and then can automate valve operations - Watchtower technology robotics (smart leakage & repair)	Task 6.1 Subtask 6.1.1
Total Cost: 200,000 €	
Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners? (Article 14a of the General Model Grant Agreement)?	NO

• **VASYD**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
• Detailed design/technical specifications of the stormwater reservoir and MU module (15,000 €).	Task 2.1 Subtask 2.1.1
• Detailed design/technical specifications of weather and water monitoring system (15,000 €). • Installation of detailed design digital twin for water treatment (30,000 €). • Installation of web-interface for visualization and communication (50,000 €).	Task 4.3 Subtask 4.3.3
Total Cost: 110,034 €	
Does the participant envisage that part of its work is performed by linked third parties	YES
• Sweden Water Research, SWR will communicate cost-efficiency and environmental benefits of demonstrated actions to the broader water industry. SWR brings expertise in linking scientific insights to broader regulatory contexts. SWR will moreover assist VA SYD with reporting to EU. SWR is the research and development company owned by the three largest public water utilities in south of Sweden, Skane region, i.e. VA SYD, NSVA and Sydvatten). It covers 18 municipalities in the region. SWR carry out research, development and innovation work in areas that are important from a sustainable water perspective. SWR coordinate competences in order to secure maintenance, identify new solutions and disseminate knowledge. So its main task will be the research, development and innovation work in areas that are important from a sustainable water perspective. SWR coordinates competences in order to secure maintenance, identify new solutions and disseminate knowledge. To do this, 19 PM will be required. Total cost: 283,100 €. • WIN Water will together with SWR communicate cost-efficiency and environmental benefits of demonstrated actions to the broader water industry and will specifically be the linkage between the water innovators (SMEs) and the public water sector. WIN Water has the expertise, international entrepreneurship collaborations (e.g. TAG Europe) and networks with investors and industry to build scalability. WIN Energy, WIN Guard. In order to carry out their task, WIN will require 8 PM.	

Total cost: 91,000 €.	
City of Lund municipality, through its Brunnshög division within the Urban Planning Office, contribute with architectural and city planning expertise. Its main tasks will be coordinating property developers and ensuring compliance with sustainability objectives. To do this, 15 PM will be required. Total cost: 193,250 €.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	YES
SLU, Swedish University of Agricultural Sciences: SLU will contribute to ST2.3.1 and ST4.3.2 focused on urine separation /hydration test beds. They will design and evaluate prototypes and be responsible for further development of prototypes for large-scale deployment in Malmö. SLU will also further develop the fertilisers resulting from urine separation for reuse in the same area in the establishment of urban greenery. The setup for this reuse strategy will be piloted and evaluated with the REWAISE project, already in the pilot phase before being realised in full-scale. SLU and Sanitation360 will moreover be involved in exploitation and replication activities based on their draft business plan. Sanitation360 will continue to participate in innovation competitions which is also a key strategy in the business plan. To do this, 2 PM will be required. Total cost: 57,000 €.	
Does the participant envisage that part of the work is performed by International Partners? (Article 14a of the General Model Grant Agreement)	NO

• **Severomoravské vodovody a kanalizace Ostrava a.s. (AQUA Link Third Party)**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
SMVAK will subcontract the implementation of smart meters (estimated 8,000)	Task 4.2
Total Cost: 9,100 €	

• **AQUANET**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
Dewatering effect analysis, crystallization effect analysis, lab-scale recovery analysis, laboratory analysis.	Task 2.3 Subtask 2.3.1
Effectiveness and quality test, investigation on emerging pollutants concentration, concentrate management investigation.	Task 4.1 Subtask 4.1.1.
Real-time data analysis, bio-kinetic modelling and validation, demo-model run.	Task 4.1 Subtask 4.1.2.
LCA	Task 7.2
Marketplace assessment.	Task 8.1
Total Cost: 225,000 €	
Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO

Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **HIDROTEC TECNOLOGIA DEL AGUA SL UNIPERSONAL**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
Expertise for development of artificial intelligence modules for: - Prediction models - Pressure smart network - Integration of devices and sources to the REWAISE CDP	Task 5.1 Subtask 5.1.3
Total Cost: 260,000 €	
Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **City of Malmoe Municipality**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
External services for communication outreach	External services for communication outreach
Total Cost: 18,000 C	
Does the participant envisage that part of its work is performed by linked third parties	YES
P-Malmö will deliver R&SWH with Lund University and their expertise is to assess how best achieve intended environmental and cost-benefits from a parking facility perspective. To do this, 10 PM will be required. Total cost: 91,875 €. MKB, Malmö Public Property Developers, will incorporate R&SWH solutions into their residential and commercial properties. They are key partners as the assets become integral parts of their investments. To do this, 20 PM will be required. Total cost: 310,000 €.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **POLYMEM SA**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
An autopsy of membrane bundles and a hollow fiber characterisation (ATR, ATG, Raman, SEM...)	Task 2.1 Subtask 2.1.3
Total Cost: 12,500 €	

Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **CETIM**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
-Assays characterisation (ICP-MS.HPLC) in WP2	Task 2.3
- Construction biopolymers pilot plant	Subtask 2.3.3
- Assays characterisation (ICP-MS.HPLC) in WP5	Task 5.2
	Subtask 5.2.3
-Assays characterisation (ICP-MS.HPLC) in WP6	Task 6.3
	Subtask 6.3.3
Total Cost: 76,000 €	
Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **Coventry University**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
The electrolyser cell design advice and consultancy with a total cost	Task 2.2
	Task 2.2.1
An intensive diagnosis of the gender dimension in the water cycle within the Competency Groups in selected Living Labs	Task 9.2
Total Cost: 40,000 €	
Does the participant envisage that part of its work is performed by linked third parties	NO
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	NO
Does the participant envisage that part of the work is performed by International Partners2 (Article 14a of the General Model Grant Agreement)?	NO

• **SWR**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
Subcontracting for analysis in water sector and industry adoption of stormwater reuse technologies	T8.1
Subcontracting for project management	T1.3
Total: 50.100 €	

• **CoL**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
External services for communication outreach	T8.5
Total: 10,000 €	

- **P-Malmö**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
External consultancy services for the detailed design and estimation of rain and stormwater harvesting and membrane ultrafiltration	ST4.3.1
Total: 13,500 €	

- **MKB**

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	YES
Installation and consumables	ST4.3.1
Total: 12,500 €	

5. Ethics and Security

5.1 Ethics

REWAISE will require the use of research, involving human participants, mainly in that tasks developed in the Living Labs. Our consortium is aware of potential ethical, fundamental rights, privacy and data protection implications that may be identified in the course of the project. The consortium is fully committed to adhere to and promote the highest ethical, fundamental rights and legal standards, as recognized at the European Union and International level, in the project's activities and outcomes. Hence, we have included [T1.9 – Ethics and Gender dimension] that will run for the duration of the project. This, together with the **Data Management Plan [DMP]** developed as part of [T1.5] lead by AQUA, will ensure that the highest ethical standards will be met, in particular, concerning the protection of personal data and privacy.

The implications and impacts of ethical, fundamental rights, privacy and data protection issues will be identified and addressed throughout REWAISE actions and recommendations will be made for compliance with relevant standards, regulations, and legislation. In particular REWAISE's activities will be carried out in strict compliance with the highest ethical principles and fundamental rights expose principally in the EU Charter on Fundamental Rights (CFREU, 2010) and the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR, 1950);

With regard to the rights to privacy and to the protection of personal data, REWAISE will adhere to the provisions of:

- The EU Charter on Fundamental Rights (art. 7 and 8);
- The European Convention for the Protection of Human Rights and Fundamental Freedoms (art. 8);
- The CoE Convention No. 108 for the Protection of Individuals with regard to Automatic Processing of Personal Data (1981);
- Regulation 2016/67 EC (General Data Protection Regulation, GDPR)

REWAISE consortium is aware that it is likely that some standards may evolve within the lifetime of the project and is committed to monitoring and taking into account such evolutions as well as issues emerging from different enforcement regulations.

For the purpose of consultation framework and creation of competence groups [WP 9], participants will be given an informed consent form and detailed information sheets that will be written in a language and in terms they can fully understand, stating that participation is voluntary and giving the consent in writing to participate. Moreover, the data to be used in REWAISE will be anonymous. REWAISE will confirm that informed consent and Copies of notifications/authorisations for the collection and/or processing of the personal data has been obtained and save and ensure that this information is provided: details of data safety procedures (protective measures to avoid unforeseen, usage or disclosure, including mosaic effect, i.e. obtaining identification by merging multiple sources). As well as procedures for data collection, storage, protection, retention, transfer, destruction or re-use. Data will be used in Europe but in case of data transferred to third countries (US/Canada), details on data transfer will be ensured by 'safe harbour recipient.

Responsible Research and Innovation (RRI)

REWAISE includes a multi-actor, transdisciplinary approach of public engagement in research and innovation to achieve its objectives, enabling easier access to scientific/technical results, the take up of gender dimension and ethics in the research and innovation content. The assessment of the potential implications and societal expectations with regards to technologies' research and innovation within REWAISE will be based on the guidelines and policy of EC[1] on responsible research and innovation (RRI) and will be periodically update in T7.6. of Verification of the RRI approach.

Environmental Issues

The REWAISE project includes large scale applications developed and implemented in WP2, WP4, WP5 and WP6. These applications will pose a minimal human and environmental risk, during the technology tests because utilities involved in REWAISE have already strong risk control protocols to avoid any environment or personal damage and a long experience and reputation in the Water Treatment Field. These protocols will be included in [WPI] in the Risk Management Plan and deployed during the WP tasks development.

5.2. Security

Please indicate if your project will involve:

- activities or results raising security issues: NO
- 'EU-classified information' as background or results: NO

ANNEX I: List of Acronyms

ACRONYM	DESCRIPTION	ACRONYM	DESCRIPTION
AAA	Authentication, Authorization and Accounting	EDBM	Electrodialysis with bipolar membranes
ABAD	Water ABSorption and further ADSorption	EDM	Electrodialysis metathesis
AEAS	Spanish association of water supply and sanitation	EDS	Energy Dispersive Electroscopy
AI	Artificial Intelligence	EEA	European Environment Agency

ACRONYM	DESCRIPTION	ACRONYM	DESCRIPTION
AMP	Asset Management Plan	EFSI	European Investment Fund
AnMBR	Anaerobic Membrane Bioreactor	EIB	European Investment Bank
AOP	Aspect-oriented programming	EIP Water	European Innovation Partnership on Water
API	Application Program Interface	EPC	Engineering, procurement and construction
B2B	Business to business	ERDF	European Regional Development Fund
BBI	Bio-based Industries	ETL	Extract, Transform, Load
BCR	Benefit cost ratio	ETP	Exchange-traded products
BEP	BIM Execution Plan	ETV	EU Environmental Technology Verification
BOT	Build-operate-transfer	EV	Electric vehicles
CA	Consortium Agreement	FAT	Factory Acceptance Test
CAGR	Compound Annual Growth Rate	FCD	Flow Control Device
CAPEX-OPEX	Capital Expenditure - Operational Expenditure	GA	General assembly
CBA	Cost-benefit analysis	GDP	Gross domestic product
CDA	Confidential Disclosure Agreement	GeoJSON	Geographic JavaScript Object Notation
CDI	Capacitive Deionization	GHG	GreenHouse Gases
CDI	Capacitive Deionization	GPSX	Standard bio-kinetic modelling
CDP	Common Digital Platform	GREAP	Governance & Regulatory Ethics Advisory Panel
CFS	Certificate of Financial Statements	HH	Household
CG	Competency Groups	HTTP	HyperText Transfer Protocol
CNG	Compressed natural gas	IA	Innovation Actions
co-AD	Anaerobic digestion	ICT	Information and Communication Technologies
COD	Chemical Oxygen Demand	IIPRE	Innovation, IPR & Exploitation Director
CP	Communication Plan	ILCD	International Reference Life Cycle Data System
CRM	Critical Raw Materials	InPa	Investor Partnership
CWWTP	Central Wastewater Treatment Plant	IoT	Internet of things
DBP	Disinfection by-products	IP	Intellectual Property
DMA	District meter areas	IPR	Intellectual property rights
DMF	Direct Membrane Filtration	IWAN	Intelligence wastewater network
DMP	Data Management Plan	JPI Water	Water Joint Programming Initiative
DSS	Decision Support System	JRC	Joint Research Centre
DW	Desalination Water	KPI	Key Performance Indicators
DWT	Drinking Water Treatment	KR	Key Results
DWTP	Drinking Water Treatment Plant	LCA	Life Cycle Assessment
EAE	European Environment Agency	LCC	Life Cycle Costing

ACRONYM	DESCRIPTION	ACRONYM	DESCRIPTION
EBC	European Benchmarking Cooperation	LCCA	Life-cycle cost analysis
EBRD	European Bank for Reconstruction and Development	LL	Living Labs
ECSA	Electrochemical active surface area	M2M	Machine to machine
ECTP	European Construction Technology Platform	MABR	Membrane aerated biofilm reactor
MBR	Membrane Bioreactor	SoA	State-of-the-Art
MMC	Mixed microbial culture	SRL	Societal Readiness Level
MQTT	Message Queuing Telemetry Transport	SROI	Social Return on Investment
MT	Management Team	ST	Subtask
MU	Membrane Ultrafiltration	SUDS	Sustainable Urban Drainage Systems
MWCO	molecular weight cut-offs	SWAN	Smart Water Networks Forum
NF	Nanofiltration	SWOT	Strengths, weaknesses, opportunities and threats
NPK	Nitrogen, Phosphorus and Potassium	TAG	Technology Approval Group
NPV	Net present value	TDS	Thermal desorption spectroscopy
O&M	Operations and Maintenance	THM	Trihalomethanes
OLR	Organic Load Rate	TL	Task Leaders
PAHs	Polycyclic Aromatic Hydrocarbons	ToR	Terms of Reference
PC	Project Coordinator	TRL	Technology Readiness Levels
PEDR	Plan for Exploitation and Dissemination of Results	UF	Ultra Filtration
PIIA	Poli-hidroxi-alkanoates	UKWIR	UK Water Industry Research organisation
R&SWH	Rain and Storm Water Harvesting	UWC	Urban Water Cycle
RO	Reverse Osmosis	VFA	Volatile Fatty acids
RRI	Responsible Research and Innovation	WDS	Water Distribution System
RTO	Research and Technology Organization	WFD	Water Framework Directive
S&T	Scientific and Technological Conference	WIN	Water Innovation Accelerator
SAB	Scientific Advisory Board	WP	Work Package
SCADA	Supervisory Control and Data Acquisition	WPL	Work Package Leaders
SDG	Sustainable Development Goals	WQ	Water Quality
SEEC	Stakeholder Engagement & Equality Community	WssTP	Water Supply and Sanitation Technology Platform
SEM	Scanning Electron Microscopy	WTP	Water Treatment Plant
SIRA	Strategic Innovation and Research Agenda	WW	Wastewater
SME	Small to Medium Enterprise	WWTP	WasteWater Treatment Plant
SO	Specific Objectives		

Annex II: Methodology of Common Digital Platform: inputs, outputs and operation logic.

Table below show characterisation of the water cycle entities for optimal control and coordination:

Entity	Inputs	Outputs	Constraints	Operation Logic
A. Catchment & Treatment (WTP)	- Raw water quality - Water demand and quality request from the WDS - Prices and conditions (water catchment payment, supply water revenue, chemicals, electricity)	- Raw water catchment (for the water authority) - Electricity consumption (for electricity supplier) - Chemicals consumption and production during water treatment (for the chemicals supplier/trader) - Freshwater quality and pressure at the handover point (for the WDS)	- Plant operational constraints - Required freshwater quality and pressure at supply point to the WDS - Granted flow	Ensure that treated freshwater is delivered to the WDS in compliance with the required quality, pressure and quantity, while minimising costs.
B. Distribution (WDS)	- Aggregated water demand from consumers in different network points - Freshwater quality and pressure from the WTPs - Prices and conditions (payment for water from WTPs, electricity)	- Predicted intake of water from different WTPs – quantity and quality (for WTPs) - Electricity consumption (for electricity supplier)	- Required Water quality at control points - Minimum and maximum pressure requirements at control points	Ensure water supply in quantity and quality, meeting pressure requirements, while minimising costs
C. (Smart) consumers (C)	Prices and conditions (payment for freshwater and purified water consumption in quantity and quality, payment for wastewater letting off in quantity and quality, electricity) Cost	- Quantity and required quality of freshwater (for WDS) - Quantity and required quality of purified water (for WWTPs) - Quantity and quality of wastewater to be let off (for SWDS) - Electricity consumption (for electricity supplier)	- Legal limits in wastewater parameters - Legal limits in freshwater parameters	Minimize operational costs, majorly coming from water and energy.
D. Sewage water network (SWDS)	- Wastewater (from consumers) and rain water quantity and quality introduced into the SWDS in different collection points - Prices and conditions (reimbursement for wastewater from consumers, payment to WWTPs for quantity and quality of sewage supplied, penalties to water authority for direct discharge in the environment, electricity) Costs	- Quantity and quality of wastewater entering the WWTPs - Quantity and quality of direct discharge into the environment - Electricity consumption (for electricity supplier)	- Sewage system capacity - Contractual obligations of minimum quality level towards the WWTPs and towards the environment	Minimise environmental burden while minimising costs
E. Wastewater treatment plant (WWTP)	- Wastewater inflow from the SWDS in quantity and quality - Reuse water demand from consumers, quantity and minimum quality request - Nutrient recovery demand - Prices and conditions (for wastewater entering in quantity and quality, for purified water supplied to consumers, for discharge in environment, for chemicals recovered/needed, electricity)	- Treated water returned to environment in quantity and quality (for water authority) - Nutrients recovered in quantity and quality - Chemicals consumed and recovered in quantity and quality (for chemicals trader/supplier) - Reused water quality (for consumers) - Electricity consumption (for electricity supplier)	- Quality standards for reused water - Legal restrictions on water returned to the environment - WWTP capacity	- Minimise environmental burden while minimising costs - Maximise nutrient recovery and water reuse in line with the concept of a resilient circular economy.
F. Water authority	- Quantity of water catchment in different catchment points from the WTPs - Quantity and quality of wastewater return from the SDWS - Quantity and quality of purified water return from the WWTPs	Governing the water cycle by rewarding/punishing water draw and return to the environment		

Supply-demand interactions a,b,c,d,e,f,g,h,i are already identified and highlighted in the table. It is denoted which of the water cycle entities issues a supply function for certain interacting variables (denoted with S_x) and which issues a demand function (denoted with D_x) that is matched with that supply function and possibly a trade is performed to change the planned evolution of the interacting variables that actually installs a win-win situation for both entities; x stands here for any letter between 'a' and 'i'. E.g. for interaction 'a' – quantity of water needed by the WDS from a certain WTP and the corresponding minimum water quality request are optimized on the side of the WDS. WDS publishes the optimized quantity and minimum quality request for a certain WTP as well as a supply function (S_a) telling how much it requires to be compensated for a range of slight changes from the optimized quantity and minimum quality request, while the WTP publishes how much it is ready to pay for a range of slight changes in the optimized quantity and minimum quality request. If demand is higher than supply for a range of changes, the WDS and WTP will automatically agree on the central platform instance about the change with highest trading volume which will represent a maximum benefit increase for both. Similar reasoning holds for all other denoted interactions b-i between different water cycle entities.

Qualitative and quantitative data collected in different parts of WWTP:

	MEASUREMENT POINT/MEDIUM	PARAMETRES MEASURED	PARAMETRES CALCULATED
QUANTITATIVE	all measurement points (Picture X) in case of strong division, with technological path in-/effluent measured	volume: maximal, minimal, average [m3/h; m3/d]	inconspicuity coefficient of inflow
QUALITATIVE	Influent	BOD, COD, CODdis, N-NH4, TKN, Ptot, TSS, TOC, heavy metals	
	WW after mechanical treatment stage	BOD, COD, CODdis, N-NO2, N-NO3, N-NH4, TKN, Ptot, TSS, TOC, heavy metals	loads, treatment efficiency/reduction, fractions to work on
	Effluent	BOD, COD, CODdis, N-NO2, N-NO3, N-NH4, TKN, Ptot, TSS, TOC, heavy metals	
	Activated sludge process (at each stage)	LKT, P-PO4, Ptot, TKN, N-NH4, N-NO2, N-NO3, COD, CODdis, pH, Temperature, alkalinity, dissolved oxygen, SS (organic, mineral, total)	sludge age, oxygen sludge age, activated sludge growth, kinetic of reactions, loads, etc. ... to work on
		chemical reagents dosage and dosing period	
	Liquors 1,2,3	COD, CODdis, N-NH4, TKN, P-PO4, TSS, TOC	calculated volume
	Samples: primary, waste activated water, thickened	SS (organic, mineral, total)	
	Digestion process	Ntot, N-NH4, pH, temperature, CODdis, TOC, SS (organic, mineral, total), heavy metals, ...	organic load, retention time, etc. ... to work on
	Digestate	SS (organic, mineral, total), P-PO4, N-NH4, pH, alkalinity, Mg,	
	Dewatered sludge	DS concentration (total and organic), heavy metals, etc.	
	Biogas	CH4, H2S, CO2, O2, H2O, siloxanes	
	OTHER	chemical reagents dosage and dosing period if it appears, energy demand/consumption/production/ratio, etc. ... weather variations (outdoor temperature, rainfall...), to work on	

ANNEX III: Letters of Commitment

1. REWAISE REPLICATION SITES

Person	Organization		Country
	EYDAP (Athens Water Supply and Sewerage Company)		GR
	Celtic Anglian Water		IE
	Aguas de Algarve / Aguas de Portugal		PT
	VCS Denmark		DK
	Caltqua / Acque di Caltanissetta		IT
	Bulgarian WATER Association		BG



27th August 2019

Letter of Commitment as a Replication Site
from
EYDAP SA, Athens, GREECE

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CF-SC5-04-2019 "Building a water-smart economy and society", under the call: GRIFFINING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program

Dear Mr. Rogalla,

Thank you for inviting me to be a fast follower in implementing the results of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders

EYDAP is the largest company of its kind in Greece and serves approximately 4,400,000 customers (2,160,000 water meters) while the length of water pipelines is 14,000 km. The sewerage sector serves 3,500,000 residents with sewers spreading at almost 9,500 km.

In recent years, the sensitivity of people, governments and enterprises towards environmental protection has increased dramatically. As a Company involved in the supply and management of water, EYDAP couldn't stay idle. The principles that run across environment protection, sustainability and proper utilization of water resources and the retention of equilibrium in ecosystems are the main pillars of EYDAP's environmental policy. The Company's approach to environment protection is realized through concrete initiatives: in the reduction of energy consumption, protection of marine life, optimal use of water resources, and environmental sensitivity and awareness.

We strongly support the above-mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water-smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of REWAISE: a carbon-free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

We are already actively participating in H2020 projects, such as Smart-Plant, intended to develop and demonstrate innovative solutions for upgrading wastewater treatment facilities; Int-Catch, intended to focus on better water management with innovative and efficient systems, technologies and techniques for water.



monitoring at the watershed level. PVI-Adapt where combined innovations in modular construction and modular photovoltaics will lead to the creation of an adaptable and multi-functional BIPV system of substantially lower cost than conventional solution. Next-Gen that will assess and promote innovative circular economy solutions and systems to improve existing water resource management practices by presenting technology, business and intergovernmental water solutions in ten large-scale pilot demonstration projects across Europe. We agree that a future collaboration with REWAISE would definitively bring added-value to our activities, both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. Therefore, we look forward to integrate in our operations and future activities the outcomes of the REWAISE, and participating in the project with advice and provide strategic direction.

We are convinced that the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and none it will be selected for funding so that we can fully participate.



Deputy Director of Environment and R&D
EYDAP S.A.



Letter of Commitment as a Replication Site
from
CELTIC ANGLIAN WATER, Dublin, Ireland

delivered to

REWAISE: REStuErrr WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SCS-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to be a fast follower in implementing the results of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

Celtic Anglian Water (CAW) is part of one of the UK's largest water companies - Anglian Water, who provides water and recycling services to over 6 million customers in England. Operating for over 20 years in the Irish market we currently operate one of the Europe's largest wastewater treatment plants, at which we currently treat over 50% of Ireland's wastewater. CAW is a proven leader in the provision of innovative water, wastewater and resource recycling solutions for a range of sectors which include municipal, industrial and commercial industries in Ireland.

We strongly support the above mentioned European Initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

With our mother company Anglian Water, we are already actively participating in similar projects, looking for answers through a living lab at our Newmarket Innovation Shop Window: a real-world location where we drive innovation through collaboration across our business, supply chain and the entire man-made water cycle. There are already more than 100 organisations working on 62 projects, and we agree that a future collaboration with **REWAISE** would definitively bring added-value to our activities, both at social and community levels.



