EUROPEAN CLIMATE, INFRASTRUCTURE AND ENVIRONMENT EXECUTIVE AGENCY (CINEA)

CINEA.C – Green research and innovation
C.3 – Horizon Europe Transport

GRANT AGREEMENT

Project 101138449 — MI-TRAP

PREAMBLE

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

on the one part,

the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and

on the other part,

1. 'the coordinator':

NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D"), PIC 999978239, established in END OF PATRIARCHOU GRIGORIOU E AND 27 NEAPOLEOS STREET, AGIA PARASKEVI 15341, Greece,

and the following other beneficiaries, if they sign their 'accession form' (see Annex 3 and Article 40):

2. **UNIVERZA V NOVI GORICI (UNOVAGOR)**, PIC 998298102, established in VIPAVSKA CESTA 13 ROZNA DOLINA, NOVA GORICA 5000, Slovenia,

3. **HAZE INSTRUMENTS, RAZVOJ IN PROIZVODNJA MERILNIH INSTRUMENTOV DOO (Haze Instr)**, PIC 902852818, established in DERMOTOVA ULICA 6, LJUBLJANA 1000, Slovenia,

4. **UNIVERSITA DEGLI STUDI DI MILANO (UMIL)**, PIC 999995796, established in Via Festa Del Perdono 7, MILANO 20122, Italy,

5. **USTAV CHEMICKYCH PROCESU AV CR, v. v. i. (ICPF)**, PIC 998590072, established in ROZVOJOVA 135, PRAHA 6 165 02, Czechia,

6. **ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON (NKUA)**, PIC 999643007, established in 6 CHRISTOU LADA STR, ATHINA 10561, Greece,

7. **TECHNISCHE UNIVERSITAET MUENCHEN (TUM)**, PIC 999977463, established in Arcisstrasse 21, MUENCHEN 80333, Germany,

8. **POLYTECHNEIO KRITIS (TUC)**, PIC 924773848, established in BUILDING E4, TECHNICAL UNIVERSITY CAMPUS COUNOUPIDIANA, CHANIA 731 00, Greece,

9. **ISTITUTO NAZIONALE DI FISICA NUCLEARE (INFN)**, PIC 999992789, established in Via Enrico Fermi 54, FRASCATI 00044, Italy,

10. **KOINONIKI SYNETAIRISTIKI EPICHEIRISI SYLLOGIKIS KAI KOINONIKIS OFELEIAS AMARANTHUS (AMRN)**, PIC 884254717, established in DELIGIANNI 7, ATHINA 106 83, Greece,

11. **WAGENINGEN UNIVERSITY (WU)**, PIC 999981634, established in DROEVENDAALSESTEEG 4, WAGENINGEN 6708 PB, Netherlands,

12. **INSTITUT MINES-TELECOM (IMT)**, PIC 999849326, established in 19 PLACE MARGUERITE PEREY, PALAISEAU 91120, France,

13. **TEKNOLOGISK INSTITUT (DTI)**, PIC 999460356, established in GREGERSENSVEJ 1, TAASTRUP 2630, Denmark,

14. **AARHUS UNIVERSITET (AU)**, PIC 999997736, established in NORDRE RINGGADE 1, AARHUS C 8000, Denmark,

15. **IST-ID ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E O DESENVOLVIMENTO (IST ID)**, PIC 954983722, established in AVENIDA ANTONIO JOSE DE ALMEIDA 12, LISBOA 1000-043, Portugal,

16. **PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)**, PIC 999596544, established in BUNDESALLEE 100, BRAUNSCHWEIG 38116, Germany,

17. **CATALYTIC INSTRUMENTS GMBH & CO KG (Catalytic Inst)**, PIC 882609791, established in ZELLERHORNSTR. 7, ROSENHEIM 83026, Germany,

18. **POLITECNICO DI MILANO (POLIMI)**, PIC 999879881, established in PIAZZA LEONARDO DA VINCI 32, MILANO 20133, Italy,

19. **FREIE UNIVERSITAET BERLIN (Freie U Berlin)**, PIC 999994826, established in KAISERSWERTHER STRASSE 16-18, BERLIN 14195, Germany,

20. **IVU UMWELT GMBH (IVU Umwelt)**, PIC 926854983, established in EMMY-NOETHER-STRASSE 2, FREIBURG 79110, Germany,

21. **NANODUST GMBH (nanoDUST)**, PIC 882193564, established in BRENTANOSTRASSE 27, ASCHAFFENBURG 63739, Germany,

22. **FINCON CONSULTING ITALIA SRL (FINCONIT)**, PIC 962928313, established in VIA VOLTURNO 46, MILANO 20124, Italy,

Unless otherwise specified, references to ‘beneficiary’ or ‘beneficiaries’ include the coordinator and affiliated entities (if any).

If only one beneficiary signs the grant agreement (‘mono-beneficiary grant’), all provisions referring to the ‘coordinator’ or the ‘beneficiaries’ will be considered — mutatis mutandis — as referring to the beneficiary.

The parties referred to above have agreed to enter into the Agreement.

By signing the Agreement and the accession forms, the beneficiaries accept the grant and agree to implement the action under their own responsibility and in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

The Agreement is composed of:

Preamble

Terms and Conditions (including Data Sheet)

Annex 1 Description of the action[1]

Annex 2 Estimated budget for the action

Annex 2a Additional information on unit costs and contributions (if applicable)

Annex 3 Accession forms (if applicable)[2]

Annex 3a Declaration on joint and several liability of affiliated entities (if applicable)[3]

Annex 4 Model for the financial statements

Annex 5 Specific rules (if applicable)

[1] Template published on Portal Reference Documents.
[2] Template published on Portal Reference Documents.
[3] Template published on Portal Reference Documents.

TERMS AND CONDITIONS

TABLE OF CONTENTS

DATA SHEET

1. General data

Project summary:

Project summary
Air Quality in urban areas and other hot spots, where transport emissions induce a large impact on human exposure remains an environmental problem of high complexity with strong public interest. Despite the significant improvements achieved, adverse health effects are found to be of high concern. There is strong evidence that, despite strict emission standards, “real world” emissions is accepted as term indicating a status of partial success of these measures and technological advances in fossil fuel emission control, while new sources such as non-exhaust emissions and micro plastics are becoming significant. A large level of uncertainty arising from the assessment and mitigation of these sources and especially the internal combustion engines arises from their physicochemical transformation from the tailpipe/stack to the ambient environment. The metrics and parameterization employed on the data analyzed from the environmental monitoring networks and measurement systems are poorly representing the material initially emitted by the specifications of these engines certified by the manufacturers and the control legislation. It is therefore difficult to link the health and other environmental effects to specific sources or modes of transport with few exceptions. Human exposure, dosimetry and burden of disease modelling will be assessed. The output will be linked to epidemiological studies across Europe and a specific epidemiological product of the extracted impact due to transport will be sought. THE PROJECT will provide innovative means in terms of monitoring devices and schemes of data analysis and management and a network of monitoring stations close to Transport emission hots, in order to remedy the traceability of the emitted pollutants from transport sources to the atmosphere and the assessment of applied legislation and control measures through a mitigating solution Toolbox

Keywords:

- Sustainable transport - general
- aerosol, solid particles, black carbon, traffic management

Project number: 101138449

Project name: MItigating TRansport-related Air Pollution in Europe

Project acronym: MI-TRAP

Call: HORIZON-CL5-2023-D5-01

Topic: HORIZON-CL5-2023-D5-01-18

Type of action: HORIZON Innovation Actions

Granting authority: European Climate, Infrastructure and Environment Executive Agency

Grant managed through EU Funding & Tenders Portal: Yes (eGrants)

Project starting date: fixed date: 1 January 2024

Project end date: 31 December 2027

Project duration: 48 months

Consortium agreement: Yes

2. Participants

List of participants:

N°	Role	Short name	Legal name	Ctry	PIC	Total eligible costs (BEN and AE)	Max grant amount
1	COO	NCSR "D"	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	EL	999978239	726 250.00	726 250.00
2	BEN	UNOVAGOR	UNIVERZA V NOVI GORICI	SI	998298102	39 000.00	39 000.00

N°	Role	Short name	Legal name	Ctry	PIC	Total eligible costs (BEN and AE)	Max grant amount
3	BEN	Haze Instr	HAZE INSTRUMENTS, RAZVOJ IN PROIZVODNJA MERILNIH INSTRUMENTOV DOO	SI	902852818	188 000.00	131 600.00
4	BEN	UMIL	UNIVERSITA DEGLI STUDI DI MILANO	IT	999995796	108 500.00	108 500.00
5	BEN	ICPF	USTAV CHEMICKYCH PROCESU AV CR, v. v. i.	CZ	998590072	169 325.00	169 325.00
6	BEN	NKUA	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	EL	999643007	173 887.50	173 887.50
7	BEN	TUM	TECHNISCHE UNIVERSITAET MUENCHEN	DE	999977463	384 250.00	384 250.00
8	BEN	TUC	POLYTECHNEIO KRITIS	EL	924773848	302 500.00	302 500.00
9	BEN	INFN	ISTITUTO NAZIONALE DI FISICA NUCLEARE	IT	999992789	200 000.00	200 000.00
10	BEN	AMRN	KOINONIKI SYNETAIRISTIKI EPICHEIRISI SYLLOGIKIS KAI KOINONIKIS OFELEIAS AMARANTHUS	EL	884254717	443 750.00	310 625.00
11	BEN	WU	WAGENINGEN UNIVERSITY	NL	999981634	153 376.25	153 376.25
12	BEN	IMT	INSTITUT MINES-TELECOM	FR	999849326	171 608.75	171 608.75
13	BEN	DTI	TEKNOLOGISK INSTITUT	DK	999460356	160 281.25	160 281.25
14	BEN	AU	AARHUS UNIVERSITET	DK	999997736	350 268.75	350 268.75
15	BEN	IST ID	IST-ID ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E O DESENVOLVIMENTO	PT	954983722	190 008.75	190 008.75
16	BEN	PTB	PHYSIKALISCH-TECHNISCHE BUNDESANSTALT	DE	999596544	260 000.00	260 000.00
17	BEN	Catalytic Inst	CATALYTIC INSTRUMENTS GMBH & CO KG	DE	882609791	267 348.75	187 144.13
18	BEN	POLIMI	POLITECNICO DI MILANO	IT	999879881	155 256.25	155 256.25
19	BEN	Freie U Berlin	FREIE UNIVERSITAET BERLIN	DE	999994826	189 937.50	189 937.50
20	BEN	IVU Umwelt	IVU UMWELT GMBH	DE	926854983	585 000.00	409 500.00
21	BEN	nanoDUST	NANODUST GMBH	DE	882193564	228 499.46	159 949.62
22	BEN	FINCONIT	FINCON CONSULTING ITALIA SRL	IT	962928313	94 375.00	66 062.50
23	AP	METAS	EIDGENOSSISCHES INSTITUT FUR METROLOGIE METAS	CH	950138184	0.00	0.00
24	AP	PSI	PAUL SCHERRER INSTITUT	CH	999994923	0.00	0.00
25	AP	INU	INCHEON NATIONAL UNIVERSITY	KR	948013981	0.00	0.00
26	AP	BRUKER NANO	BRUKER NANO GMBH	DE	968726973	0.00	0.00
Total						5 541 423.21	4 999 331.25

Coordinator:

- NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D")

3. Grant

Maximum grant amount, total estimated eligible costs and contributions and funding rate:

Total eligible costs (BEN and AE)	Funding rate (%)	Maximum grant amount (Annex 2)	Maximum grant amount (award decision)
5 541 423.21	70, 100	4 999 331.25	4 999 331.25

Grant form: Budget-based

Grant mode: Action grant

Budget categories/activity types:

- A. Personnel costs
  - A.1 Employees, A.2 Natural persons under direct contract, A.3 Seconded persons
  - A.4 SME owners and natural person beneficiaries

- B. Subcontracting costs

- C. Purchase costs
  - C.1 Travel and subsistence
  - C.2 Equipment
  - C.3 Other goods, works and services

- D. Other cost categories
  - D.2 Internally invoiced goods and services

- E. Indirect costs

Cost eligibility options:

- In-kind contributions eligible costs

- Parental leave

- Project-based supplementary payments

- Average personnel costs (unit cost according to usual cost accounting practices)

- Limitation for subcontracting

- Travel and subsistence:
  - Travel: Actual costs
  - Accommodation: Actual costs
  - Subsistence: Actual costs

- Equipment: depreciation only

- Indirect cost flat-rate: 25% of the eligible direct costs (categories A-D, except volunteers costs, subcontracting costs, financial support to third parties and exempted specific cost categories, if any)

- VAT: Yes

- Other ineligible costs

Budget flexibility: Yes (no flexibility cap)

4. Reporting, payments and recoveries

4.1 Continuous reporting (art 21)

Deliverables: see Funding & Tenders Portal Continuous Reporting tool

4.2 Periodic reporting and payments

Reporting and payment schedule (art 21, 22):

Reporting					Payments	
Reporting periods			Type	Deadline	Type	Deadline (time to pay)
RP No	Month from	Month to				
					Initial prefinancing	30 days from entry into force/10 days before starting date – whichever is the latest
1	1	18	Periodic report	60 days after end of reporting period	Interim payment	90 days from receiving periodic report
2	19	36	Periodic report	60 days after end of reporting period	Interim payment	90 days from receiving periodic report
3	37	48	Periodic report	60 days after end of reporting period	Final payment	90 days from receiving periodic report

Prefinancing payments and guarantees:

Prefinancing payment	
Type	Amount
Prefinancing 1 (initial)	2 666 143.36

Reporting and payment modalities (art 21, 22):

Mutual Insurance Mechanism (MIM): Yes

MIM contribution: 5% of the maximum grant amount (249 966.56), retained from the initial prefinancing

Restrictions on distribution of initial prefinancing: The prefinancing may be distributed only if the minimum number of beneficiaries set out in the call condititions (if any) have acceded to the Agreement and only to beneficiaries that have acceded.

Interim payment ceiling (if any): 90% of the maximum grant amount

Exception for revenues: Yes

No-profit rule: Yes

Late payment interest: ECB + 3.5%

Bank account for payments:

GR2901720090005009109896191

Conversion into euros: Double conversion

Reporting language: Language of the Agreement

4.3 Certificates (art 24):

Certificates on the financial statements (CFS):

Conditions:

Schedule: only at final payment, if threshold is reached

Standard threshold (beneficiary-level):

- financial statement: requested EU contribution to costs ≥ EUR 430 000.00

Special threshold for beneficiaries with a systems and process audit(see Article 24): financial statement: requested EU contribution to costs ≥ EUR 725 000.00

4.4 Recoveries (art 22)

First-line liability for recoveries:

Beneficiary termination: Beneficiary concerned

Final payment: Each beneficiary for their own debt

After final payment: Beneficiary concerned

Joint and several liability for enforced recoveries (in case of non-payment):

Individual financial responsibility: Each beneficiary is liable only for its own debts (and those of its affiliated entities, if any)

Joint and several liability of affiliated entities — n/a

5. Consequences of non-compliance, applicable law & dispute settlement forum

Suspension and termination:

Additional suspension grounds (art 31)

Additional termination grounds (art 32)

Applicable law (art 43):

Standard applicable law regime: EU law + law of Belgium

Dispute settlement forum (art 43):

Standard dispute settlement forum:

EU beneficiaries: EU General Court + EU Court of Justice (on appeal)

Non-EU beneficiaries: Courts of Brussels, Belgium (unless an international agreement provides for the enforceability of EU court judgements)

6. Other

Specific rules (Annex 5): Yes

Standard time-limits after project end:

Confidentiality (for X years after final payment): 5

Record-keeping (for X years after final payment): 5 (or 3 for grants of not more than EUR 60 000)

Reviews (up to X years after final payment): 2

Audits (up to X years after final payment): 2

Extension of findings from other grants to this grant (no later than X years after final payment): 2

Impact evaluation (up to X years after final payment): 5 (or 3 for grants of not more than EUR 60 000)

CHAPTER 1 GENERAL

ARTICLE 1 — SUBJECT OF THE AGREEMENT

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

ARTICLE 2 — DEFINITIONS

For the purpose of this Agreement, the following definitions apply:

Actions — The project which is being funded in the context of this Agreement.

Grant — The grant awarded in the context of this Agreement.

EU grants — Grants awarded by EU institutions, bodies, offices or agencies (including EU executive agencies, EU regulatory agencies, EDA, joint undertakings, etc.).

Participants — Entities participating in the action as beneficiaries, affiliated entities, associated partners, third parties giving in-kind contributions, subcontractors or recipients of financial support to third parties.

Beneficiaries (BEN) — The signatories of this Agreement (either directly or through an accession form).

Affiliated entities (AE) — Entities affiliated to a beneficiary within the meaning of Article 187 of EU Financial Regulation 2018/1046[4] which participate in the action with similar rights and obligations as the beneficiaries (obligation to implement action tasks and right to charge costs and claim contributions).

Associated partners (AP) — Entities which participate in the action, but without the right to charge costs or claim contributions.

Purchases — Contracts for goods, works or services needed to carry out the action (e.g. equipment, consumables and supplies) but which are not part of the action tasks (see Annex 1).

Subcontracting — Contracts for goods, works or services that are part of the action tasks (see Annex 1).

In-kind contributions — In-kind contributions within the meaning of Article 2(36) of EU Financial

[4] For the definition, see Article 187 Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 ('EU Financial Regulation') (OJ L 193, 30.7.2018, p. 1): "**affiliated entities** [are]:
(a) entities that form a sole beneficiary [(i.e. where an entity is formed of several entities that satisfy the criteria for being awarded a grant, including where the entity is specifically established for the purpose of implementing an action to be financed by a grant)];
(b) entities that satisfy the eligibility criteria and that do not fall within one of the situations referred to in Article 136(1) and 141(1) and that have a link with the beneficiary, in particular a legal or capital link, which is neither limited to the action nor established for the sole purpose of its implementation".

Regulation 2018/1046, i.e. non-financial resources made available free of charge by third parties.

Fraud — Fraud within the meaning of Article 3 of EU Directive 2017/1371[5] and Article 1 of the Convention on the protection of the European Communities' financial interests, drawn up by the Council Act of 26 July 1995[6], as well as any other wrongful or criminal deception intended to result in financial or personal gain.

Irregularities — Any type of breach (regulatory or contractual) which could impact the EU financial interests, including irregularities within the meaning of Article 1(2) of EU Regulation 2988/95[7].

Grave professional misconduct — Any type of unacceptable or improper behaviour in exercising one's profession, especially by employees, including grave professional misconduct within the meaning of Article 136(1)(c) of EU Financial Regulation 2018/1046.

Applicable EU, international and national law — Any legal acts or other (binding or non-binding) rules and guidance in the area concerned.

Portal — EU Funding & Tenders Portal; electronic portal and exchange system managed by the European Commission and used by itself and other EU institutions, bodies, offices or agencies for the management of their funding programmes (grants, procurements, prizes, etc.).

CHAPTER 2 ACTION

ARTICLE 3 — ACTION

The grant is awarded for the action **101138449** — **MI-TRAP** ('action'), as described in Annex 1.

ARTICLE 4 — DURATION AND STARTING DATE

The duration and the starting date of the action are set out in the Data Sheet (see Point 1).

CHAPTER 3 GRANT

ARTICLE 5 — GRANT

5.1 Form of grant

The grant is an action grant[8] which takes the form of a budget-based mixed actual cost grant (i.e. a

[5] Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law (OJ L 198, 28.7.2017, p. 29).
[6] OJ C 316, 27.11.1995, p. 48.
[7] Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.1995, p. 1).
[8] For the definition, see Article 180(2)(a) EU Financial Regulation 2018/1046: '**action grant**' means an EU grant to finance "an action intended to help achieve a Union policy objective".

grant based on actual costs incurred, but which may also include other forms of funding, such as unit costs or contributions, flat-rate costs or contributions, lump sum costs or contributions or financing not linked to costs).

5.2 Maximum grant amount

The maximum grant amount is set out in the Data Sheet (see Point 3) and in the estimated budget (Annex 2).

5.3 Funding rate

The funding rate for costs is 100% of the eligible costs for beneficiaries that are non-profit legal entities[9] and 70% of the eligible costs for beneficiaries that are profit legal entities.

Contributions are not subject to any funding rate.

5.4 Estimated budget, budget categories and forms of funding

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

It contains the estimated eligible costs and contributions for the action, broken down by participant and budget category.

Annex 2 also shows the types of costs and contributions (forms of funding)[10] to be used for each budget category.

If unit costs or contributions are used, the details on the calculation will be explained in Annex 2a.

5.5 Budget flexibility

The budget breakdown may be adjusted — without an amendment (see Article 39) — by transfers (between participants and budget categories), as long as this does not imply any substantive or important change to the description of the action in Annex 1.

However:

- changes to the budget category for volunteers (if used) always require an amendment
- changes to budget categories with lump sums costs or contributions (if used; including financing not linked to costs) always require an amendment
- changes to budget categories with higher funding rates or budget ceilings (if used) always require an amendment
- addition of amounts for subcontracts not provided for in Annex 1 either require an amendment or simplified approval in accordance with Article 6.2

[9] For the definition, see Article XX of the Horizon Europe Framework Programme and Rules for Participation Regulation (EU) XXX: '**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.

[10] See Article 125 EU Financial Regulation 2018/1046.

- other changes require an amendment or simplified approval, if specifically provided for in Article 6.2

- flexibility caps: not applicable.

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS AND CONTRIBUTIONS

In order to be eligible, costs and contributions must meet the **eligibility** conditions set out in this Article.

6.1 General eligibility conditions

The **general eligibility conditions** are the following:

(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 4 (with the exception of costs relating to the submission of the final periodic report, which may be incurred afterwards; see Article 21)

(iii) they must be declared under one of the budget categories set out in Article 6.2 and 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 or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the units must:

- be actually used or produced by the beneficiary in the period set out in Article 4 (with the exception of units relating to the submission of the final periodic report, which may be used or produced afterwards; see Article 21)

- be necessary for the implementation of the action and

(iii) the number of units must be identifiable and verifiable, in particular supported by records and documentation (see Article 20)

(c) for flat-rate costs or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the costs or contributions to which the flat-rate is applied must:

- be eligible
- relate to the period set out in Article 4 (with the exception of costs or contributions relating to the submission of the final periodic report, which may be incurred afterwards; see Article 21)

(d) for lump sum costs or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the work must be properly implemented by the beneficiary in accordance with Annex 1

(iii) the deliverables/outputs must be achieved in the period set out in Article 4 (with the exception of deliverables/outputs relating to the submission of the final periodic report, which may be achieved afterwards; see Article 21)

(e) for unit, flat-rate or lump sum costs or contributions according to usual cost accounting practices (if any):

(i) they must fulfil the general eligibility conditions for the type of cost concerned

(ii) the cost accounting practices must be applied in a consistent manner, based on objective criteria, regardless of the source of funding

(f) for financing not linked to costs (if any): the results must be achieved or the conditions must be fulfilled as described in Annex 1.

In addition, for direct cost categories (e.g. personnel, travel & subsistence, subcontracting and other direct costs) only costs that are directly linked to the action implementation and can therefore be attributed to it directly are eligible. They must not include any indirect costs (i.e. costs that are only indirectly linked to the action, e.g. via cost drivers).

In-kind contributions provided by third parties free of charge may be declared as eligible direct costs by the beneficiaries which use them (under the same conditions as if they were their own, provided that they concern only direct costs and that the third parties and their in-kind contributions are set out in Annex 1 (or approved ex post in the periodic report, if 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; 'simplified approval procedure').

6.2 Specific eligibility conditions for each budget category

For each budget category, the **specific eligibility conditions** are as follows:

Direct costs

A. Personnel costs

A.1 Costs for employees (or equivalent) are eligible as personnel costs if they fulfil the general eligibility conditions and are related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action.

They must be limited to salaries (including net payments during parental leave), social security contributions, taxes and other costs linked to the remuneration, if they arise from national law or the employment contract (or equivalent appointing act) and be calculated on the basis of the costs actually incurred, in accordance with the following method:

{daily rate for the person

multiplied by

number of day-equivalents worked on the action (rounded up or down to the nearest half-day)}.

The daily rate must be calculated as:

{annual personnel costs for the person

divided by

215}.

The number of day-equivalents declared for a person must be identifiable and verifiable (see Article 20).

The actual time spent on parental leave by a person assigned to the action may be deducted from the 215 days indicated in the above formula.

The total number of day-equivalents declared in EU grants, for a person for a year, cannot be higher than 215, minus time spent on parental leave (if any).

For personnel which receives supplementary payments for work in projects (project-based remuneration), the personnel costs must be calculated at a rate which:

- corresponds to the actual remuneration costs paid by the beneficiary for the time worked by the person in the action over the reporting period
- does not exceed the remuneration costs paid by the beneficiary for work in similar projects funded by national schemes (‘national projects reference’)
- is defined based on objective criteria allowing to determine the amount to which the person is entitled

and

- reflects the usual practice of the beneficiary to pay consistently bonuses or supplementary payments for work in projects funded by national schemes.

The national projects reference is the remuneration defined in national law, collective labour agreement or written internal rules of the beneficiary applicable to work in projects funded by national schemes.

If there is no such national law, collective labour agreement or written internal rules or if the project-

based remuneration is not based on objective criteria, the national project reference will be the average remuneration of the person in the last full calendar year covered by the reporting period, excluding remuneration paid for work in EU actions.

If the beneficiary uses average personnel costs (unit cost according to usual cost accounting practices), the personnel costs must fulfil the general eligibility conditions for such unit costs and the daily rate must be calculated:

- using the actual personnel costs recorded in the beneficiary's accounts and excluding any costs which are ineligible or already included in other budget categories; the actual personnel costs may be adjusted on the basis of budgeted or estimated elements, if they are relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information

and

- according to usual cost accounting practices which are applied in a consistent manner, based on objective criteria, regardless of the source of funding.

A.2 and **A.3 Costs for natural persons working under a direct contract** other than an employment contract and costs for **seconded persons by a third party against payment** are also eligible as personnel costs, if they are assigned to the action, fulfil the general eligibility conditions and:

(a) work 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) and

(b) the result of the work belongs to the beneficiary (unless agreed otherwise).

They must be calculated on the basis of a rate which corresponds to the costs actually incurred for the direct contract or secondment and must not be significantly different from those for personnel performing similar tasks under an employment contract with the beneficiary.

A.4 The work of **SME owners** for the action (i.e. owners of beneficiaries that are small and medium-sized enterprises[11] not receiving a salary) or **natural person beneficiaries** (i.e. beneficiaries that are natural persons not receiving a salary) may be declared as personnel costs, if they fulfil the general eligibility conditions and are calculated as unit costs in accordance with the method set out in Annex 2a.

B. Subcontracting costs

Subcontracting costs for the action (including related duties, taxes and charges, such as non-deductible or non-refundable value added tax (VAT)) are eligible, if they are calculated on the basis

[11] For the definition, see Commission Recommendation 2003/361/EC: micro, small or medium-sized enterprise (SME) are enterprises

- engaged in an economic activity, irrespective of their legal form (including, in particular, self- employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity) and

- employing fewer than 250 persons (expressed in 'annual working units' as defined in Article 5 of the Recommendation) and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

of the costs actually incurred, fulfil the general eligibility conditions and are awarded using the beneficiary's usual purchasing practices — provided these ensure subcontracts with best value for money (or if appropriate the lowest price) and that there is no conflict of interests (see Article 12).

Beneficiaries that are 'contracting authorities/entities' within the meaning of the EU Directives on public procurement must also comply with the applicable national law on public procurement.

Subcontracting may cover only a limited part of the action.

The tasks to be subcontracted 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 (or may be approved ex post in the periodic report, if the use of subcontracting 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; 'simplified approval procedure').

C. Purchase costs

Purchase costs for the action (including related duties, taxes and charges, such as non-deductible or non-refundable value added tax (VAT)) are eligible if they fulfil the general eligibility conditions and are bought using the beneficiary's usual purchasing practices — provided these ensure purchases with best value for money (or if appropriate the lowest price) and that there is no conflict of interests (see Article 12).

Beneficiaries that are 'contracting authorities/entities' within the meaning of the EU Directives on public procurement must also comply with the applicable national law on public procurement.

C.1 Travel and subsistence

Purchases for **travel, accommodation** and **subsistence** must be calculated as follows:

- travel: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel
- accommodation: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel
- subsistence: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel .

C.2 Equipment

Purchases of **equipment, infrastructure or other assets** used for the action must be declared as depreciation costs, calculated on the basis of the costs actually incurred and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

Only the portion of the costs that corresponds to the rate of actual use for the action during the action duration can be taken into account.

Costs for **renting or leasing** equipment, infrastructure or other assets are also eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets and do not include any financing fees.

C.3 Other goods, works and services

Purchases of **other goods, works and services** must be calculated on the basis of the costs actually incurred.

Such goods, works and services include, for instance, consumables and supplies, promotion, dissemination, protection of results, translations, publications, certificates and financial guarantees, if required under the Agreement.

D. Other cost categories

D.2 Internally invoiced goods and services

Costs for internally invoiced goods and services directly used for the action may be declared as unit cost according to usual cost accounting practices, if and as declared eligible in the call conditions, if they fulfil the general eligibility conditions for such unit costs and the amount per unit is calculated:

- using the actual costs for the good or service recorded in the beneficiary's accounts, attributed either by direct measurement or on the basis of cost drivers, and excluding any cost which are ineligible or already included in other budget categories; the actual costs may be adjusted on the basis of budgeted or estimated elements, if they are relevant for calculating the costs, reasonable and correspond to objective and verifiable information

and

- according to usual cost accounting practices which are applied in a consistent manner, based on objective criteria, regardless of the source of funding.

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

This cost will not be taken into account for the indirect cost flat-rate.

Indirect costs

E. Indirect costs

Indirect costs will be reimbursed at the flat-rate of 25% of the eligible direct costs (categories A-D, except volunteers costs, subcontracting costs, financial support to third parties and exempted specific cost categories, if any).

Contributions

Not applicable

6.3 Ineligible costs and contributions

The following costs or contributions are **ineligible**:

(a) costs or contributions that do not comply with the conditions set out above (Article 6.1 and 6.2), in particular:

(i) costs related to return on capital and dividends paid by a beneficiary

(ii) debt and debt service charges

(iii) provisions for future losses or debts

(iv) interest owed

(v) currency exchange losses

(vi) bank costs charged by the beneficiary's bank for transfers from the granting authority

(vii) excessive or reckless expenditure

(viii) deductible or refundable VAT (including VAT paid by public bodies acting as public authority)

(ix) costs incurred or contributions for activities implemented during grant agreement suspension (see Article 31)

(x) in-kind contributions by third parties: not applicable

(b) costs or contributions declared under other EU grants (or grants awarded by an EU Member State, non-EU country or other body implementing the EU budget), except for the following cases:

(i) Synergy actions: not applicable

(ii) if the action grant is combined with an operating grant[12] running during the same period and the beneficiary can demonstrate that the operating grant does not cover any (direct or indirect) costs of the action grant

(c) costs or contributions for staff of a national (or regional/local) administration, for activities that are part of the administration's normal activities (i.e. not undertaken only because of the grant)

(d) costs or contributions (especially travel and subsistence) for staff or representatives of EU institutions, bodies or agencies

(e) other :

(i) country restrictions for eligible costs: not applicable

(ii) costs or contributions declared specifically ineligible in the call conditions.

6.4 Consequences of non-compliance

If a beneficiary declares costs or contributions that are ineligible, they will be rejected (see Article 27).

This may also lead to other measures described in Chapter 5.

[12] For the definition, see Article 180(2)(b) of EU Financial Regulation 2018/1046: '**operating grant**' means an EU grant to finance "the functioning of a body which has an objective forming part of and supporting an EU policy".

CHAPTER 4 GRANT IMPLEMENTATION

SECTION 1 CONSORTIUM: BENEFICIARIES, AFFILIATED ENTITIES AND OTHER PARTICIPANTS

ARTICLE 7 — BENEFICIARIES

The beneficiaries, as signatories of the Agreement, are fully responsible towards the granting authority for implementing it and for complying with all its obligations.

They must implement the Agreement to their best abilities, in good faith and in accordance with all the obligations and terms and conditions it sets out.

They must have the appropriate resources to implement the action and implement the action under their own responsibility and in accordance with Article 11. If they rely on affiliated entities or other participants (see Articles 8 and 9), they retain sole responsibility towards the granting authority and the other beneficiaries.

They are jointly responsible for the *technical* implementation of the action. If one of the beneficiaries fails to implement their part of the action, the other beneficiaries must ensure that this part is implemented by someone else (without being entitled to an increase of the maximum grant amount and subject to an amendment; see Article 39). The *financial* responsibility of each beneficiary in case of recoveries is governed by Article 22.

The beneficiaries (and their action) must remain eligible under the EU programme funding the grant for the entire duration of the action. Costs and contributions will be eligible only as long as the beneficiary and the action are eligible.

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

(a) Each beneficiary must:

(i) keep information stored in the Portal Participant Register up to date (see Article 19)

(ii) inform the granting authority (and the other beneficiaries) immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 19)

(iii) submit to the coordinator in good time:

- the prefinancing guarantees (if required; see Article 23)
- the financial statements and certificates on the financial statements (CFS) (if required; see Articles 21 and 24.2 and Data Sheet, Point 4.3)
- the contribution to the deliverables and technical reports (see Article 21)
- any other documents or information required by the granting authority under the Agreement

(iv) submit via the Portal data and information related to the participation of their affiliated entities.

(b) The coordinator must:

(i) monitor that the action is implemented properly (see Article 11)

(ii) act as the intermediary for all communications between the consortium and the granting authority, unless the Agreement or granting authority specifies otherwise, and in particular:

- submit the prefinancing guarantees to the granting authority (if any)
- request and review any documents or information required and verify their quality and completeness before passing them on to the granting authority
- submit the deliverables and reports to the granting authority
- inform the granting authority about the payments made to the other beneficiaries (report on the distribution of payments; if required, see Articles 22 and 32)

(iii) distribute the payments received from the granting authority to the other beneficiaries without unjustified delay (see Article 22).

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

However, coordinators which are public bodies may delegate the tasks set out in Point (b)(ii) last indent and (iii) above to entities with 'authorisation to administer' which they have created or which are controlled by or affiliated to them. In this case, the coordinator retains sole responsibility for the payments and for compliance with the obligations under the Agreement.

Moreover, coordinators which are 'sole beneficiaries'[13] (or similar, such as European research infrastructure consortia (ERICs)) may delegate the tasks set out in Point (b)(i) to (iii) above to one of their members. The coordinator retains sole responsibility for compliance with the obligations under the Agreement.

The beneficiaries must have **internal arrangements** regarding their operation and co-ordination, to ensure that the action is implemented properly.

If required by the granting authority (see Data Sheet, Point 1), these arrangements must be set out in a written **consortium agreement** between the beneficiaries, covering for instance:

- the internal organisation of the consortium
- the management of access to the Portal
- different distribution keys for the payments and financial responsibilities in case of recoveries (if any)
- additional rules on rights and obligations related to background and results (see Article 16)

[13] For the definition, see Article 187(2) EU Financial Regulation 2018/1046: "Where several entities satisfy the criteria for being awarded a grant and together form one entity, that entity may be treated as the **sole beneficiary**, including where it is specifically established for the purpose of implementing the action financed by the grant."

- settlement of internal disputes
- liability, indemnification and confidentiality arrangements between the beneficiaries.

The internal arrangements must not contain any provision contrary to this Agreement.

ARTICLE 8 — AFFILIATED ENTITIES

Not applicable

ARTICLE 9 — OTHER PARTICIPANTS INVOLVED IN THE ACTION

9.1 Associated partners

The following entities which cooperate with a beneficiary will participate in the action as 'associated partners':

- **EIDGENOSSISCHES INSTITUT FUR METROLOGIE METAS (METAS)**, PIC 950138184
- **PAUL SCHERRER INSTITUT (PSI)**, PIC 999994923
- **INCHEON NATIONAL UNIVERSITY (INU)**, PIC 948013981
- **BRUKER NANO GMBH (BRUKER NANO)**, PIC 968726973

Associated partners must implement the action tasks attributed to them in Annex 1 in accordance with Article 11. They may not charge costs or contributions to the action and the costs for their tasks are not eligible.

The tasks must be set out in Annex 1.

The beneficiaries must ensure that their contractual obligations under Articles 11 (proper implementation), 12 (conflict of interests), 13 (confidentiality and security), 14 (ethics), 17.2 (visibility), 18 (specific rules for carrying out action), 19 (information) and 20 (record-keeping) also apply to the associated partners.

The beneficiaries must ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the associated partners.

9.2 Third parties giving in-kind contributions to the action

Other third parties may give in-kind contributions to the action (i.e. personnel, equipment, other goods, works and services, etc. which are free-of-charge) if necessary for the implementation.

Third parties giving in-kind contributions do not implement any action tasks. They may not charge costs or contributions to the action, but the costs for the in-kind contributions are eligible and may be charged by the beneficiaries which use them, under the conditions set out in Article 6. The costs will be included in Annex 2 as part of the beneficiaries' costs.

The third parties and their in-kind contributions should be set out in Annex 1.

The beneficiaries must ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the third parties giving in-kind contributions.

9.3 Subcontractors

Subcontractors may participate in the action, if necessary for the implementation.

Subcontractors must implement their action tasks in accordance with Article 11. The costs for the subcontracted tasks (invoiced price from the subcontractor) are eligible and may be charged by the beneficiaries, under the conditions set out in Article 6. The costs will be included in Annex 2 as part of the beneficiaries' costs.

The beneficiaries must ensure that their contractual obligations under Articles 11 (proper implementation), 12 (conflict of interest), 13 (confidentiality and security), 14 (ethics), 17.2 (visibility), 18 (specific rules for carrying out action), 19 (information) and 20 (record-keeping) also apply to the subcontractors.

The beneficiaries must ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the subcontractors.

9.4 Recipients of financial support to third parties

If the action includes providing financial support to third parties (e.g. grants, prizes or similar forms of support), the beneficiaries must ensure that their contractual obligations under Articles 12 (conflict of interest), 13 (confidentiality and security), 14 (ethics), 17.2 (visibility), 18 (specific rules for carrying out action), 19 (information) and 20 (record-keeping)also apply to the third parties receiving the support (recipients).

The beneficiaries must also ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the recipients.

ARTICLE 10 — PARTICIPANTS WITH SPECIAL STATUS

10.1 Non-EU participants

Participants which are established in a non-EU country (if any) undertake to comply with their obligations under the Agreement and:

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)
- for the submission of certificates under Article 24: to use qualified external auditors which are independent and comply with comparable standards as those set out in EU Directive 2006/43/EC[14]
- for the controls under Article 25: to allow for checks, reviews, audits and investigations

[14] 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 or similar national regulations (OJ L 157, 9.6.2006, p. 87).