As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. Therefore, we look forward to integrate in our operations and future activities the outcomes of the **REWaise**, and participating in the project with advice and provide strategic direction.

We are convinced that the **REWASE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

28th August 2019

Head of Business Development

[illegible]



Letter of Commitment as a Replication Site
from
Águas de Portugal, SA, SGPS, Lisboa, Portugal

delivered to

REWAISE RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Mr. Rogalla,

Thank you for inviting me to be a fast follower in implementing the results of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

Águas de Portugal, SA, SGPS involves the integrate management of the urban water cycle: from the abstraction, treatment and distribution of water public consumption to the collection, transporting, treatment and disposal of urban and industrial wastewaters, including their recycling and reuse. Through its subsidiaries, the AdP Group is present throughout mainland Portugal, providing water supply and wastewater treatment services to around 80% of the Portuguese population.

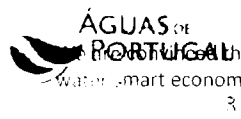
We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

We are already actively participating in similar projects, that is the case of **InteGrid**, whose vision is to bridge the gap between citizens, technology and the other players of the energy system.. There are already more than 100 organisations working on 62 projects, and .We agree that a future collaboration with REWAISE would definitively bring added-value to our activities, both at social and community levels.

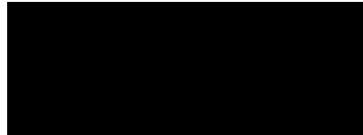
As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence.





that the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

28th August 2019



(Member of the Board)



Vandværksvej 7 DK-5000 Odense C
Denmark

Phone +45 63 13 23 33
Fax +45 63 13 23 34 info@
vcsdenmark.com
www.vcsdenmark.com

27 August 2019

Contact:
Per Henrik Nielsen Phone +45 29 69
24 23
phn@vcsdenmark.com

Letter of Commitment as a Replication Site
from
VCS Denmark Ltd., Odense, DENMARK

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY
to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Mr. Rogalla,

Thank you for inviting me to be a fast follower in implementing the results of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

VCS Denmark is the third largest water and wastewater company in Denmark. We operate 7 waterworks, 8 wastewater treatment plants and 3400 km of water and wastewater pipeline network. VCS Denmark is known as a frontrunner in the Danish water and wastewater sector. We have supplied the city of Odense with clean drinking water since 1853, and as a company, we embody more than 150 years of experience in water supply and wastewater management.

Today we are a modern water and wastewater company with 185 employees, all highly skilled professionals within their field. Through their daily work, our employees have developed hands-on experience with all aspects of water and wastewater management. We call it practical water knowledge.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

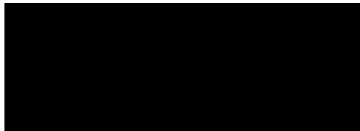


Our current focus is aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

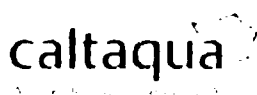
As a water and wastewater company we carry great responsibilities. Both towards our customers, and towards the environment. Not only is it our responsibility to provide such essential services as supplying clean drinking water and remove wastewater. It is also our responsibility to do so in an environmentally sustainable way: To minimize our impact on the environment - and to protect our precious water resources. We agree that a future collaboration with **REWAISE** would definitively bring added-value to our activities, both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. Therefore, we look forward to integrate in our operations and future activities the outcomes of the **REWAISE**, and participating in the project with advice and provide strategic direction.

We are convinced that the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Senior Project Manager
VCS Denmark Ltd.



27th August 2019

Letter of Commitment as a Replication Site
from
Acque di Caltanissetta s.p.a., Caltanissetta, ITALY

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Mr. Rogalla,

Thank you for inviting me to be a fast follower in implementing the results of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

Caltacqua, Acque di Caltanissetta SpA, is the manager of the integrated water service for the entire province of Caltanissetta since 27 July 2006. We combine the consolidated experience of the companies that are part of it with a large group of professionals equipped with the most advanced technology to guarantee every day a better service for supplying, purifying and purifying water in all the municipalities in the province of Caltanissetta.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use. We agree that a future collaboration with **REWAISE** would definitively bring added-value to our activities, both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. Therefore, we look forward to integrate in our operations and future activities the outcomes of the **REWAISE**, and participating in the project with advice and provide strategic direction.

We are convinced that the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Chairman of the Management Board
Acque di Caltanissetta s.p.a.

Letter of Commitment as member of the Stakeholder Engagement & Equality Community
from

BULGARIAN WATER ASSOCIATION - BWA, Sofia, BULGARIA

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SCS.04-2019 'Building a water-smart economy and society', under the call GREENING
THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded
under the European Commission Horizon 2020 Program

Dear Sir or Madam,

Thank you for inviting me to the **Stakeholder Engagement & Equality Community (SEEC)** of the H2020 REWAISE project
I am pleased to **participate** in this project led by Aquella and with many potent partners and stakeholders.

BWA develops expert appraisals, standpoints, strategies, technologies, and gives consultations on all issues concerning
water supply and sewerage, water treatment, preservation and utilization of water resources as well as participates in
projects with both national and international significance. BWA also organises and conducts training courses and
specializations in the country and abroad.

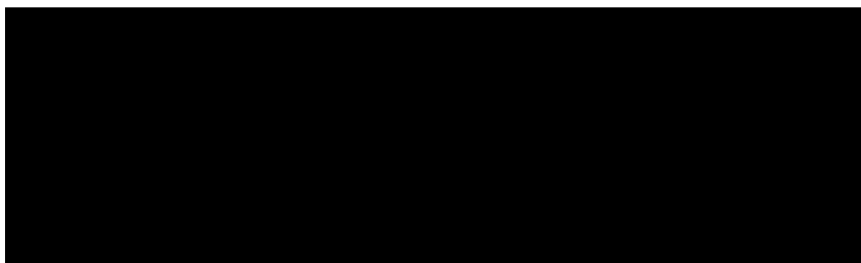
We strongly support the above mentioned European initiative for creating a new 'water ecosystem' in line with the
objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate
and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and
quality when necessary.

Our current focus is aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle
demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are
closely connected to various stakeholders to reduce water and energy use.

We are already actively participating in similar projects, such as WATenERgy CYCLE, and agree that a future
collaboration with REWAISE would definitively bring added-value to our activities both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and
integration of the future concept in our country and sphere of influence. In addition, we look forward to participating in the
Stakeholder Engagement & Equality Community contributing to periodic meetings and events, to support the project with
advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy and hope
it will be selected for funding so that we can fully participate.



REWAISE ADVISORY BOARDS

Category	Person	Organisation	Country
Scientific Advisory Board		University of Bath	 UK
		IHE Delft Institute for Water Education	 NL
		Jozef Stefan Institute	 SI
		Universidad de Cantabria	 ES
		University of Michigan	 US
		PUB (National Water Agency of Singapore)	 SG
		Smart Water Networks Forum SWAN	 IL
		EPA (Environmental Protection Agency of Lithuania)	 LT
		Bulgarian Academy of Science - Space Research and Technology Institute	 BG
		VAV (Agency of Water and Wastewater) - City of Oslo	 NO
		IGWWP - Chamber of Commerce Polish Waterworks	 PL
		Department Integrated Water systems and governance. IHE Delft	 NL
		EUREAU: European Federation of National Associations of Water Services	 BE
		ARA (Romanian Water Association)	 RO
Governance & Regulatory Ethics Advisory Panel		AEAS (Spanish Association of Water Supply and Sanitation Services)	 ES
		BALTIC ENVIRONMENTAL FORUM ESTONIA	 EE
		Junta de Extremadura (Regional Government of Extremadura)	 ES
		DANVA (Danish Water and Wastewater Association)	 DK

Stakeholder Engagement & Equality Community		European Irrigation Association		HR
		Majis Industrial Services (Industrial Water Solution Provider in Oman)		OM
		Aalborg University		DK
		Orange Telecommunication		ES
		EDEYA- Hellenic Association of Municipal Water and Sewerage Companies		GR
		EUSEA (European Science Engagement Association)		AT
		UMGENT Water of South Africa		ZA
		Latvian Institute of Aquatic Ecology		LV
		National Grid		UK
		Coventry & Warwickshire Enterprise partnership		UK
Investors Partnership		Global Impact Partners		FR
		SKION		DE
		Water Innovation Accelerator WIN		SE
		NEV WATER PARTNERS (managing over \$400 million USD of investment capital)		CA
		RESONANCE ASSET MANAGEMENT		UK
		REMONDIS AQUA		DE
		HSY (Helsinki Region Environmental Services Authority HSY)		FI
		EPSAR (Water Treatment Authority for the Region of Valencia)		ES



Mirella Di Lorenzo Associate Professor
(Reader) Department of Chemical
Engineering University of Bath BA2
7AY, Bath, UK m.di.lorenzo@bath.ac.uk
+44(0)1225 385574

27th August, 2019

**Re: Letter of Commitment as member of the Scientific Advisory Board for the project
REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY**

Dear Sir/Madam

With this letter, I wish to confirm that I am pleased to accept the invitation to be part of the Scientific Advisory Board for the REWAISE project application to the European Commission Horizon 2020 Program, CE-SC5-04-2019 "Building a water-smart economy and society", under the call GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), led by Aqualia.

I fully support REWAISE's mission to build a sustainable and smart water ecosystem for decentralised water services and decision making, aimed at reducing freshwater and energy use within a resilient circular economy.

My research expertise and interests are strongly in line with the objective of REWAISE. In particular, I have over 10 years of expertise on bioelectrochemical systems for energy recovery from wastewaters and water quality monitoring. I also work on development of eco-friendly and sustainable solutions for water-energy-food security. My research addresses the Global Sustainable Development Goals of: Clean Water and Sanitation (Goal 6), Affordable and Clean Energy (Goal 7), Climate Action (Goal 13). I have lead and co-lead several research projects in collaboration with ODA countries, such as Mexico, Colombia, Brazil, Kenya, Vietnam and India.

As such, my research is aligned with the main goal of REWAISE to establish a carbon free, resilient and sustainable water cycle, through innovative and smart tools that would allow the use of alternative water resources and recover materials.

I am already involved in related projects, such as the GREENER project funded by Horizon 2020 (call H2020-NMBP-B10-CN-2018), focused on sustainable and self-powered technologies for water and soil bioremediation, and I believe that the involvement in the REWAISE project would definitively bring added-value to my research activities, and particularly help establish links with key stakeholders in areas relevant to my research.

As such, I am happy to commit in exchanging and share information and efforts to facilitate the development of the activities planned in REWAISE. I am truly looking forward to be part of the scientific advisory board, and participate to periodic meetings and events, to support the project with advice and provide strategic direction.

In conclusion, I believe that REWAISE provides a clear and coherent strategy to build a water smart economy, and I hope it is selected for funding.

Sincerely,

A large black rectangular box redacting the signature of Mirella Di Lorenzo.

Letter of Commitment as member of the Scientific Advisory Board



**Department of Environmental
Engineering and Water
Technology**

From

Prof. Maria Kennedy, PhD
T +31 15 215 1774
E m.kennedy@un-ihe.org

02 September 2019

TO WHOM IT MAY CONCERN

from
INSTITUTE FOR WATER EDUCATION, Delft, Netherlands

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Scientific Advisory Board of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

IHE Delft Institute for Water Education is the largest international graduate water education facility in the world. Since its establishment in 1957, the Institute has played an instrumental role in developing the capacities of water sector organizations in the Global South, not least by strengthening the efforts of other universities and research centres to increase the knowledge and skills of professionals working in the water sector. IHE Delft carries out educational, research and institutional strengthening activities that complement and reinforce each other in the broad fields of water engineering, water management, environment, sanitation, and governance.

I strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and I am enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

IHE DELFT is already actively participating in or leading related projects, such as AfriAlliance: Africa-EU Innovation Alliance for Water and Climate (Coordinator) and agree that a future collaboration with the REWAISE project would definitively bring added-value to our activities.

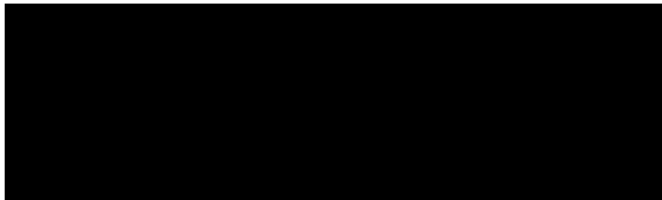
As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we

PO Box 3015, 2601 DA Delft, The Netherlands • Westvest 7, 2611 AX Delft • T +31 15 215 17 15 • info@un-ihe.org • www.un-ihe.org
The Institute is an independent entity not affiliated with the UNESCO/UNEP Secretariat and is solely the Foundation's own institution.



look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Professor of Water Treatment Technology
Department of Environmental Engineering and Water Technology

Jožef Stefan Institute, Ljubljana, Slovenia

Jamova cesta 39 POB 3000 SI - 1001 Ljubljana Slovenia / www.ijs.si
Tel: +386 1 477 3900 / Fax: +386 1 453 5400



Letter of Commitment as member of the Scientific Advisory Board From
Jožef Stefan Institute - Department of Environmental Sciences, Ljubljana, Slovenia

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGs), to
be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting us to the Governance and Regulatory Ethics Advisory Panel of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

The Jožef Stefan Institute - Department of Environmental Sciences is currently active in research and development of water purification and water conditioning technologies. We are one of the founding organisations of the Slovenian Water Technology Platform and member of the national Strategic innovation & development partnership for circular economy.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

We were or are actively participating in related national and international projects, such as *RusaLCA* (Nanoremediation of water from small waste water treatment plants and reuse of water and solid remains for local needs, Life+), *HYDRONET* (Floating Sensorised Networked Robots for Water Monitoring, FP7), *CYTOTHREAT* (Fate and effects of cytostatic pharmaceuticals in the environment and identification of biomarkers for an improved risk assessment on environmental exposure, FP7), *ACT CLEAN* (The way to cleaner production, Interreg Central Europe), *iNTeg-Risk* (Early Recognition, Monitoring, and Integrated

Jožef Stefan Institute, Ljubljana, Slovenia

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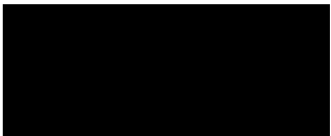
Management of Emerging, New Technology related Risks, EU PF7), *SMURBS* (Smart urban solutions for air quality, disasters and city growth, ERA PLANET H2020) and agree that a future collaboration with the REWAISE project would definitively bring added-value to our activities.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Scientific Advisory Board, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Ljubljana, 30 August 2019


Head of the Group of Isotope Geochemistry
Proposed member of the project Governance and Regulatory Ethics Advisory Panel


Head of Department of Environmental Sciences



Dpto. ingeniería de Comunicaciones

Letter of Commitment as member of the Scientific Advisory Board
from
DEPARTMENT OF COMMUNICATIONS ENGINEERING, UNIVERSITY OF CANTABRIA,
Santander, SPAIN

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Scientific Advisory Board of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

University of Cantabria played a key role in managing one of the r¹ Framework Program flagship projects named SmartSantander. It has become an inspiration initiative thanks to more than 15.000 devices deployed along the city of Santander. Collecting data from most of the urban services the city has evolved to a semiautonomous one behaving in a predictive way. The experience that we have gathered during near 10 years may be relevant for REWAISE initiative.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

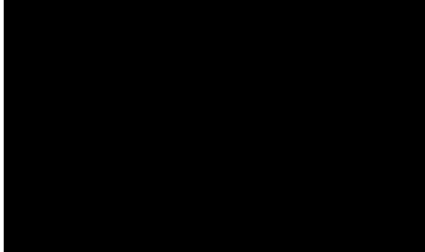
We are already actively participating in related projects, such as EAR-IT, FIESTA, OrganiCity, FESTIVAL WISE-IoT, SynchroniCity, and agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities, both at technical and commercial level.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

Edificio Ingeniería de Telecomunicación "Profesor José Luis Sarda"
Plaza de la Ciencia, s/n. 39005 Santander, SPAIN. Teléf +34 942 20 13 87. Fax: +34 942 20 14 91

We are convinced the Rewaise consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

19th August 2019





August 27, 2019

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REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

REWAISE is a Horizon 2020 project that aims to develop innovative water technologies and business models to address the challenges of water scarcity and contamination in the context of the circular economy. The project is led by Aqualia and involves many other partners, including the University of Michigan.

Dear Mr. Rogalla,

Thank you for inviting me to the Scientific Advisory Board of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

My Environmental Biotechnology research team and I believe that bringing innovative solutions to the market and harnessing water research and innovation, will result in great benefits for industry, policy makers and citizens in Europe. By implementing concepts of circular economy, the needs of a growing global population will be met within the sustainable limits of the planet's natural resources and eco-systems.

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

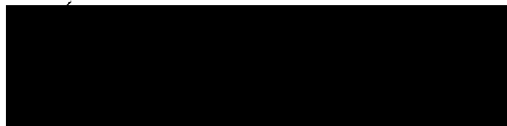
The main goal of **REWAISE** is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

We consider that 4Ward Cycle is aligned with the goals and interests of my Environmental Biotechnology research team at the University of Michigan, and agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities, both at technical and commercial levels.

We consider that **REWAISE** is aligned with the goals and interests of my Environmental Biotechnology research team at the University of Michigan, and therefore, we confirm our commitment to cooperate and support the project participating in the **scientific advisory board**, which advises and orientates the project providing strategic direction, guide quality improvement, and assess program effectiveness when necessary.

We look forward to participate in all relevant project events promoted by the partners, and hope it will be selected for funding.

Sincerely,



Altarum/ERIM Russell O'Neal Professor of Engineering

Tel: 6326 2950
Email: harry_seah@pub.gov.sg



Letter of

26 August 2019

Commitment as member of the Scientific Advisory Board from
PUB SINGAPORE'S NATIONAL WATER AGENCY, Singapore, delivered to
REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE
ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the
European Commission Horizon 2020 Program.

Dear Mr. Rogalla

Thank you for inviting me to the Scientific Advisory Board of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

2PUB, Singapore's National Water Agency, believe that bringing innovative solutions to the market and harnessing water research and innovation, will result in great benefit for industry, policy makers and citizens in Europe and other regions. By implementing concepts of circular economy, the needs of a growing global population will be met within the sustainable limits of the planet's natural resources and eco-systems.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

Our current initiatives are aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

Our R&D projects are conducted in-house while others are test-bedding projects held in our facilities for performance check. We have collaborated on an array of projects in Intelligent Watershed Management, Water Treatment, Wastewater Treatment, Water Quality and Security, Network Management and Membrane Technology. We agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities, both at technical and commercial levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Yours Sincerely

Chief Engineering and Technology Officer PUB,
Singapore's National Water Agency

400, North Bridge Road, Singapore 079504
Tel: 6326 2950 Fax: 6326 2951 Email: harry_seah@pub.gov.sg
Website: www.pub.gov.sg

Letter of Commitment as member of the Scientific Advisory Board
from

Smart Water Networks Forum, Surrey, UK

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY
to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Scientific Advisory Board of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

The Smart Water Networks Forum (SWAN) is the leading global hub for the smart water sector, accelerating the awareness and adoption of data-driven technologies in water and wastewater networks worldwide. A non-profit organisation, SWAN brings together key players in the water sector to collaborate and share knowledge while offering access to cutting-edge research, global networking opportunities, and the ability to proactively influence the future of the water industry.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use. We agree that a future collaboration with the REWAISE project would definitively bring added-value to our activities, both at technical and commercial levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the Rewaise consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Executive Director
SWAN Forum



Vilniaus vandenis

August, August 2019

Letter of Commitment as member of the Scientific Advisory Board from
VILNAUS VANDENYS, Vilnius, LITHUANIA delivered to

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN
LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European
Commission Horizon 2020 Program..

Dear Mr Rogalla

Thank you for inviting me to the Scientific Advisory Board of the H2020 REWAI SE project and pleased to participate in this project led by Aqualia and with many potent partners.

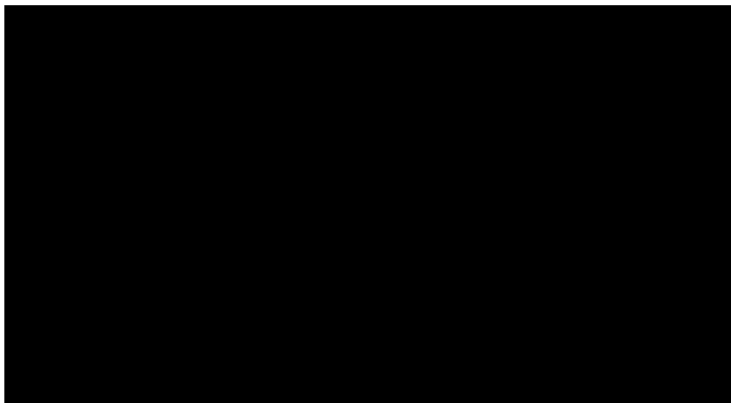
As experienced environmental expert, I believe that bringing smart solutions on waste minimization to the market and harnessing water research and innovation, will resulting great benefit for industry, policy makers and citizens in Lithuania and other countries.

I strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

My current initiatives are aligned with the main goal of REWAI SE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and I am in close contact with various stakeholders to reduce water and energy use.

As such, I am committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in Lithuania. In addition, I look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

I am convinced the Rewaise consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Letter of Commitment as member of the Scientific Advisory Board
from
REMOTE SENSING AND GIS DEPARTMENT (RS&GIS), SPACE RESEARCH AND
TECHNOLOGY INSTITUTE, BULGARIAN ACADEMY OF SCIENCES (SRTI-BAS), Sofia,
BULGARIA

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Scientific Advisory Board of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

The mission of RS&GIS Dept. at SRTI-BAS (URL: <http://www.rse-sg.com>) is "Development, improvement, and transfer of methods for environmental studies with integrated use of Earth observation technologies, geoinformation systems and ground-based methods.". The Department comprises 14 researchers and specialists and 2 specialised Labs: "Space Biotechnology Laboratory" and "FLSSM - Field Laboratory for Sub-Satellite Measurements" which are equipped for field and laboratory experiments of terrestrial and aquatic ecosystems at large.

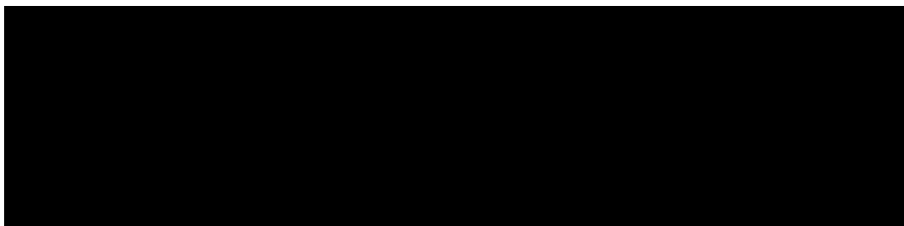
We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

We are already actively participating in related projects, such as PROAGROBURO (BELSPO), TS2AgroBG (ESA-PECS) and agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities, both at technical and commercial levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we look forward to participating in the scientific advisory board, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.





Letter of Commitment as member of the Governance and Regulatory Ethics Advisory Panel from
CITY OF OSLO, Agency for Water and Wastewater Services, Oslo, NORWAY delivered to
REWAISE: RESilient WATER Innovation for Smart Economy

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

City of Oslo, Agency for Water and Wastewater Services, believe that bringing innovative solutions to the market and harnessing water research and innovation, will result in great benefit for industry, policy makers and citizens in Europe. By implementing concepts of circular economy, the needs of a growing global population will be met within the sustainable limits of the planet's natural resources and eco-systems.