(including on-the-spot checks, visits and inspections) by the bodies mentioned in that Article (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.).

Special rules on dispute settlement apply (see Data Sheet, Point 5).

10.2 Participants which are international organisations

Participants which are international organisations (IOs; if any) undertake to comply with their obligations under the Agreement and:

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)

- for the submission of certificates under Article 24: to use either independent public officers or external auditors which comply with comparable standards as those set out in EU Directive 2006/43/EC

- for the controls under Article 25: to allow for the checks, reviews, audits and investigations by the bodies mentioned in that Article, taking into account the specific agreements concluded by them and the EU (if any).

For such participants, nothing in the Agreement will be interpreted as a waiver of their privileges or immunities, as accorded by their constituent documents or international law.

Special rules on applicable law and dispute settlement apply (see Article 43 and Data Sheet, Point 5).

10.3 Pillar-assessed participants

Pillar-assessed participants (if any) may rely on their own systems, rules and procedures, in so far as they have been positively assessed and do not call into question the decision awarding the grant or breach the principle of equal treatment of applicants or beneficiaries.

'Pillar-assessment' means a review by the European Commission on the systems, rules and procedures which participants use for managing EU grants (in particular internal control system, accounting system, external audits, financing of third parties, rules on recovery and exclusion, information on recipients and protection of personal data; see Article 154 EU Financial Regulation 2018/1046).

Participants with a positive pillar assessment may rely on their own systems, rules and procedures, in particular for:

- record-keeping (Article 20): may be done in accordance with internal standards, rules and procedures

- currency conversion for financial statements (Article 21): may be done in accordance with usual accounting practices

- guarantees (Article 23): for public law bodies, prefinancing guarantees are not needed

- certificates (Article 24):

    - certificates on the financial statements (CFS): may be provided by their regular internal

or external auditors and in accordance with their internal financial regulations and procedures

- certificates on usual accounting practices (CoMUC): are not needed if those practices are covered by an ex-ante assessment

and use the following specific rules, for:

- recoveries (Article 22): in case of financial support to third parties, there will be no recovery if the participant has done everything possible to retrieve the undue amounts from the third party receiving the support (including legal proceedings) and non-recovery is not due to an error or negligence on its part

- checks, reviews, audits and investigations by the EU (Article 25): will be conducted taking into account the rules and procedures specifically agreed between them and the framework agreement (if any)

- impact evaluation (Article 26): will be conducted in accordance with the participant's internal rules and procedures and the framework agreement (if any)

- grant agreement suspension (Article 31): certain costs incurred during grant suspension are eligible (notably, minimum costs necessary for a possible resumption of the action and costs relating to contracts which were entered into before the pre-information letter was received and which could not reasonably be suspended, reallocated or terminated on legal grounds)

- grant agreement termination (Article 32): the final grant amount and final payment will be calculated taking into account also costs relating to contracts due for execution only after termination takes effect, if the contract was entered into before the pre-information letter was received and could not reasonably be terminated on legal grounds

- liability for damages (Article 33.2): the granting authority must be compensated for 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 only if the damage is due to an infringement of the participant's internal rules and procedures or due to a violation of third parties' rights by the participant or one of its employees or individual for whom the employees are responsible.

Participants whose pillar assessment covers procurement and granting procedures may also do purchases, subcontracting and financial support to third parties (Article 6.2) in accordance with their internal rules and procedures for purchases, subcontracting and financial support.

Participants whose pillar assessment covers data protection rules may rely on their internal standards, rules and procedures for data protection (Article 15).

The participants may however not rely on provisions which would breach the principle of equal treatment of applicants or beneficiaries or call into question the decision awarding the grant, such as in particular:

- eligibility (Article 6)

- consortium roles and set-up (Articles 7-9)

- security and ethics (Articles 13, 14)
- IPR (including background and results, access rights and rights of use), communication, dissemination and visibility (Articles 16 and 17)
- information obligation (Article 19)
- payment, reporting and amendments (Articles 21, 22 and 39)
- rejections, reductions, suspensions and terminations (Articles 27, 28, 29-32)

If the pillar assessment was subject to remedial measures, reliance on the internal systems, rules and procedures is subject to compliance with those remedial measures.

Participants whose assessment has not yet been updated to cover (the new rules on) data protection may rely on their internal systems, rules and procedures, provided that they ensure that personal data is:

- processed lawfully, fairly and in a transparent manner in relation to the data subject
- collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes
- adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed
- accurate and, where necessary, kept up to date
- kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data is processed and
- processed in a manner that ensures appropriate security of the personal data.

Participants must inform the coordinator without delay of any changes to the systems, rules and procedures that were part of the pillar assessment. The coordinator must immediately inform the granting authority.

Pillar-assessed participants that have also concluded a framework agreement with the EU, may moreover — under the same conditions as those above (i.e. not call into question the decision awarding the grant or breach the principle of equal treatment of applicants or beneficiaries) — rely on the provisions set out in that framework agreement.

SECTION 2 RULES FOR CARRYING OUT THE ACTION

ARTICLE 11 — PROPER IMPLEMENTATION OF THE ACTION

11.1 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, the call conditions and all legal obligations under applicable EU, international and national law.

11.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 12 — CONFLICT OF INTERESTS

12.1 Conflict of interests

The beneficiaries must take all measures to prevent any situation where the impartial and objective implementation of the Agreement could be compromised for reasons involving family, emotional life, political or national affinity, economic interest or any other direct or indirect interest (‘conflict of interests’).

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

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

12.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28) and the grant or the beneficiary may be terminated (see Article 32).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 13 — CONFIDENTIALITY AND SECURITY

13.1 Sensitive information

The parties must keep confidential any data, documents or other material (in any form) that is identified as sensitive in writing (‘sensitive information’) — during the implementation of the action and for at least until the time-limit set out in the Data Sheet (see Point 6).

If a beneficiary requests, the granting authority may agree to keep such information confidential for a longer period.

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

The beneficiaries may disclose sensitive information to their personnel or other participants involved in the action only if they:

(a) need to know it in order to implement the Agreement and

(b) are bound by an obligation of confidentiality.

The granting authority may disclose sensitive information to its staff and to other EU institutions and bodies.

It may moreover disclose sensitive information to third parties, if:

(a) this is necessary to implement the Agreement or safeguard the EU financial interests and

(b) the recipients of the information are bound by an obligation of confidentiality.

The confidentiality obligations no longer apply if:

(a) the disclosing party agrees to release the other party

(b) the information becomes publicly available, without breaching any confidentiality obligation

(c) the disclosure of the sensitive information is required by EU, international or national law.

Specific confidentiality rules (if any) are set out in Annex 5.

13.2 Classified information

The parties must handle classified information in accordance with the applicable EU, international or national law on classified information (in particular, Decision 2015/444[15] and its implementing rules).

Deliverables which contain classified information must be submitted according to special procedures agreed with the granting authority.

Action tasks involving classified information may be subcontracted only after explicit approval (in writing) from the granting authority.

Classified information may not be disclosed to any third party (including participants involved in the action implementation) without prior explicit written approval from the granting authority.

Specific security rules (if any) are set out in Annex 5.

13.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 14 — ETHICS AND VALUES

14.1 Ethics

The action must be carried out in line with the highest ethical standards and the applicable EU, international and national law on ethical principles.

Specific ethics rules (if any) are set out in Annex 5.

14.2 Values

The beneficiaries must commit to and ensure the respect of basic EU values (such as respect for

[15] Commission Decision 2015/444/EC, Euratom of 13 March 2015 on the security rules for protecting EU classified information (OJ L 72, 17.3.2015, p. 53).

human dignity, freedom, democracy, equality, the rule of law and human rights, including the rights of minorities).

Specific rules on values (if any) are set out in Annex 5.

14.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 15 — DATA PROTECTION

15.1 Data processing by the granting authority

Any personal data under the Agreement will be processed under the responsibility of the data controller of the granting authority in accordance with and for the purposes set out in the Portal Privacy Statement.

For grants where the granting authority is the European Commission, an EU regulatory or executive agency, joint undertaking or other EU body, the processing will be subject to Regulation 2018/1725[16].

15.2 Data processing by the beneficiaries

The beneficiaries must process personal data under the Agreement in compliance with the applicable EU, international and national law on data protection (in particular, Regulation 2016/679[17]).

They must ensure that personal data is:

- processed lawfully, fairly and in a transparent manner in relation to the data subjects
- collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes
- adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed
- accurate and, where necessary, kept up to date
- kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data is processed and
- processed in a manner that ensures appropriate security of the data.

[16] Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC (OJ L 295, 21.11.2018, p. 39).

[17] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (‘GDPR’) (OJ L 119, 4.5.2016, p. 1).

The beneficiaries may grant their personnel access to personal data only if it is strictly necessary for implementing, managing and monitoring the Agreement. The beneficiaries must ensure that the personnel is under a confidentiality obligation.

The beneficiaries must inform the persons whose data are transferred to the granting authority and provide them with the Portal Privacy Statement.

15.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 16 — INTELLECTUAL PROPERTY RIGHTS (IPR) — BACKGROUND AND RESULTS —ACCESS RIGHTS AND RIGHTS OF USE

16.1 Background and access rights to background

The beneficiaries must give each other and the other participants access to the background identified as needed for implementing the action, subject to any specific rules in Annex 5.

'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 is:

(a) held by the beneficiaries before they acceded to the Agreement and

(b) needed to implement the action or exploit the results.

If background is subject to rights of a third party, the beneficiary concerned must ensure that it is able to comply with its obligations under the Agreement.

16.2 Ownership of results

The granting authority does not obtain ownership of the results produced under the action.

'Results' means any tangible or intangible effect of the action, such as data, know-how or information, whatever its form or nature, whether or not it can be protected, as well as any rights attached to it, including intellectual property rights.

16.3 Rights of use of the granting authority on materials, documents and information received for policy, information, communication, dissemination and publicity purposes

The granting authority has the right to use non-sensitive information relating to the action and materials and documents received from the beneficiaries (notably summaries for publication, deliverables, as well as any other material, such as pictures or audio-visual material, in paper or electronic form) for policy, information, communication, dissemination and publicity purposes — during the action or afterwards.

The right to use the beneficiaries' materials, documents and information is granted in the form of a royalty-free, non-exclusive and irrevocable licence, which includes the following rights:

(a) **use for its own purposes** (in particular, making them available to persons working for the granting authority or any other EU service (including institutions, bodies, offices, agencies, etc.) or EU Member State institution or body; copying or reproducing them in whole or in part, in unlimited numbers; and communication through press information services)

(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** (including shortening, summarising, inserting other elements (e.g. 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) **storage** in paper, electronic or other form

(f) **archiving**, in line with applicable document-management rules

(g) the right to authorise **third parties** to act on its behalf or sub-license to third parties the modes of use set out in Points (b), (c), (d) and (f), if needed for the information, communication and publicity activity of the granting authority

(h) **processing**, analysing, aggregating the materials, documents and information received and **producing derivative works**.

The rights of use are granted for the whole duration of the industrial or intellectual property rights concerned.

If materials or documents are subject to moral rights or third party rights (including intellectual property rights or rights of natural persons on their image and voice), the beneficiaries must ensure that they comply with their obligations under this Agreement (in particular, by obtaining the necessary licences and authorisations from the rights holders concerned).

Where applicable, the granting authority will insert the following information:

> "© – [year] – [name of the copyright owner]. All rights reserved. Licensed to the [name of granting authority] under conditions."

16.4 Specific rules on IPR, results and background

Specific rules regarding intellectual property rights, results and background (if any) are set out in Annex 5.

16.5 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such a breach may also lead to other measures described in Chapter 5.

ARTICLE 17 — COMMUNICATION, DISSEMINATION AND VISIBILITY

17.1 Communication — Dissemination — Promoting the action

Unless otherwise agreed with the granting authority, the beneficiaries must promote the action and its results by providing targeted information to multiple audiences (including the media and the public), in accordance with Annex 1 and in a strategic, coherent and effective manner.

Before engaging in a communication or dissemination activity expected to have a major media impact, the beneficiaries must inform the granting authority.

17.2 Visibility — European flag and funding statement

Unless otherwise agreed with the granting authority, communication activities of the beneficiaries related to the action (including media relations, conferences, seminars, information material, such as brochures, leaflets, posters, presentations, etc., in electronic form, via traditional or social media, etc.), dissemination activities and any infrastructure, equipment, vehicles, supplies or major result funded by the grant must acknowledge EU support and display the European flag (emblem) and funding statement (translated into local languages, where appropriate):

Funded by the
European Union

Co-funded by the
European Union

The emblem must remain distinct and separate and cannot be modified by adding other visual marks, brands or text.

Apart from the emblem, no other visual identity or logo may be used to highlight the EU support.

When displayed in association with other logos (e.g. of beneficiaries or sponsors), the emblem must be displayed at least as prominently and visibly as the other logos.

For the purposes of their obligations under this Article, the beneficiaries may use the emblem without first obtaining approval from the granting authority. This does not, however, give them the right to

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

17.3 Quality of information — Disclaimer

Any communication or dissemination activity related to the action must use factually accurate information.

Moreover, it must indicate the following disclaimer (translated into local languages where appropriate):

> "Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or [name of the granting authority]. Neither the European Union nor the granting authority can be held responsible for them."

17.4 Specific communication, dissemination and visibility rules

Specific communication, dissemination and visibility rules (if any) are set out in Annex 5.

17.5 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 18 — SPECIFIC RULES FOR CARRYING OUT THE ACTION

18.1 Specific rules for carrying out the action

Specific rules for implementing the action (if any) are set out in Annex 5.

18.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such a breach may also lead to other measures described in Chapter 5.

SECTION 3 GRANT ADMINISTRATION

ARTICLE 19 — GENERAL INFORMATION OBLIGATIONS

19.1 Information requests

The beneficiaries must provide — during the action or afterwards and in accordance with Article 7 — any information requested in order to verify eligibility of the costs or contributions declared, proper implementation of the action and compliance with the other obligations under the Agreement.

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

19.2 Participant Register data updates

The beneficiaries must keep — at all times, during the action or afterwards — their information stored in the Portal Participant Register up to date, in particular, their name, address, legal representatives, legal form and organisation type.

19.3 Information about events and circumstances which impact the action

The beneficiaries must immediately inform the granting authority (and the other beneficiaries) of any of the following:

(a) **events** which are likely to affect or delay the implementation of the action or affect the EU's financial interests, in particular:

(i) changes in their legal, financial, technical, organisational or ownership situation (including changes linked to one of the exclusion grounds listed in the declaration of honour signed before grant signature)

(ii) linked action information: not applicable

(b) **circumstances** affecting:

(i) the decision to award the grant or

(ii) compliance with requirements under the Agreement.

19.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 20 — RECORD-KEEPING

20.1 Keeping records and supporting documents

The beneficiaries must — at least until the time-limit set out in the Data Sheet (see Point 6) — keep records and other supporting documents to prove the proper implementation of the action in line with the accepted standards in the respective field (if any).

In addition, the beneficiaries must — for the same period — keep the following to justify the amounts declared:

(a) for actual costs: adequate records and supporting documents to prove the costs declared (such as contracts, subcontracts, invoices and accounting records); in addition, the beneficiaries' usual accounting 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 documents

(b) for flat-rate costs and contributions (if any): adequate records and supporting documents to prove the eligibility of the costs or contributions to which the flat-rate is applied

(c) for the following simplified costs and contributions: the beneficiaries do not need to keep specific records on the actual costs incurred, but must keep:

(i) for unit costs and contributions (if any): adequate records and supporting documents to prove the number of units declared

(ii) for lump sum costs and contributions (if any): adequate records and supporting documents to prove proper implementation of the work as described in Annex 1

(iii) for financing not linked to costs (if any): adequate records and supporting documents to prove the achievement of the results or the fulfilment of the conditions as described in Annex 1

(d) for unit, flat-rate and lump sum costs and contributions according to usual cost accounting practices (if any): the beneficiaries must keep any adequate records and supporting documents to prove that their cost accounting practices have been applied in a consistent manner, based on objective criteria, regardless of the source of funding, and that they comply with the eligibility conditions set out in Articles 6.1 and 6.2.

Moreover, the following is needed for specific budget categories:

(e) for personnel costs: time worked for the beneficiary under the action must be supported by declarations signed monthly by the person and their supervisor, unless another reliable time-record system is in place; the granting authority may accept alternative evidence supporting the time worked for the action declared, if it considers that it offers an adequate level of assurance

(f) additional record-keeping rules: not applicable

The records and supporting documents must be made available upon request (see Article 19) or in the context of checks, reviews, audits or investigations (see Article 25).

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 25), the beneficiaries must keep these 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 granting authority may accept non-original documents if they offer a comparable level of assurance.

20.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, costs or contributions insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 27), and the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 21 — REPORTING

21.1 Continuous reporting

The beneficiaries must continuously report on the progress of the action (e.g. **deliverables, milestones, outputs/outcomes, critical risks, indicators,** etc; if any), in the Portal Continuous Reporting tool and in accordance with the timing and conditions it sets out (as agreed with the granting authority).

Standardised deliverables (e.g. progress reports not linked to payments, reports on cumulative expenditure, special reports, etc; if any) must be submitted using the templates published on the Portal.

21.2 Periodic reporting: Technical reports and financial statements

In addition, the beneficiaries must provide reports to request payments, in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2):

- for additional prefinancings (if any): an **additional prefinancing report**
- for interim payments (if any) and the final payment: a **periodic report**.

The prefinancing and periodic reports include a technical and financial part.

The technical part includes an overview of the action implementation. It must be prepared using the template available in the Portal Periodic Reporting tool.

The financial part of the additional prefinancing report includes a statement on the use of the previous prefinancing payment.

The financial part of the periodic report includes:

- the financial statements (individual and consolidated; for all beneficiaries/affiliated entities)
- the explanation on the use of resources (or detailed cost reporting table, if required)
- the certificates on the financial statements (CFS) (if required; see Article 24.2 and Data Sheet, Point 4.3).

The **financial statements** must detail the eligible costs and contributions for each budget category and, for the final payment, also the revenues for the action (see Articles 6 and 22).

All eligible costs and contributions incurred should be declared, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Amounts that are not declared in the individual financial statements will not be taken into account by the granting authority.

By signing the financial statements (directly in the Portal Periodic Reporting tool), the beneficiaries confirm that:

- the information provided is complete, reliable and true
- the costs and contributions declared are eligible (see Article 6)
- the costs and contributions can be substantiated by adequate records and supporting documents (see Article 20) that will be produced upon request (see Article 19) or in the context of checks, reviews, audits and investigations (see Article 25)
- for the final periodic report: all the revenues have been declared (if required; see Article 22).

Beneficiaries will have to submit also the financial statements of their affiliated entities (if any). In case of recoveries (see Article 22), beneficiaries will be held responsible also for the financial statements of their affiliated entities.

21.3 Currency for financial statements and conversion into euros

The financial statements must be drafted in euro.

Beneficiaries with general accounts 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* (ECB website), calculated over the corresponding reporting period.

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

Beneficiaries with general accounts in euro must convert costs incurred in another currency into euro according to their usual accounting practices.

21.4 Reporting language

The reporting must be in the language of the Agreement, unless otherwise agreed with the granting authority (see Data Sheet, Point 4.2).

21.5 Consequences of non-compliance

If a report submitted does not comply with this Article, the granting authority may suspend the payment deadline (see Article 29) and apply other measures described in Chapter 5.

If the coordinator breaches its reporting obligations, the granting authority may terminate the grant or the coordinator's participation (see Article 32) or apply other measures described in Chapter 5.

ARTICLE 22 — PAYMENTS AND RECOVERIES — CALCULATION OF AMOUNTS DUE

22.1 Payments and payment arrangements

Payments will be made in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2).

They will be made in euro to the bank account indicated by the coordinator (see Data Sheet, Point 4.2) and must be distributed without unjustified delay (restrictions may apply to distribution of the initial prefinancing payment; see Data Sheet, Point 4.2).

Payments to this bank account will discharge the granting authority from its payment obligation.

The cost of payment transfers will be borne as follows:

- the granting authority 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.

Payments by the granting authority will be considered to have been carried out on the date when they are debited to its account.

22.2 Recoveries

Recoveries will be made, if — at beneficiary termination, final payment or afterwards — it turns out that the granting authority has paid too much and needs to recover the amounts undue.

Each beneficiary's financial responsibility in case of recovery is in principle limited to their own debt and undue amounts of their affiliated entities.

In case of enforced recoveries (see Article 22.4), affiliated entities will be held liable for repaying debts of their beneficiaries, if required by the granting authority (see Data Sheet, Point 4.4).

22.3 Amounts due

22.3.1 Prefinancing payments

The aim of the prefinancing is to provide the beneficiaries with a float.

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

For **initial prefinancings** (if any), the amount due, schedule and modalities are set out in the Data Sheet (see Point 4.2).

For **additional prefinancings** (if any), the amount due, schedule and modalities are also set out in the Data Sheet (see Point 4.2). However, if the statement on the use of the previous prefinancing payment shows that less than 70% was used, the amount set out in the Data Sheet will be reduced by the difference between the 70% threshold and the amount used.

The contribution to the Mutual Insurance Mechanism will be retained from the prefinancing payments (at the rate and in accordance with the modalities set out in the Data Sheet, see Point 4.2) and transferred to the Mechanism.

Prefinancing payments (or parts of them) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency, offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

22.3.2 Amount due at beneficiary termination — Recovery

In case of beneficiary termination, the granting authority will determine the provisional amount due for the beneficiary concerned. Payments (if any) will be made with the next interim or final payment.

The **amount due** will be calculated in the following step:

Step 1 — Calculation of the total accepted EU contribution

Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the beneficiary for all reporting periods, by calculating the 'maximum EU contribution to costs' (applying the funding rate to the accepted costs of the beneficiary), taking into account requests for a lower contribution to costs and CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

After that, the granting authority will take into account grant reductions (if any). The resulting amount is the 'total accepted EU contribution' for the beneficiary.

The **balance** is then calculated by deducting the payments received (if any; see report on the distribution of payments in Article 32), from the total accepted EU contribution:

{total accepted EU contribution for the beneficiary

minus

{prefinancing and interim payments received (if any)}}.

If the balance is **positive**, the amount will be included in the next interim or final payment to the consortium.

If the balance is **negative**, it will be **recovered** in accordance with the following procedure:

The granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to recover, the amount due, the amount to be recovered and the reasons why and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received), it will confirm the amount to be recovered and ask this amount to be paid to the coordinator (**confirmation letter**).

If payment is not made to the coordinator by the date specified in the confirmation letter, the granting authority may call on the Mutual Insurance Mechanism to intervene, if continuation of the action is guaranteed and the conditions set out in the rules governing the Mechanism are met.

In this case, it will send a **beneficiary recovery letter**, together with a **debit note** with the terms and date for payment.

The debit note for the beneficiary will include the amount calculated for the affiliated entities which also had to end their participation (if any).

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

The amounts will later on also be taken into account for the next interim or final payment.

22.3.3 Interim payments

Interim payments reimburse the eligible costs and contributions claimed for the implementation of the action during the reporting periods (if any).

Interim payments (if any) will be made in accordance with the schedule and modalities set out the Data Sheet (see Point 4.2).

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

The **interim payment** will be calculated by the granting authority in the following steps:

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the interim payment ceiling

Step 1 — Calculation of the total accepted EU contribution

The granting authority will calculate the 'accepted EU contribution' for the action for the reporting period, by first calculating the 'maximum EU contribution to costs' (applying the funding rate to the accepted costs of each beneficiary), taking into account requests for a lower contribution to costs, and CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

After that, the granting authority will take into account grant reductions from beneficiary termination (if any). The resulting amount is the 'total accepted EU contribution'.

Step 2 — Limit to the interim payment ceiling

The resulting amount is then capped to ensure that the total amount of prefinancing and interim payments (if any) does not exceed the interim payment ceiling set out in the Data Sheet (see Point 4.2).

Interim payments (or parts of them) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency, offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

22.3.4 Final payment — Final grant amount — Revenues and Profit — Recovery

The final payment (payment of the balance) reimburses the remaining part of the eligible costs and contributions claimed for the implementation of the action (if any).

The final payment will be made in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2).

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

The **final grant amount for the action** will be calculated in the following steps:

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the action for all reporting periods, by calculating the 'maximum EU contribution to costs' (applying the funding rate to the total accepted costs of each beneficiary), taking into account requests for a lower contribution to costs, CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

After that, the granting authority will take into account grant reductions (if any). The resulting amount is the 'total accepted EU contribution'.

Step 2 — Limit to the maximum grant amount

If the resulting amount is higher than the maximum grant amount set out in Article 5.2, it will be limited to the latter.

Step 3 — Reduction due to the no-profit rule

If the no-profit rule is provided for in the Data Sheet (see Point 4.2), the grant must not produce a profit (i.e. surplus of the amount obtained following Step 2 plus the action's revenues, over the eligible costs and contributions approved by the granting authority).

'Revenue' is all income generated by the action, during its duration (see Article 4), for beneficiaries that are profit legal entities (— with the exception of income generated by the exploitation of results, which are not considered as revenues).

If there is a profit, it will be deducted in proportion to the final rate of reimbursement of the eligible costs approved by the granting authority (as compared to the amount calculated following Steps 1 and 2 minus the contributions).

The **balance** (final payment) is then calculated by deducting the total amount of prefinancing and interim payments already made (if any), from the final grant amount:

{final grant amount

minus

{prefinancing and interim payments made (if any)}}.

If the balance is **positive**, it will be **paid** to the coordinator.

The amount retained for the Mutual Insurance Mechanism (see above) will be released and **paid** to the coordinator (in accordance with the rules governing the Mechanism).

The final payment (or part of it) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency,

offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

If — despite the release of the Mutual Insurance Mechanism contribution — the balance is **negative**, it will be **recovered** in accordance with the following procedure:

The granting authority will send a **pre-information letter** to the coordinator:

- formally notifying the intention to recover, the final grant amount, the amount to be recovered and the reasons why
- requesting a report on the distribution of payments to the beneficiaries within 30 days of receiving notification and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received) and the coordinator has submitted the report on the distribution of payments, it will calculate the **share of the debt per beneficiary**, by:

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

{{{total accepted EU contribution for the beneficiary

divided by

total accepted EU contribution for the action}

multiplied by

final grant amount for the action},

minus

{prefinancing and interim payments received by the beneficiary (if any)}}

and

(b) dividing the debt:

{{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 to be recovered}.

and confirm the amount to be recovered from each beneficiary concerned (**confirmation letter**), together with **debit notes** with the terms and date for payment.

The debit notes for beneficiaries will include the amounts calculated for their affiliated entities (if any).

If the coordinator has not submitted the report on the distribution of payments, the granting authority will **recover** the full amount from the coordinator (**confirmation letter** and **debit note** with the terms and date for payment).

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

22.3.5 Audit implementation after final payment — Revised final grant amount — Recovery

If — after the final payment (in particular, after checks, reviews, audits or investigations; see Article 25) — the granting authority rejects costs or contributions (see Article 27) or reduces the grant (see Article 28), it will calculate the **revised final grant amount** for the beneficiary concerned.

The **beneficiary revised final grant amount** will be calculated in the following step:

Step 1 — Calculation of the revised total accepted EU contribution

Step 1 — Calculation of the revised total accepted EU contribution

The granting authority will first calculate the 'revised accepted EU contribution' for the beneficiary, by calculating the 'revised accepted costs' and 'revised accepted contributions'.

After that, it will take into account grant reductions (if any). The resulting 'revised total accepted EU contribution' is the beneficiary revised final grant amount.

If the revised final grant amount is lower than the beneficiary's final grant amount (i.e. its share in the final grant amount for the action), it will be **recovered** in accordance with the following procedure:

The **beneficiary final grant amount** (i.e. share in the final grant amount for the action) is calculated as follows:

{{total accepted EU contribution for the beneficiary

divided by

total accepted EU contribution for the action}

multiplied by

final grant amount for the action}.

The granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to recover, the amount to be recovered and the reasons why and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received), it will confirm the amount to be recovered (**confirmation letter**), together with a **debit note** with the terms and the date for payment.

Recoveries against affiliated entities (if any) will be handled through their beneficiaries.

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

22.4 Enforced recovery

If payment is not made by the date specified in the debit note, the amount due will be recovered:

(a) by offsetting the amount — without the coordinator or beneficiary's consent — against any amounts owed to the coordinator or beneficiary by the granting authority.

In exceptional circumstances, to safeguard the EU financial interests, the amount may be offset before the payment date specified in the debit note.

For grants where the granting authority is the European Commission or an EU executive agency, debts may also be offset against amounts owed by other Commission services or executive agencies.

(b) financial guarantee(s): not applicable

(c) joint and several liability of beneficiaries: not applicable

(d) by holding affiliated entities jointly and severally liable (if any, see Data Sheet, Point 4.4)

(e) by taking legal action (see Article 43) or, provided that the granting authority is the European Commission or an EU executive agency, by adopting an enforceable decision under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 100(2) of EU Financial Regulation 2018/1046.

If the Mutual Insurance Mechanism was called on by the granting authority to intervene, recovery will be continued in the name of the Mutual Insurance Mechanism. If two debit notes were sent, the second one (in the name of the Mutual Insurance Mechanism) will be considered to replace the first one (in the name of the granting authority). Where the MIM intervened, offsetting, enforceable decisions or any other of the above-mentioned forms of enforced recovery may be used mutatis mutandis.

The amount to be recovered will be increased by **late-payment interest** at the rate set out in Article 22.5, from the day following the payment date in the debit note, up to and including the date the full payment is received.

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 2015/2366[18] applies.

For grants where the granting authority is an EU executive agency, enforced recovery by offsetting or enforceable decision will be done by the services of the European Commission (see also Article 43).

22.5 Consequences of non-compliance

[18] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (OJ L 337, 23.12.2015, p. 35).

22.5.1 If the granting authority 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 the rate specified in the Data Sheet (Point 4.2). 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 on 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).

If payments or the payment deadline are suspended (see Articles 29 and 30), payment will not be considered as late.

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.

22.5.2 If the coordinator breaches any of its obligations under this Article, the grant may be reduced (see Article 28) and the grant or the coordinator may be terminated (see Article 32).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 23 — GUARANTEES

Not applicable

ARTICLE 24 — CERTIFICATES

24.1 Operational verification report (OVR)

Not applicable

24.2 Certificate on the financial statements (CFS)

If required by the granting authority (see Data Sheet, Point 4.3), the beneficiaries must provide certificates on their financial statements (CFS), in accordance with the schedule, threshold and conditions set out in the Data Sheet.

The coordinator must submit them as part of the periodic report (see Article 21).

The certificates must be drawn up using the template published on the Portal, cover the costs declared on the basis of actual costs and costs according to usual cost accounting practices (if any), and fulfil the following conditions:

(a) be provided by a qualified approved external auditor which is independent and complies with Directive 2006/43/EC[19] (or for public bodies: by a competent independent public officer)

(b) the verification must be carried out according to the highest professional standards to ensure that the financial statements comply with the provisions under the Agreement and that the costs declared are eligible.

The certificates will not affect the granting authority's right to carry out its own checks, reviews or audits, nor preclude the European Court of Auditors (ECA), the European Public Prosecutor's Office (EPPO) or the European Anti-Fraud Office (OLAF) from using their prerogatives for audits and investigations under the Agreement (see Article 25).

If the costs (or a part of them) were already audited by the granting authority, these costs do not need to be covered by the certificate and will not be counted for calculating the threshold (if any).

24.3 Certificate on the compliance of usual cost accounting practices (CoMUC)

Not applicable

24.4 Systems and process audit (SPA)

Beneficiaries which:

- use unit, flat rate or lump sum costs or contributions according to documented (i.e. formally approved and in writing) usual costs accounting practices (if any) or

- have formalised documentation on the systems and processes for calculating their costs and contributions (i.e. formally approved and in writing), have participated in at least 150 actions under Horizon 2020 or the Euratom Research and Training Programme (2014-2018 or 2019-2020) and participate in at least 3 ongoing actions under Horizon Europe or the Euratom Research and Training Programme (2021-2025 or 2026-2027)

may apply to the granting authority for a systems and process audit (SPA).

This audit will be carried out as follows:

Step 1 – Application by the beneficiary.

Step 2 – If the application is accepted, the granting authority will carry out the systems and process audit, complemented by an audit of transactions (on a sample of the beneficiary's Horizon Europe or the Euratom Research and Training Programme financial statements).

Step 3 – The audit result will take the form of a risk assessment classification for the beneficiary: low, medium or high.

Low-risk beneficiaries will benefit from less (or less in-depth) ex-post audits (see Article 25) and a higher threshold for submitting certificates on the financial statements (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3).

[19] 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 or similar national regulations (OJ L 157, 9.6.2006, p. 87).

24.5 Consequences of non-compliance

If a beneficiary does not submit a certificate on the financial statements (CFS) or the certificate is rejected, the accepted EU contribution to costs will be capped to reflect the CFS threshold.

If a beneficiary breaches any of its other obligations under this Article, the granting authority may apply the measures described in Chapter 5.

ARTICLE 25 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS

25.1 Granting authority checks, reviews and audits

25.1.1 Internal checks

The granting authority may — during the action or afterwards — check the proper implementation of the action and compliance with the obligations under the Agreement, including assessing costs and contributions, deliverables and reports.

25.1.2 Project reviews

The granting authority may carry out reviews on the proper implementation of the action and compliance with the obligations under the Agreement (general project reviews or specific issues reviews).

Such project reviews may be started during the implementation of the action and until the time-limit set out in the Data Sheet (see Point 6). They will be formally notified to the coordinator or beneficiary concerned and will be considered to start on the date of the notification.

If needed, the granting authority may be assisted by independent, outside experts. If it uses outside experts, the coordinator or beneficiary concerned will be informed and have the right to object on grounds of commercial confidentiality or conflict of interest.

The coordinator or beneficiary concerned must cooperate diligently and 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 granting authority may request beneficiaries to provide such information to it directly. Sensitive information and documents will be treated in accordance with Article 13.

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

For **on-the-spot visits**, the beneficiary concerned must allow access to sites and premises (including to the outside experts) 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 **project review report** will be drawn up.

The granting authority will formally notify the project review report to the coordinator or beneficiary concerned, which has 30 days from receiving notification to make observations.

Project reviews (including project review reports) will be in the language of the Agreement.

25.1.3 Audits

The granting authority may carry out audits on the proper implementation of the action and compliance with the obligations under the Agreement.

Such audits may be started during the implementation of the action and until the time-limit set out in the Data Sheet (see Point 6). They will be formally notified to the beneficiary concerned and will be considered to start on the date of the notification.

The granting authority may use its own audit service, delegate audits to a centralised service or use external audit firms. If it uses an external firm, the beneficiary concerned will be informed and have the right to object on grounds of commercial confidentiality or conflict of interest.

The beneficiary concerned must cooperate diligently and provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to verify compliance with the Agreement. Sensitive information and documents will be treated in accordance with Article 13.

For **on-the-spot** visits, the beneficiary concerned must allow access to sites and premises (including for the external audit firm) 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 auditors will formally notify the draft audit report to the beneficiary concerned, which has 30 days from receiving notification to make observations (contradictory audit procedure).

The **final audit report** will take into account observations by the beneficiary concerned and will be formally notified to them.

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

25.2 European Commission checks, reviews and audits in grants of other granting authorities

Where the granting authority is not the European Commission, the latter has the same rights of checks, reviews and audits as the granting authority.

25.3 Access to records for assessing simplified forms of funding

The beneficiaries must give the European Commission access to their statutory records for the periodic assessment of simplified forms of funding which are used in EU programmes.

25.4 OLAF, EPPO and ECA audits and investigations

The following bodies may also carry out checks, reviews, audits and investigations — during the action or afterwards:

- the European Anti-Fraud Office (OLAF) under Regulations No 883/2013[20] and No 2185/96[21]

- the European Public Prosecutor's Office (EPPO) under Regulation 2017/1939

- the European Court of Auditors (ECA) under Article 287 of the Treaty on the Functioning of the EU (TFEU) and Article 257 of EU Financial Regulation 2018/1046.

If requested by these bodies, the beneficiary concerned must provide full, accurate and complete information in the format requested (including complete accounts, individual salary statements or other personal data, including in electronic format) and allow access to sites and premises for on-the-spot visits or inspections — as provided for under these Regulations.

To this end, the beneficiary concerned must keep all relevant information relating to the action, at least until the time-limit set out in the Data Sheet (Point 6) and, in any case, until any ongoing checks, reviews, audits, investigations, litigation or other pursuits of claims have been concluded.

25.5 Consequences of checks, reviews, audits and investigations — Extension of results of reviews, audits or investigations

25.5.1 Consequences of checks, reviews, audits and investigations in this grant

Findings in checks, reviews, audits or investigations carried out in the context of this grant may lead to rejections (see Article 27), grant reduction (see Article 28) or other measures described in Chapter 5.

Rejections or grant reductions after the final payment will lead to a revised final grant amount (see Article 22).

Findings in checks, reviews, audits or investigations during the action implementation may lead to a request for amendment (see Article 39), to change the description of the action set out in Annex 1.

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

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

25.5.2 Extension from other grants

Results of checks, reviews, audits or investigations in other grants may be extended to this grant, if:

(a) the beneficiary concerned is found, in other EU 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

[20] 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).

[21] Council Regulation (Euratom, EC) No 2185/96 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).

(b) those findings are formally notified to the beneficiary concerned — together with the list of grants affected by the findings — within the time-limit for audits set out in the Data Sheet (see Point 6).

The granting authority will formally notify the beneficiary concerned of the intention to extend the findings and the list of grants affected.

If the extension concerns **rejections of costs or contributions**: the 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 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.

If the extension concerns **grant reductions**: the notification will include:

(a) an invitation to submit observations on the list of grants affected by the findings and

(b) the **correction rate for extrapolation**, established on the basis of the systemic or recurrent errors and the principle of proportionality.

The beneficiary concerned has **60 days** from receiving notification to submit observations, revised financial statements or to propose a duly substantiated **alternative correction method/rate**.

On the basis of this, the granting authority will analyse the impact and decide on the implementation (i.e. start rejection or grant reduction procedures, either on the basis of the revised financial statements or the announced/alternative method/rate or a mix of those; see Articles 27 and 28).

25.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, costs or contributions insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 27), and the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

ARTICLE 26 — IMPACT EVALUATIONS

26.1 Impact evaluation

The granting authority may carry out impact evaluations of the action, measured against the objectives and indicators of the EU programme funding the grant.

Such evaluations may be started during implementation of the action and until the time-limit set out

in the Data Sheet (see Point 6). They will be formally notified to the coordinator or beneficiaries and will be considered to start on the date of the notification.

If needed, the granting authority may be assisted by independent outside experts.

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

26.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the granting authority may apply the measures described in Chapter 5.