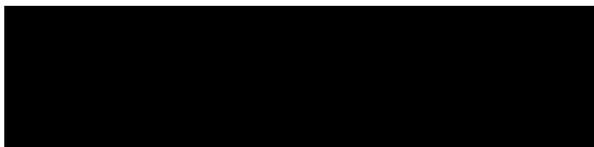
We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

We are already actively participating in H2020 projects, for example **STOP-IT**, that focuses on the strategic, tactical and operational protection of critical water infrastructures against physical and cyber threats. To protect them, Stop-It brings together a strong team of 23 partners from across Europe and Israel to develop solutions to the most pressing threats. The team identifies risks and co-develops an all-hazards risk management framework for the physical and cyber protection of critical water infrastructures. We agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



City of Oslo, Agency for Water and Wastewater Services



Izba Gospodarcza
WODOCIĄGI POLSKIE

Bydgoszcz, 06.04.2020

Letter of Consent as a member of the Governance and Regulatory Ethics Advisory Panel

IZBA GOSPODARCZA WODOCIĄGI POLSKIE, Bydgoszcz, Poland

delivered to:

the Consortium of the REWAISE project coordinated
and supported by the Administrative

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the DE-SC3-04-2018 "Building a water-smart economy and society" call of the GREENING THE
ECONOMY - JNCL 2014-1 THE SUSTAINABLE DEVELOPMENT GOALS
to be funded under the European Commission Horizon 2020

Dear Mr. Rogalla

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners

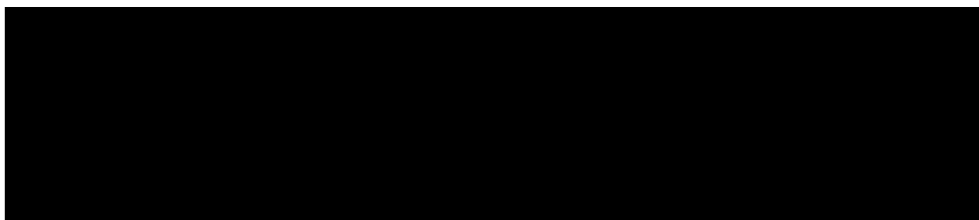
Izba Gospodarcza „Wodociągi Polskie” is the only organization – economic self-government – the water and sewage industry, in Poland. Established in 1991, today it associates 491 water and sewage associated enterprises. Being a member of European Federation of National Associations of Water Companies (EFNAC), Izba participates actively in three EUREAU commissions on: Drinking Water, Waste Water treatment as well as Economics and Legal Affairs. Izba Gospodarcza is **always** seeking for innovative solutions to create favorable conditions for the functioning of Polish water sector with the greatest respect for protection of the natural environment and sustainable economic development.

We welcome the above mentioned European initiative for creating a new "water ecosystem" with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

As a result, **Izba Gospodarcza „Wodociągi polskie”** is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our sphere of influence in Poland. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate in it. We are committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in Poland.



email: j.kucharski@iawp.org.pl mobile: +48 517 013 728



Frank Rogalla
Head of Technology
Aqualia
Madrid
SPAIN

Department of Integrated
Water Systems and
Governance

Dr. Uta Wehn
Associate Professor

T +31 (0)15 275 1970
E u.w@un-delft.nl

13 August 2019

Letter of Commitment to act as member of the Governance and Regulatory Ethics Advisory Panel of the
H2020 REWAISE project proposal - RESILIENT WATER INNOVATION FOR SMART ECONOMY

Dear Mr. Rogalla,

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 **REWAISE** project - I am pleased to participate in this project, led by Aqualia and with many competent partners.

IHE Delft Institute for Water Education is the largest international graduate water education facility in the world. Since its establishment in 1957, the Institute has played an instrumental role in developing the capacities of water sector organizations in the Global South, not least by strengthening the efforts of other universities and research centres to increase the knowledge and skills of professionals working in the water sector. IHE Delft carries out educational, research and institutional strengthening activities that complement and reinforce each other in the broad fields of water engineering, water management, environment, sanitation, and governance.

As a social scientist from the field of science, technology and innovation studies with a background ICTs, I work at the intersection of digital innovation, data and knowledge co-creation, and water & environmental management and governance. My research and capacity development activities focus on the social dynamics of innovation and how to harness digital transformations for participatory environmental governance and sustainable behaviour. I have pioneered the field of water innovation studies, represent IHE Delft at high level policy initiatives such as the OECD Water Governance Initiative and am a member of the EIP Water Steering Group.

We strongly support the intention of the REWAISE proposal to create a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of REWAISE - a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials - and we are in close contact with various stakeholders to reduce water and energy use.

PO Box 3015, 2601 DA Delft, The Netherlands • Westvest 1, 2611 AX Delft • T +31 15 275 17 15 • info@un-delft.nl • www.un-delft.nl



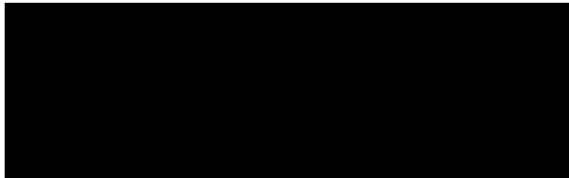
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21

We are already actively participating in or leading related projects as *AfriAlliance: Africa-EU Innovation Alliance for Water and Climate* Consortium and agree that a future collaboration with the **REWAISE** project would definitely bring added value to our initiatives.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Yours sincerely,



Associate Professor of Water Innovation Studies
IHE Delft Institute for Water Education

EurEau

Letter of Commitment

As member of the
Governance and Regulatory Ethics Advisory Panel
from
EurEau (Brussels, Belgium)

to sign up to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

REWAISE is a project funded by the European Union under the Horizon 2020 research and innovation programme. The project aims to develop a new "water ecosystem" in line with the objectives of the circular economy, developing a water-smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Dear Sir or Madam

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 **REWAISE** project. I am pleased to participate in this project led by Aqualla and with many plant partners.

EurEau is the voice of European water service providers. Through our 32 member associations from 29 countries, we represent public and private drinking and waste water operators of all sizes and from different climatic and regulatory contexts. Our pool of 180 experts enables us to collect the views of qualified practitioners from across the continent, and to use them as multipliers when disseminating information.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water-smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current vision is aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

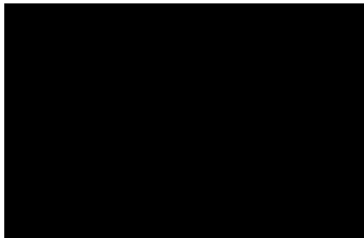
Sincerely,
[Signature]

We have already been actively participating in related projects, such as POWERSTEP and INCOVER, and agree that a future collaboration with the REWAISE project would definitively bring added value to our activities.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Brussels, 26 August 2019





Asociația Română a Apei

Letter of Commitment as member of the Governance and Regulatory Ethics Advisory Panel
of the
Romanian Water Association, Bucharest, Romania
delivered on

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC3-04-2019 "Building a water-smart economy and society" under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program

26.08.2019

Dear Sir or Madam

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

Romanian Water Association (ARA) is an employers' association and professional, based on three pillars: entrepreneurs, professionals, and suppliers. ARA facilitate and promote cooperation between its members in order to identify new approaches to sustainable and cost-effective solutions to improve the quality of water resources management and water supply services, sewerage and wastewater treatment. ARA and its members are involved in promoting sustainable and holistic management of water resources, by integrating water supply, sewerage and wastewater treatment in concepts broader term development and environmental protection. We welcome the above mentioned European initiative for the demonstration at large scale of the applicability of innovative technological concepts for a circular economy to improve the efficiency of water services in the future.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of **REWAISE**, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the **REWAISE** consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.





F-15-2019

Madrid 29th August 2019

Subject: Letter of Commitment as member of the Governance and Regulatory Ethics Advisory Panel FROM AEAS TO REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

Dear Mr Rogalla

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

AEAS, the Spanish Association of Water Supply and Sanitation, is the leading technical and professional association of water service providers and other collaborating entities, who provide operation, maintenance and management of urban water services, which include water supply and sanitation, whether they are public, private or mixed. Our partners provide service to more than 37 million people in more than 1,700 municipalities (86% of the Spanish population).

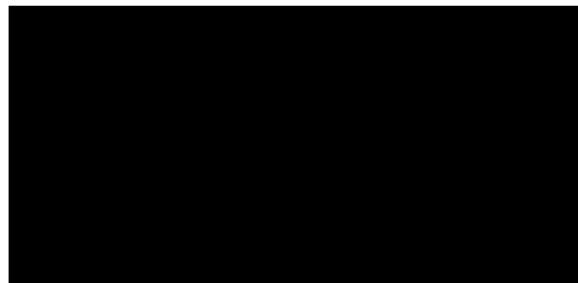
As the voice of the urban water sector in Spain, we are interested in the results of projects and specific actions that propose novel solutions for a more efficient management of resources, the reduction of environmental impact and the implementation of collaborative innovation processes that follow Responsible Research and Innovation principles.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities. We will make available Ms. Gari Villa-Landa Sokolova, responsible for International Affairs for the close follow-up of the project.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



LETTER OF COMMITMENT
from
BALTIC ENVIRONMENTAL FORUM ESTONIA Tallinn, ESTONIA
delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

In topic CF-SC5-04-2019 "Building a water-smart economy and society" under the call
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program

Baltic Environmental Forum Estonia is a non-governmental organization working in the areas of environmental protection and nature conservation since 1995. Our main aim is to preserve sustainable environment through raising awareness and promoting environmental management to increase knowledge and improve skills of different stakeholders (authorities, consumers, industry etc). In recent years we have been working a lot with hazardous substances, marine issues and climate adaptation.

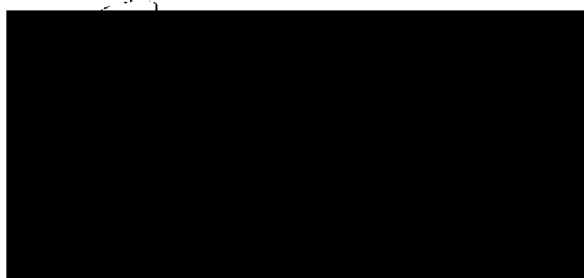
We are eager to contribute to the above project proposal for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

This Entity is committed to bring our experience from related projects in which we are participating, such as LIFE UrbanStorm and NONHAZCITY and agree that a future collaboration with the REWAISE would definitely bring added-value to our activities, both at technical and commercial levels.

As such, **BALTIC ENVIRONMENTAL FORUM ESTONIA** will exchange knowledge and share information and support efforts to facilitate the development, implementation and market uptake of the future concepts in our water management activities in ESTONIA.

We are particularly interested to participate in the Exploitation and Stakeholder Panels and are looking forward to starting this exciting endeavour to change the paradigm of the European water industry, mobilising our co-funding as much as possible.



**Letter of Commitment as member of the Governance and Regulatory Ethics
Advisory Panel**

from
JUNTA DE EXTREMADURA

delivered to
the consortium coordinated by AQUANA, S.L.
and proposing the collaborative letter

REWAISE RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-G4-2019 "Building a water-smart economy and society" under the call: **GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS SDGs**, to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the **Governance and Regulatory Ethics Advisory Panel** of the H2020 **REWAISE** project – I am pleased to participate in this project led by AQUANA and with many potent partners

JUNTA DE EXTREMADURA (JUNTAEX) is the regional Government of the Spanish autonomous community of Extremadura establishing policy and directing the administration of the Autonomous Region

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of **REWAISE** is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised

We plan to participate in related projects and agree that a future collaboration with the **REWAISE** project would definitively bring added-value to our activities, both at technical and commercial levels.

As such, **JUNTA DE EXTREMADURA** is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in Spain.

We consider that **REWAISE** is aligned with the goals and interests of **JUNTAEX** and therefore we confirm our commitment to cooperate and support the project participating in the **Governance and Regulatory Ethics Advisory Panel**, which advises and orientates the project providing strategic direction, guide quality improvement and assess program effectiveness when necessary

forwarded to the relevant authorities for their consideration. The parties
be selected in the event of a dispute.

10/04/2020





Dear Mr. Krogstad

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

Clean water to Denmark and the world - the vision of DANVA - Danish water and wastewater association, the national branch association for Danish water and wastewater utilities

DANVA UNITES all water utilities involved in the daily supply of clean drinking water, wastewater management and flood prevention based on traditional and innovative methods for adapting to climate change.

DANVA SUPPORTS all water utilities involved in developing and implementing innovative water solutions for Denmark and the rest of the world.

DANVA COMMUNICATES about the value and impact of Danish water solutions that create better living conditions and contribute to growth in Denmark.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

We are already actively participating in related projects, such as Bonus CLEANWATER, (where the aim is to develop ECo-technological solutions for removal of micro-pollutants and microplastic for contaminated water), and The Nordic Phosphorus Network (where we cooperate about phosphorus recovery from bio-waste and wastewater). In addition, many of our members at the water utilities are involved in different projects related to resource recovery. We agree that a future collaboration with the REWAISE project would definitely bring added value to our activities.

As such, DANVA Danish Water and Wastewater association is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in the Nordic countries (Sweden, Norway, Finland, Iceland). In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Contact details: Helle Kayerød - hke@danva.dk



Letter of Invitation to participate in the Stakeholder Engagement & Equality Community

From

European Irrigation Association
Diamant E 120, Boulevard Auguste Reyers 8, 1050 Brussels, Belgium

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SCF-04-2019 "Building a water-smart economy and society" under the call: GREENING THE ECONOMY, IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGs), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 **REWAISE** project. I am pleased to participate in this project on behalf of the European Irrigation Association (EIA), led by Aqualia and with many potent partners and stakeholders.

The European Irrigation Association represents professionals from agriculture, landscape and turf irrigation sectors, with membership including some of the leading irrigation product manufacturers, irrigation distributors and contractors, as well as independent irrigation planners and specifiers. The Association is strongly committed to promoting innovation in products, practices and services related to water management: irrigation.

Since its establishment in 1991, the EIA organized number of specialized training courses, conferences and forum events aimed at mobilizing irrigation industry professionals and other stakeholders towards continuous improvement of policies and practices in conservation, distribution and recovery of water resources for economic needs.

Among its' recent activities, the EIA contributed to public consultation over EU Commission proposal for a Regulation on Minimum Requirements for Water Reuse, through the Policy Paper which highlighted concerns over some aspects of the new regulatory framework that may potentially hamper, instead of facilitate the uptake of wastewater re-use practice in Europe. In late 2016 the EIA organized an industry forum event "The proposal for an EU water reuse regulation: a missed opportunity?" which enabled exchange between the key irrigation industry players and some of the leading European experts in wastewater re-use.

European Irrigation Association (EIA)
Diamant E 120, Boulevard Auguste Reyers 8, 1050 Brussels, Belgium
Tel: +32 (0)2 735 00 00 - Fax: +32 (0)2 735 00 01 - Email: info@eia-irrigation.eu - Website: www.eia-irrigation.eu - Registration Number: 0195 041 066 000



We will support the above mentioned European project in creating a new water ecosystem in line with the priorities of the EU, developing a water smart economy and society and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

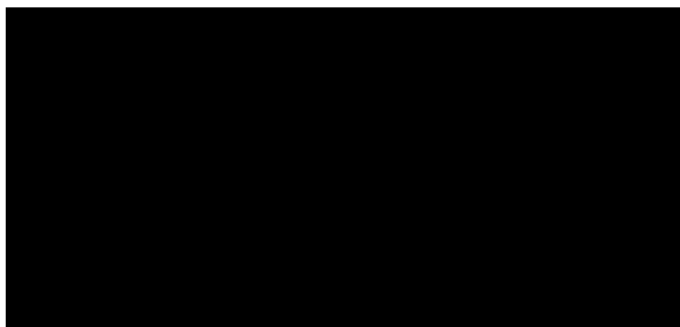
Our current focus is aligned with the main goal of REWAISE: a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

An important role of the European Irrigation Association is in transmitting the findings and results of relevant public funded research to irrigation professionals, as well as informing various other stakeholders of advances in irrigation technologies and practices. Future collaboration with REWAISE would definitely bring added value to our activities, both at social and community levels.

The European Irrigation Association is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in the European Union and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy and hope it will be selected for funding so that we can fully participate.

Zagreb, 28.08.2019.



European Irrigation Association, EIA
Blueprint - Brussels - Angela Reuter (EIA Vice President - Belgium)
and European Association of Crop Scientists, EAC
Transparency Register number 507612076000



Dear

MAJIS INDUSTRIAL SERVICES
as
delivered to REWAISE (the
a water smart economy and
the GREENING
THE EUROPEAN UNION
THE EUROPEAN UNION
the
under the
European
horizon 2020

Dear Mr. Rogalla

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of REWAISE - a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Fax: +968 26852444

majis.com

majis.com

Tel: +968 26852400

Letter of Intent as part of the Stakeholder Engagement & Equality Community

Civil Engineering Department, Engineering, Aalborg University

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the call DE-S05-04-2019 "Building a water-smart economy and society" under the
GREENING THE ECONOMY - II - THE SUSTAINABLE DEVELOPMENT GOALS
to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders

Description of the field and capabilities of the supporting entity: Quantification of microplastics in environmental matrices - analytical methods for microplastic quantification - research in sources, pathways and fate of microplastics

We are eager to contribute to the above project proposal for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

This Entity is committed to bring our experience from related projects in which we are participating such as Farpiesstic-sea and agree that a future collaboration with the REWAISE would definitely bring added-value to our activities, both at technical and commercial levels.

As such, Aalborg University, Department of Civil Engineering will exchange knowledge and share information, and support efforts to facilitate the development, implementation and market uptake of the future concepts in our water management activities in Denmark - addition, we look forward to participating in the Stakeholder Engagement & Equality Community contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate

Aalborg, the 23rd of August 2019





Letter of Intent
ORANGE ESPAGNE
REWAISE: RESilient
to the topic DE-SC5-04-2019
FREEDOM THE ECONOMIC GROWTH THE SUSTAINABLE DEVELOPMENT GOALS
to be funded by the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

ORANGE ESPAGNE is a Company authorize to provide telecommunications (voice and data) services in Spain. The country is the second market of the Orange Group, one of the world's leading telecommunications operators with 266 million customers as of June 30, 2019. With a value generation project based on convergence, innovation and quality of service, we are the second operator in the Spanish telecommunications market and one of the main foreign investors in the country.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

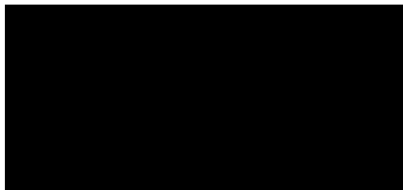
Our current focus is aligned with the main goal of REWAISE: a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

We are already actively participating in similar projects and agree that a future collaboration with REWAISE would definitely bring added-value to our activities, both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Madrid, 29th August 2019



Letter of Commitment as member of the Stakeholder Engagement & Equality Community
from

E.D.E.Y.A. Larissa - GREECE

delivered to

RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CF-SC5-04-2019 "Building a water-smart economy and society", under the call
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SOGS) to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 **REWAISE** project. I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders.

The Hellenic Association of Municipal Water and Sewerage Companies abbreviated E.D.E.Y.A. was founded in 1989 and is a **non profitable and non governmental organization**. E.D.E.Y.A. is located in the city of **Larissa in central Greece**.

E.D.E.Y.A. has 117 D.E.Y.A. (Municipal Water and Sewerage Companies) members all over Greece.

The law 1069/80 was the main reason why the Association was established. Its purpose is to coordinate the activities of its members and represent them. Furthermore, **it assists its members** to improve their services in the water supply and sewage sectors.

More specifically EDEYA:

- **Claimed sustainable solutions** from the State (Ministry of Interior and Ministry of Energy and Environment and other relevant Authorities) for the legal, institutional and financial problems of its members.
- **Submitted several proposals** and **cooperated** with the Ministry of Interior to replace the institutional framework of its members.
- **Submitted a coherent proposal** to the Special Secretariat of Water regarding the Water Resources Management in Greece.
- **Transfers** to its members information, experience and knowledge related to their activities.
- **Informs** its members about the European Environmental Programmes and participates as partner in relevant projects.
- **Organizes** educational programmes, seminars and workshops for the personnel of D.E.Y.A.s.

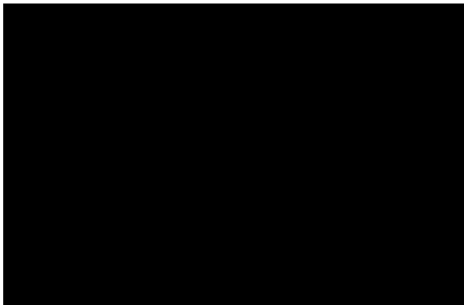
We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

We agree that a future collaboration with REWAISE would definitively bring added-value to our activities, both at social and community levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the Rewarse consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



Letter of Intent as Stakeholder Engagement & Equality Community

European Science Engagement Association, EUSEA, Vienna, Austria

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the **CE-915-04-2019** "Building a Water-Smart Economy and Society for a Resilient and Greening the Economy" **LINE 1**, **THE SUSTAINABLE DEVELOPMENT GOALS** to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners and stakeholders

The European Science Engagement Association, EUSEA, is an international community of public engagement professionals, science festival and science event organizers. The association comprises about 110 members, including universities and scientific institutions, science festival organisations, science centres and museums, municipalities and NGO's. The network has developed from a knowledge-sharing platform for European science festivals to a collaborative community of public engagement professionals developing and testing new formats of science communication, building relationships with researchers, policy-makers and stakeholders from scientific institutions, higher education institutions, municipalities and regions.

EUSEA member institutions cover almost all European countries and some non-European states such as Israel, Georgia or Egypt. EUSEA members can provide experience and knowledge to conduct complex co-creative public engagement and science communication strategies addressing a wide range of target groups. The geographic distribution of EUSEA members allows the organisation to cover most European countries.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

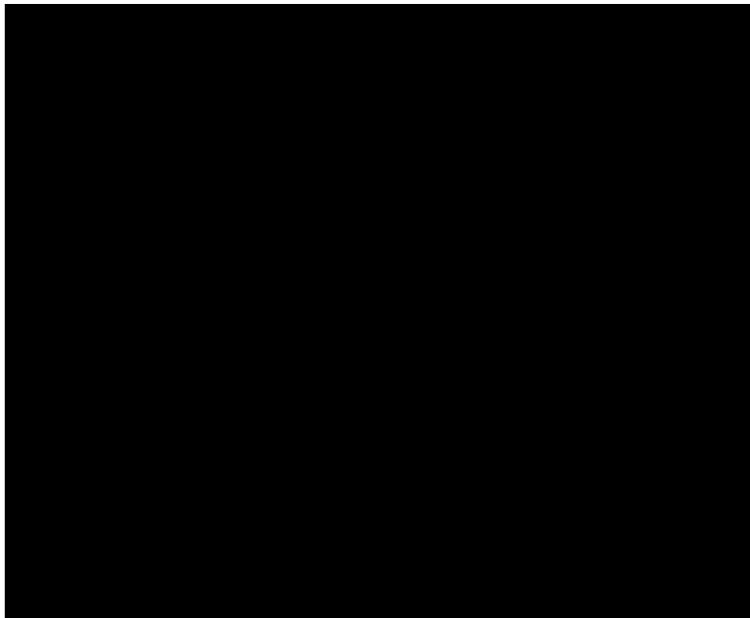
Our current focus is aligned with the main goal of REWAISE: a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

We are already actively participating in similar projects, such as the FP 7 project PLACES or the HORIZON 2020 projects 'NUCLEUS PERFORM' or SUSTAIN and agree that a future collaboration with **REWAISE** would definitely bring added-value to our activities, both at social and community levels.

...in the ... efforts ... facilitate ...
... we ... State ... E ... & ...
... meetings and events ... the project ... advice and ...
... success ...

We are convinced the Rewaise ... has a clear ... coherent strategy for ... a water ...
smart ... and hope ... be selected for ... so that we can ...

26 August 2019





UMGENI WATER is a public entity established in 1974 to provide water services - water supply and sanitation services - to other water services institutions in its service area. The organisation is a National Government Business Enterprise which reports directly to the Department of Water Affairs of the Republic of South Africa. UMGENI WATER, it is one of the largest water utilities in Southern Africa and it has an operational area of 24 155 km². As society we are facing several environmental and resource efficiency challenges including water shortage and climate change adaptation and mitigation.

Dear Mr. Rogalla

Thank you for inviting me to the Stakeholder Engagement & Equality Community (SEEC) of the H2020 REWAISE project. I am pleased to participate in this project led by Aquaria and with many potent partners and stakeholders.

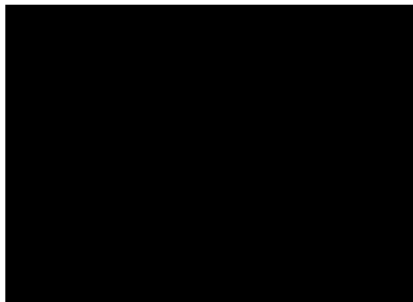
UMGENI WATER is a public entity established in 1974 to provide water services - water supply and sanitation services - to other water services institutions in its service area. The organisation is a National Government Business Enterprise which reports directly to the Department of Water Affairs of the Republic of South Africa. UMGENI WATER, it is one of the largest water utilities in Southern Africa and it has an operational area of 24 155 km². As society we are facing several environmental and resource efficiency challenges including water shortage and climate change adaptation and mitigation.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide in community engagement and equal access to services for all citizens, and assess program effectiveness and quality when necessary.

Our current focus is aligned with the main goal of REWAISE - a carbon free, resilient and sustainable water cycle demonstrating innovative and smart approaches to use alternative water resources and recover resources, and we are closely connected to various stakeholders to reduce water and energy use.