CHAPTER 5 CONSEQUENCES OF NON-COMPLIANCE

SECTION 1 REJECTIONS AND GRANT REDUCTION

ARTICLE 27 — REJECTION OF COSTS AND CONTRIBUTIONS

27.1 Conditions

The granting authority will — at beneficiary termination, interim payment, final payment or afterwards — reject any costs or contributions which are ineligible (see Article 6), in particular following checks, reviews, audits or investigations (see Article 25).

The rejection may also be based on the extension of findings from other grants to this grant (see Article 25).

Ineligible costs or contributions will be rejected.

27.2 Procedure

If the rejection does not lead to a recovery, the granting authority will formally notify the coordinator or beneficiary concerned of the rejection, the amounts and the reasons why. The coordinator or beneficiary concerned may — within 30 days of receiving notification — submit observations if it disagrees with the rejection (payment review procedure).

If the rejection leads to a recovery, the granting authority will follow the contradictory procedure with pre-information letter set out in Article 22.

27.3 Effects

If the granting authority rejects costs or contributions, it will deduct them from the costs or contributions declared and then calculate the amount due (and, if needed, make a recovery; see Article 22).

ARTICLE 28 — GRANT REDUCTION

28.1 Conditions

The granting authority may — at beneficiary termination, final payment or afterwards — reduce the grant for a beneficiary, if:

(a) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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 (see Article 25).

The amount of the reduction will be calculated for each beneficiary concerned and proportionate to the seriousness and the duration of the errors, irregularities or fraud or breach of obligations, by applying an individual reduction rate to their accepted EU contribution.

28.2 Procedure

If the grant reduction does not lead to a recovery, the granting authority will formally notify the coordinator or beneficiary concerned of the reduction, the amount to be reduced and the reasons why. The coordinator or beneficiary concerned may — within 30 days of receiving notification — submit observations if it disagrees with the reduction (payment review procedure).

If the grant reduction leads to a recovery, the granting authority will follow the contradictory procedure with pre-information letter set out in Article 22.

28.3 Effects

If the granting authority reduces the grant, it will deduct the reduction and then calculate the amount due (and, if needed, make a recovery; see Article 22).

SECTION 2 SUSPENSION AND TERMINATION

ARTICLE 29 — PAYMENT DEADLINE SUSPENSION

29.1 Conditions

The granting authority may — at any moment — suspend the payment deadline if a payment cannot be processed because:

(a) the required report (see Article 21) has not been submitted or is not complete or additional information is needed

(b) there are doubts about the amount to be paid (e.g. ongoing audit extension procedure, queries

about eligibility, need for a grant reduction, etc.) and additional checks, reviews, audits or investigations are necessary, or

(c) there are other issues affecting the EU financial interests.

29.2 Procedure

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

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

If the conditions for suspending the payment deadline are no longer met, the suspension will be **lifted** — and the remaining time to pay (see Data Sheet, Point 4.2) will resume.

If the suspension exceeds two months, the coordinator may request the granting authority to confirm if the suspension will continue.

If the payment deadline has been suspended due to the non-compliance of the report and the revised report is not submitted (or was submitted but is also rejected), the granting authority may also terminate the grant or the participation of the coordinator (see Article 32).

ARTICLE 30 — PAYMENT SUSPENSION

30.1 Conditions

The granting authority may — at any moment — suspend payments, in whole or in part for one or more beneficiaries, if:

(a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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.

If payments are suspended for one or more beneficiaries, the granting authority will make partial payment(s) for the part(s) not suspended. If suspension concerns the final payment, the payment (or recovery) of the remaining amount after suspension is lifted will be considered to be the payment that closes the action.

30.2 Procedure

Before suspending payments, the granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to suspend payments and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the observations it has received, it will confirm the suspension (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

At the end of the suspension procedure, the granting authority will also inform the coordinator.

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

If the conditions for resuming payments are met, the suspension will be **lifted**. The granting authority will formally notify the beneficiary concerned (and the coordinator) and set the suspension end date.

During the suspension, no prefinancing will be paid to the beneficiaries concerned. For interim payments, the periodic reports for all reporting periods except the last one (see Article 21) must not contain any financial statements from the beneficiary concerned (or its affiliated entities). 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.

ARTICLE 31 — GRANT AGREEMENT SUSPENSION

31.1 Consortium-requested GA suspension

31.1.1 Conditions and procedure

The beneficiaries may request the suspension of the grant or any part of it, if exceptional circumstances — in particular *force majeure* (see Article 35) — make implementation impossible or excessively difficult.

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the date the suspension takes effect; this date may be before the date of the submission of the amendment request and
- the expected date of resumption.

The suspension will **take effect** on the day specified in the amendment.

Once circumstances allow for implementation to resume, the coordinator must immediately request another **amendment** of the Agreement to set the suspension end date, the resumption date (one day after suspension end date), extend the duration and make other changes necessary to adapt the action to the new situation (see Article 39) — unless the grant has been terminated (see Article 32). The suspension will be **lifted** with effect from the suspension end date set out in the amendment. This date may be before the date of the submission of the amendment request.

During the suspension, no prefinancing will be paid. Costs incurred or contributions for activities implemented during grant suspension are not eligible (see Article 6.3).

31.2 EU-initiated GA suspension

31.2.1 Conditions

The granting authority may suspend the grant or any part of it, if:

(a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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

(c) other:

(i) linked action issues: not applicable

(ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

31.2.2 Procedure

Before suspending the grant, the granting authority will send a **pre-information letter** to the coordinator:

- formally notifying the intention to suspend the grant and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the observations it has received, it will confirm the suspension (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

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

Once the conditions for resuming implementation of the action are met, the granting authority will formally notify the coordinator a **lifting of suspension letter**, in which it will set the suspension end date and invite the coordinator to request an amendment of the Agreement to set the resumption

date (one day after suspension end date), extend the duration and make other changes necessary to adapt the action to the new situation (see Article 39) — unless the grant has been terminated (see Article 32). The suspension will be **lifted** with effect from the suspension end date set out in the lifting of suspension letter. This date may be before the date on which the letter is sent.

During the suspension, no prefinancing will be paid. Costs incurred or contributions for activities implemented during suspension are not eligible (see Article 6.3).

The beneficiaries may not claim damages due to suspension by the granting authority (see Article 33).

Grant suspension does not affect the granting authority's right to terminate the grant or a beneficiary (see Article 32) or reduce the grant (see Article 28).

ARTICLE 32 — GRANT AGREEMENT OR BENEFICIARY TERMINATION

32.1 Consortium-requested GA termination

32.1.1 Conditions and procedure

The beneficiaries may request the termination of the grant.

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the date the consortium ends work on the action ('end of work date') and
- the date the termination takes effect ('termination date'); this date must be after the date of the submission of the amendment request.

The termination will **take effect** on the termination date specified in the amendment.

If no reasons are given or if the granting authority considers the reasons do not justify termination, it may consider the grant terminated improperly.

32.1.2 Effects

The coordinator must — within 60 days from when termination takes effect — submit a **periodic report** (for the open reporting period until termination).

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before the end of work date (see Article 22). Costs relating to contracts due for execution only after the end of work are not eligible.

If the granting authority does not receive the report within the deadline, only costs and contributions which are included in an approved periodic report will be taken into account (no costs/contributions if no periodic report was ever approved).

Improper termination may lead to a grant reduction (see Article 28).

After termination, the beneficiaries' obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks,

reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

32.2 Consortium-requested beneficiary termination

32.2.1 Conditions and procedure

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

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the opinion of the beneficiary concerned (or proof that this opinion has been requested in writing)
- the date the beneficiary ends work on the action ('end of work date')
- the date the termination takes effect ('termination date'); this date must be after the date of the submission of the amendment request.

If the termination concerns the coordinator and is done without its agreement, the amendment request must be submitted by another beneficiary (acting on behalf of the consortium).

The termination will **take effect** on the termination date specified in the amendment.

If no information is given or if the granting authority considers that the reasons do not justify termination, it may consider the beneficiary to have been terminated improperly.

32.2.2 Effects

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

(i) a **report on the distribution of payments** to the beneficiary concerned

(ii) a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, the financial statement, the explanation on the use of resources, and, if applicable, the certificate on the financial statement (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3)

(iii) a second **request for amendment** (see Article 39) with other amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before the end of work date (see Article 22). Costs relating to contracts due for execution only after the end of work are not eligible.

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 21).

If the granting authority does not receive the termination report within the deadline, only costs and contributions which are included in an approved periodic report will be taken into account (no costs/ contributions if no periodic report was ever approved).

If the granting authority does not receive the report on the distribution of payments within the deadline, 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.

If the second request for amendment is accepted by the granting authority, the Agreement is **amended** to introduce the necessary changes (see Article 39).

If the second request for amendment is rejected by the granting authority (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the grant may be terminated (see Article 32).

Improper termination may lead to a reduction of the grant (see Article 31) or grant termination (see Article 32).

After termination, the concerned beneficiary's obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

32.3 EU-initiated GA or beneficiary termination

32.3.1 Conditions

The granting authority may terminate the grant or the participation of one or more beneficiaries, if:

(a) one or more beneficiaries do not accede to the Agreement (see Article 40)

(b) a change to the action or the legal, financial, technical, organisational or ownership situation of a beneficiary is likely to substantially affect the implementation of the action or calls into question the decision to award the grant (including changes linked to one of the exclusion grounds listed in the declaration of honour)

(c) following termination of one or more beneficiaries, the necessary changes to the Agreement (and their impact on the action) would call into question the decision awarding the grant or breach the principle of equal treatment of applicants

(d) implementation of the action has become impossible or the changes necessary for its continuation would call into question the decision awarding the grant or breach the principle of equal treatment of applicants

(e) a beneficiary (or person with unlimited liability for its debts) is subject to bankruptcy proceedings or similar (including insolvency, winding-up, administration by a liquidator or court, arrangement with creditors, suspension of business activities, etc.)

(f) a beneficiary (or person with unlimited liability for its debts) is in breach of social security or tax obligations

(g) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has been found guilty of grave professional misconduct

(h) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed fraud, corruption, or is involved in a criminal organisation, money laundering, terrorism-related crimes (including terrorism financing), child labour or human trafficking

(i) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) was created under a different jurisdiction with the intent to circumvent fiscal, social or other legal obligations in the country of origin (or created another entity with this purpose)

(j) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:

  (i) substantial errors, irregularities or fraud or

  (ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.)

(k) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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 25)

(l) despite a specific request by the granting authority, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its affiliated entities or associated partners that is in one of the situations under points (d), (f), (e), (g), (h), (i) or (j) and to reallocate its tasks, or

(m) other:

  (i) linked action issues: not applicable

  (ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

32.3.2 Procedure

Before terminating the grant or participation of one or more beneficiaries, the granting authority will send **a pre-information letter** to the coordinator or beneficiary concerned:

- formally notifying the intention to terminate and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the observations it has received, it will confirm the termination and the date it will take effect (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

For beneficiary terminations, the granting authority will — at the end of the procedure — also inform the coordinator.

The termination will **take effect** the day after the confirmation notification is sent (or on a later date specified in the notification; 'termination date').

32.3.3 Effects

(a) for **GA termination**:

The coordinator must — within 60 days from when termination takes effect — submit a **periodic report** (for the last open reporting period until termination).

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before termination takes effect (see Article 22). Costs relating to contracts due for execution only after termination are not eligible.

If the grant is terminated for breach of the obligation to submit reports, the coordinator may not submit any report after termination.

If the granting authority does not receive the report within the deadline, only costs and contributions which are included in an approved periodic report will be taken into account (no costs/contributions if no periodic report was ever approved).

Termination does not affect the granting authority's right to reduce the grant (see Article 28) or to impose administrative sanctions (see Article 34).

The beneficiaries may not claim damages due to termination by the granting authority (see Article 33).

After termination, the beneficiaries' obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

(b) for **beneficiary termination**:

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

(i) a **report on the distribution of payments** to the beneficiary concerned

(ii) a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, the financial

statement, the explanation on the use of resources, and, if applicable, the certificate on the financial statement (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3)

(iii) a **request for amendment** (see Article 39) with any amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before termination takes effect (see Article 22). Costs relating to contracts due for execution only after termination are not eligible.

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 21).

If the granting authority does not receive the termination report within the deadline, only costs and contributions included in an approved periodic report will be taken into account (no costs/ contributions if no periodic report was ever approved).

If the granting authority does not receive the report on the distribution of payments within the deadline, 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.

If the request for amendment is accepted by the granting authority, the Agreement is **amended** to introduce the necessary changes (see Article 39).

If the request for amendment is rejected by the granting authority (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the grant may be terminated (see Article 32).

After termination, the concerned beneficiary's obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

SECTION 3 OTHER CONSEQUENCES: DAMAGES AND ADMINISTRATIVE SANCTIONS

ARTICLE 33 — DAMAGES

33.1 Liability of the granting authority

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

The granting authority cannot be held liable for any damage caused by any of the beneficiaries or other participants involved in the action, as a consequence of the implementation of the Agreement.

33.2 Liability of the beneficiaries

The beneficiaries must compensate the granting authority 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, provided that it was caused by gross negligence or wilful act.

The liability does not extend to indirect or consequential losses or similar damage (such as loss of profit, loss of revenue or loss of contracts), provided such damage was not caused by wilful act or by a breach of confidentiality.

ARTICLE 34 — ADMINISTRATIVE SANCTIONS AND OTHER MEASURES

Nothing in this Agreement may be construed as preventing the adoption of administrative sanctions (i.e. exclusion from EU award procedures and/or financial penalties) or other public law measures, in addition or as an alternative to the contractual measures provided under this Agreement (see, for instance, Articles 135 to 145 EU Financial Regulation 2018/1046 and Articles 4 and 7 of Regulation 2988/95[22]).

SECTION 4 FORCE MAJEURE

ARTICLE 35 — FORCE MAJEURE

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

'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 other participants involved in the action), and
- proves to be inevitable in spite of exercising all due diligence.

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.

CHAPTER 6 FINAL PROVISIONS

ARTICLE 36 — COMMUNICATION BETWEEN THE PARTIES

36.1 Forms and means of communication — Electronic management

[22] Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.1995, p. 1).

EU grants are managed fully electronically through the EU Funding & Tenders Portal ('Portal').

All communications must be made electronically through the Portal, in accordance with the Portal Terms and Conditions and using the forms and templates provided there (except if explicitly instructed otherwise by the granting authority).

Communications must be made in writing and clearly identify the grant agreement (project number and acronym).

Communications must be made by persons authorised according to the Portal Terms and 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 their appointment letter (see Portal Terms and Conditions).

If the electronic exchange system is temporarily unavailable, instructions will be given on the Portal.

36.2 Date of communication

The sending date for communications made through the Portal will be the date and time of sending, as indicated by the time logs.

The receiving date for communications made through the Portal will be the date and time the communication is accessed, as indicated by the time logs. Formal notifications that have not been accessed within 10 days after sending, will be considered to have been accessed (see Portal Terms and Conditions).

If a communication is exceptionally made on paper (by e-mail or postal service), general principles apply (i.e. date of sending/receipt). Formal notifications by registered post with proof of delivery will be considered to have been received either on 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.

36.3 Addresses for communication

The Portal can be accessed via the Europa website.

The address for paper communications to the granting authority (if exceptionally allowed) is the official mailing address indicated on its website.

For beneficiaries, it is the legal address specified in the Portal Participant Register.

ARTICLE 37 — INTERPRETATION OF THE AGREEMENT

The provisions in the Data Sheet take precedence over the rest of the Terms and Conditions of the Agreement.

Annex 5 takes precedence over the Terms and Conditions; the Terms and Conditions take precedence over the Annexes other than Annex 5.

Annex 2 takes precedence over Annex 1.

ARTICLE 38 — CALCULATION OF PERIODS AND DEADLINES

In accordance with Regulation No 1182/71[23], 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.

'Days' means calendar days, not working days.

ARTICLE 39 — AMENDMENTS

39.1 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.

39.2 Procedure

The party requesting an amendment must submit a request for amendment signed directly in the Portal Amendment tool.

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:

- 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 granting authority may request additional information.

If the party receiving the request agrees, it must sign the amendment in the tool within 45 days of receiving notification (or any additional information the granting authority 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 of entry into force or other date specified in the amendment.

[23] 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).

ARTICLE 40 — ACCESSION AND ADDITION OF NEW BENEFICIARIES

40.1 Accession of the beneficiaries mentioned in the Preamble

The beneficiaries which are not coordinator must accede to the grant by signing the accession form (see Annex 3) directly in the Portal Grant Preparation tool, within 30 days after the entry into force of the Agreement (see Article 44).

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 44).

If a beneficiary does not accede to the grant within the above deadline, the coordinator must — within 30 days — request an amendment (see Article 39) to terminate the beneficiary and make any changes necessary to ensure proper implementation of the action. This does not affect the granting authority's right to terminate the grant (see Article 32).

40.2 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 39. It must include an accession form (see Annex 3) signed by the new beneficiary directly in the Portal Amendment tool.

New beneficiaries will assume the rights and obligations under the Agreement with effect from the date of their accession specified in the accession form (see Annex 3).

Additions are also possible in mono-beneficiary grants.

ARTICLE 41 — TRANSFER OF THE AGREEMENT

In justified cases, the beneficiary of a mono-beneficiary grant may request the transfer of the grant to a new beneficiary, provided that this would not call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiary must submit a request for **amendment** (see Article 39), with

- the reasons why
- the accession form (see Annex 3) signed by the new beneficiary directly in the Portal Amendment tool and
- additional supporting documents (if required by the granting authority).

The new beneficiary will assume the rights and obligations under the Agreement with effect from the date of accession specified in the accession form (see Annex 3).

ARTICLE 42 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE GRANTING AUTHORITY

The beneficiaries may not assign any of their claims for payment against the granting authority to

any third party, except if expressly approved in writing by the granting authority on the basis of a reasoned, written request by the coordinator (on behalf of the beneficiary concerned).

If the granting authority has not accepted the assignment or if 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 granting authority.

ARTICLE 43 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

43.1 Applicable law

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

Special rules may apply for beneficiaries which are international organisations (if any; see Data Sheet, Point 5).

43.2 Dispute settlement

If a dispute concerns the interpretation, application or validity of the Agreement, the parties must bring action before the EU General Court — or, on appeal, the EU Court of Justice — under Article 272 of the Treaty on the Functioning of the EU (TFEU).

For non-EU beneficiaries (if any), such disputes must be brought before the courts of Brussels, Belgium — unless an international agreement provides for the enforceability of EU court judgements.

For beneficiaries with arbitration as special dispute settlement forum (if any; see Data Sheet, Point 5), the dispute will — in the absence of an amicable settlement — be settled in accordance with the Rules for Arbitration published on the Portal.

If a dispute concerns administrative sanctions, offsetting or an enforceable decision under Article 299 TFEU (see Articles 22 and 34), the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice — under Article 263 TFEU.

For grants where the granting authority is an EU executive agency (see Preamble), actions against offsetting and enforceable decisions must be brought against the European Commission (not against the granting authority; see also Article 22).

ARTICLE 44 — ENTRY INTO FORCE

The Agreement will enter into force on the day of signature by the granting authority or the coordinator, depending on which is later.

SIGNATURES

For the coordinator

For the granting authority

ANNEX 1

Horizon Europe (HORIZON)

Description of the action (DoA)

Part A

Part B

DESCRIPTION OF THE ACTION (PART A)

COVER PAGE

Part A of the Description of the Action (DoA) must be completed directly on the Portal Grant Preparation screens.