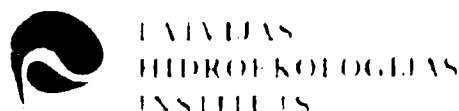
As such, our entity is committed to exchange and share information and efforts aiming to facilitate the development and integration of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



ent

of n Africa



23 August 2019

Riga

No 19-40

LETTER OF COMMITMENT

from

Latvian Institute of Aquatic Ecology Riga, LATVIA

for

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

In topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) to be funded under the European Commission Horizon 2020 Program

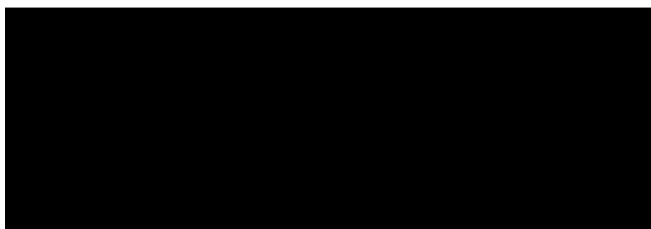
Latvian Institute of Aquatic Ecology (LIAE) is a research institute with expertise in marine and freshwater environment and ecology, founded in 1995. LIAE is responsible for national marine monitoring and data reporting in line with EU Marine Strategy Framework Directive, has to contribute to national maritime spatial plan and respective data collection. LIAE has a large experience in marine oceanographic observations and measurements *in situ* in the Baltic Sea. Investigations of aquatic ecosystem health and impacts of natural and manmade polluting and toxic substances has concentrated in excellence of eco-toxicological tests using various organisms. For the last two years LIAE is working intensively in the direction of the plastic pollution to have a comprehensive view on amounts, sources and impacts on both marine and freshwater ecosystems. LIAE has a long-term experience in administration and management of both national and international projects, including Framework Programmes 5, 6 and 7, Horizon2020, Interreg III-V regional and bilateral programmes, and EEA/Norway grants. Currently LIAE is participating at 18 various projects.

We are eager to contribute to the above project proposal for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

LIAE is committed to bring the experience from related projects in which we are participating, such as FanPLESSic-Sea and agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and academic levels. As such, LIAE will exchange knowledge and share information, and support efforts to facilitate the development and implementation of the future concepts in our water management activities in Latvia.

We are particularly interested to participate in the Stakeholder Panel and are looking forward to starting this exciting endeavour to change the paradigm of the European water industry, mobilising our co-funding as much as possible.

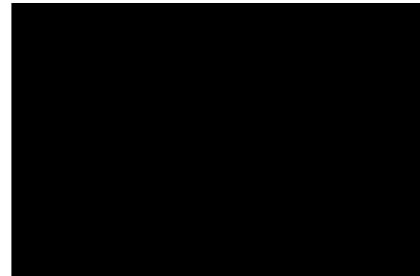


X / 0

nationalgrid

National Grid
House
Street

Mr.
2 St. Street.
Coventry
CV4 2LZ



Date: 29 August 2019

Letter of Commitment as member of the Stakeholder Engagement &

Equality Community from

NATIONAL GRID GAS PLC, WARWICK, UK

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGs): to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the Scientific Advisory Board of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and additional partners

National Grid Gas Transmission (NGGT) owns and operates the National Transmission System (NTS) ensuring gas is taken from entry into the UK to its customers and Gas Distribution offtake sites around the UK. NGGT have committed to decarbonise gas transmission with the use of bio-methane and hydrogen amongst other emerging technologies. Through this project NGGT would be interested in the end product and whether localised bio-methane and hydrogen injection sites could be linked to waste water treatment plants. Our capabilities include how these sites could be connected to the NTS and the impact of these new gas mediums on the existing network.

We strongly support the above mentioned European initiative for creating a new water ecosystem in line with the objectives of the circular economy: developing a water smart economy and society, and we are enthusiastic to cooperate and guide quality improvement, and assess program effectiveness when necessary.

National Grid
Registered Office: 1-3 Strand, London WC2N 5EH
Registered in England and Wales: 04401015

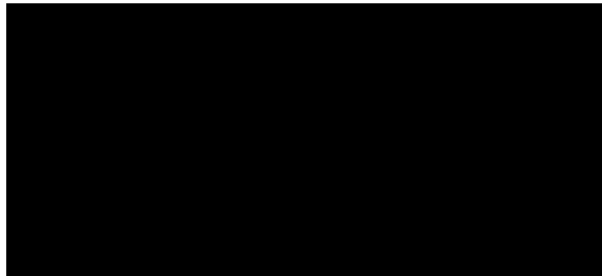
Initiatives are demonstrating innovative and use alternative and sustainable water and energy resources and materials. We are stakeholders to reduce water and energy use.

We are already actively participating in related projects such as Project Cayendish which is looking at the introduction of hydrogen to the Isle of Grain and the Feasibility of Hydrogen on the NTS project focusing more on the engineering challenges of hydrogen in our existing pipework. NGGT agree that a future collaboration with the REWAISE project would definitely bring added-value to our activities both at technical and commercial levels.

As such, National Grid Gas Transmission is committed to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Stakeholder Engagement & Equality Community, contributing to periodic meetings and events, to support the project with advice and provide strategic direction.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy and hope it will be selected for funding so that we can fully participate.

Yours sincerely,





REWAISE

REWAISE: THE BLUE

REWAISE: THE BLUE
GREENING THE ECONOMY
of the European Commission

REWAISE: THE BLUE
GREENING THE ECONOMY
of the European Commission

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REWAISE: THE BLUE
GREENING THE ECONOMY
of the European Commission

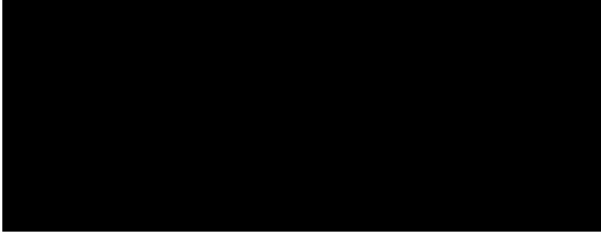
REWAISE: THE BLUE
GREENING THE ECONOMY
of the European Commission

REWAISE: THE BLUE
GREENING THE ECONOMY
of the European Commission

[illegible]

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The *Agrobacterium* strains were grown in the YEA medium for 24 h at 28°C. The cell concentration of the strains was adjusted to 1.0 × 10⁸ cells/ml. The cell suspension was then diluted to 10⁶, 10⁷, 10⁸, 10⁹ and 10¹⁰ cells/ml. The cell suspension was then mixed with the plant tissue and the transformation efficiency was determined. The results are shown in Table 1.

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know and hope be selected for funding so that we can publicize



1945-1946

Global Impact PARTNERS

Letter of Commitment as member of the Investors Partnership from
GLOBAL IMPACT PARTNERS delivered to
REWAISE, REsilient Water Innovation for Smart Economy
to the topic CE-SC5 04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

20th August 2019

Dear Mr. Rogallo

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

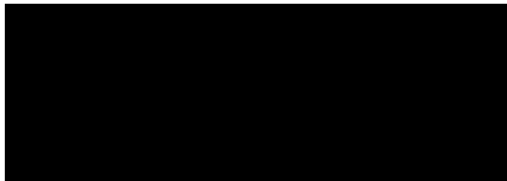
GLOBAL IMPACT PARTNERS is a company, which works at the international level in partnership with public organisations, investment funds, industries, large companies, SMEs and start-ups on developing the innovation portfolio, undertaking technology benchmark and facilitating market development and access.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy: developing a water smart economy and society, and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

Our current initiatives are aligned with the main goal of REWAISE: a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our sphere of influence. In addition, we look forward to participating in the Investors Partnership, contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



ion

LETTER OF INTENT as of 27 August 2019

Water Bad

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

Topic: CE 3-15-14-01-9 "Building a water-smart economy and society" under the call: GREENING THE ECONOMY, IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

SKion Water is the holding company bundling German entrepreneur Susanne Klatten's investments in the water sector. Over the last decade, SKion has invested into several water technology companies globally and today our portfolio companies realize an annual turnover of ~600 million Euros providing fresh water and waste water treatment solutions to both municipal and industrial customers. SKion's mission in water includes supporting the introduction of advanced technologies into the water market. To this end, SKion invests into innovative water technology companies and encourages its portfolio companies to partner with young technology companies to help bring their technologies to the market.

We are eager to contribute to the above project proposal for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society. The objectives of REWAISE also are a good match with our initiatives to deliver digital solutions to the water market.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By proactive governance appropriate, managing risks, water scarcity and contamination is minimised.

As such, SKion Water will exchange knowledge and share information and support efforts to facilitate the development, implementation and market uptake of novel concepts and technologies across our water portfolio.

We are particularly interested to participate in the Investors's Partnership as we believe this is the area where we can add the most value to REWAISE. We are looking forward to starting this exciting endeavour to change the paradigm of the European water industry, mobilising our co-funding as soon as possible.

Bad Homburg, Germany, August 27, 2019



SKion GmbH Biedersteiner Weg 55 53352 Bad Homburg, Germany Phone: +49 (0) 61 172 404-639	Fachsch 1563 6. 255 Bad Homburg, Germany Phone: +49 (0) 61 172 404-639	Telefon: +49 (0) 61 172 404-631 Fax: +49 (0) 61 172 404-639	Geschäftsleitung Susanne Klatten, Dr. Johannes Fritz	Biz./Antragerecht Bad Homburg, Germany

SKion Water is a subsidiary of SKion AG, a public company listed on the Frankfurt Stock Exchange (FSE:SKN).



LETTER OF INTENT to join the Investors Partnership
WATER INNOVATION ACCELERATOR in Sweden

concerning
the introduction of the "REWAISE" project
coordinated by Aqualia, Spain
and processing the collaborative project:

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic "CE-S05-04-2019 - building a water-smart economy and society" under the call "GREENING THE ECONOMY" IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

Water Innovation Accelerator, hosted by Ideen Open AB, is a business network that facilitates faster market access to innovative products and services. Founded in January 2012, the WIN network consists of small innovative companies as well as large corporations and other organizations such as universities and municipalities.

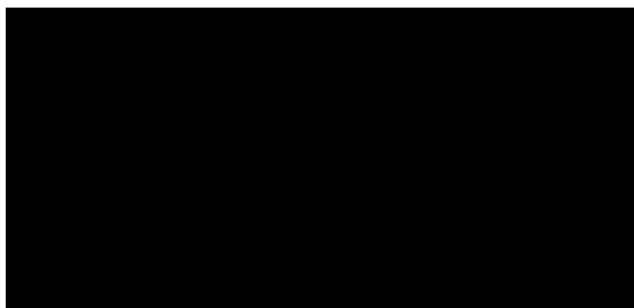
We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

We are already actively participating in related projects, such as the Horizon 2020 project Neptune, Blue Growth Accelerator and agree that a future collaboration with the REWAISE project would definitely bring added-value to our activities, both at technical and commercial levels.

As such, Water Innovation Accelerator is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in Sweden, Norway, Denmark, Finland, Germany and The Netherlands where WIN is already active. In addition, we look forward to participating in the Investors Partnership contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Lund, 30/08/2019





Letter of Commitment as member of the
WATER PARTNERS
Partnership
delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the for H2020-SC5-04-2019 "Building a water-smart economy and society" under the call:
"SPRINGING THE ECONOMIC LIFELINE OF THE SUSTAINABLE DEVELOPMENT GOALS"
to be funded under the European Commission Horizon 2020 Program.

August 26th 2019

Dear Mr Rogalla

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

As a society we are facing several environmental and social challenges including water and climate change adaptation and mitigation. At xpV we are big believers in smarter decision making & management of buried infrastructure which will result in great benefit for industry, policy makers and citizens in Europe. By implementing concepts of circular economy, the needs of a growing global population will be met within the sustainable limits of the planet's natural resources and eco systems.

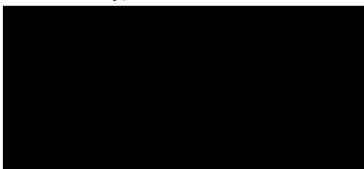
Water Partners is composed of experienced water entrepreneurs, operators, and investment professionals dedicated to making a difference in water. xpV partners with, invests in, and actively supports entrepreneurial companies so they can grow and deliver value for all stakeholders. xpV manages over \$400 million in investment capital from some of the top institutional investors in North America, Europe, the Middle East, and Asia. The xpV family of portfolio companies is making a difference in water both by driving more efficient management of the world's most critical resource and by creating significant shareholder value that can help move the industry forward.

xpV is pleased to provide this letter of support for the 4Ward Cycle project. We recognize that xpV will demonstrate this new pathway to convert traditional water infrastructure into opportunities for new resources, by smart management, recovering products, and using local energy generation and water reclamation factories, based on a combination of new solutions developed by the project partners.

Our current initiatives are aligned with the main goal of REWAISE - a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our sphere of influence. In addition, we look forward to participating in the Investors Partnership contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate



Resonance Asset Management Ltd
1 Tudor Street
London
EC4Y 0AH
T +44 20 7832 0910
F +44 20 7832 0911

Letter of Commitment as member of the Investors Partnership delivered to
REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY
to the topic CE-SC5-04-2019 'Building a water-smart economy and society', under the call GREENING THE
ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the
European Commission Horizon 2020 Program

August 27th 2019

Dear Sir or Madam

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners

At Resonance Asset Management ("Resonance"), we are strong believers in smarter decision making & management of buried infrastructure, which will result in great benefit for industry, policy makers and citizens in Europe. By implementing concepts of circular economy, the needs of a growing global population will be met within the sustainable limits of the planet's natural resources and eco-systems.

Resonance Asset Management manages the investment fund Resonance Industrial Water Infrastructure Limited (the "Fund"). The Fund invests in greenfield and retro-fit industrial water treatment and resource recovery infrastructure assets across the globe. The Fund has total Commitments of USD 319,150,000.00 from investors, with USD 298,374,308.76 available to invest.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our sphere of influence. In addition, we look forward to participating in the Investors Partnership, contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Resonance Asset Management

Resonance Asset Management is a member of the Resonance Group of Companies, which is a group of companies



Letter of Commitment as in " " Mrs. Fraitzling REMONDIS
GERMANY delivered

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic 05-005-04-2019 "Building a water-smart economy and society" under the call
GREENING THE ECONOMY, LINE 101 THE SUSTAINABLE DEVELOPMENT GOALS
to be funded under the European Commission Horizon 2020 Program.

Dear Sir or Madam

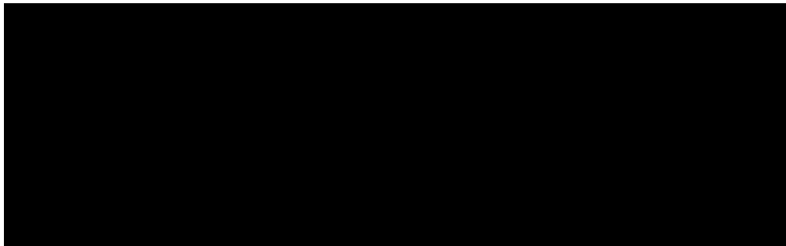
Thank you for inviting me to the Investors Partnership of the H2020 **REWAISE** project - I am pleased to participate in this project led by Aqualia and with many potent partners.

REMONDIS Aqua International GmbH, we support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

Our current initiatives are aligned with the main goal of REWAISE: a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our sphere of influence. In addition, we look forward to participating in the Investors Partnership contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate



Letter of Commitment as

to

THE UNION REWAISE PROJECT

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

the RE-SC5-04-201 a Horizon 2020
GREENING THE ECONOMY LINE THE SUSTAINABLE DEVELOPMENT GOALS
to be funded under the European Union Horizon 2020 Program

Dear Mr. Rogalla

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

HELSINKI REGION ENVIRONMENTAL SERVICES AUTHORITY (later called HES), is a public entity, which is responsible for water services for Helsinki Metropolitan area as well as solid waste management and regional data services for municipalities and authorities. The history of municipal water services is more than 100 years old and R&D activities have been always an important role to achieve high quality drinking water and advanced wastewater treatment results for our clients. HES has several active R&D projects which are close to REWAISE. Good example is RAVITA project, where we do development work related to our nutrient recovery innovation. Additionally, HES does R&D activities around smart grid ideology and the project is called ALYKÄS VESI.

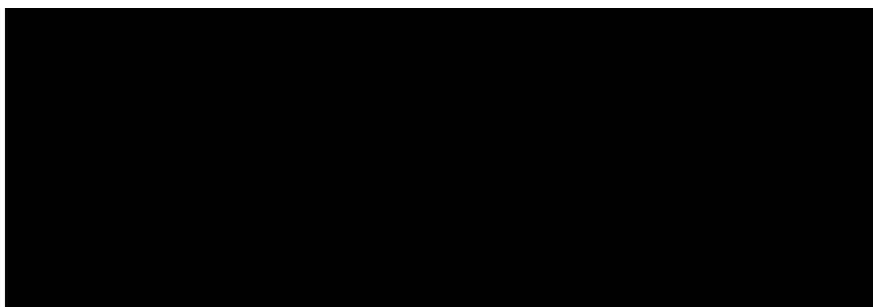
We strongly support the above mentioned European initiative for creating a new "water ecosystem", in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

We are already actively participating in related projects, such as RAVITA (an innovation project for nutrient recovery) and ALYKÄS VESI (a Smart Water project) and agree that a future collaboration with the REWAISE project would definitely bring added-value to our activities, both at technical and commercial levels.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Investors Partnership, contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.

Helsinki, Finland 30th August 2019





Letter of Intent as member of the Investors Partnership from
Entidad de Saneamiento de Aguas Residuales de la Comunidad Valenciana-EPSAR
Spain

delivered to
the consortium of the REWAISE project,
coordinated by Aqualia, Spain,
and proposing the collaborative project:

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SQ5-04-2019 "Building a water-smart economy and society" under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS),
to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the Investors Partnership of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners. The Project is of great interest for this Entity, since it involves demonstrating innovative and smart tools to use alternative water resources and recover materials and involve the stakeholders to reduce water and energy use. Improving the efficiency and feasibility of water management is one of the objectives of EPSAR.

We strongly support the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate in order to maximize the profitability and ROI of the project.

We are already actively participating in related projects, such as the Innovation Deal entitled "Sustainable wastewater treatment using innovative anaerobic membrane bioreactors technology, AnMBR" and agree that a future collaboration with the REWAISE project would definitively bring added-value to our technical activities.

As such, EPSAR is willing to exchange and share information and efforts aiming to facilitate the development of the future concept up to the 482 waste water treatment plants managed by EPSAR, which treat 421.13 hm³/year. In addition, we look forward to participating in the Investors Partnership, contributing to periodic meetings and events towards business applications and positive turnover growth.

We are convinced the REWAISE consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate

Valencia, 26/03/2019

Manager of Entidad d

Comunidad Valenciana -

ANNEX IV: Letters of support

Person	Organisation		Country
	HRVATSKE VODE (Water Authority of Croatia)		HR
	AGRICULTURE INSTITUTE		PL
	IRRIAGADORES (Federation of Irrigators Communities of Spain)		ES
	VATTEN (Swedish Water and Wastewater Association)		SE
	Microcab Industries (hydrogen fuel cell electric cars manufacturer)		UK
	European Business and Innovation Centre Network		BE
	KUMA (Water consultancy)		PL
	Water Europe (Voice and promotor of water-related RTD and innovation in Europe)		BE
	Lithuanian Chamber of Commerce, Industry and Crafts		LT
	KURZEME PLANOSANAS REGIONS		LV
	TEOLIA ENERGIA POZNAN		PL



Hrvatske vode

KLASA: 315-01/19-01/0000662

URBROJ: 374-1-2-19-1

Zagreb, 01.08.2019

SVEUČILIŠTE U ZAGREB
FAKULTET ELEKTROTENIKE I RAČUNARSTVA
Zavod za automatiku i računalno inženjerstvo
Ravnatelj inovacijskog centra Nikola Tesla
Prof.dr.sc. Nedjeljko Perk
10000 Unska 3

LETTER OF SUPPORT

from
Hrvatske vode, Zagreb, Croatia

delivered to
the consortium of the "REWAISE" project,
coordinated by Aqualia, Spain,
and proposing the collaborative project:

RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be
funded under the European Commission Horizon 2020 Program.

Hrvatske vode is a legal entity for water management established by the Water Act (Official Gazette no. 107/95 & 150/2005). The Republic of Croatia is the founder of Hrvatske vode. The activities of Hrvatske vode is water management for the entire territory of the Republic of Croatia within the limits of the following tasks:

- Preparation of planning documents for water management
- Water regulation and protection from adverse effects of water
- (Supervision of) construction and maintenance of basic amelioration drainage facilities
- Determining water reserves, care for strategic water reserves, water research works, giving opinions on implementing regulations adopted pursuant to the Water Act by local and/or regional self-government units;
- Management of water quality, implementation of monitoring of surface waters, including the coastal water, and groundwater, including laboratory tasks during monitoring, implementation and supervision of implementation of other bodies under obligation to implement the National Plan of Measures for Sudden and Accidental Pollution, co-financing



construction of public irrigation facilities and supervision of commercial use of funds

- Construction of irrigation facilities in the ownership of regional self-government units in accordance with national programmes and projects, co-financing construction of irrigation facilities in the ownership of regional self-government units,
- Keeping water documents and integrated Water Information System and issuing water rights documents pursuant to the Water Act,
- Expert tasks for the purpose of awarding concessions for the commercial use of waters
- Expert supervision of implementation of conditions from water rights documents and concession conditions (water supervision);
- Calculation and collection of concession fees for the commercial use of water
- Calculation and collection of water fees pursuant to the Act regulating financing of water management

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society

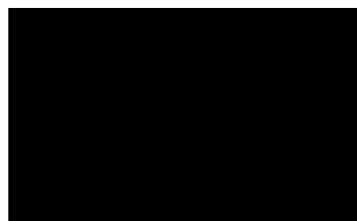
The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

The collaboration of this Entity will be to provide institutional support to the initiative, which does not include financial support.

We are already actively participating in related projects, such as Interreg WATERCARE and Interreg SIMONA and agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and commercial levels.

As such, Hrvatske vode is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in forthcoming water management activities in Croatia

This letter is not intended to be a legally binding document. We simply hope that the European team will become active in this important topic



LETTER OF SUPPORT
from
AIGOCRACY INSTITUTE Sp. z o.o. Warsaw POLAND
delivered to
the consortium of the "REWAISE" project,
coordinated by Aqualis, Spain,
and proposing the collaborative project:

REWAISE - RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

AIGOCRACY INSTITUTE is a think-tank company whose main area of expertise is research and development of state-of-the-art data science methods, processes, algorithms and systems. The company offers its services to entities from various domains and industries, who need to deal with big data challenges and thus seek for innovative data-driven solutions. Our focus is put on application of data analytics, artificial intelligence, machine and deep learning and statistical methods that may support entities in decision making and accelerating their business growth.

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

The researchers of the company have a wide experience in various projects from a variety of domains such as energy (smart grids), maritime transport and logistics, telecommunication, banking, cybersecurity with regard to application of advanced data analytics and artificial intelligence methods. We agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and commercial levels.

As such, AIGOCRACY INSTITUTE Sp. z o.o. is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in Poland, where AIGOCRACY INSTITUTE Sp. z o.o. is already active.

This letter is not intended to be a legally binding document, but we assume that the scope and terms of a future co-operation may be later negotiated, defined and signed in a mutual agreement. In this phase we simply hope that the European team will become active in this important topic.

31.07.2019

Contact:
AIGOCRACY INSTITUTE Sp. z o.o.
Ul. Marszałkowska 89
00-693 Warsaw, Poland

LIST POPARCIA
od
AIGOCRACY INSTITUTE Sp z o.o. Warszawa, Polska

do
konsorcjum projektu "REWAISE"
koordynowanego przez firmę Aquahis z Hiszpanii,
składającego ofertę w ramach realizacji wspólnego projektu

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY (INNOWACYJNA OCHRONA ZASOBÓW WODNYCH – CELEM ZAPEWNIENIA INTELIGENTNEJ GOSPODARKI)

w odniesieniu do tematu CE-SC5-04-2019 "Building a water-smart economy and society" [Budowanie inteligentnej gospodarki wodnej i świadomego społeczeństwa], w odpowiedzi na zaproszenie do udziału w postępowaniu w ramach programu roboczego „GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGs) [CORAZ BARDZIEJ ZIELONA GOSPODARKA, ZGODNIE Z CELAMI W ZAKRESIE ZRÓWNOWAŻONEGO ROZWOJU (SDG)]”, które będzie finansowane w ramach programu Komisji Europejskiej "Horyzont 2020"

AIGOCRACY INSTITUTE Sp. z o.o. to think-thank, której głównym obszarem działania są nowoczesne metody, procesy, algorytmy i systemy z zakresu data science. Firma oferuje swoje usługi podmiotom z różnych dziedzin i branż, które mierzą się z wyzwaniem związanym z dużymi zasobami danych (big data) oraz poszukują innowacyjnych rozwiązań opartych o analizę danych. Firma prowadzi prace badawczo-rozwojowe dotyczące zastosowania analizy danych, sztucznej inteligencji, uczenia maszynowego oraz metod statystycznych, w celu wspierania podmiotów w podejmowaniu decyzji i rozwoju ich działalności.