PROJECT *Grant Preparation (General Information screen) — Enter the info.*	
Project number:	101138449
Project name:	MItigating TRansport-related Air Pollution in Europe
Project acronym:	MI-TRAP
Call:	HORIZON-CL5-2023-D5-01
Topic:	HORIZON-CL5-2023-D5-01-18
Type of action:	HORIZON-IA
Service:	CINEA/C/03
Project starting date:	fixed date: 1 January 2024
Project duration:	48 months

TABLE OF CONTENTS

PROJECT SUMMARY

Project summary

Grant Preparation (General Information screen) — Provide an overall description of your project (including context and overall objectives, planned activities and main achievements, and expected results and impacts (on target groups, change procedures, capacities, innovation etc)). This summary should give readers a clear idea of what your project is about.

Use the project summary from your proposal.

Air Quality in urban areas and other hot spots, where transport emissions induce a large impact on human exposure remains an environmental problem of high complexity with strong public interest.
Despite the significant improvements achieved, adverse health effects are found to be of high concern. There is strong evidence that, despite strict emission standards, “real world” emissions is accepted as term indicating a status of partial success of these measures and technological advances in fossil fuel emission control, while new sources such as non-exhaust emissions and micro plastics are becoming significant. A large level of uncertainty arising from the assessment and mitigation of these sources and especially the internal combustion engines arises from their physicochemical transformation from the tailpipe/stack to the ambient environment. The metrics and parameterization employed on the data analyzed from the environmental monitoring networks and measurement systems are poorly representing the material initially emitted by the specifications of these engines certified by the manufacturers and the control legislation. It is therefore difficult to link the health and other environmental effects to specific sources or modes of transport with few exceptions.
Human exposure, dosimetry and burden of disease modelling will be assessed. The output will be linked to epidemiological studies across Europe and a specific epidemiological product of the extracted impact due to transport will be sought.
THE PROJECT will provide innovative means in terms of monitoring devices and schemes of data analysis and management and a network of monitoring stations close to Transport emission hots, in order to remedy the traceability of the emitted pollutants from transport sources to the atmosphere and the assessment of applied legislation and control measures through a mitigating solution Toolbox

LIST OF PARTICIPANTS

PARTICIPANTS

Grant Preparation (Beneficiaries screen) — Enter the info.

Number	Role	Short name	Legal name	Country	PIC
1	COO	NCSR "D"	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	EL	999978239
2	BEN	UNOVAGOR	UNIVERZA V NOVI GORICI	SI	998298102
3	BEN	Haze Instr	HAZE INSTRUMENTS, RAZVOJ IN PROIZVODNJA MERILNIH INSTRUMENTOV DOO	SI	902852818
4	BEN	UMIL	UNIVERSITA DEGLI STUDI DI MILANO	IT	999995796
5	BEN	ICPF	USTAV CHEMICKYCH PROCESU AV CR, v. v. i.	CZ	998590072
6	BEN	NKUA	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	EL	999643007
7	BEN	TUM	TECHNISCHE UNIVERSITAET MUENCHEN	DE	999977463
8	BEN	TUC	POLYTECHNEIO KRITIS	EL	924773848
9	BEN	INFN	ISTITUTO NAZIONALE DI FISICA NUCLEARE	IT	999992789

PARTICIPANTS

Grant Preparation (Beneficiaries screen) — Enter the info.

Number	Role	Short name	Legal name	Country	PIC
10	BEN	AMRN	KOINONIKI SYNETAIRISTIKI EPICHEIRISI SYLLOGIKIS KAI KOINONIKIS OFELEIAS AMARANTHUS	EL	884254717
11	BEN	WU	WAGENINGEN UNIVERSITY	NL	999981634
12	BEN	IMT	INSTITUT MINES-TELECOM	FR	999849326
13	BEN	DTI	TEKNOLOGISK INSTITUT	DK	999460356
14	BEN	AU	AARHUS UNIVERSITET	DK	999997736
15	BEN	IST ID	IST-ID ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E O DESENVOLVIMENTO	PT	954983722
16	BEN	PTB	PHYSIKALISCH-TECHNISCHE BUNDESANSTALT	DE	999596544
17	BEN	Catalytic Inst	CATALYTIC INSTRUMENTS GMBH & CO KG	DE	882609791
18	BEN	POLIMI	POLITECNICO DI MILANO	IT	999879881
19	BEN	Freie U Berlin	FREIE UNIVERSITAET BERLIN	DE	999994826
20	BEN	IVU Umwelt	IVU UMWELT GMBH	DE	926854983
21	BEN	nanoDUST	NANODUST GMBH	DE	882193564
22	BEN	FINCONIT	FINCON CONSULTING ITALIA SRL	IT	962928313
23	AP	METAS	EIDGENOSSISCHES INSTITUT FUR METROLOGIE METAS	CH	950138184
24	AP	PSI	PAUL SCHERRER INSTITUT	CH	999994923
25	AP	INU	INCHEON NATIONAL UNIVERSITY	KR	948013981
26	AP	BRUKER NANO	BRUKER NANO GMBH	DE	968726973

LIST OF WORK PACKAGES

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
WP1	Innovative air quality monitoring technologies for transport emission sources	16 - PTB	130.00	1	18	D1.1 – Ten fully characterized, portable, cost-effective instruments for the online, real-time measurement of solid-particle number (sPN) concentration in ambient air D1.2 – Six customized catalytic strippers for the advanced air quality monitoring stations and 12 compact catalytic cores for the cost-effective monitoring stations D1.3 – Two complementary elemental analysis protocols based on time-resolved filter-type and size-fractionated impaction for the deposition of emitted particles D1.4 – QA/QC protocol for operating HR-A and CE-C stations
WP2	Pilot studies for air quality monitoring and advanced data products	1 - NCSR "D"	211.00	6	42	D2.1 – Characterization of transport-related emissions with respect to air quality microphysical, chemical, noise, and traffic metrics D2.2 – Report on Methodology and Analytics for High-Level Data Products from the NRT Networks
WP3	NRT air pollution and noise modelling to quantify the different transport contributions	7 - TUM	147.00	1	42	D3.1 – System design document and development plan D3.2 – Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.1)

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
						D3.3 – Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.2) D3.4 – MI-TRAP repository and dashboard online for visualisation of NRT air pollution and noise levels D3.5 – Report on the provision of NRT maps
WP4	Links between transport-related pollutants, noise and health	6 - NKUA	73.00	1	46	D4.1 – Health Impact Assessment for traffic exposure (BC, UFP and noise) in Europe D4.2 – Use of concentration and dose indices for determining health effects arising from epidemiological studies
WP5	Integration of MI-TRAP Technologies, Nature Based Solutions, Innovative Tools and Services	15 - IST ID	92.00	7	48	D5.1 – Report on the implementation of NBS in demonstration sites, including follow-up manual D5.2 – Manual for the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool D5.3 – The integrated MI-TRAP toolbox
WP6	Stakeholder engagement, citizen science, dissemination & communication and policy recommendation	10 - AMRN	130.00	1	48	D6.1 – MI-TRAP Roadmap for bottom-up actions and preparation for the international LL D6.2 – Review report: Evaluation of results of the ILL D6.3 – Citizen Science review and analysis of results

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
						D6.4 – Communication and dissemination plan (V.1) D6.5 – Communication and dissemination plan (V.2) D6.6 – Communication and dissemination plan(V.3) D6.7 – Communication and dissemination plan (V.4)
WP7	Project Management	1 - NCSR "D"	46.00	1	48	D7.1 – Data Management Plan (V.1) D7.2 – Data Management Plan (V.2) D7.3 – Data Management Plan (V.3) D7.4 – Data Management Plan (V.4) D7.5 – MI-TRAP Exploitation plan (V.1) D7.6 – MI-TRAP Exploitation plan (V.2) D7.7 – MI-TRAP Exploitation plan (V.3) D7.8 – MI-TRAP Exploitation plan (V.4)

Work package WP1 – Innovative air quality monitoring technologies for transport emission sources

Work Package Number	WP1	Lead Beneficiary	16. PTB
Work Package Name	Innovative air quality monitoring technologies for transport emission sources		
Start Month	1	End Month	18

Objectives
WP1 aims to: a) develop new instrumentation for air quality monitoring of solid ultrafine particles, b) provide traceable calibration of the instruments deployed in field campaigns and c) develop and validate traceable techniques for the elemental analysis of particles sampled with time- and size-resolution (PTB, BRN, NCSR “D”, METAS, DTI, PSI, HAZE INSTR, INFN, CATALYTIC INST, NANODUST, ICPF)

Description
Task 1.1 Development of novel instrumentation for monitoring the number concentration of solid particles emitted by transport-related combustion sources (METAS, NANODUST, CATALYTIC INST) (M1-M18) A new portable, cost-effective instrument for the online, real-time measurement of solid-particle number (sPN) concentration in ambient air will be developed by NANODUST. The concept will rely on existing methodologies, e.g. diffusion charging, already successfully applied in the periodic technical inspection of diesel-vehicle exhaust, with optimized design for air quality monitoring. More specifically, the 50% cut-off limit (i.e., the particle size at which the counting efficiency is 50 %) of the new sPN-instrument will be shifted from 23 nm to 10 nm and the detection limit will be reduced from about 5000 cm-3 to below 3000 cm-3. The instrument will be equipped with a particle after-treatment system to remove volatile materials, i.e., it will be a stand-alone instrument which does not require any external accessory units. Instrument performance, including size-dependent counting efficiency, intraday stability, day-to-day repeatability and unit-to-unit variability will be thoroughly characterized in METAS laboratories using soot as test aerosol and a traceable condensation particle counter as reference standard [Vasilatou et al., 2023]. A guideline for the in-field calibration of the instrument will also be developed. Customized catalytic strippers will be developed by CATALYTIC INST to run at different aerosol flow rates matching the sampling flowrate of the instruments deployed at the monitoring stations. Two different designs will be developed: a) a catalytic stripper optimized for a flow rate of 4-6 L/min, which will be used in the advanced monitoring stations to denude the ambient aerosol sampled in parallel by the CPC and aethalometer, and b) a compact catalytic core optimized for a flow rate of 0.15-0.3 L/min to be placed upstream of CPCs and portable aethalometers in the cost-effective monitoring stations. The performance of the new catalytic strippers will be characterized at METAS in terms of oxidation efficiency by performing offline EC/OC analysis and in terms of size-dependent particle penetration efficiency using size-selected soot aerosols (both fresh and aged soot) in a wide particle size and number concentration range. Task 1.2 Calibration of instruments deployed in the field campaigns (PTB, HAZE INSTR, METAS, DTI, ICPF) (M6-M18) The aim of this task is to provide quality assurance for all types of instruments deployed in the field campaigns. Instruments, where possible, will be calibrated in a traceable manner according to European or international documentary standards as follows: Mobility particle size spectrometers (MPSS) equipped with a catalytic stripper (CS) will be calibrated by PTB according to ISO 15900:2020, while MPSSs without CS, will be calibrated according to CEN/TS 17434:2020 and ACTRIS procedures at ACTRIS ECAC (ICPF) ii) Condensation particle counters (CPCs) equipped with a CS will be calibrated by PTB against a reference electrometer according to ISO 27891:2015. CPCs for ambient measurements (i.e. without CS), operated by project partners who are ACTRIS RPOs, will be calibrated according to ACTRIS SOPs, iii) Aethalometers equipped with CS will be calibrated at METAS against a reference photothermal interferometer (PTAAM-2λ, HAZE INSTR) using soot as test aerosols. Aethalometers for ambient measurements will be calibrated according to ACTRIS SOPs iv) NOx sensors and PM monitors will be calibrated by co-location measurements at national air quality stations. CO2 sensors will be calibrated at DTI. Other instruments, for which there exists no international documentary standard (e.g. ACSM), will be calibrated according to guidelines established within ACTRIS ICOS or COLOSSAL In all cases, a rigorous measurement uncertainty budget will be established.

Task 1.3 Development of innovative technologies and measurement traceability for non-exhaust emission monitoring (INFN, PTB, BRN, NCSR “D”, PSI, HAZE INSTR) (M1-M18)

The task aims at the time-resolved elemental analysis of ambient particles with a non-exhaust metric (trace metals) described in 1.2.2. This calls for a robust calibration of both the sampling and analysis procedures in order to ensure time-resolved quantitative results. The underlying activities of this task will involve:
i) Elemental analysis of particle deposits on moving filter tape samples after sampling by commercially available NRT XRF analytical systems. ii) Standard filters will contain one- or multi-elemental thin film deposits qualified by reference-free XRF at PTB and standard-less Ion Beam Analysis (RBS and PIXE) at INFN-LABEC, and are to serve for the calibration of the elemental analysis in i). iii) The usage of a additional size-fractionating cascade impactor (provided by BRN) and the Size- and Time-Resolved Aerosol Sampler (STRAS), designed and provided by INFN will serve for the validation of the calibration of filter-tape sampling and the subsequent lab-based XRF and PIXE analysis. iv) The elemental analysis of the size-fractionated samples will employ artificial aerosol standard on NRT XRF filter for lab-based calibration or reference-free, grazing-incidence XRF by PTB and by BRN, and standard-less PIXE by INFN-LABEC, reflecting complementary chemical and physical traceability chains. The latter ensures the highest reliability of the quantification in a broad dynamical range of elemental mass depositions to be characterized.

Task 1.4 To establish a portable and fast-response instrumentation for high emitter detection to estimate emission factors and to identify emission plumes for source apportionment (ICPF, HAZE INSTR, METAS, PTB, NCSR “D”) (M6-M18)

We will use commercial mid-cost instruments for CO2 and NOx concentrations to identify emission plumes for detection of high emitters. In combination with instruments developed in Task 1.1 and commercial aethalometers a detailed source apportionment study can be established to identify periods for high pollution events, especially with a multilinear regression method including BC, sPN, CO2 and NOX [Alfody et al., 2023]. A metric will be developed to calculate emission factors for traffic sources. These will be compared against on-road measured plumes as described in the methodology.

Task 1.5 Development of the complete instrumentation package for chemical and microphysical characterization and deployment at measurement sites (NCSR “D”, HAZE INSTR, ICPF, PTB, METAS) (M12-M18)

Two different types of monitoring stations will be developed and deployed at monitoring sites: a) the High-Resolution Advanced Monitoring Stations, which include state-of-the-art instruments for aerosol physical and chemical characterization, and b) the Compact Cost-Effective monitoring stations, which will include (where possible) portable instrumentation, mainly developed in Task 1.1 and 1.3. A full list of instruments deployed in each type of station is presented in Tables 1.2.2.a and 1.2.2.b. Stations will include commercial instruments, e.g. CPCs, aethalometers and PM monitors, and newly developed instruments described in Task 1.1. The monitoring instruments will be calibrated in a traceable manner (e.g. In-field calibration with transportable aerosol generators) as described in Task 1.2.

Work package WP2 – Pilot studies for air quality monitoring and advanced data products

Work Package Number	WP2	**Lead Beneficiary**	1. NCSR "D"
Work Package Name	Pilot studies for air quality monitoring and advanced data products		
Start Month	6	**End Month**	42

Objectives
WP2 aims to: a) demonstrate the technological advancements for highly quality traffic-related air quality data, b) provide the establishment of a network of advanced and cost-effective stations for monitoring different traffic-related metrics, c) provide NRT and higher level data products for effective mitigation strategies (NCSR “D”, PSI, HAZE INSTR, IMT, WU, DTI, UMIL, INFN, ICPF, IST ID, AU, UNOVAGOR, TUC, POLIMI, INU, METAS)

Description
Task 2.1 Design of the Pilot studies (NCSR “D”, PSI, HAZE INSTR, IMT, WU, DTI, UMIL, INFN, ICPF, IST ID, AU, METAS) (M06-M12)

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

In the framework of this task, all the details associated with the establishment of the network of monitoring stations and the pilot studies in each Pilot city will be organized. The pilot sites proposed in MI-TRAP for the establishment of the stations (Fig. 1.2.2.) are representative hotspots of transport-related emissions either from traffic (traffic junctions, ring-roads), or from other modes of transport (ports for shipping emissions, airports for aircraft emissions, and rail stations for train emissions). The timeline of the pilots, the details on site selection, the duration of the pilots and the period/season for the pilots to be implemented in each city will be defined in this task and the overall Plan for pilot studies implementation" that will be developed by M06 (D2.1). For the planning of the pilots, we will take into account the period for the highest concentration at each area, and the logistical requirements especially where co-location with NMN stations is sought.

Task 2.2 Pilot measurement programme at the MI-TRAP urban traffic, rail, harbour and airport stations (AU, NCSR "D", PSI, HAZE INSTR, IMT, WU, DTI, UMIL, INFN, ICPF, IST ID, INU, TUC, POLIMI) (M12-M36)

The instrumentation packages proposed in Task 1.5, will be deployed in the field for real-time chemical and microphysical characterization of ambient aerosol and NRT monitoring of gaseous exhausts emissions, noise and traffic-relevant parameters (traffic density and fleet composition statistics). In each city, one high-end advanced station and two cost-effective stations will run in parallel, forming a network of monitoring stations demonstrating the capacity of the infrastructure proposed in WP1 to deliver beyond the state-of-the-art air quality data. All partners have agreed to contribute with their instrumentation (either advanced or cost-effective) to an adequate capacity for supporting the implementation of the pilots for a minimum of three-month study period in each Pilot city by M36; Transport emissions do not vary significantly with season during the year so a three-month campaign, where data are provided with hourly resolution, provides a very robust evaluation of a model performance regarding numerical accuracy. The choice of season of the year will be one that is considered representative from assessing long-term air quality data. Collection of vessel activity at the harbor Pilots will be implemented by installing PAQman©-watcher (INU). It will collect data for ship activity to estimate ship air emissions in all MI-TRAP port cities by conducting a series of field campaigns, while data will be compared to those from other major ports in various countries for implementation in WP3 & WP5. In parallel and during the pilot campaigns, training on the new MI-TRAP techniques will be provided to the operators of the existing stations offered by stakeholders and collaborating authorities to implement City pilots. This will ensure the long term operation of this type of monitoring infrastructure after the end of the project.

Task 2.3 Database of Air Quality microphysical, chemical noise and traffic parameters and online platform (ICPF, PSI, UNOVAGOR, IMT, WU, DTI, UMIL, INFN, ICPF, IST ID, AU) (M12-M36).

The data produced from the pilots in Task 2.2 will be further processed to create a uniform and harmonized database of the monitored parameters. Regulated, unregulated and emerging pollutants will be measured to characterize the exhaust and non-exhaust emissions of the different modes of transport studied in MI-TRAP. Data handling and curation will be defined at an early stage of the project to allow for optimal utilization of the data products produced. An online platform will be created (cloud service) where the NRT data products will become available for further use in WP3, for real-time monitoring of the air pollution and noise and traffic management, in WP4 for the health impact evaluation as well as in WP5 for the development of the Integrated MI-TRAP toolbox. These data will be also treated in line with the recommendations and standards specified by established Data centers (e.g. ACTRIS), or other secured repositories (ATMO-ACCESS), to be submitted in the relevant data centers and be made publicly available. All the details regarding the FAIR Data management, curation and utilization will be specified in Task 7.3.

Task 2.4 Level-3 data products from further processing (IMT, UNOVAGOR, NCSR "D", UMIL, AU, INFN, ICPF, PSI) (M12-M42)

The data products produced in Task 2.3 will be further analyzed to produce in-depth knowledge of the impact on air quality of the transport-related emissions and evaluate specific emission factors. Special focus will be given to the detailed characterization of the exhaust and non-exhaust emissions. Different approaches and analytical tools will be used to link emission sources to air quality- and health- relevant metrics.
a) NRT-SA focused on traffic exhaust and non-exhaust emissions: Source apportionment aims at estimating the impacts of emissions from different sources of pollutants based on ambient data. In the framework of RI-Urbans a novel methodology has been developed enabling real-time assessment of the organic and carbonaceous aerosol sources and is already employed in the MI-TRAP consortium partners (PSI-NCSR "D", IMT). MI-TRAP will build on this technique to generate information on the emission profiles related to vehicle class and engine types. These results will be linked to traffic-related metrics (traffic density and fleet composition statistics) to generate information on real world emission profiles for sub-μm particles. This will be achieved by combining the NRT-SA outputs with the traffic-related metrics derived from the NRT monitoring of the vehicle fleet composition.
b) Identification of super-polluter fraction from high resolution data analysis: We aim to identify the super-polluter fraction of exhaust emissions (i.e. vehicles non-compliant with tail-pipe emission standards). At the HR-A City-Pilots,

the BC and UFPs monitors will be operated at a fast time resolution mode of 1sec. Advanced analytical algorithm will be applied for high time resolution signal processing, including SSA, time-frequency analysis, and adaptive filtering, allowing for the deconvolution of rapidly changing spikes in the signal that may indicate the presence of "super-polluters".
c) Estimation for exhaust and non-exhaust vehicle emission factors: In this task we will produce a coherent overview of exhaust and non-exhaust emission factors from different transport sectors (road, sea, air, rail), which will be based on the results from measurements in Task 2.1-2.3. The emission factors will be identified for: CO2 and NOx/NO2, particle mass (PM2.5) and UFPs (N10) and particle composition (eBC, total organics, heavy and trace elements). For regulated pollutants, the obtained results will be evaluated in relation to the existing databases (e.g. EMEP/EEA, COPERT, FAIRMODE) to evaluate current conditions.

Work package WP3 – NRT air pollution and noise modelling to quantify the different transport contributions

Work Package Number	WP3	**Lead Beneficiary**	7. TUM
Work Package Name	NRT air pollution and noise modelling to quantify the different transport contributions		
Start Month	1	**End Month**	42

Objectives
WP3 aims to a) provide near real-time maps of traffic flows, air pollutant concentrations and noise levels attributed to transport modes for the core cities, and b) integrate four modeling systems into a platform while optimally benefitting from complementary strengths on source apportionment, UFP, operation capacity and transfer learning. (TUM, NCSR "D", TUC, AMRN, AU, FREIE U BERLIN, IVU UMWELT, INU).

Description
Task 3.1 – Overall design of platform (IVU UMWELT, TUM, FREIE U BERLIN, AU, INU) (M01-M12) This task aims to inventory the required (static and dynamic) input information for each model, to define the required intermediate products and data streams between the models and to subsequently design the platform implementation in functional and technical manner. To facilitate the efficient and consistent collection and exchange of information, model in- and output data are to be passed to and from repository using an adjustable data interface (e. g. json, SOAP, HTTP, ASCII, NetCDF) or API. For data storage within the core a file based RDBMS database system (e. g. postgres) will be used. The availability of the required data and the availability for operational data acquisition routines will be checked for each city and model, respectively. Task 3.2 – Implementation of the modelling platform (FREIE U BERLIN, IVU UMWELT, TUM, AU, INU) (M06-M36) The first implementation of the platform will be performed for two data rich cities: Copenhagen and Milan. The following activities are planned: i) Collection and pre-processing of input data (e.g. land use, road network attributes, fleet composition, urban morphology, meteorology), ii) Train state-of-the-art deep learning models (e.g. Graph Neural networks for city wide traffic volumes for both cities and apply the PAQman© system for AIS based shipping emissions (Copenhagen/Aarhus); iii) Set up IMMIS-MT for Milan and expand DEHM-UBM-AirGIS model system with Nord2000 for simulating noise in Copenhagen, iv) Implement the short term transport oriented source contribution forecasting using LOTOS-EUROS for Europe and the urban background, v) Derivation of the required policy relevant parameters for PM2.5/10, BC, NO/NO2, O3, UFP and LAeq), vi) Evaluation with available operation and MI-TRAP observations using FAIRMODE recommendations. Task 3.3 – Improving the platform functionality (AU, IVU UMWELT, FREIE U BERLIN, TUM, INU) (M18-M36) In the second phase of MI-TRAP the focus shifts to expanding the functionality to provide all parameters for all cities. i) in LOTOS-EUROS (and the other modelling systems) we improve the representation of the intrinsic variability of exhaust and non-exhaust emissions by further developing its dynamic emission modules. By integrating the empirical information on real word emission factors into the HBEFA traffic emission methodology both the background and local modelling benefit. ii) Expansion of the traffic and IMMIS-MT modelling to three cities (i.e. Lisbon, Copenhagen, Milan) and the PAQman© shipping emission modelling to two ports (i.e. Rotterdam and Lisbon or Piraeus). Create the feedback

of the high resolution emissions into the LOTOS-EUROS source apportionment modelling iii) Expand the IMMIS-MT model with UFP based on real world emission factors and coagulation efficiencies derived from AirGIS; iv) Develop transfer learning methods for UFP and noise based on airQUIS and for air pollutant dispersion based on IMMIS-MT to enable NRT modelling in all cities. v) To derive quantitative information on some of the (modeling) uncertainties of each target component from model validations with observations (for AI methods using data withheld from the training).

Task 3.4 – Demonstration and dashboard development (TUM, IVU UMWELT, AU, FREIE U BERLIN, INU, NCSR "D", AMRN) (M24-M42)

The MI-TRAP repository containing transport, air pollution and noise information that is being collected and modelled within WP3 will be visualized on an online dashboard. The functionality to allow a degree of user interaction based on pre-calculated scenario data will be added. The dashboard will be used in the downstream WPs for displaying the scenarios for the support of policy decisions

Work package WP4 – Links between transport-related pollutants, noise and health

Work Package Number	WP4	**Lead Beneficiary**	6. NKUA
Work Package Name	Links between transport-related pollutants, noise and health		
Start Month	1	**End Month**	46

Objectives

WP4 will address the link between the traffic related pollution and health by informed health impact assessment for the targeted air pollutants in MI-TRAP exposures and a proof-of-concept application of the near real-time measurements that will be collected within the project to assess short-term exposure impact on natural mortality in a time-series design. (NKUA, TUC, PSI, NCSR "D", IST ID).

Description

Task 4.1 Systematic review of the health effects of long-term exposure to targeted traffic related exposures (BC, UFP, trace elements and noise) in Europe (NKUA, TUC, PSI, NCSR "D", IST ID). (M01-M30)

We will perform a systematic review of existing epidemiological studies to assess current evidence on the association between short-term and long-term exposures for the targeted traffic exposure and mortality and morbidity incidence, focused (but not limited to) in Europe. Depending on the number of studies per health outcome, we will apply meta-analyses to derive the concentration –response functions (CRFs) for the association between source specific pollutants and selected health outcomes for which sufficient evidence is available (indicatively above 4 studies for a health outcome). We will apply random effects meta-analysis and explore heterogeneity between effect estimates based on location or population characteristics, while we will further assess the risk of bias in included studies.

Task 4.2 Health impact assessment of long-term exposure to BC and UFP in Europe (NKUA, TUC, PSI, NCSR "D", IST ID). (M01-M36)

Informed by the evidence base of 4.1 and the level of the measured targeted exposures we will estimate the burden of disease, also making use of WHO's AirQ+ health impact assessment tool for the environmental burden of disease assessment. We will build scenarios on improvement of air quality and estimate the attributed number of cases per selected outcome that could be prevented. We will specifically collect and combine data on 1) current air quality for the present study and data produced by other studies derived from
Task 4.1, 2) background disease rate from the cities, country and /or Global Burden of Disease study, and 3) exposure-dose data from the scientific literature in 4.1 to estimate the health risk. We will focus on pairs of associations for which there is sufficient evidence and confidence in the association.

Task 4.3. Proof of concept application of measurements in the investigation of short-term exposure mortality effects (TUC, NKUA, PSI, NCSR "D", IST ID) (M09-M46)

As a proof-of-concept use of the data produced by the monitoring network established within MI-TRAP in epidemiological studies we will apply a two-stage approach of a time-series study design. Specifically, in the first stage

we will use city-specific daily number of deaths from natural causes and the measurements in each participating city to assess the mortality impact of short-term exposure of targeted pollutants during the measurement campaign. Poisson modelling approaches will be applied to estimate corresponding relative
risks. In the second stage we will pool city-specific estimates using meta-analysis techniques to estimate an overall association and explore potential heterogeneity. Dosimetry tools will be also used to calculate the dose and retention of particles in the respiratory tract during and after exposure and clearance to the blood, esophagus and lymph nodes. Additional indices will be applied as exposures of interest including internal inhalation dose in different parts of the human respiratory tract, blood and lymph nodes and oxidative potential of PM. The corresponding dose series data for different parts of the population will be used for the same analysis in the epidemiological study. It is the first time that alternative indices such as dose data will be used to determine health effects arising from epidemiological studies, a significant novel component.

Work package WP5 – Integration of MI-TRAP Technologies, Nature Based Solutions, Innovative Tools and Services

Work Package Number	WP5	**Lead Beneficiary**	15. IST ID
Work Package Name	Integration of MI-TRAP Technologies, Nature Based Solutions, Innovative Tools and Services		
Start Month	7	**End Month**	48

Objectives

WP5 aims to provide a toolbox of innovative tools, services and technological and nature based solutions, developed and demonstrated during the project, in order to assist relevant authorities and policy makers in the design of effective plans for the reduction of transport emissions and the mitigation of urban air and noise pollution. The integrated MI-TRAP toolbox will also be available to the general public, further promoting citizen awareness and engagement in the new mitigation strategies (IST ID, NCSR “D”, TUM, FREIE U BERLIN, AU, DTI, NKUA, POLIMI, TUC, UMIL, ICPF, AMRN, IMT, INFN, PSI, WU, IVU UMWELT, INU, FINCONIT)

Description

Task 5.1 Development of the integrated MI-TRAP toolbox (IST ID, NCSR “D”, AMRN, AU, FREIE U BERLIN, POLIMI, FINCONIT) (M25-M48)

The integrated MI-TRAP toolbox will consist of a web-based platform which will incorporate and give access to the following tools, services and solutions, developed and demonstrated during the project: (i) Real-time maps from measurement monitoring networks for transport-related pollutants and noise and transport emission footprint; (ii) Real-time mapping tool for air and noise pollution; (iii) the Metabolism based NBS Planning and Simulation Toolkit; (iv) the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool. This toolbox will be available on-line free of charge and is intended for different audience groups (i.e. policy makers, researchers and citizens). For this reason, it will be built upon a user-friendly interface that will allow its use by non-experts as well. The different modules of the toolbox will be developed within Tasks 5.2-5.5.

Task 5.2. Real-time maps from measurement monitoring networks (AU, IST ID, NCSR “D”, FREIE U BERLIN, UMIL, ICPF, IMT, INFN, PSI, WU) (M13-M48)

In this Task, mapping of transport-related pollutants and noise and transport emission footprint will be made available from the data collected in monitoring stations. Specifically, an online tool will be developed that will provide near real-time (with a time resolution of 1h or better) mapping of key air pollutants and noise in transport hot spots (including vehicular traffic hot spots, airports, ports and railway). This tool will be linked to the online database to be created in WP2 (Task 2.3), and will display the levels of regulated, non-regulated and emerging pollutants and noise, monitored by the MI-TRAP pilot stations in the 10 project cities. The data collected by urban traffic stations operated by the respective NMN will be also displayed, while for shipping emissions INU will build an API server for displaying ship traffic by means of their PAQman©-watcher. In addition, the emission footprint of the different types of transport sources (vehicular exhaust and non-exhaust, airport, port and railway) will be assessed and presented on a continuous basis. This includes source apportionment of aerosol pollution, performed within WP2 in the pilot stations (Task 2.3), the transport focused source apportionment information for the urban background (WP3) and the use of tracer ratios of emerging

pollutants (as defined by the outcome of WP1) and the monitored NRT emission factors/footprint obtained by data and vehicle analysis in WP2. Module 1 is intended mainly for policy makers but may be informative also for the general public.

Task 5.3 Integration of the real-time mapping tool for air and noise pollution (FREIE U BERLIN, AU, IVU UMWELT, INU, IST ID, NCSR "D") (M36-M48)

In this task the neat real time mapping of air and noise pollution, implemented in WP3, will be integrated into the MI-TRAP toolbox. Through linking with the MI-TRAP modelling repository (WP3), module 2 will provide access to transport focused air pollution source apportionment information for the urban background levels in all project cities, with more than 250 thousand inhabitants in Europe. On top, the local contributions for air and noise pollution for the target cities will be provided.

Task 5.4 Development and demonstration of nature based solution (POLIMI, FINCONIT, IST ID, NCSR "D", DTI, AU, AMRN) (M7-M36)

Initially MI-TRAP will collect evidence, good practices and lessons learnt on nature based solutions (NBS) and related processes in urban planning through extensive literature review, relevant projects (e.g. EuPOLIS, proGIreg, HARMONIA, CLEVER CITIES and GREENVEST), meaningful participatory processes, results of experts-and-citizens exchange and experiences from cities and involved partners. MI-TRAP solutions will be demonstrated in 6 sites in 4 European cities (Athens-Piraeus, Milan, Lisbon, Gladsaxe-Copenhagen). Customized spatial solutions will be designed and implemented at each site. The case studies will include traffic hot spots (Milan, Gladsaxe-Copenhagen), port areas (Athens-Piraeus) and areas near airports (Milan, Lisbon). Their impact will be monitored and assessed, with respect to Public Health (PH) and Wellbeing (WB), as well as social and environmental results. In addition, they will be assessed through air quality and noise metrics through pilot measurement campaigns with cost effective stations established in WP2 and transported at the NBS pilot sites. The knowledge collected in Task 5.4, will be made available in a systematic manner through the Metabolism-based NBS Planning and Simulation Toolkit and the Module 3 of the MI-TRAP Toolbox, that will serve as an EU knowledge portfolio, offering fully integrated solutions and tools to planners, community organizers and policymakers ready to use in future interventions.

Task 5.5 Development of the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool (NCSR "D", IST ID, TUC, FREIE U BERLIN, TUM, AU, NKUA, POLIMI, UMIL, ICPF, AMRN, IMT, INFN, PSI, WU, INU) (M13-M48)

Within Task 5.5, an innovative long-term policy support tool will be developed, with the objective to assist policy makers and other relevant stakeholders to identify measures to improve air quality and develop more efficient emissions and noise reduction plans, specifically targeting transport emissions. Multiple scientifically based transport-related emission data and air quality and noise impacts, collected in WP1 - 4, together with the Citizen-generated data, will be incorporated into the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool. The main functionalities of the tool will include: (i) Display of stored data for the 10 project cities and covering the last decade, on: yearly emissions (including traffic, harbor and airport emissions) and emission footprint; air pollutant concentration data from NMN stations; mapping of air pollution and transport-related pollution (provided by the LOTOS-EUROS model, and, through a nesting procedure, on a 1x1 Km grid) in order to identify hot spots within each city; population exposure to transport-related pollutants; health impacts assessment, including internal dose of pollutants, burden of disease and hazard characterization (WP4); (ii) Assessment of pre-defined emission control scenarios and nature based solutions, with respect to changes induced on: emissions; urban air quality (estimated by the LOTOS-EUROS model and based on the outcome of Task 5.4 for NBS); population exposure; associated health benefits and citizen sentiment and overall health and well-being. A cost-benefit analysis will be also provided, focusing on investment costs and cost benefits through improved mental and physical health; value added in terms of increased sustainable environmental practices will be estimated.

Work package WP6 – Stakeholder engagement, citizen science, dissemination & communication and policy recommendation

Work Package Number	WP6	**Lead Beneficiary**	10. AMRN
Work Package Name	Stakeholder engagement, citizen science, dissemination & communication and policy recommendation		
Start Month	1	**End Month**	48

Objectives

The objectives of this WP are (i) to develop a roadmap of actions for all the CPs; (ii) to setup an international LL, validate the short list of solutions recommended from WP5 with a high-level stakeholder ecosystem; (iii) to establish a horizontal citizen science framework for monitoring and citizen engagement, iv) to develop and run a communication and dissemination strategy, and (v) to provide evidence-based knowledge and recommendations at EU level. (AMRN & all partners).

Description

Task 6.1 Roadmap for bottom-up actions and preparation for the international LL (AMRN & All) (M1-M9)

Development of an action plan framework for all the City Pilot Studies (CPS). Drawing from the developed methodology for Monitoring air quality at transport hotspots (WP2), traffic and air quality mapping tools and management (WP3) health impacts (WP4) and the Toolbox Solutions (WP5), this task will develop a roll-out agenda of collaboration and co-creation activities within CPSs leading to the implementation of the international LL. This Task will also initiate a preparatory phase to the set-up of the LL. It will implement stakeholder mapping at high-level scale for including the Quadruple/Quintuple Helix considering the academia, policymakers, key community systems (different sectors), civil society and environmentalists. The Stakeholder mapping and analysis aims at defining key stakeholders in international level and how the network is connected. The stakeholders will be selected based on enabling uptake, replication, or implementation of identified solutions.

Task 6.2 LL setup and implementation for vision, solution validation and policy recommendations (AMRN & All) (M6-M48)

This task will set up an International LL to leverage systemic change regarding mitigation of transport related air pollution, linked to the pursuit of the Sustainable Development Goals. Three workshops of the international LL will be organized. The first workshop will set up the LL, will capture the common mentality of the stakeholder community regarding the project objectives, and will co-develop a common vision. The second workshop will create a future narrative of transformative pathways towards the vision by validating and fine-tuning the short-list of selected solutions of MI-TRAP—technical, natural, epidemiological, and social innovations. The outputs will be communicated to the relevant WPs (WP2 technical, WP3— epidemiological, WP5—NBSs, and T6.3—social innovations). The third workshop will construct evidence based policy briefs and will spot bottlenecks and facilitating elements. The policy briefs will be shared with strategically selected policy dissemination channels in EU and national levels, for MI-TRAP outcomes facilitating the Zero-Pollution strategy. The policy briefs will include circles relevant to raising awareness, capacity building, and solutions uptake, replicability and scalability.

Task 6.3 Citizen Science for engagement and monitoring social attributes (AMRN & All) (M1-M42)

Task 6.3 will address a twofold objective: Firstly, it will constitute one of the four innovative MI-TRAP solutions, the social innovation, facilitating citizen engagement and secondly, it will operate as a monitoring tool for a number of social attributes, such as perception on air pollution effects in regards with the transportation mode, population group, and health related outcomes (i.e. respiratory system, stress). This task will be based on existing mature co-creation activities for the identification of topics that affect daily life and well-being of citizens with regards to air pollution and health [Gignac et al., 2022]. A major online survey will be conducted in which citizens will provide daily repeated measures of different cognitive and mental health outcomes and relate them to the air pollution concentrations. The experimentation design will consider typical relevant challenges, such as maximization of citizen engagement and representativity.