Z przyjemnością wesprzemy wspomnianą wyżej inicjatywę europejską dotyczącą stworzenia nowego "wodnego ekosystemu" zgodnie z celami gospodarki o obiegu zamkniętym, przyczyniającego się do rozwoju inteligentnej gospodarki wodnej i świadomego społeczeństwa.

Główny cel projektu "REWAISE" to zapewnienie wolnego od emisji dwutlenku węgla do atmosfery, odpornego na zagrożenia i zrównoważonego obiegu wody w przyrodzie oraz stworzenie innowacyjnych narzędzi umożliwiających wykorzystywanie alternatywnych zasobów wody i odzysk materiałów, a także włączenie interesariuszy w procesy zmniejszania zużycia wody i energii. Odpowiednie zarządzanie ryzykiem skutkuje zmniejszeniem deficytów wody oraz jej zanieczyszczeń.

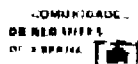
Obecnie pracownicy firmy posiadają bogate doświadczenia w realizacji projektów w takich dziedzinach jak energetyka (smart grids), transport morski i logistyka, telekomunikacja, bankowość, cyberbezpieczeństwo, w zakresie zaawansowanej analizy danych wykorzystującej metody sztucznej inteligencji. Jesteśmy pewni, że współpraca w przyszłości w ramach projektu "REWAISE" zdecydowanie zwiększy wartość dodaną naszych działań zarówno na poziomie technicznym, jak i komercyjnym.

Zgodnie z powyższym, AIGOCRACY INSTITUTE Sp. z o.o. z chęcią weźmie udział w wymianie informacji oraz w działaniach, mających na celu uściślenie opracowania i wprowadzenie na rynek opracowywanej koncepcji w Polsce, w których AIGOCRACY INSTITUTE Sp. z o.o. działa już teraz.

Niniejszy list nie stanowi prawnie wiążącego dokumentu, a zakres i warunki współpracy w przyszłości mogą podlegać negocjacjom, zdefiniowaniu na nowo oraz mogą zostać uzgodnione w ramach podpisania wspólnego porozumienia. Na obecnym etapie mamy po prostu nadzieję, że zespół europejski aktywnie zaangażuje się w ten ważny temat.

31.07.2019

Dane kontaktowe:
AIGOCRACY
Ul. Mariacka
00-893 Warsaw, Poland



PRE-IDENTE

FENACORE

D. Frank Rogalla
Director de Innovación y Tecnología
FCC Aguas
Paseo del Camino de Santiago,
Madrid España
Correo-e: frank.rogalla@fcc.es
Tel: +34 91 503 62 53

Carta de apoyo

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

Madrid, 22 de Agosto de 2019

Estimado D. Rogalla,

A través de esta carta queremos confirmar que la FEDERACION NACIONAL DE COMUNIDADES DE REGANTES (FENACORE) tiene un profundo interés en la propuesta del proyecto REWAISE que se presenta la convocatoria del programa HORIZONTE 2020, dentro del apartado CE-SCS-04- 2019 "Building a water-smart economy and society".

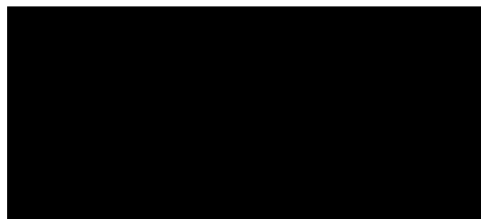
Esta Federación Nacional agrupa a las entidades dedicadas a la administración del agua para riego agrícola. Sin duda alguna, las Comunidades de Regantes, como grupos de interés, juegan un papel muy importante en la gestión del agua dedicada a la agricultura.

Por tanto, apoyamos la propuesta REWAISE, estamos interesados en aportar nuestra experiencia, debatir posibles necesidades, tener acceso privilegiado a los resultados del Proyecto, y compartir ideas con los socios del proyecto acerca el impacto potencial futuro de sus resultados.

D. David Hernández estará a su disposición para participar en el seguimiento del proyecto.

A nuestro entender, esta colaboración es voluntaria, esta carta no constituye en modo alguno un contrato de servicios. Asimismo, nuestra participación, no será remunerada por el proyecto, no obstante estamos satisfechos por la oportunidad que supone apoyar este trabajo innovador que usted y su equipo están preparando.

Sin otro particular, reciba un cordial saludo



Paseo de la Habana, 26 - 28036 Madrid
Tel.: +34 91 503 62 53 Fax: 91 503 62 53 e-mail: fenacore@fenacore.org

Letter of Commitment as member of the Governance and Regulatory Ethics Advisory Panel

SVENSKT VATTEN, Bromma SWEDEN

delivered to

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program

Dear Sir or Madam

Thank you for inviting me to the Governance and Regulatory Ethics Advisory Panel of the H2020 REWAISE project - I am pleased to participate in this project led by Aqualia and with many potent partners.

Svenskt Vatten is the Swedish water and wastewater association with over 300 utility members/municipalities. We have 23 staff members, including nine experts in different water related areas, one R&D manager, a communications department and we manage around 80 courses and seven national thematic conferences annually. In 2008 we initiated the formation of four national research clusters, in which seven universities, two research institutes and 79 municipalities are involved today. Besides working closely with our research networks, we financially support research projects from actors in the sector and have a strong collaboration with other national research funders and authorities.

We strongly support the above-mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society, and are enthusiastic to cooperate and guide regulatory issues, assessing legal framework for the project when necessary.

Our current initiatives are aligned with the main goal of REWAISE, a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and we are in close contact with various stakeholders to reduce water and energy use.

As such, our entity is committed to exchange and share information and efforts aiming to facilitate the introduction of the future concept in our country and sphere of influence. In addition, we look forward to participating in the Governance and Regulatory Ethics Advisory Panel, contributing to periodic meetings and events, in order to enable communication and control channels with administrations and regulatory authorities.

We are convinced the Rewaise consortium has a clear and coherent strategy to build a water smart economy, and hope it will be selected for funding so that we can fully participate.



1

RECEIVED: 15 JULY 2014; REVISED: 10 SEPTEMBER 2014; ACCEPTED: 10 SEPTEMBER 2014.

GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS

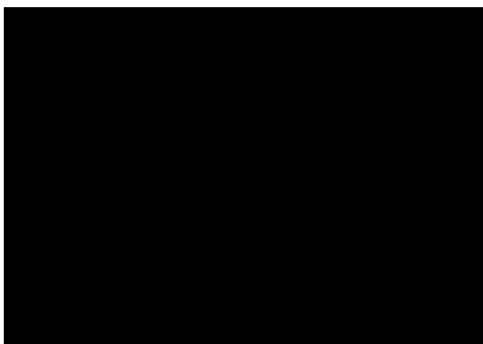
innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity

project) and SWARM, Hydrogen fuel cell vehicle demonstration project) and agree that a future

China where Microcab Industries Ltd is already active.

In this phase, we expect to have that the 5 research teams will become active in this important topic.

12 August 2019



LETTER

European Business and Innovation Centres Network, Brussels, BELGIUM

the REWAISE
coordinated
and processing the collaboration

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2018 "Building a water-smart economy and society" under the call
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program

The European Business & Innovation Centre Network (EBN) is the leading, non-profit, pan-European association of incubator units and business support structures. EBN was created in 1984 by the European Commission and European industry leaders, with the aim of stimulating the growth of new enterprises by providing technical support to innovative start-ups, spin-offs, SMEs, and entrepreneurs. EBN is a network of over 150 quality certified Business and Innovation Centres (BICs), and has in excess of 100 associate members which support the development and growth of innovative entrepreneurs, start-ups, and SMEs. At present, EBN's members cover over 40 countries in Europe and beyond (Turkey, Canada, USA, Egypt, China, among others). Over the last two decades, EBN has become a reference point in Europe on innovation, spin-off, incubation, entrepreneurship, SMEs, and regional economic development.

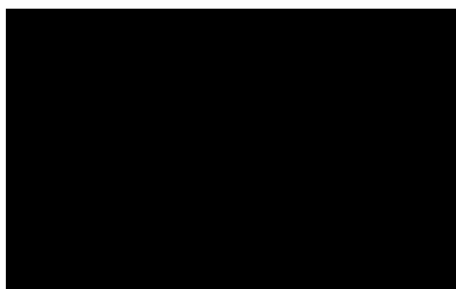
We welcome the above-mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

EBN is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in all the countries covered by our network.

This letter is not intended to be a legally binding document, but we assume that the scope and terms of a future co-operation may be later negotiated, defined and signed in a mutual agreement. In this phase we simply hope that the European team will become active in this important topic.

Brussels, 09-05-2018



Wzrost

Skuma,
delivered
the REWAISE
located in Javalis, Spain,
and is a joint collaborative project

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04 2019 "Secure a water smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimized.

We are sure that a future collaboration with the REWAISE would definitely bring added-value to our activities, both at technical and business levels.

As such, Skuma is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept in Poland.

This letter is not intended to be a formal document, but we assume that the scope and terms of a future collaboration may be later negotiated, defined and signed in a mutual agreement. In this sense we simply hope that the European team will become active on this important topic.

(Signature)

Podpis: dr hab. Sławomir

Skema

REWAISE
 Akademyjny projekt badawczy i innowacyjny
 realizowany w ramach inicjatywy Europejskiego

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY (INNOWACYJNA OCHRONA ZASOBÓW WODNYCH – CELEM ZAPEWNIENIA INTELIGENTNEJ GOSPODARKI)

w kontekście do tematu CELE 2030 "Building a water smart economy and society" [Budowanie inteligentnej gospodarki wodnej i świadomego społeczeństwa], w odpowiedzi na zaproszenie do udziału w konkursowaniu w ramach programu roboczego „GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) (CORAZ BARDZIEJ ZIELONA GOSPODARKA, ZGODNIE Z CELAMI W ZAKRESIE ZRÓWNOWAŻONEGO ROZWOJU)”, które będzie finansowane w ramach programu Koniacji Europejskiej: Horyzont 2020”

Z radością witamy uczestników inicjatywy Europejskiej dotyczącej stworzenia nowego witalnego ekosystemu gospodarki wodnej i świadomego społeczeństwa przyczyniającego się do rozwoju inteligentnej gospodarki wodnej i świadomego społeczeństwa

Celem projektu REWAISE jest zapewnienie wolnego od emisji dwutlenku węgla, odporność na zagrożenia, zmniejszenie obrotu wody w przemyśle oraz stworzenie innowacyjnych narzędzi umożliwiających wykorzystywanie alternatywnych zasobów wody i odzysk materiałów, a także włączyć interesariuszy w procesy zmniejszania zużycia wody i emisji. Odpowiednie zarządzanie ryzykiem skutkuje zmniejszaniem deficytów wody oraz jej zanieczyszczeń

Jesteśmy przekonani, że uczestnicy w przyszkole w ramach projektu REWAISE zdecydowanie zwiększąby dodaną wartość działań zarówno na poziomie technicznym, jak i innowacyjnym

Łącznie z powyższymi Skema z udziałem udział w wymagalnej informacji oraz w działaniach mających na celu ułatwienie komercjalizacji wprowadzenia na rynek innowacyjnych technologii w

Niniejszy list nie stanowi pisma wiążącego dokumentu, a zakres warunki współpracy w przyszłości mogą podlegać negocjowaniu i identyfikowaniu na nowo oraz mogą zostać uzgodnione w ramach podpisania umowy przewidzianej. Na obecnym etapie mamy po prostu nadzieję, że zespół uczestników będzie zaangażowany w ten ważny temat

10.08.2019; Polite

Polite

Polite



LETTER OF SUPPORT
from
WATER EUROPE, Brussels, Belgium

delivered to
the consortium of the "REWAISE" project,
coordinated by Aqualia, Spain,
and proposing the collaborative project:

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call: GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Water Europe is the recognized voice and promotor of water-related RTD and innovation in Europe. Water Europe strives to increase coordination and collaboration, to enhance the performance of the water service providers, water users, and technology providers, in a sustainable and inclusive way, and to contribute to solving water-related societal challenges. With over 200 members across Europe on board, Water Europe is recognised by the European Commission as the industry-led European Technology Platform(ETP) for Water. Water Europe envisions a smart-water society, in which the true value of water is recognised and realised and all available water sources are managed in such a way that water scarcity and pollution of groundwater are avoided.

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

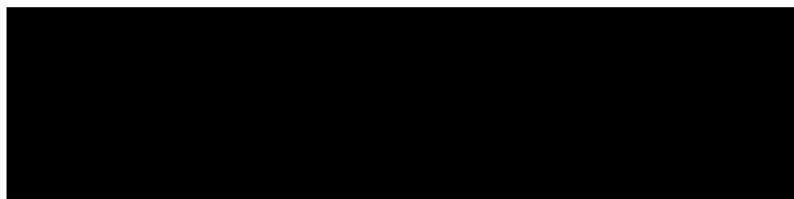
The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

We are already actively participating in several Life Programme and H2020 projects and agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and commercial levels.

As such, Water Europe is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept different European countries, where Water Europe already active.

This letter is not intended to be a legally binding document, but we assume that the scope and terms of a future co-operation may be later negotiated, defined and signed in a mutual agreement. In this phase we simply hope that the European team will become active in this important topic.

Yours sincerely,



European Technology Platform for Water
www.etp4h2o.eu Brussels, Belgium

LETTER OF COMMITMENT

from

Siauliai Chamber of Commerce, Industry and Crafts, Siauliai LITHUANIA
delivered to

REWAISE RESILIENT WATER INNOVATION FOR SMART ECONOMY

topic CE-SC5 04-2019 'Building a water-smart economy and society' under the call GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS), to be funded under the European Commission Horizon 2020 Program.

Siauliai CCIC is a non-governmental and a non-profit seeking organization with voluntary membership of 212. It is one of the five chambers of Lithuania, operating in Siauliai and Telsiai counties. Based on private law, its main goal is supporting the development of companies' economic activity and representing the interests of business community. The community is comprised of various businesses, educational, scientific, and high technology institutions. As part of a national representation chamber performs opinion surveys of companies' analysis in the region as regards business. Permanently implements concrete activities and initiatives aimed at improving the business environment, attracting new investments, promoting export, enhancing competitiveness of the regional businesses. SCCIC provides services that meet global standards ISO 9001:2008. SCCIC aims to promote socially responsible sustainable development cooperation between education and business.

We are eager to contribute to the above project proposal for creating a new 'water ecosystem' in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

This Entity is committed to bring our experience from related projects in which we are participating such as FanPLESSite-sea and agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and commercial levels.

As such, SIAULIAI CHAMBER OF COMMERCE, INDUSTRY AND CRAFTS will exchange knowledge and share information, and support efforts to facilitate the development, implementation and market uptake of the future concepts in our water management activities in Siauliai and Telsiai Regions of Lithuania.

We are particularly interested to participate in the Exploitation and Stakeholder Panels and are looking forward to starting this exciting endeavour to change the paradigm of the European water industry mobilising our co-funding as much as possible.



KURZEMES PLĀNOŠANAS REĢIONS

Reg. Nr. 90002180362

Juridiskā adrese: Avotu iela 12, Saldus, Saldus nov., LV-3801; Valguma iela 4a, Rīga, LV-1045
Tālrunis: +371 67 111497 e-pasts: pasaks@kurzemesrejons.lv www.kurzemesrejons.lv

Rīga, Latvija

02.09.2019 Nr.2-5.5/127/19-N

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

In topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:

GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS

(SDGS), to be funded under the European Commission Horizon 2020 Program.

LETTER OF COMMITMENT

Kurzeme Planning region (KPR) is located in western Latvian and covers 20 Municipalities - 18 Counties and 2 Cities. The strategic operations of organization is based on the Kurzeme region Sustainable development strategy 2015 - 2030 and Development Programme 2015 - 2020. Both documents defines development goals, which includes also actions related to sustainable resource management.

We are eager to contribute to the above project proposal for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised.

This Entity is committed to bring our experience from related projects in which we are participating, and agree that a future collaboration with the REWAISE would

definitive bring added-value to the project both at technical and commercial level

As such, KURZEME PLANNING REGION will exchange knowledge and share information, and support efforts to facilitate the development, implementation and market uptake of the future concepts in our water management activities in KURZEME PLANNING REGION, LATVIA.

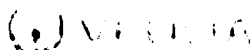
We are particularly interested to participate in the Exploitation and Stakeholder Panels and are looking forward to starting this exciting endeavour to change the paradigm of the European water industry, mobilising our co-funding as much as possible.

Head of Administration

evita.ozolina@kurzemesregio.lv

Aiga Piekševica +371 67331492

Poznań, September, 02 2019



LETTER OF SUPPORT

from

VEOLIA Energia Poznań SA, Poznań, POLAND

delivered to

the consortium of the "REWAISE" project,

coordinated by Aquila, Spain,

and proposing the collaborative project:

REWAISE: RESILIENT WATER INNOVATION FOR SMART ECONOMY

to the topic CE-SC5-04-2019 "Building a water-smart economy and society", under the call:
GREENING THE ECONOMY IN LINE WITH THE SUSTAINABLE DEVELOPMENT GOALS
(SDGS), to be funded under the European Commission Horizon 2020 Program.

VEOLIA Energia Poznań SA, being a producer of combined heat and electricity power, with the management of heating network, covers 80% of Poznań's area heat demand – not only for the residents but also for the industrial and public utilities along with other service centres. Within the continuation of 115-year-long tradition of energy production in Poznań and the 50-year history of the municipal heating network, VEOLIA Energia Poznań contributes to the development of surrounding agglomeration infrastructure.

Actions taken by VEOLIA are always characterized by innovative solutions and ecological efficiency

We welcome the above mentioned European initiative for creating a new "water ecosystem" in line with the objectives of the circular economy, developing a water smart economy and society.

The main goal of REWAISE is a carbon free, resilient and sustainable water cycle, demonstrating innovative and smart tools to use alternative water resources and recover materials, and involve the stakeholders to reduce water and energy use. By appropriately managing risks, water scarcity and contamination is minimised

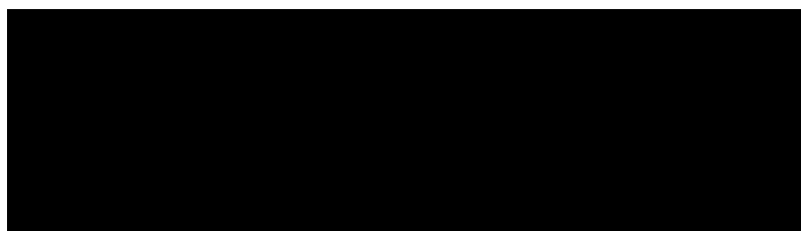
We are already actively participating in related projects, such as "Heat recovery from wastewater in Szlachecin" and agree that a future collaboration with the REWAISE would definitively bring added-value to our activities, both at technical and commercial levels.

As such, VEOLIA Energia Poznań SA is willing to exchange and share information and efforts aiming to facilitate the development and market uptake of the future concept of circular resource management and eco-friendly water-smart city idea in Poland, where VEOLIA is already active.

This letter is not intended to be a legally binding document or the source of any obligations, but we assume that the scope and terms of a future co-operation may be later negotiated, defined and signed in a mutual agreement. In this phase we simply hope that the European team will become active in this important topic.

date and signature

contact details



4-50071301 - THE FRONTIER AREA (3715) 65912 - 7142971

[illegible]

ANNEX 2a

ADDITIONAL INFORMATION ON THE ESTIMATED BUDGET

Unit cost for SME owners/natural beneficiaries without salary

1. Costs for a SME owner not receiving a salary

Units: hours worked on the action

Amount per unit ('hourly rate'): calculated according to the following formula:

{the monthly living allowance for researchers in MSCA-IF actions / 143 hours}

multiplied by

{country-specific correction coefficient of the country where the beneficiary is established}

The monthly living allowance and the country-specific correction coefficients are set out in the Work Programme (section 3 MSCA) in force at the time of the call:

- for calls *before* Work Programme 2018-2020:
 - o for the monthly living allowance: **EUR 4 650**
 - o for the country-specific correction coefficients: see Work Programme 2014-2015 and Work Programme 2016-2017 (available on the Participant Portal Reference Documents page)
- for calls *under* Work Programme 2018-2020:
 - o for the monthly living allowance: **EUR 4 880**
 - o for the country-specific correction coefficients: see Work Programme 2018-2020 (available on the Participant Portal Reference Documents page)

For the following beneficiaries/linked third parties, the amounts per unit (hourly rate) are fixed as follows:

- beneficiary/linked third party ResourSEAs: EUR 35.63

Estimated number of units: see Annex 2

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SEVERN TRENT WATER LIMITED (STW), established in SEVERN TRENT CENTRE 2 ST JOHNS STREET, COVENTRY CV1 2LZ, United Kingdom, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('2')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

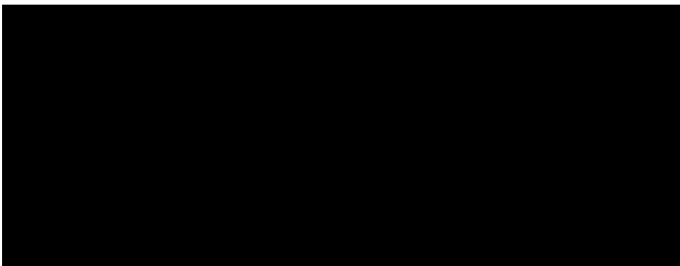
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

VA SYD (VASYD), established in HJALMAREGATAN 3, MALMO 201 21, Sweden, VAT number: SE222000237801, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('3')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

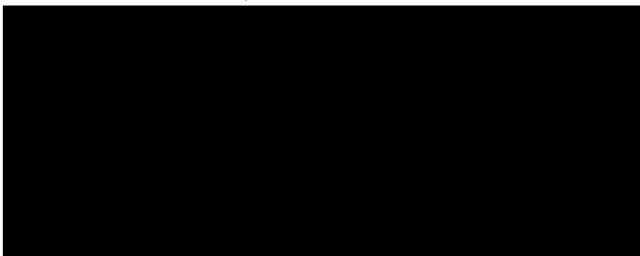
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AQUANET SPOLKA AKCYJNA (ANET), established in UL. DOLNA WILDA 126, POZNAN 61-492, Poland, VAT number: PL.7770003274, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('4')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

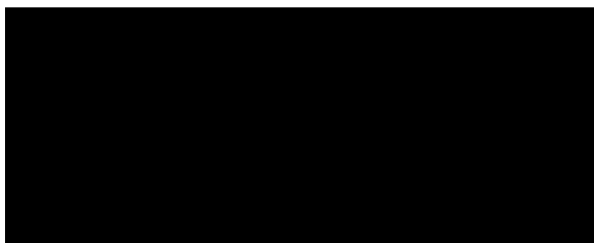
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

EUROPEAN NETWORK OF LIVING LABS IVZW (ENOLL), established in PLEINLAAN 9, BRUSSEL 1050, Belgium, VAT number: BE0824793473, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('5')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

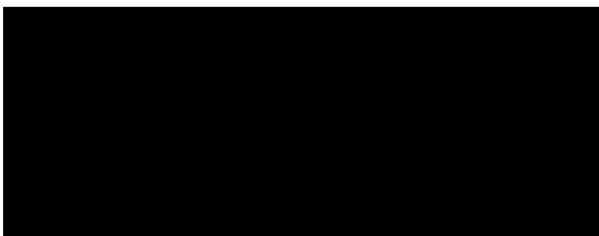
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

HIDROTEC TECNOLOGIA DEL AGUA SL (HIDRO), established in AVENIDA KANSAS CITY 9, SEVILLA 41007, Spain, VAT number: ESB91033621, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('6')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WATER Innovation for Smart Economy (REWAISE)'.

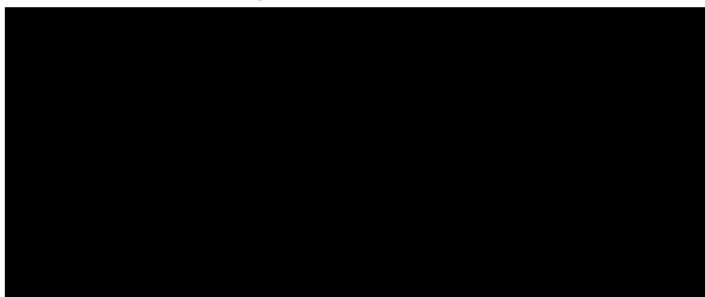
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

MALMO STAD (MALM), established in AUGUST PALM PLATS 1, MALMO 200 42, Sweden, VAT number: SE212000112401, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('7')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient Water Innovation for Smart Economy (REWAISE)'.

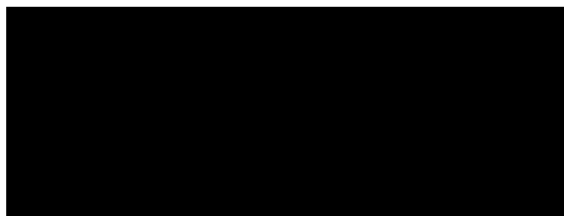
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLYMEM (POLY), established in 3 RUE DE L'INDUSTRIE ZONE DE VIC, CASTANET-TOLOSAN 31320, France, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('8')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

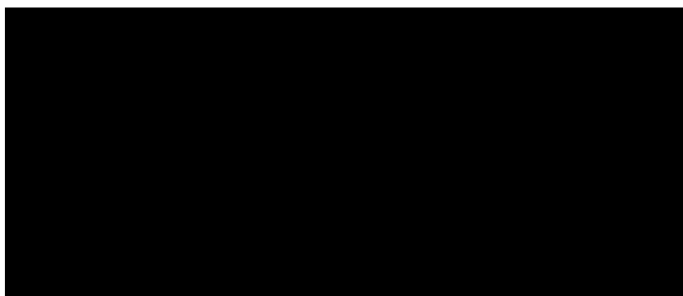
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

RESOURSEAS S.R.L. (RESA), established in EDIFICIO 16, VIALE DELLE SCIENZE (ARCA), PALERMO 90128, Italy, VAT number: IT06596440823, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('9')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'RESilient WATER Innovation for Smart Economy (REWASE)'.

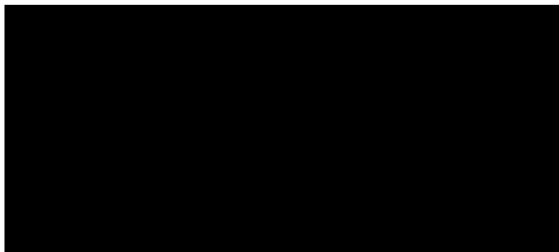
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

BLUETECHTRACKER LIMITED (BLUE), established in UNIT 4 JOYCE HOUSE BARRACK SQUARE, CORK, Ireland, VAT number: IE9836588F, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('10')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

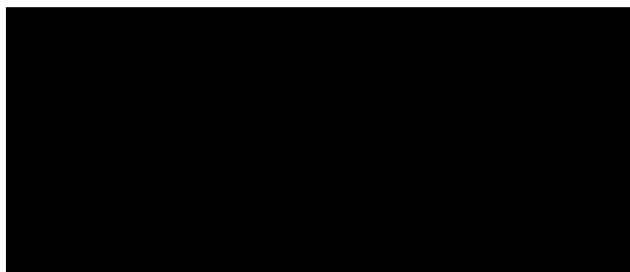
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AQUAPORIN AS (APOR), established in NYMOLLEVEJ 78, KOBENHAVN 2800, Denmark, VAT number: DK28315694, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('11')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WATER Innovation for Smart Economy (REWAISE)'.

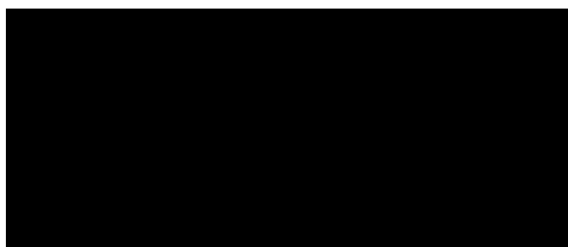
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

WATER, ENVIRONMENT AND BUSINESS FOR DEVELOPMENT SL (WE&B), established in PLAZA SANT JAUME 10 PLANTA 2 PUERTA 2, SANT QUIRZE DEL VALLES 08192, Spain, VAT number: ESB66119330, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('12')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

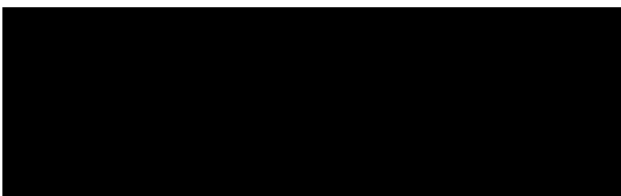
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ENVIRONMENTAL MONITORING SOLUTIONS LIMITED (EMS), established in 7 PRESIDENT BUILDINGS SAVILE STREET EAST, SHEFFIELD S4 7UQ, United Kingdom, VAT number: GB804048360, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('13')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

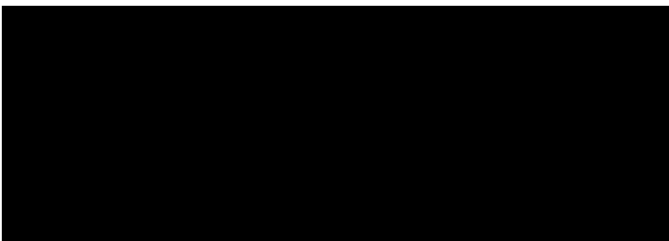
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SOLAR WATER PLC (SOLWA), established in SALISBURY HOUSE LONDON WALL, LONDON EC2M 5PS, United Kingdom, VAT number: GB279101893, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('14')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient Water Innovation for Smart Economy (REWAISE)'.

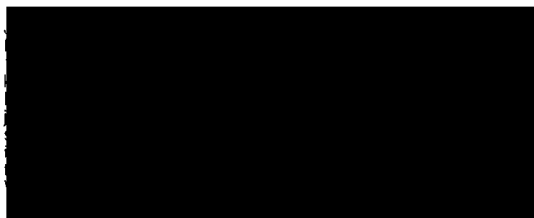
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

INSTYTUT EKOLOGII TERENOW UPRZEMYSLOWIONYCH (IETU), established in ULICA KOSSUTHA 6, KATOWICE 40 844, Poland, VAT number: PL6340125519, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('15')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'RESilient WAter Innovation for Smart Economy (REWAISE)'.

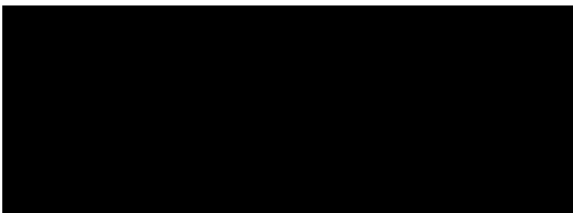
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UNIVERSITAT DE VALENCIA (UVAL), established in AVENIDA BLASCO IBANEZ 13, VALENCIA 46010, Spain, VAT number: ESQ4618001D, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('16')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'RESilient Water Innovation for Smart Economy (REWAISE)'.

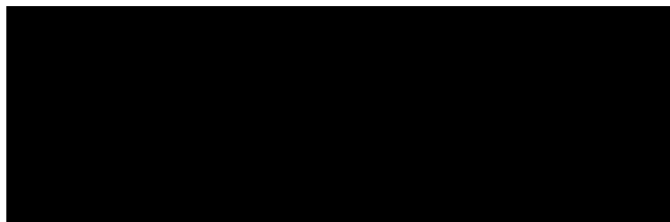
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

VYSOKA SKOLA BANSKA - TECHNICKA UNIVERZITA OSTRAVA (TUOS), established in 17 LISTOPADU 2172/15, OSTRAVA PORUBA 708 00, Czechia, VAT number: CZ61989100, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('17')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient Water Innovation for Smart Economy (REWAISE)'.

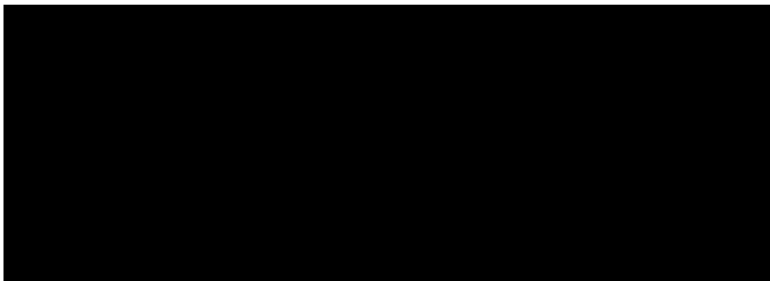
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA (UNIZ), established in UNSKA 3, ZAGREB 10000, Croatia, VAT number: HR57029260362, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('18')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

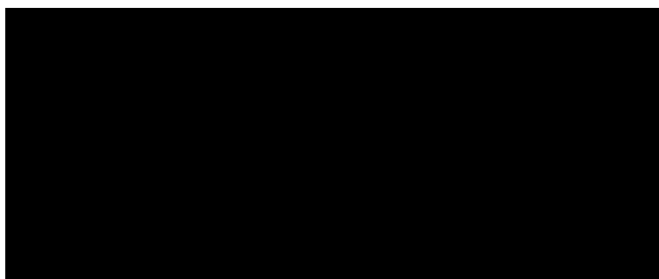
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FUNDACION CENTRO TECNOLOGICO DE INVESTIGACION MULTISECTORIAL (CETIM), established in PARQUE EMPRESARIAL ALVEDRO, CALLE H NUMERO 20, CULLEREDO 15180, Spain, VAT number: ESG70302427, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('19')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

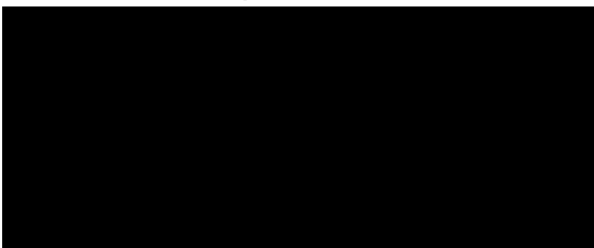
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

COVENTRY UNIVERSITY (COVU), established in PRIORY STREET, COVENTRY CV1 5FB, United Kingdom, VAT number: GB918037524, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('20')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA **and** the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

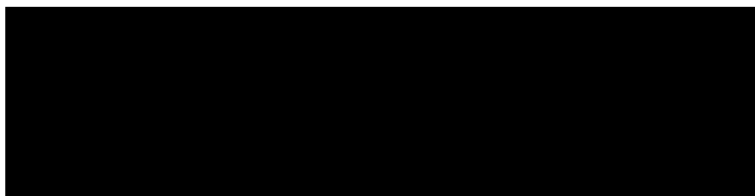
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LUNDS UNIVERSITET (LUND), established in Paradisgatan 5c, LUND 22100, Sweden, VAT number: SE202100321101, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('21')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'RESilient WAter Innovation for Smart Economy (REWAISE)'.

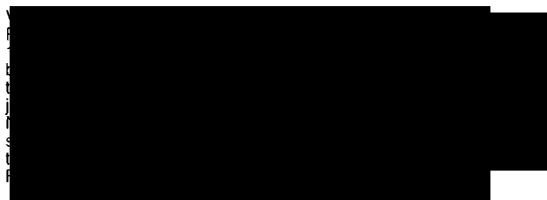
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLITECHNIKA POZNANSKA (PUT), established in PL MARI SKŁODOWSKIEJ CURIE 5, POZNAN 60 965, Poland, VAT number: PL7770003699, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('22')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WAter Innovation for Smart Economy (REWAISE)'.

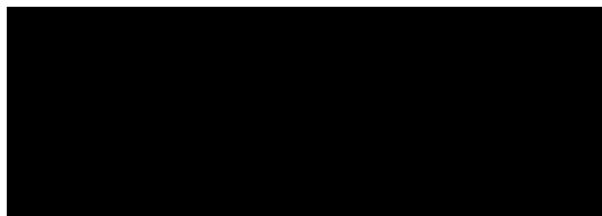
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

PKF ATTEST INNCOME SL (INNCO), established in CALLE ORENSE 81 7 PLANTA, MADRID 28020, Spain, VAT number: ESB87239489, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned.

hereby agrees

to become beneficiary No ('23')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'RESilient WATER Innovation for Smart Economy (REWAISE)'.

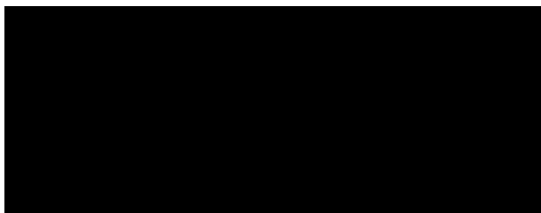
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UNIVERSITA DEGLI STUDI DI PALERMO (UNIPA), established in PIAZZA MARINA 61, PALERMO 90133, Italy, VAT number: IT00605880822, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('24')

in Grant Agreement No 869496 ('the Agreement')

between FCC AQUALIA SA and the Executive Agency for Small and Medium-sized Enterprises (EASME) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

for the action entitled 'REsilient WATER Innovation for Smart Economy (REWAISE)'.

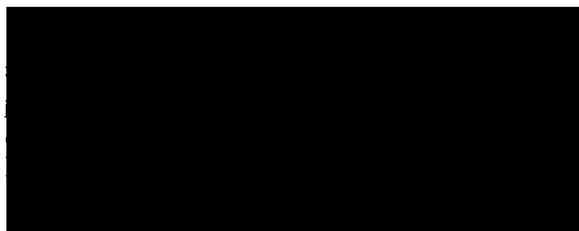
and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



[illegible]

The beneficiary/insured third party hereby confirms that:
The documents attached to support the application
have been derived from public records.
The facts are substantiated by a public records search through a national and/or state and court record of the United States, Canada, United Kingdom, Australia and New Zealand.
The beneficiary/insured third party hereby confirms that all the records have been destroyed (see Article 1.1).

Only specify unit costs that do not include selling costs

ANNEX 5

MODEL FOR THE CERTIFICATE ON THE FINANCIAL STATEMENTS

- For options (*in italics in square brackets*): choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data

TABLE OF CONTENTS

TERMS OF REFERENCE FOR AN INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

Terms of Reference for an Independent Report of Factual Findings on costs declared under a Grant Agreement financed under the Horizon 2020 Research and Innovation Framework Programme

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] *[OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')]*

agrees to engage

[insert legal name of the auditor] ('the Auditor')

to produce an independent report of factual findings ('the Report') concerning the Financial Statements¹ drawn up by the *[Beneficiary]* *[Linked Third Party]* for the Horizon 2020 grant agreement [insert number of the grant agreement, title of the action, acronym and duration from/to] ('the Agreement'), and

to issue a Certificate on the Financial Statements' ('CFS') referred to in Article 20.4 of the Agreement based on the compulsory reporting template stipulated by the Commission.

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and *[OPTION 1: the European Union, represented by the European Commission ('the Commission')]* *[OPTION 2: the European Atomic Energy Community (Euratom,) represented by the European Commission ('the Commission')]* *[OPTION 3: the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)] ('the Agency'), under the powers delegated by the European Commission ('the Commission').]*

The *[Commission]* *[Agency]* is mentioned as a signatory of the Agreement with the Beneficiary only. The *[European Union]* *[Euratom]* *[Agency]* is not a party to this engagement.

1.1 Subject of the engagement

The coordinator must submit to the *[Commission]* *[Agency]* the final report within 60 days following the end of the last reporting period which should include, amongst other documents, a CFS for each beneficiary and for each linked third party that requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 20.4 of the Agreement). The CFS must cover all reporting periods of the beneficiary or linked third party indicated above.

The Beneficiary must submit to the coordinator the CFS for itself and for its linked third party(ies), if the CFS must be included in the final report according to Article 20.4 of the Agreement.

The CFS is composed of two separate documents:

- The Terms of Reference ('the ToR') to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;

¹ By which costs under the Agreement are declared (see template 'Model Financial Statements' in Annex 4 to the Grant Agreement).

- The Auditor's Independent Report of Factual Findings ('the Report') to be issued on the Auditor's letterhead, dated, stamped and signed by the Auditor (or the competent public officer) which includes the agreed-upon procedures ('the Procedures') to be performed by the Auditor, and the standard factual findings ('the Findings') to be confirmed by the Auditor.

If the CFS must be included in the final report according to Article 20.4 of the Agreement, the request for payment of the balance relating to the Agreement cannot be made without the CFS. However, the payment for reimbursement of costs covered by the CFS does not preclude the Commission / Agency, / the European Anti-Fraud Office and the European Court of Auditors from carrying out checks, reviews, audits and investigations in accordance with Article 22 of the Agreement.

1.2 Responsibilities

The *[Beneficiary] [Linked Third Party]*:

- must draw up the Financial Statement(s) for the action financed by the Agreement in compliance with the obligations under the Agreement. The Financial Statement(s) must be drawn up according to the *[Beneficiary's] [Linked Third Party's]* accounting and book-keeping system and the underlying accounts and records;
- must send the Financial Statement(s) to the Auditor;
- is responsible and liable for the accuracy of the Financial Statement(s);
- is responsible for the completeness and accuracy of the information provided to enable the Auditor to carry out the Procedures. It must provide the Auditor with a written representation letter supporting these statements. The written representation letter must state the period covered by the statements and must be dated;
- accepts that the Auditor cannot carry out the Procedures unless it is given full access to the *[Beneficiary's] [Linked Third Party's]* staff and accounting as well as any other relevant records and documentation.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the *[Beneficiary's] [Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with this ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement, the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with²:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the [Commission]/[Agency] requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there is no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]*, and must specify - if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7).

Under Article 22 of the Agreement, the Commission[, the Agency], the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from [the European Union] [Euratom] budget. This includes work related to this engagement. The Auditor must provide access to all working papers (e.g. recalculation of hourly rates, verification of the time declared for the action) related to this assignment if the Commission [, the Agency], the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]

[name & function of authorised representative]

[dd Month yyyy]

Signature of the Auditor

[legal name of the [Beneficiary]/[Linked Third Party]]

[name & function of authorised representative]

[dd Month yyyy]

Signature of the [Beneficiary]/[Linked Third Party]

² Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent Report of Factual Findings on costs declared
under Horizon 2020 Research and Innovation Framework Programme**

(To be printed on the Auditor's letterhead)

To

[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),
established at
[full address/city/state/province/country],
represented by
[name and function of an authorised representative],

have carried out the procedures agreed with you regarding the costs declared in the Financial Statement(s)³ of the [Beneficiary] [Linked Third Party] concerning the grant agreement [insert grant agreement reference: number, title of the action and acronym] ('the Agreement'),

with a total cost declared of
[total amount] EUR,

and a total of actual costs and unit costs calculated in accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices' declared of

[sum of total actual costs and total direct personnel costs declared as unit costs calculated in accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices] EUR

and hereby provide our Independent Report of Factual Findings ('the Report') using the compulsory report format agreed with you.

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') examined.

³ By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in Annex 4 to the Agreement).

The Procedures were carried out solely to assist the [Commission] [Agency] in evaluating whether the [Beneficiary's] [Linked Third Party's] costs in the accompanying Financial Statement(s) were declared in accordance with the Agreement. The [Commission] [Agency] draws its own conclusions from the Report and any additional information it may require.

The scope of the Procedures was defined by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence. Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, the Auditor does not give a statement of assurance on the Financial Statements.

Had the Auditor carried out additional procedures or an audit of the [Beneficiary's] [Linked Third Party's] Financial Statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to its attention and would have been included in the Report.

Not applicable Findings

We examined the Financial Statement(s) stated above and considered the following Findings not applicable:

Explanation (to be removed from the Report):

If a Finding was not applicable, it must be marked as 'N.A.' ('Not applicable') in the corresponding row on the right-hand column of the table and means that the Finding did not have to be corroborated by the Auditor and the related Procedure(s) did not have to be carried out.

The reasons of the non-application of a certain Finding must be obvious i.e.

- i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable;*
- ii) if the condition set to apply certain Procedure(s) are not met the related Finding(s) and those Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than euro' the Procedure and Finding related to 'beneficiaries with accounts established in euro' are not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.*

List here all Findings considered not applicable for the present engagement and explain the reasons of the non-applicability.

....

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and evaluate the Findings.

Explanation (to be removed from the Report):

- If the Auditor was not able to successfully complete a procedure requested, it must be marked as 'E' ('Exception') in the corresponding row on the right-hand column of the table. The reason such as the inability to reconcile key information or the unavailability of data that prevents the Auditor from carrying out the Procedure must be indicated below.*
- If the Auditor cannot corroborate a standard finding after having carried out the corresponding procedure, it must also be marked as 'E' ('Exception') and, where possible, the reasons why the Finding was not fulfilled and its possible impact must be explained here below.*

List here any exceptions and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, include the corresponding amount.

....

Example (to be removed from the Report):

1. The Beneficiary was unable to substantiate the Finding number 1 on ... because
2. Finding number 30 was not fulfilled because the methodology used by the Beneficiary to calculate unit costs was different from the one approved by the Commission. The differences were as follows: ...
3. After carrying out the agreed procedures to confirm the Finding number 31, the Auditor found a difference of _____ EUR. The difference can be explained by ...

Further Remarks

In addition to reporting on the results of the specific procedures carried out, the Auditor would like to make the following general remarks:

Example (to be removed from the Report):

1. Regarding Finding number 8 the conditions for additional remuneration were considered as fulfilled because ...
2. In order to be able to confirm the Finding number 15 we carried out the following additional procedures:

Use of this Report

This Report may be used only for the purpose described in the above objective. It was prepared solely for the confidential use of the [Beneficiary] [Linked Third Party] and the [Commission] [Agency], and only to be submitted to the [Commission] [Agency] in connection with the requirements set out in Article 20.4 of the Agreement. The Report may not be used by the [Beneficiary] [Linked Third Party] or by the [Commission] [Agency] for any other purpose, nor may it be distributed to any other parties. The [Commission] [Agency] may only disclose the Report to authorised parties, in particular to the European Anti-Fraud Office (OLAF) and the European Court of Auditors.

This Report relates only to the Financial Statement(s) submitted to the [Commission] [Agency] by the [Beneficiary] [Linked Third Party] for the Agreement. Therefore, it does not extend to any other of the [Beneficiary's] [Linked Third Party's] Financial Statement(s).

There was no conflict of interest⁴ between the Auditor and the Beneficiary [and Linked Third Party] in establishing this Report. The total fee paid to the Auditor for providing the Report was EUR _____ (including EUR _____ of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance.

[legal name of the Auditor]

[name and function of an authorised representative]

[dd Month yyyy]

Signature of the Auditor

⁴ A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

EUROPEAN COMMISSION - DIRECTORATE-GENERAL REGIONAL AND URBAN DEVELOPMENT - ANEXO 1 - 11/2014

Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor

The European Commission reserves the right to i) provide the auditor with additional guidance regarding the procedures to be followed or the facts to be ascertained and the way in which to present them (this may include sample coverage and findings) or to ii) change the procedures, by notifying the Beneficiary in writing. The procedures carried out by the auditor to confirm the standard factual finding are listed in the table below.

If this certificate relates to a Linked Third Party, any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

The 'result' column has three different options: 'C', 'E' and 'N.A.':

- 'C' stands for 'confirmed' and means that the auditor can confirm the 'standard factual finding' and, therefore, there is no exception to be reported.
- 'E' stands for 'exception' and means that the Auditor carried out the procedures but cannot confirm the 'standard factual finding', or that the Auditor was not able to carry out a specific procedure (e.g. because it was impossible to reconcile key information or data were unavailable).
- 'N.A.' stands for 'not applicable' and means that the Finding did not have to be examined by the Auditor and the related Procedure(s) did not have to be carried out. The reasons of the non-application of a certain Finding must be obvious i.e. i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable; ii) if the condition set to apply certain Procedure(s) are not met then the related Finding(s) and Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than the euro' the Procedure related to 'beneficiaries with accounts established in euro' is not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A	ACTUAL PERSONNEL COSTS AND UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICE		
	The Auditor draws a sample of persons whose costs were declared in the Financial Statement(s) to carry out the procedures indicated in the consecutive points of this section A. <i>(The sample should be selected randomly so that it is representative. Full coverage is required if there are fewer than 10 people (including employees, natural persons working under a direct contract and personnel seconded by a third party), otherwise the sample should have a minimum of 10 people, or 10% of the total, whichever number is the highest)</i> The Auditor sampled _____ people out of the total of _____ people.		

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Project Title: [insert acronym] [insert call identifier] [insert project title]

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.1	PERSONNEL COSTS <u>For the persons included in the sample and working under an employment contract or equivalent act (general procedures for individual actual personnel costs and personnel costs declared as unit costs)</u> To confirm standard factual findings 1-5 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: - o a list of the persons included in the sample indicating the period(s) during which they worked for the action, their position (classification or category) and type of contract; - o the payslips of the employees included in the sample; - o reconciliation of the personnel costs declared in the Financial Statement(s) with the accounting system (project accounting and general ledger) and payroll system; - o information concerning the employment status and employment conditions of personnel included in the sample, in particular their employment contracts or equivalent; - o the Beneficiary's usual policy regarding payroll matters (e.g. salary policy, overtime policy, variable pay); - o applicable national law on taxes, labour and social security and - o any other document that supports the personnel costs declared. The Auditor also verified the eligibility of all components of the retribution (see Article 6 GA) and recalculated the personnel costs for employees included in the sample.	1) The employees were i) directly hired by the Beneficiary in accordance with its national legislation, ii) under the Beneficiary's sole technical supervision and responsibility and iii) remunerated in accordance with the Beneficiary's usual practices.	
		2) Personnel costs were recorded in the Beneficiary's accounts/payroll system.	
		3) Costs were adequately supported and reconciled with the accounts and payroll records.	
		4) Personnel costs did not contain any ineligible elements.	
		5) There were no discrepancies between the personnel costs charged to the action and the costs recalculated by the Auditor.	
	<i>Further procedures if 'additional remuneration' is paid</i> To confirm standard factual findings 6-9 listed in the next column, the Auditor: o reviewed relevant documents provided by the Beneficiary (legal form, legal/statutory	6) The Beneficiary paying "additional remuneration" was a non-profit legal entity.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

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Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	obligations, the Beneficiary's usual policy on additional remuneration, criteria used for its calculation, the Beneficiary's usual remuneration practice for projects funded under national funding schemes...); o recalculated the amount of additional remuneration eligible for the action based on the supporting documents received (full-time or part-time work, exclusive or non-exclusive dedication to the action, usual remuneration paid for projects funded by national schemes) to arrive at the applicable FTE/year and pro-rata rate (see data collected in the course of carrying out the procedures under A.2 'Productive hours' and A.4 'Time recording system'). <i>'ADDITIONAL REMUNERATION' MEANS ANY PART OF THE REMUNERATION WHICH EXCEEDS WHAT THE PERSON WOULD BE PAID FOR TIME WORKED IN PROJECTS FUNDED BY NATIONAL SCHEMES.</i> <i>IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE QUALIFIES AS "ADDITIONAL REMUNERATION" AND IS ELIGIBLE UNDER THE PROVISIONS OF ARTICLE 6.2.A.1, THIS CAN BE CHARGED AS ELIGIBLE COST TO THE ACTION UP TO THE FOLLOWING AMOUNT:</i> <i>(A) IF THE PERSON WORKS FULL TIME AND EXCLUSIVELY ON THE ACTION DURING THE FULL YEAR: UP TO EUR 8 000/YEAR;</i> <i>(B) IF THE PERSON WORKS EXCLUSIVELY ON THE ACTION BUT NOT FULL-TIME OR NOT FOR THE FULL YEAR: UP TO THE CORRESPONDING PRO-RATA AMOUNT OF EUR 8 000, OR</i> <i>(C) IF THE PERSON DOES NOT WORK EXCLUSIVELY ON THE ACTION: UP TO A PRO-RATA AMOUNT CALCULATED IN ACCORDANCE TO ARTICLE 6.2.A.1.</i>	7) The amount of additional remuneration paid corresponded to the Beneficiary's usual remuneration practices and was consistently paid whenever the same kind of work or expertise was required. 8) The criteria used to calculate the additional remuneration were objective and generally applied by the Beneficiary regardless of the source of funding used. 9) The amount of additional remuneration included in the personnel costs charged to the action was capped at EUR 8,000 per FTE/year (up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).	
	<i>Additional procedures in case "unit costs calculated by the Beneficiary in accordance with its usual cost accounting practices" is applied:</i> Apart from carrying out the procedures indicated above to confirm standard factual findings 1-5 and, if applicable, also 6-9, the Auditor carried out following procedures to confirm standard	10) The personnel costs included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice. This methodology was consistently	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Ref	Procedures	Standard factual finding	Result (C/E/ N.A.)
	factual findings 10-13 listed in the next column: - obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs; - reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; - verified the employees included in the sample were charged under the correct category (in accordance with the criteria used by the Beneficiary to establish personnel categories) by reviewing the contract/IIR-record or analytical accounting records; - verified that there is no difference between the total amount of personnel costs used in calculating the cost per unit and the total amount of personnel costs recorded in the statutory accounts; - verified whether actual personnel costs were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, objective and supported by documents.	used in all H2020 actions. 11) The employees were charged under the correct category. 12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts. 13) Any estimated or budgeted element used by the Beneficiary in its unit-cost calculation were relevant for calculating personnel costs and corresponded to objective and verifiable information.	
	<u>For natural persons included in the sample and working with the Beneficiary under a direct contract other than an employment contract, such as consultants (no subcontractors).</u> To confirm standard factual findings 14-17 listed in the next column the Auditor reviewed following information/documents provided by the Beneficiary: - the contracts, especially the cost, contract duration, work description, place of work, ownership of the results and reporting obligations to the Beneficiary; - the employment conditions of staff in the same category to compare costs and; - any other document that supports the costs declared and its registration (e.g. invoices, accounting records, etc.).	14) The natural persons worked under conditions similar to those of an employee, in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed. 15) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Annex 1: Monitoring and Reporting of Financial and Non-Financial Indicators

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		results were generated by itself.	
		16) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		17) The costs were supported by audit evidence and registered in the accounts.	
	<u>For personnel seconded by a third party and included in the sample (not subcontractors)</u> To confirm standard factual findings 18-21 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: - o their secondment contract(s) notably regarding costs, duration, work description, place of work and ownership of the results; - o if there is reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution against payment): any documentation that supports the costs declared (e.g. contract, invoice, bank payment, and proof of registration in its accounting/payroll, etc.) and reconciliation of the Financial Statement(s) with the accounting system (project accounting and general ledger) as well as any proof that the amount invoiced by the third party did not include any profit; - o if there is no reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution free of charge): a proof of the actual cost borne by the Third Party for the resource made available free of charge to the Beneficiary such as a statement of costs incurred by the Third Party and proof of the registration in the Third Party's accounting/payroll;	18) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary). 19) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results were generated by itself.. <i>If personnel is seconded against payment:</i> 20) The costs declared were supported with documentation and recorded in the	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	any other document that supports the costs declared (e.g. invoices, etc.).	Beneficiary's accounts. The third party did not include any profit. <i>If personnel is seconded free of charge:</i> 21) The costs declared did not exceed the third party's cost as recorded in the accounts of the third party and were supported with documentation.	
A.2	PRODUCTIVE HOURS To confirm standard factual findings 22-27 listed in the next column, the Auditor reviewed relevant documents, especially national legislation, labour agreements and contracts and time records of the persons included in the sample, to verify that: - the annual productive hours applied were calculated in accordance with one of the methods described below, - the full-time equivalent (FTEs) ratios for employees not working full-time were correctly calculated. If the Beneficiary applied method B, the auditor verified that the correctness in which the total number of hours worked was calculated and that the contracts specified the annual workable hours. If the Beneficiary applied method C, the auditor verified that the 'annual productive hours' applied when calculating the hourly rate were equivalent to at least 90 % of the 'standard annual workable hours'. The Auditor can only do this if the calculation of the standard annual workable	22) The Beneficiary applied method [choose one option and delete the others] [A: 1720 hours] [B: the 'total number of hours worked'] [C: 'standard annual productive hours' used correspond to usual accounting practices] 23) Productive hours were calculated annually. 24) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Annex 1 to the Grant Agreement: Description of the Beneficiary's Methodology

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	hours can be supported by records, such as national legislation, labour agreements, and contracts. <i>BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:</i> <i>A. 1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)</i> <i>B. THE TOTAL NUMBER OF HOURS WORKED BY THE PERSON FOR THE BENEFICIARY IN THE YEAR (THIS METHOD IS ALSO REFERRED TO AS 'TOTAL NUMBER OF HOURS WORKED' IN THE NEXT COLUMN). THE CALCULATION OF THE TOTAL NUMBER OF HOURS WORKED WAS DONE AS FOLLOWS: ANNUAL WORKABLE HOURS OF THE PERSON ACCORDING TO THE EMPLOYMENT CONTRACT, APPLICABLE LABOUR AGREEMENT OR NATIONAL LAW PLUS OVERTIME WORKED MINUS ABSENCES (SUCH AS SICK LEAVE OR SPECIAL LEAVE).</i> <i>C. THE STANDARD NUMBER OF ANNUAL HOURS GENERALLY APPLIED BY THE BENEFICIARY FOR ITS PERSONNEL IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES (THIS METHOD IS ALSO REFERRED TO AS 'STANDARD ANNUAL PRODUCTIVE HOURS' IN THE NEXT COLUMN). THIS NUMBER MUST BE AT LEAST 90% OF THE STANDARD ANNUAL WORKABLE HOURS.</i> <i>'ANNUAL WORKABLE HOURS' MEANS THE PERIOD DURING WHICH THE PERSONNEL MUST BE WORKING, AT THE EMPLOYER'S DISPOSAL AND CARRYING OUT HIS/HER ACTIVITY OR DUTIES UNDER THE EMPLOYMENT CONTRACT, APPLICABLE COLLECTIVE LABOUR AGREEMENT OR NATIONAL WORKING TIME LEGISLATION.</i>	<i>If the Beneficiary applied method B.</i> 25) The calculation of the number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary. 25.1) The Beneficiary calculates the hourly rates per full financial year following procedure A.3 (method B is not allowed for beneficiaries calculating hourly rates per month). <i>If the Beneficiary applied method C.</i> 26) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		27) The 'annual productive hours' used for calculating the hourly rate were consistent with the usual cost accounting practices of the Beneficiary and were equivalent to at least 90 % of the 'annual workable hours'.	
A.3	HOURLY PERSONNEL RATES <u>I) For unit costs calculated in accordance to the Beneficiary's usual cost accounting practice (unit costs):</u> If the Beneficiary has a "Certificate on Methodology to calculate unit costs " (CoMUC) approved by the Commission, the Beneficiary provides the Auditor with a description of the approved methodology and the Commission's letter of acceptance. The Auditor verified that the Beneficiary has indeed used the methodology approved. If so, no further verification is necessary. If the Beneficiary does not have a "Certificate on Methodology" (CoMUC) approved by the Commission, or if the methodology approved was not applied, then the Auditor: - o reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; - o recalculated the unit costs (hourly rates) of staff included in the sample following the results of the procedures carried out in A.1 and A.2. <u>II) For individual hourly rates:</u> The Auditor: - o reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates;	28) The Beneficiary applied [choose one option and delete the other]: [Option I: "Unit costs (hourly rates) were calculated in accordance with the Beneficiary's usual cost accounting practices"] [Option II: Individual hourly rates were applied] <i>For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC):</i> 29) The Beneficiary used the Commission-approved methodology to calculate hourly rates. It corresponded to the organisation's usual cost accounting practices and was applied consistently for all	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Annex 1 - Audit of the Beneficiary's Financial Statements - Methodology - Summary

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	- recalculated the hourly rates of staff included in the sample (recalculation of all hourly rates if the Beneficiary uses annual rates, recalculation of three months selected randomly for every year and person if the Beneficiary uses monthly rates) following the results of the procedures carried out in A.1 and A.2; (only in case of monthly rates) confirmed that the time spent on parental leave is not deducted, and that, if parts of the basic remuneration are generated over a period longer than a month, the Beneficiary has included only the share which is generated in the month.	activities irrespective of the source of funding.	
	<u>"UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES":</u> IT IS CALCULATED BY DIVIDING THE TOTAL AMOUNT OF PERSONNEL COSTS OF THE CATEGORY TO WHICH THE EMPLOYEE BELONGS VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF FTE AND THE ANNUAL TOTAL PRODUCTIVE HOURS OF THE SAME CATEGORY CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH PROCEDURE A.2. <u>HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:</u> IT IS CALCULATED FOLLOWING ONE OF THE TWO OPTIONS BELOW: A) [OPTION BY DEFAULT] BY DIVIDING THE ACTUAL ANNUAL AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2 (FULL FINANCIAL YEAR HOURLY RATE); B) BY DIVIDING THE ACTUAL MONTHLY AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY 1/12 OF THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2. (MONTHLY HOURLY RATE).	<i>For option I concerning unit costs and if the Beneficiary applies a methodology not approved by the Commission:</i> 30) The unit costs re-calculated by the Auditor were the same as the rates applied by the Beneficiary.	
		<i>For option II concerning individual hourly rates:</i> 31) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary. 31.1) The Beneficiary used only one option (per full financial year or per month) throughout each financial year examined. 31.2) The hourly rates do not include additional remuneration.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.4	TIME RECORDING SYSTEM To verify that the time recording system ensures the fulfilment of all minimum requirements and that the hours declared for the action were correct, accurate and properly authorised and supported by documentation, the Auditor made the following checks for the persons included in the sample that declare time as worked for the action on the basis of time records: - o description of the time recording system provided by the Beneficiary (registration, authorisation, processing in the HR-system); - o its actual implementation; - o time records were signed at least monthly by the employees (on paper or electronically) and authorised by the project manager or another manager; - o the hours declared were worked within the project period; - o there were no hours declared as worked for the action if HR-records showed absence due to holidays or sickness (further cross-checks with travels are carried out in B.I below) ; - o the hours charged to the action matched those in the time recording system.	32) All persons recorded their time dedicated to the action on a daily/ weekly/ monthly basis using a paper/computer-based system. <i>(delete the answers that are not applicable)</i>	
		33) Their time-records were authorised at least monthly by the project manager or other superior.	
		34) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
	<i>ONLY THE HOURS WORKED ON THE ACTION CAN BE CHARGED. ALL WORKING TIME TO BE CHARGED SHOULD BE RECORDED THROUGHOUT THE DURATION OF THE PROJECT, ADEQUATELY SUPPORTED BY EVIDENCE OF THEIR REALITY AND RELIABILITY (SEE SPECIFIC PROVISIONS BELOW FOR PERSONS WORKING EXCLUSIVELY FOR THE ACTION WITHOUT TIME RECORDS).</i>	35) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<u>If the persons are working exclusively for the action and without time records</u> For the persons selected that worked exclusively for the action without time records, the Auditor verified evidence available demonstrating that they were in reality exclusively dedicated to the action and that the Beneficiary signed a declaration confirming that they have worked exclusively for the action.	36) The exclusive dedication is supported by a declaration signed by the Beneficiary and by any other evidence gathered.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

37) The use of claimed subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category.

Ref	Procedures	Standard factual finding	Result (C / F / N.A.)
B	COSTS OF SUBCONTRACTING		
B.1	The Auditor obtained the detail/breakdown of subcontracting costs and sampled ~~randomly~~ cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest). To confirm standard factual findings 37-41 listed in the next column, the Auditor reviewed the following for the items included in the sample: - o the use of subcontractors was foreseen in Annex 1; - o subcontracting costs were declared in the subcontracting category of the Financial Statement; - o supporting documents on the selection and award procedure were followed; - o the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the subcontract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment). In particular, i. if the Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the subcontracting complied with the Terms and Conditions of the Agreement. ii. if the Beneficiary did not fall under the above-mentioned category the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement..	37) The use of claimed subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category. 38) There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. Subcontracts were awarded in accordance with the principle of best value for money. <i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)</i> 39) The subcontracts were not awarded to other Beneficiaries	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

[insert name of the beneficiary] [insert acronym] [insert call identifier]

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	For the items included in the sample the Auditor also verified that: - the subcontracts were not awarded to other Beneficiaries in the consortium; - there were signed agreements between the Beneficiary and the subcontractor; - there was evidence that the services were provided by subcontractor;	of the consortium. 40) All subcontracts were supported by signed agreements between the Beneficiary and the subcontractor. 41) There was evidence that the services were provided by the subcontractors.	
C	COSTS OF PROVIDING FINANCIAL SUPPORT TO THIRD PARTIES		
C.1	The Auditor obtained the detail/breakdown of the costs of providing financial support to third parties and sampled [redacted] cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest). The Auditor verified that the following minimum conditions were met: a) the maximum amount of financial support for each third party did not exceed EUR 60 000, unless explicitly mentioned in Annex 1; b) the financial support to third parties was agreed in Annex 1 of the Agreement and the other provisions on financial support to third parties included in Annex 1 were respected.	42) All minimum conditions were met	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Contractual Costs: [insert number] [insert acronym] [insert call identifier]

D	OTHER ACTUAL DIRECT COSTS		
D.1	COSTS OF TRAVEL AND RELATED SUBSISTENCE ALLOWANCES The Auditor sampled [redacted] cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest). The Auditor inspected the sample and verified that: - travel and subsistence costs were consistent with the Beneficiary's usual policy for travel. In this context, the Beneficiary provided evidence of its normal policy for travel costs (e.g. use of first class tickets, reimbursement by the Beneficiary on the basis of actual costs, a lump sum or per diem) to enable the Auditor to compare the travel costs charged with this policy; - travel costs are correctly identified and allocated to the action (e.g. trips are directly linked to the action) by reviewing relevant supporting documents such as minutes of meetings, workshops or conferences, their registration in the correct project account, their consistency with time records or with the dates/duration of the workshop/conference; - no ineligible costs or excessive or reckless expenditure was declared (see Article 6.5 MGA).	43) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels. 44) There was a link between the trip and the action. 45) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting. 46) No ineligible costs or excessive or reckless expenditure was declared.	
D.2	DEPRECIATION COSTS FOR EQUIPMENT, INFRASTRUCTURE OR OTHER ASSETS The Auditor sampled [redacted] cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest). For "equipment, infrastructure or other assets" [from now on called "asset(s)"] selected in the sample the Auditor verified that: the assets were acquired in conformity with the Beneficiary's internal guidelines and procedures;	47) Procurement rules, principles and guides were followed. 48) There was a link between the grant agreement and the asset charged to the action. 49) The asset charged to the action was traceable to the accounting records and the underlying documents.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Financial Statement Audit Report for the period 1 January 2014 to 31 December 2014

D.3	○ they were correctly allocated to the action (with supporting documents such as delivery note invoice or any other proof demonstrating the link to the action) ○ they were entered in the accounting system; ○ the extent to which the assets were used for the action (as a percentage) was supported by reliable documentation (e.g. usage overview table); The Auditor recalculated the depreciation costs and verified that they were in line with the applicable rules in the Beneficiary's country and with the Beneficiary's usual accounting policy (e.g. depreciation calculated on the acquisition value). The Auditor verified that no ineligible costs such as deductible VAT, exchange rate losses, excessive or reckless expenditure were declared (see Article 6.5 GA).	50) The depreciation method used to charge the asset to the action was in line with the applicable rules of the Beneficiary's country and the Beneficiary's usual accounting policy.	
		51) The amount charged corresponded to the actual usage for the action.	
		52) No ineligible costs or excessive or reckless expenditure were declared.	
	COSTS OF OTHER GOODS AND SERVICES The Auditor sampled XXXX cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest). For the purchase of goods, works or services included in the sample the Auditor verified that: ○ the contracts did not cover tasks described in Annex 1; ○ they were correctly identified, allocated to the proper action, entered in the accounting system (traceable to underlying documents such as purchase orders, invoices and accounting); ○ the goods were not placed in the inventory of durable equipment; ○ the costs charged to the action were accounted in line with the Beneficiary's usual accounting practices; ○ no ineligible costs or excessive or reckless expenditure were declared (see Article 6 GA). In addition, the Auditor verified that these goods and services were acquired in conformity with	53) Contracts for works or services did not cover tasks described in Annex 1.	
		54) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.	
		55) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.	
		56) No ineligible costs or excessive or reckless expenditure were declared. For internal invoices/charges only the cost element was charged, without any mark-ups.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

FP7 – Marie Skłodowska Curie Actions – Specific Programme – Marie Skłodowska Curie Grant Agreement

	the Beneficiary's internal guidelines and procedures, in particular: ○ if Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the procurement contract complied with the Terms and Conditions of the Agreement. ○ if the Beneficiary did not fall into the category above, the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement. For the items included in the sample the Auditor also verified that: ○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the contract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Auditor also verified that the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment); <i>SUCH GOODS AND SERVICES INCLUDE, FOR INSTANCE, CONSUMABLES AND SUPPLIES, DISSEMINATION (INCLUDING OPEN ACCESS), PROTECTION OF RESULTS, SPECIFIC EVALUATION OF THE ACTION IF IT IS REQUIRED BY THE AGREEMENT, CERTIFICATES ON THE FINANCIAL STATEMENTS IF THEY ARE REQUIRED BY THE AGREEMENT AND CERTIFICATES ON THE METHODOLOGY, TRANSLATIONS, REPRODUCTION.</i>	57) Procurement rules, principles and guides were followed. There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. The purchases were made in accordance with the principle of best value for money. <i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)</i>	
D.4	AGGREGATED CAPITALISED AND OPERATING COSTS OF RESEARCH INFRASTRUCTURE The Auditor ensured the existence of a positive ex-ante assessment (issued by the EC Services) of the cost accounting methodology of the Beneficiary allowing it to apply the guidelines on direct costing for large research infrastructures in Horizon 2020.	58) The costs declared as direct costs for Large Research Infrastructures (in the appropriate line of the Financial Statement) comply with the methodology described in the positive ex-ante assessment report.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

	<i>In the cases that a positive ex-ante assessment has been issued (see the standard factual findings 58-59 on the next column),</i> The Auditor ensured that the beneficiary has applied consistently the methodology that is explained and approved in the positive ex ante assessment; <i>In the cases that a positive ex-ante assessment has NOT been issued (see the standard factual findings 60 on the next column),</i> The Auditor verified that no costs of Large Research Infrastructure have been charged as direct costs in any costs category; <i>In the cases that a draft ex-ante assessment report has been issued with recommendation for further changes (see the standard factual findings 60 on the next column),</i> The Auditor followed the same procedure as above (when a positive ex-ante assessment has NOT yet been issued) and paid particular attention (testing reinforced) to the cost items for which the draft ex-ante assessment either rejected the inclusion as direct costs for Large Research Infrastructures or issued recommendations.	59) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly.	
		60) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.	
		61) The costs of internally invoiced goods and services included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice.	
D.5	Costs of internally invoiced goods and services		
	The Auditor sampled cost items selected randomly (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest). To confirm standard factual findings 61-65 listed in the next column, the Auditor: - obtained a description of the Beneficiary's usual cost accounting practice to calculate costs of internally invoiced goods and services (unit costs); - reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; - ensured that the methodology to calculate unit costs is being used in a consistent manner, based on objective criteria, regardless of the source of funding; - verified that any ineligible items or any costs claimed under other budget categories, in particular indirect costs, have not been taken into account when calculating the costs of	62) The cost accounting practices used to calculate the costs of internally invoiced goods and services were applied by the Beneficiary in a consistent manner based on objective criteria regardless of the source of funding.	
		63) The unit cost is calculated using the actual costs for the good or service recorded in the Beneficiary's accounts, excluding any ineligible cost or costs included in other	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

	internally invoiced goods and services (see Article 6 GA); - o verified whether actual costs of internally invoiced goods and services were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, and correspond to objective and verifiable information. - o verified that any costs of items which are not directly linked to the production of the invoiced goods or service (e.g. supporting services like cleaning, general accountancy, administrative support, etc. not directly used for production of the good or service) have not been taken into account when calculating the costs of internally invoiced goods and services. - o verified that any costs of items used for calculating the costs internally invoiced goods and services are supported by audit evidence and registered in the accounts.	budget categories.	
		64) The unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.	
		65) The costs items used for calculating the actual costs of internally invoiced goods and services were relevant, reasonable and correspond to objective and verifiable information.	
E	USE OF EXCHANGE RATES		
E.1	a) For Beneficiaries with accounts established in a currency other than euros The Auditor sampled _____ cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest): <i>COSTS RECORDED IN THE ACCOUNTS IN A CURRENCY OTHER THAN EURO SHALL BE CONVERTED INTO EURO AT THE AVERAGE OF THE DAILY EXCHANGE RATES PUBLISHED IN THE C SERIES OF OFFICIAL JOURNAL OF THE EUROPEAN UNION (http://www.ecb.int/press/pr/exchange/index.html), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i> <i>IF NO DAILY EURO EXCHANGE RATE IS PUBLISHED IN THE OFFICIAL JOURNAL OF THE EUROPEAN UNION FOR THE CURRENCY IN QUESTION, CONVERSION SHALL BE MADE AT THE AVERAGE OF THE MONTHLY ACCOUNTING RATES ESTABLISHED BY THE COMMISSION AND PUBLISHED ON ITS WEBSITE (http://ec.europa.eu/economy_finance/).</i>	66) The exchange rates used to convert other currencies into Euros were in accordance with the rules established of the Grant Agreement and there was no difference in the final figures.	

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

ANNEX 2 – VERIFICATION OF THE BENEFICIARY'S ACCOUNTING PRACTICES

DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.		
b) For Beneficiaries with accounts established in euros The Auditor sampled _____ cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest): COSTS INCURRED IN ANOTHER CURRENCY SHALL BE CONVERTED INTO EURO BY APPLYING THE BENEFICIARY'S USUAL ACCOUNTING PRACTICES.	67) The Beneficiary applied its usual accounting practices.	

~~(Signature of the Auditor)~~
~~(Name and function of the authorized representative)~~
~~(Date)~~
 <Signature of the Auditor>

ANNEX 6

MODEL FOR THE CERTIFICATE ON THE METHODOLOGY

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data.

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TERMS OF REFERENCE FOR AN AUDIT ENGAGEMENT FOR A METHODOLOGY CERTIFICATE IN CONNECTION WITH ONE OR MORE GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON THE METHODOLOGY CONCERNING GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

**Terms of reference for an audit engagement for a methodology certificate
in connection with one or more grant agreements financed
under the Horizon 2020 Research and Innovation Framework Programme**

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: *[insert name of the beneficiary]* (*‘the Beneficiary’*)] [OPTION 2: *[insert name of the linked third party]* (*‘the Linked Third Party’*), third party linked to the Beneficiary *[insert name of the beneficiary]* (*‘the Beneficiary’*)]

agrees to engage

[insert legal name of the auditor] (*‘the Auditor’*)

to produce an independent report of factual findings (*‘the Report’*) concerning the *[Beneficiary’s]* *[Linked Third Party’s]* usual accounting practices for calculating and claiming direct personnel costs declared as unit costs (*‘the Methodology’*) in connection with grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme.

The procedures to be carried out for the assessment of the methodology will be based on the grant agreement(s) detailed below:

[title and number of the grant agreement(s)] (*‘the Agreement(s)’*)

The Agreement(s) has(have) been concluded between the Beneficiary and [OPTION 1: *the European Union, represented by the European Commission* (*‘the Commission’*)] [OPTION 2: *the European Atomic Energy Community (Euratom), represented by the European Commission* (*‘the Commission’*)] [OPTION 3: *the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)]* (*‘the Agency’*), under the powers delegated by the European Commission (*‘the Commission’*).].

The *[Commission]* *[Agency]* is mentioned as a signatory of the Agreement with the Beneficiary only. The *[European Union]* *[Euratom]* *[Agency]* is not a party to this engagement.

1.1 Subject of the engagement

According to Article 18.1.2 of the Agreement, beneficiaries *[and linked third parties]* that declare direct personnel costs as unit costs calculated in accordance with their usual cost accounting practices may submit to the *[Commission]* *[Agency]*, for approval, a certificate on the methodology (*‘CoMUC’*) stating that there are adequate records and documentation to prove that their cost accounting practices used comply with the conditions set out in Point A of Article 6.2.

The subject of this engagement is the CoMUC which is composed of two separate documents:

- the Terms of Reference (*‘the ToR’*) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;
- the Auditor’s Independent Report of Factual Findings (*‘the Report’*) issued on the Auditor’s letterhead, dated, stamped and signed by the Auditor which includes; the standard statements (*‘the Statements’*) evaluated and signed by the *[Beneficiary]* *[Linked Third Party]*, the agreed-upon procedures (*‘the Procedures’*) performed by the Auditor and the standard factual findings

(‘the Findings’) assessed by the Auditor. The Statements, Procedures and Findings are summarised in the table that forms part of the Report.

The information provided through the Statements, the Procedures and the Findings will enable the Commission to draw conclusions regarding the existence of the [Beneficiary's] [Linked Third Party's] usual cost accounting practice and its suitability to ensure that direct personnel costs claimed on that basis comply with the provisions of the Agreement. The Commission draws its own conclusions from the Report and any additional information it may require.

1.2 Responsibilities

The parties to this agreement are the [Beneficiary] [Linked Third Party] and the Auditor.

The [Beneficiary] [Linked Third Party]:

- is responsible for preparing financial statements for the Agreement(s) (‘the Financial Statements’) in compliance with those Agreements;
- is responsible for providing the Financial Statement(s) to the Auditor and enabling the Auditor to reconcile them with the [Beneficiary's] [Linked Third Party's] accounting and bookkeeping system and the underlying accounts and records. The Financial Statement(s) will be used as a basis for the procedures which the Auditor will carry out under this ToR;
- is responsible for its Methodology and liable for the accuracy of the Financial Statement(s);
- is responsible for endorsing or refuting the Statements indicated under the heading ‘Statements to be made by the Beneficiary/ Linked Third Party’ in the first column of the table that forms part of the Report;
- must provide the Auditor with a signed and dated representation letter;
- accepts that the ability of the Auditor to carry out the Procedures effectively depends upon the [Beneficiary] [Linked Third Party] providing full and free access to the [Beneficiary's] [Linked Third Party's] staff and to its accounting and other relevant records.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the Beneficiary's *[and Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with these ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the [Beneficiary] [Linked Third Party].

The Commission sets out the Procedures to be carried out and the Findings to be endorsed by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with¹:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the Commission requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there was no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]* that could have a bearing on the Report, and must specify – if the service is invoiced – the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7 of the Agreement).

Under Article 22 of the Agreement, the Commission, *[the Agency]*, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from *[the European Union] [Euratom]* budget. This includes work related to this engagement. The Auditor must provide access to all working papers related to this assignment if the Commission¹, *the Agency*, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by **[dd Month yyyy]**.

1.6 Other Terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the Auditor

[legal name of the [Beneficiary] [Linked Third Party]]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the *[Beneficiary] [Linked Third Party]*

¹ Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

Independent report of factual findings on the methodology concerning grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme

(To be printed on letterhead paper of the auditor)

To

[name of contact person(s)], [Position]

[[Beneficiary's] [Linked Third Party's] name]

[Address]

[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: *[insert name of the beneficiary]* ('the Beneficiary')] [OPTION 2: *[insert name of the linked third party]* ('the Linked Third Party'), third party linked to the Beneficiary *[insert name of the beneficiary]* ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),

established at

[full address/city/state/province/country],

represented by

[name and function of an authorised representative],

have carried out the agreed-upon procedures ('the Procedures') and provide hereby our Independent Report of Factual Findings ('the Report'), concerning the [Beneficiary's] [Linked Third Party's] usual accounting practices for calculating and declaring direct personnel costs declared as unit costs ('the Methodology').

You requested certain procedures to be carried out in connection with the grant(s)

[title and number of the grant agreement(s)] ('the Agreement(s)').

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes: the standard statements ('the Statements') made by the [Beneficiary] [Linked Third Party], the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') confirmed by us.

The engagement involved carrying out the Procedures and assessing the Findings and the documentation requested appended to this Report, the results of which the Commission uses to draw conclusions regarding the acceptability of the Methodology applied by the [Beneficiary] [Linked Third Party].

The Report covers the methodology used from [dd Month yyyy]. In the event that the [Beneficiary] [Linked Third Party] changes this methodology, the Report will not be applicable to any Financial Statement¹ submitted thereafter.

The scope of the Procedures and the definition of the standard statements and findings were determined solely by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence.

Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not give a statement of assurance on the costs declared on the basis of the [Beneficiary's] [Linked Third Party's] Methodology. Had we carried out additional procedures or had we performed an audit or review in accordance with these standards, other matters might have come to its attention and would have been included in the Report.

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] agreed with the standard Statements and provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and corroborate the standard Findings.

List here any exception and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, also indicate the corresponding amount.

.....

Explanation of possible exceptions in the form of examples (to be removed from the Report):
 i. the [Beneficiary] [Linked Third Party] did not agree with the standard Statement number ... because...;
 ii. the Auditor could not carry out the procedure ... established because (e.g. due to the inability to reconcile key information or the unavailability or inconsistency of data);
 iii. the Auditor could not confirm or corroborate the standard Finding number ... because

Remarks

We would like to add the following remarks relevant for the proper understanding of the Methodology applied by the [Beneficiary] [Linked Third Party] or the results reported:

Example (to be removed from the Report):
 Regarding the methodology applied to calculate hourly rates ...
 Regarding standard Finding 15 it has to be noted that ...
 The [Beneficiary] [Linked Third Party] explained the deviation from the benchmark statement XXIV concerning time recording for personnel with no exclusive dedication to the action in the following manner:
 ...

Annexes

Please provide the following documents to the auditor and annex them to the report when submitting this CoMUC to the Commission:

¹ Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

1. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;
2. Brief description of the time recording system in place;
3. An example of the time records used by the [Beneficiary] [Linked Third Party];
4. Description of any budgeted or estimated elements applied, together with an explanation as to why they are relevant for calculating the personnel costs and how they are based on objective and verifiable information;
5. A summary sheet with the hourly rate for direct personnel declared by the [Beneficiary] [Linked Third Party] and recalculated by the Auditor for each staff member included in the sample (the names do not need to be reported);
6. A comparative table summarising for each person selected in the sample a) the time claimed by the [Beneficiary] [Linked Third Party] in the Financial Statement(s) and b) the time according to the time record verified by the Auditor;
7. A copy of the letter of representation provided to the Auditor.

Use of this Report

This Report has been drawn up solely for the purpose given under Point 1.1 Reasons for the engagement.

The Report:

- is confidential and is intended to be submitted to the Commission by the [Beneficiary] [Linked Third Party] in connection with Article 18.1.2 of the Agreement;
- may not be used by the [Beneficiary] [Linked Third Party] or by the Commission for any other purpose, nor distributed to any other parties;
- may be disclosed by the Commission only to authorised parties, in particular the European Anti-Fraud Office (OLAF) and the European Court of Auditors.
- relates only to the usual cost accounting practices specified above and does not constitute a report on the Financial Statements of the [Beneficiary] [Linked Third Party].

No conflict of interest² exists between the Auditor and the Beneficiary [and the Linked Third Party] that could have a bearing on the Report. The total fee paid to the Auditor for producing the Report was EUR _____ (including EUR _____ of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance which may be required.

Yours sincerely

[legal name of the Auditor]

[name and title of the authorised representative]

[dd Month yyyy]

Signature of the Auditor

² A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Project acronym: [insert acronym] [insert call identifier]

Statements to be made by the Beneficiary/Linked Third Party ('the Statements') and Procedures to be carried out by the Auditor ('the Procedures') and standard factual findings ('the Findings') to be confirmed by the Auditor

The Commission reserves the right to provide the auditor with guidance regarding the Statements to be made, the Procedures to be carried out or the Findings to be ascertained and the way in which to present them. The Commission reserves the right to vary the Statements, Procedures or Findings by written notification to the Beneficiary/Linked Third Party to adapt the procedures to changes in the grant agreement(s) or to any other circumstances.

If this methodology certificate relates to the Linked Third Party's usual accounting practices for calculating and claiming direct personnel costs declared as unit costs any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
A. Use of the Methodology I. The cost accounting practice described below has been in use since [dd Month yyyy]. II. The next planned alteration to the methodology used by the Beneficiary will be from [dd Month yyyy].	Procedure: ✓ The Auditor checked these dates against the documentation the Beneficiary has provided. Factual finding: 1. The dates provided by the Beneficiary were consistent with the documentation.
B. Description of the Methodology III. The methodology to calculate unit costs is being used in a consistent manner and is reflected in the relevant procedures. <i>[Please describe the methodology your entity uses to calculate personnel costs, productive hours and hourly rates, present your description to the Auditor and annex it to this certificate]</i> <i>[If the statement of section "B. Description of the methodology" cannot be endorsed by the Beneficiary or there is no written methodology to calculate unit costs it should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:</i> ...]	Procedure: ✓ The Auditor reviewed the description, the relevant manuals and/or internal guidance documents describing the methodology. Factual finding: 2. The brief description was consistent with the relevant manuals, internal guidance and/or other documentary evidence the Auditor has reviewed. 3. The methodology was generally applied by the Beneficiary as part of its usual costs accounting practices.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

EUROPEAN COMMISSION - DIRECTORATE-GENERAL FOR RESEARCH AND INNOVATION

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
C. Personnel costs	Procedure:
General	<i>The Auditor draws a sample of employees to carry out the procedures indicated in this section C and the following sections D to F.</i> <i>[The Auditor has drawn a random sample of 10 employees assigned to Horizon 2020 action(s). If fewer than 10 employees are assigned to the Horizon 2020 action(s), the Auditor has selected all employees assigned to the Horizon 2020 action(s) complemented by other employees irrespective of their assignments until he has reached 10 employees.]. For this sample:</i>
IV. The unit costs (hourly rates) are limited to salaries including during parental leave, social security contributions, taxes and other costs included in the remuneration required under national law and the employment contract or equivalent appointing act;	✓ the Auditor reviewed all documents relating to personnel costs such as employment contracts, payslips, payroll policy (e.g. salary policy, overtime policy, variable pay policy), accounting and payroll records, applicable national tax, labour and social security law and any other documents corroborating the personnel costs claimed;
V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility;	✓ in particular, the Auditor reviewed the employment contracts of the employees in the sample to verify that:
VI. The Beneficiary remunerates its employees in accordance with its usual practices. This means that personnel costs are charged in line with the Beneficiary's usual payroll policy (e.g. salary policy, overtime policy, variable pay) and no special conditions exist for employees assigned to tasks relating to the European Union or Euratom, unless explicitly provided for in the grant agreement(s);	i. they were employed directly by the Beneficiary in accordance with applicable national legislation;
VII. The Beneficiary allocates its employees to the relevant group/category/cost centre for the purpose of the unit cost calculation in line with the usual cost accounting practice;	ii. they were working under the sole technical supervision and responsibility of the latter;
VIII. Personnel costs are based on the payroll system and accounting system.	iii. they were remunerated in accordance with the Beneficiary's usual practices;
IX. Any exceptional adjustments of actual personnel costs resulted from relevant budgeted or estimated elements and were based on objective and verifiable information. <i>[Please describe the 'budgeted or estimated elements' and their relevance to personnel costs, and explain how they were reasonable and based on objective and verifiable information, present your explanation to the Auditor and annex it to this certificate].</i>	iv. they were allocated to the correct group/category/cost centre for the purposes of calculating the unit cost in line with the Beneficiary's usual cost accounting practices;
X. Personnel costs claimed do not contain any of the following ineligible costs: costs related to return on capital; debt and debt service charges; provisions for future losses or debts; interest owed; doubtful debts; currency exchange losses; bank costs charged by the Beneficiary's bank for transfers from the Commission/Agency; excessive or reckless expenditure; deductible VAT or costs incurred during suspension of the implementation of the action.	✓ the Auditor verified that any ineligible items or any costs claimed under other costs categories or costs covered by other types of grant or by other grants financed from the European Union budget have not been taken into account when calculating the personnel costs;
XI. Personnel costs were not declared under another EU or Euratom grant	✓ the Auditor numerically reconciled the total amount of personnel costs used to calculate the unit cost with the total amount of personnel costs recorded in the statutory accounts and the payroll system.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Project Name: [insert project name] [insert acronym] [insert call identifier]

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary (including grants awarded by a Member State and financed by the EU budget and grants awarded by bodies other than the Commission/Agency for the purpose of implementing the EU or Euratom budget in the same period, unless the Beneficiary can demonstrate that the operating grant does not cover any costs of the action). <u>If additional remuneration as referred to in the grant agreement(s) is paid</u> XII. The Beneficiary is a non-profit legal entity; XIII. The additional remuneration is part of the beneficiary's usual remuneration practices and paid consistently whenever the relevant work or expertise is required; XIV. The criteria used to calculate the additional remuneration are objective and generally applied regardless of the source of funding; XV. The additional remuneration included in the personnel costs used to calculate the hourly rates for the grant agreement(s) is capped at EUR 8 000 per full-time equivalent (reduced proportionately if the employee is not assigned exclusively to the action). <i>{If certain statements of location "C. Personnel costs" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings: - ...}</i>	Procedures to be carried out and Findings to be confirmed by the Auditor ✓ to the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, the Auditor carefully examined those elements and checked the information source to confirm that they correspond to objective and verifiable information; ✓ if additional remuneration has been claimed, the Auditor verified that the Beneficiary was a non-profit legal entity, that the amount was capped at EUR 8 000 per full-time equivalent and that it was reduced proportionately for employees not assigned exclusively to the action(s); ✓ the Auditor recalculated the personnel costs for the employees in the sample. Factual finding: 4. All the components of the remuneration that have been claimed as personnel costs are supported by underlying documentation. 5. The employees in the sample were employed directly by the Beneficiary in accordance with applicable national law and were working under its sole supervision and responsibility. 6. Their employment contracts were in line with the Beneficiary's usual policy; 7. Personnel costs were duly documented and consisted solely of salaries, social security contributions (pension contributions, health insurance, unemployment fund contributions, etc.), taxes and other statutory costs included in the remuneration (holiday pay, thirteenth month's pay, etc.); 8. The totals used to calculate the personnel unit costs are consistent with those registered in the payroll and accounting records; 9. To the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, those elements were relevant for calculating the personnel costs and correspond to objective and verifiable information. The budgeted or estimated elements used are: — (indicate the elements and their values). 10. Personnel costs contained no ineligible elements; 11. Specific conditions for eligibility were fulfilled when additional

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Form No. 10 – Declaration of the Beneficiary on the Action – November 2014

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	remuneration was paid: a) the Beneficiary is registered in the grant agreements as a non-profit legal entity; b) it was paid according to objective criteria generally applied regardless of the source of funding used and c) remuneration was capped at EUR 8000 per full-time equivalent (or up to up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).
D. Productive hours XVI. The number of productive hours per full-time employee applied is <i>[delete as appropriate]</i>: A. 1720 productive hours per year for a person working full-time (corresponding pro-rata for persons not working full time). B. the total number of hours worked in the year by a person for the Beneficiary C. the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the standard annual workable hours. <u>If method B is applied</u> XVII. The calculation of the total number of hours worked was done as follows: annual workable hours of the person according to the employment contract, applicable labour agreement or national law plus overtime worked minus absences (such as sick leave and special leave). XVIII. 'Annual workable hours' are hours during which the personnel must be working, at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation. XIX. The contract (applicable collective labour agreement or national working time legislation) do specify the working time enabling to calculate the annual workable hours.	Procedure (same sample basis as for Section C: Personnel costs): ✓ The Auditor verified that the number of productive hours applied is in accordance with method A, B or C. ✓ The Auditor checked that the number of productive hours per full-time employee is correct. ✓ If method B is applied the Auditor verified i) the manner in which the total number of hours worked was done and ii) that the contract specified the annual workable hours by inspecting all the relevant documents, national legislation, labour agreements and contracts. ✓ If method C is applied the Auditor reviewed the manner in which the standard number of working hours per year has been calculated by inspecting all the relevant documents, national legislation, labour agreements and contracts and verified that the number of productive hours per year used for these calculations was at least 90% of the standard number of working hours per year. Factual finding: <u>General</u> 12. The Beneficiary applied a number of productive hours consistent with method A, B or C detailed in the left-hand column. 13. The number of productive hours per year per full-time employee was accurate. <u>If method B is applied</u> 14. The number of 'annual workable hours', overtime and absences was

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

2014-2020 Operational Program for the Growth and Employment of Youth

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
If method C is applied XX. The standard number of productive hours per year is that of a full-time equivalent. XXI. The number of productive hours per year on which the hourly rate is based i) corresponds to the Beneficiary's usual accounting practices; ii) is at least 90 % of the standard number of workable (working) hours per year. XXII. Standard workable (working) hours are hours during which personnel are at the Beneficiary's disposal performing the duties described in the relevant employment contract, collective labour agreement or national labour legislation. The number of standard annual workable (working) hours that the Beneficiary claims is supported by labour contracts, national legislation and other documentary evidence. <i>If certain statement(s) of section "D. Productive hours" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:</i> - ...]	verifiable based on the documents provided by the Beneficiary and the calculation of the total number of hours worked was accurate. 15. The contract specified the working time enabling to calculate the annual workable hours. <u>If method C is applied</u> 16. The calculation of the number of productive hours per year corresponded to the usual costs accounting practice of the Beneficiary. 17. The calculation of the standard number of workable (working) hours per year was corroborated by the documents presented by the Beneficiary. 18. The number of productive hours per year used for the calculation of the hourly rate was at least 90 % of the number of workable (working) hours per year.
E. Hourly rates The hourly rates are correct because: XXIII. Hourly rates are correctly calculated since they result from dividing annual personnel costs by the productive hours of a given year and group (e.g. staff category or department or cost centre depending on the methodology applied) and they are in line with the statements made in section C. and D. above. <i>If the statement of section "E. Hourly rates" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:</i> - ...]	Procedure ✓ The Auditor has obtained a list of all personnel rates calculated by the Beneficiary in accordance with the methodology used. ✓ The Auditor has obtained a list of all the relevant employees, based on which the personnel rate(s) are calculated. For 10 employees selected at random (same sample basis as Section C: Personnel costs): ✓ The Auditor recalculated the hourly rates. ✓ The Auditor verified that the methodology applied corresponds to the usual accounting practices of the organisation and is applied consistently for all activities of the organisation on the basis of objective criteria irrespective of the source of funding. Factual finding:

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Project title: [insert project title] [insert acronym] [insert call identifier]

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	19. No differences arose from the recalculation of the hourly rate for the employees included in the sample.
F. Time recording XXIV. Time recording is in place for all persons with no exclusive dedication to one Horizon 2020 action. At least all hours worked in connection with the grant agreement(s) are registered on a daily/weekly/monthly basis <i>[delete as appropriate]</i> using a paper/computer-based system <i>[delete as appropriate]</i>; XXV. For persons exclusively assigned to one Horizon 2020 activity the Beneficiary has either signed a declaration to that effect or has put arrangements in place to record their working time; XXVI. Records of time worked have been signed by the person concerned (on paper or electronically) and approved by the action manager or line manager at least monthly; XXVII. Measures are in place to prevent staff from: - recording the same hours twice, - recording working hours during absence periods (e.g. holidays, sick leave), - recording more than the number of productive hours per year used to calculate the hourly rates, and - recording hours worked outside the action period. XXVIII. No working time was recorded outside the action period; XXIX. No more hours were claimed than the productive hours used to calculate the hourly personnel rates. <i>(Please provide a brief description of the <u>time recording system</u> in place together with the measures applied to ensure its reliability to the Auditor and annex it to the</i>	Procedure ✓ The Auditor reviewed the brief description, all relevant manuals and/or internal guidance describing the methodology used to record time. The Auditor reviewed the time records of the random sample of 10 employees referred to under Section C: Personnel costs, and verified in particular: ✓ that time records were available for all persons with not exclusive assignment to the action; ✓ that time records were available for persons working exclusively for a Horizon 2020 action, or, alternatively, that a declaration signed by the Beneficiary was available for them certifying that they were working exclusively for a Horizon 2020 action; ✓ that time records were signed and approved in due time and that all minimum requirements were fulfilled; ✓ that the persons worked for the action in the periods claimed; ✓ that no more hours were claimed than the productive hours used to calculate the hourly personnel rates; ✓ that internal controls were in place to prevent that time is recorded twice, during absences for holidays or sick leave; that more hours are claimed per person per year for Horizon 2020 actions than the number of productive hours per year used to calculate the hourly rates; that working time is recorded outside the action period; ✓ the Auditor cross-checked the information with human-resources records to verify consistency and to ensure that the internal controls have been effective. In addition, the Auditor has verified that no more hours were charged to Horizon 2020 actions per person per year than the number of productive hours per year used to calculate the hourly rates, and verified that

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

Annex 10 – Monitoring and Reporting – Financial Statements

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
present certificate¹]. The Beneficiary shall: 1. Time recording: The Beneficiary shall ensure that the time recording system is consistent with the requirements of the Financial Statements and that it is consistent with the requirements of the Financial Statements.	no time worked outside the action period was charged to the action. Factual finding: 20. The brief description, manuals and/or internal guidance on time recording provided by the Beneficiary were consistent with management reports/records and other documents reviewed and were generally applied by the Beneficiary to produce the financial statements. 21. For the random sample time was recorded or, in the case of employees working exclusively for the action, either a signed declaration or time records were available; 22. For the random sample the time records were signed by the employee and the action manager/line manager, at least monthly. 23. Working time claimed for the action occurred in the periods claimed; 24. No more hours were claimed than the number productive hours used to calculate the hourly personnel rates; 25. There is proof that the Beneficiary has checked that working time has not been claimed twice, that it is consistent with absence records and the number of productive hours per year, and that no working time has been claimed outside the action period. 26. Working time claimed is consistent with that on record at the human-resources department.

¹ The description of the time recording system must state among others information on the content of the time records, its coverage (full or action time-recording, for all personnel or only for personnel involved in H2020 actions), its degree of detail (whether there is a reference to the particular tasks accomplished), its form, periodicity of the time registration and authorisation (paper or a computer-based system; on a daily, weekly or monthly basis; signed and countersigned by whom), controls applied to prevent double-charging of time or ensure consistency with HR-records such as absences and travels as well as its information flow up to its use for the preparation of the Financial Statements.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

1. [insert name of the Agency] [insert name of the Agency] [insert name of the Agency]

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<i>[official name of the [Beneficiary] [Linked Third Party]]</i>	<i>[official name of the Auditor]</i>
<i>[name and title of authorised representative]</i>	<i>[name and title of authorised representative]</i>
<i>[dd Month yyyy]</i>	<i>[dd Month yyyy]</i>
<i><Signature of the [Beneficiary] [Linked Third Party]></i>	<i><Signature of the Auditor></i>



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