Task 6.4 Dissemination and communication activities (AMRN & All) (M1-M48)

The objectives of this task are to maximize the impact of the project by raising awareness, communicating around the project activities, and disseminating results. To this end, MI-TRAP will launch the project website during the first 3 months and produce all the necessary promotional material and communication channels to ensure visibility and adequate access to stakeholders. Moreover, this WP will ensure dissemination and synergies to existing initiatives during and beyond the project life cycle. Dissemination activities will include training on interpretation and usage of the results from developed solutions and Tools for all City authorities and relevant stakeholders. This WP will also support all WPs with dissemination and communication activities, with the stakeholder engagement and the communication in the different Case Studies. By leveraging a comprehensive dissemination strategy, this task aims to create an efficient process for disseminating project results to a wide range of stakeholders, maximizing the impact and helping drive innovation in improving human health and protecting the natural environment. MI-TRAP will also contribute, upon invitation by the CINEA, to common information and dissemination activities to increase the visibility and synergies between HE/H2020

supported actions. A detailed dissemination and communication plan will be provided by M6 and will be periodically updated in alignment with the project's progress (D6.4-D6.7).

Work package WP7 – Project Management

Work Package Number	WP7	Lead Beneficiary	1. NCSR "D"
Work Package Name	Project Management		
Start Month	1	End Month	48

Objectives

WP7 will ensure the successful achievement of project goals and objectives, while adhering to the defined constraints of time, scope, cost, and quality, will be responsible for verifying that all project activities are conducted in strict accordance with the ethical guidelines set forth by the European Union and national governing bodies, and will ensure ethical and responsible handling of project data, the management team will oversee the implementation of transparent, accountable, and fair data management practices.
(NCSR "D" & all partners).

Description

Task 7.1 Project Management and Coordination (NCSR "D" & all) (M01-M48)

The management and coordination of this project will ensure the proper day-to-day administrative, financial, and legal management of the Grant Agreement. The National Center for Scientific Research "Demokritos" (NCSRD) will assume the primary responsibility for project management as the Coordinator, and will lead negotiations for the Consortium Agreement (CA), which will specify project procedures and intellectual property rights (IPR) management. The Coordinator will distribute work and responsibilities between the Project Manager (professional) and the Scientific Leader, with other partners providing support through participation in decision-making, consortium meetings, and contribution to technical and financial reports. The Project Manager will serve as the primary liaison between the commission and the consortium, disseminating information, developing a detailed project plan and timeline, communicating with partners and stakeholders, co-chairing the General Assembly (GA), Executive Board (EB), and Stakeholder Board (SB), coordinating GA, EB, and SB activities, monitoring overall project performance, and coordinating the preparation of project reports. The GA will consist of one representative from each consortium party with voting rights, including associate partners. It will have ultimate decision-making power within the consortium, addressing project strategy issues and conflict resolution. The EB, consisting of WP leaders, will serve as the supervisory body for efficient project execution and be accountable to the GA. The EB will implement decisions of the GA, prepare GA meetings, propose decisions, and prepare GA agendas. The SB will be an advisory board comprised of representatives of target audiences identified at the project outset, supporting exploitation of project results. The GA will meet twice per year, the SB once per year, and the EB will meet once every two months (virtually or physically) to monitor project implementation progress.

Task 7.2 GDPR, Ethical Issues & Gender Dimension management (NCSR "D" & all) (M01-M48)

This task will be responsible for designing and implementing procedures and protocols for managing legal and ethical issues throughout the project's lifespan. A committee will be appointed by the consortium to carry out regular ethical assessments of all project activities and create guidelines to ensure compliance with the legal and ethical requirements outlined in the Ethics table of Part A. This committee will identify the need for ethical permits and documentation for all work packages (WPs) and conduct an impact assessment of
personal data use, ensuring GDPR and Privacy Compliance Policy compliance according to EU GDPR regulation (EU 2016/679) and national data protection legislation. To facilitate research involving humans, the committee will provide templates for documents such as Information sheets, Privacy Notice, and Informed Consent Forms, as well as specify procedures for personal data treatment, which will be included in the Data Management Plan (T1.3). Ethical experts and legal counsels of participating institutions will support the work of this task. Additionally, the committee will monitor the gender dimension throughout the project.

Task 7.3 FAIR Data Management (NCSR "D" & all) (M01-M48)

The consortium is committed to ensuring that the large amount of data generated during the project is managed following the FAIR data principles and open science practices. To achieve this, the consortium has proactively reached out to Data Providers, such as EBAS and ATMOSS-ACCESS. Any data that cannot be accommodated by these data centers will be submitted to other trusted repositories under a Creative Commons license selected by the respective owner of the results, with a preference for CC BY 4.0 as recommended by the coordinator. A Data Management Plan (DMP) and its revised versions will be developed at M6 and at the end of each reporting period, respectively, to ensure that data management is consistent and effective throughout the project's lifespan (D7.1-D7.4). The DMP will include provisions for metadata generation, data preservation, and opening, as well as addressing other key aspects of data management. Personal data will be treated in accordance with guidelines prepared by the Ethical Committee (T7.2).

Task 7.4: Exploitation Management (PTB & all) (M01-M48)

This task will perform the business analysis as well as the first steps for the project solution take up and continuation after its end. At first, exploitation targets for partners having identified the potential business case will be listed. Each private sector partner will then provide a short analysis made from desk research as well as interactions with potential customers. Both post-project technological and market feasibility of the outcomes will be fostered, providing also the commercial/ technology pathway component of the Integrated Roadmap. The project will also investigate the sociological parameters as well as technical outcomes' readiness from a social perspective regarding their market take-up and adoption. The process will involve the identification of the key elements for innovation management and commercialization. The Exploitation Plan will be developed by M6 and periodically revised at the end of each reporting period (D7.5-D7.8).

STAFF EFFORT

Staff effort per participant

Grant Preparation (Work packages - Effort screen) — Enter the info.

Participant	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total Person-Months
1 - NCSR "D"	8.00	24.00	3.00	3.00	18.00	18.00	12.00	86.00
2 - UNOVAGOR		5.00				1.00	1.00	7.00
3 - Haze Instr	22.00	8.00				1.00	1.00	32.00
4 - UMIL		14.00			1.00	1.00	1.00	17.00
5 - ICPF	8.00	21.00			1.00	1.00	1.00	32.00
6 - NKUA				22.00	3.00	1.00	1.00	27.00
7 - TUM			24.00		2.00	5.00	1.00	32.00
8 - TUC		2.00	16.00	39.00	1.00	1.00	1.00	60.00
9 - INFN	14.00	14.00			1.00	1.00	2.00	32.00
10 - AMRN			5.00	5.00	5.00	44.00	1.00	60.00
11 - WU		10.00			1.00	1.00	1.00	13.00
12 - IMT		19.00			1.00	1.00	1.00	22.00
13 - DTI	1.00	8.00			1.00	1.00	2.00	13.00
14 - AU		16.00	8.00		2.00	2.00	2.00	30.00
15 - IST ID		14.00		2.00	14.00	14.00	2.00	46.00
16 - PTB	29.00					2.00	1.00	32.00
17 - Catalytic Inst	16.00					3.00	3.00	22.00
18 - POLIMI		4.00			10.00	10.00	2.00	26.00
19 - Freie U Berlin			15.00		3.00	1.00	1.00	20.00

Staff effort per participant

Grant Preparation (Work packages - Effort screen) — Enter the info.

Participant	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total Person-Months
20 - IVU Umwelt			44.00		8.00	2.00	2.00	56.00
21 - nanoDUST	14.00					1.00	1.00	16.00
22 - FINCONIT					5.00	3.00	1.00	9.00
23 - METAS	11.00	10.00				2.00	1.00	24.00
24 - PSI	1.00	24.00		2.00	3.00	10.00	1.00	41.00
25 - INU		18.00	32.00		12.00	3.00	3.00	68.00
26 - BRUKER NANO	6.00							6.00
Total Person-Months	130.00	211.00	147.00	73.00	92.00	130.00	46.00	829.00

LIST OF DELIVERABLES

Deliverables

Grant Preparation (Deliverables screen) — Enter the info.

The labels used mean:

Public — fully open (⚠ automatically posted online)
Sensitive — limited under the conditions of the Grant Agreement
EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D1.1	Ten fully characterized, portable, cost-effective instruments for the online, real-time measurement of solid-particle number (sPN) concentration in ambient air	WP1	21 - nanoDUST	DEM — Demonstrator, pilot, prototype	SEN - Sensitive	18
D1.2	Six customized catalytic strippers for the advanced air quality monitoring stations and 12 compact catalytic cores for the cost-effective monitoring stations	WP1	17 - Catalytic Inst	DEM — Demonstrator, pilot, prototype	SEN - Sensitive	12
D1.3	Two complementary elemental analysis protocols based on time-resolved filter-type and size-fractionated impaction for the deposition of emitted particles	WP1	9 - INFN	R — Document, report	PU - Public	18
D1.4	QA/QC protocol for operating HR-A and CE-C stations	WP1	16 - PTB	R — Document, report	PU - Public	18
D2.1	Characterization of transport-related emissions with respect to air quality microphysical, chemical, noise, and traffic metrics	WP2	5 - ICPF	R — Document, report	PU - Public	42
D2.2	Report on Methodology and Analytics for	WP2	12 - IMT	R — Document, report	PU - Public	42

Deliverables

Grant Preparation (Deliverables screen) — Enter the info.

The labels used mean:

Public — fully open (automatically posted online)
Sensitive — limited under the conditions of the Grant Agreement
EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
	High-Level Data Products from the NRT Networks					
D3.1	System design document and development plan	WP3	20 - IVU Umwelt	R — Document, report	SEN - Sensitive	12
D3.2	Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.1)	WP3	19 - Freie U Berlin	R — Document, report	SEN - Sensitive	24
D3.3	Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.2)	WP3	19 - Freie U Berlin	R — Document, report	SEN - Sensitive	36
D3.4	MI-TRAP repository and dashboard online for visualisation of NRT air pollution and noise levels	WP3	14 - AU	DEM — Demonstrator, pilot, prototype	SEN - Sensitive	42
D3.5	Report on the provision of NRT maps	WP3	7 - TUM	R — Document, report	PU - Public	42
D4.1	Health Impact Assessment for traffic exposure (BC, UFP and noise) in Europe	WP4	6 - NKUA	R — Document, report	PU - Public	36
D4.2	Use of concentration and dose indices for determining health effects arising from epidemiological studies	WP4	8 - TUC	R — Document, report	PU - Public	40
D5.1	Report on the implementation of NBS	WP5	18 - POLIMI	R — Document, report	PU - Public	36

Deliverables

Grant Preparation (Deliverables screen) — Enter the info.

The labels used mean:

Public — fully open (⚠ automatically posted online)
Sensitive — limited under the conditions of the Grant Agreement
EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
	in demonstration sites, including follow-up manual					
D5.2	Manual for the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool	WP5	1 - NCSR "D"	R — Document, report	PU - Public	48
D5.3	The integrated MI-TRAP toolbox	WP5	15 - IST ID	DEM — Demonstrator, pilot, prototype	SEN - Sensitive	48
D6.1	MI-TRAP Roadmap for bottom-up actions and preparation for the international LL	WP6	10 - AMRN	R — Document, report	PU - Public	9
D6.2	Review report: Evaluation of results of the ILL	WP6	10 - AMRN	R — Document, report	PU - Public	48
D6.3	Citizen Science review and analysis of results	WP6	10 - AMRN	R — Document, report	PU - Public	42
D6.4	Communication and dissemination plan (V.1)	WP6	10 - AMRN	R — Document, report	PU - Public	6
D6.5	Communication and dissemination plan (V.2)	WP6	10 - AMRN	R — Document, report	PU - Public	18
D6.6	Communication and dissemination plan(V.3)	WP6	10 - AMRN	R — Document, report	PU - Public	36
D6.7	Communication and dissemination plan (V.4)	WP6	10 - AMRN	R — Document, report	PU - Public	48

Deliverables

Grant Preparation (Deliverables screen) — Enter the info.

The labels used mean:

Public — fully open (automatically posted online)
Sensitive — limited under the conditions of the Grant Agreement
EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D7.1	Data Management Plan (V.1)	WP7	1 - NCSR "D"	DMP — Data Management Plan	PU - Public	6
D7.2	Data Management Plan (V.2)	WP7	1 - NCSR "D"	DMP — Data Management Plan	PU - Public	18
D7.3	Data Management Plan (V.3)	WP7	1 - NCSR "D"	DMP — Data Management Plan	PU - Public	36
D7.4	Data Management Plan (V.4)	WP7	1 - NCSR "D"	DMP — Data Management Plan	PU - Public	48
D7.5	MI-TRAP Exploitation plan (V.1)	WP7	16 - PTB	R — Document, report	PU - Public	6
D7.6	MI-TRAP Exploitation plan (V.2)	WP7	16 - PTB	R — Document, report	PU - Public	18
D7.7	MI-TRAP Exploitation plan (V.3)	WP7	16 - PTB	R — Document, report	PU - Public	36
D7.8	MI-TRAP Exploitation plan (V.4)	WP7	16 - PTB	R — Document, report	PU - Public	48

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

Deliverable D1.1 – Ten fully characterized, portable, cost-effective instruments for the online, real-time measurement of solid-particle number (sPN) concentration in ambient air

Deliverable Number	D1.1	**Lead Beneficiary**	21. nanoDUST
Deliverable Name	Ten fully characterized, portable, cost-effective instruments for the online, real-time measurement of solid-particle number (sPN) concentration in ambient air		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	SEN - Sensitive
Due Date (month)	18	**Work Package No**	WP1

Description
Novel portable instrumentation for real-time monitoring of the number concentration of solid nanoparticles. Relying on the existing methodologies, ten instruments will be developed by NANODUST to be deployed in the City Pilots (Task 1.1) (Means of verification: Instruments ready to be employed in the Pilots)

Deliverable D1.2 – Six customized catalytic strippers for the advanced air quality monitoring stations and 12 compact catalytic cores for the cost-effective monitoring stations

Deliverable Number	D1.2	**Lead Beneficiary**	17. Catalytic Inst
Deliverable Name	Six customized catalytic strippers for the advanced air quality monitoring stations and 12 compact catalytic cores for the cost-effective monitoring stations		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	SEN - Sensitive
Due Date (month)	12	**Work Package No**	WP1

Description
Catalytic Inst will develop six customized catalytic strippers to run at different flow rates, matching the sampling flowrate of the instruments deployed (Task 1.1) ((Means of verification: Catalytic strippers ready to be employed in the Pilots)

Deliverable D1.3 – Two complementary elemental analysis protocols based on time-resolved filter-type and size-fractionated impaction for the deposition of emitted particles

Deliverable Number	D1.3	**Lead Beneficiary**	9. INFN
Deliverable Name	Two complementary elemental analysis protocols based on time-resolved filter-type and size-fractionated impaction for the deposition of emitted particles		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	18	**Work Package No**	WP1

Description
This document will provide detailed procedures for robust calibration, sampling and analysis for time-resolved measurements based on filter tapes (i.e. with collection of particles on moving filters). These procedures-guidelines will be developed and validated within Task 1.3, involving also measurements on standards and on size fractionated samples. (Means of verification: Report submitted)

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

Deliverable D1.4 – QA/QC protocol for operating HR-A and CE-C stations

Deliverable Number	D1.4	**Lead Beneficiary**	16. PTB
Deliverable Name	QA/QC protocol for operating HR-A and CE-C stations		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	18	**Work Package No**	WP1

Description
Quality Assurance (QA) and Quality Control (QC) protocols are essential for ensuring the reliable and consistent operation of the HR-A and CE-C stations. This document will establish clear and comprehensive documentation, including guidelines and operating procedures for both type of stations (Task 1.2) (Means of verification: Report submitted)

Deliverable D2.1 – Characterization of transport-related emissions with respect to air quality microphysical, chemical, noise, and traffic metrics

Deliverable Number	D2.1	**Lead Beneficiary**	5. ICPF
Deliverable Name	Characterization of transport-related emissions with respect to air quality microphysical, chemical, noise, and traffic metrics		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	42	**Work Package No**	WP2

Description
The instrumentation packages proposed in Task 1.5, will be deployed in the field for real-time chemical and microphysical characterization of ambient aerosol and NRT monitoring of gaseous exhausts emissions, noise and traffic-relevant parameters (traffic density and fleet composition statistics). The data produced will be further processed in order to characterize transport related metrics, air pollutants and noise. These results will be documented in this report (Task 2.3, Task 2.2) (Means of verification: Report submitted)

Deliverable D2.2 – Report on Methodology and Analytics for High-Level Data Products from the NRT Networks

Deliverable Number	D2.2	**Lead Beneficiary**	12. IMT
Deliverable Name	Report on Methodology and Analytics for High-Level Data Products from the NRT Networks		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	42	**Work Package No**	WP2

Description
This document will provide a description of the different approaches, analytical tools and data processing used within the MI-TRAP project to identify the super-polluters from high resolution data analysis (Task 2.4) (Means of verification: Report submitted)

Deliverable D3.1 – System design document and development plan

Deliverable Number	D3.1	Lead Beneficiary	20. IVU Umwelt
Deliverable Name	System design document and development plan		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	12	Work Package No	WP3

Description
This document will provide a comprehensive overview of the design and development process of the coupled air pollution and traffic management system that is based on traffic data and LOTOS-EUROS modelling (Task 3.1) (Mean of verification: Presentation of the design and development plan to stakeholders)

Deliverable D3.2 – Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.1)

Deliverable Number	D3.2	Lead Beneficiary	19. Freie U Berlin
Deliverable Name	Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.1)		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	24	Work Package No	WP3

Description
This document will provide detailed information about the platform's capabilities, features, and configurations both from a technical and functional perspective. The initial implementation of the modelling platform, as detailed in Task 3.1, will be performed in Copenhagen and Milan. The activities and outcomes outlined in Task 3.2 will be documented in this report (Task 3.2) (Means of verification: Report available with AQ and noise maps for Copernhagen and Milan; Presentation given to respective city stakeholders)

Deliverable D3.3 – Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.2)

Deliverable Number	D3.3	Lead Beneficiary	19. Freie U Berlin
Deliverable Name	Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models (V.2)		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	36	Work Package No	WP3

Description
Updated Technical and Functional documentation of the modelling platform, including extensions of the MI-TRAP models, in aligment with the progress of the project (Task 3.2, Task 3.3) (Means of verification: Report available with AQ and noise maps for all cities; Presentation given to repective city stakeholders)

Deliverable D3.4 – MI-TRAP repository and dashboard online for visualisation of NRT air pollution and noise levels

Deliverable Number	D3.4	**Lead Beneficiary**	14. AU
Deliverable Name	MI-TRAP repository and dashboard online for visualisation of NRT air pollution and noise levels		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	SEN - Sensitive
Due Date (month)	42	**Work Package No**	WP3

Description
MI-TRAP repository and dashboard will demonstrate the results of the enhanced emission modeling by integrating real-world data and expand modeling to multiple cities and ports. The demonstration will showcase the improved UFP modeling and develop transfer learning methods while quantifying modeling uncertainties through validation. (Task 3.3 and Task 3.4) (Mean of verificaiton: Dashboard available online; Presentation of the interactive online dashboard to stakeholders)

Deliverable D3.5 – Report on the provision of NRT maps

Deliverable Number	D3.5	**Lead Beneficiary**	7. TUM
Deliverable Name	Report on the provision of NRT maps		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	42	**Work Package No**	WP3

Description
This document will provide a detailed description of the interactive online dashboard for the MI-TRAP repository, showcasing transport, air pollution, and noise data collected in the upstream tasks (Task 3.4) (Means of verification: Report submitted, Presentation of the interactive online dashboard to stakeholders)

Deliverable D4.1 – Health Impact Assessment for traffic exposure (BC, UFP and noise) in Europe

Deliverable Number	D4.1	**Lead Beneficiary**	6. NKUA
Deliverable Name	Health Impact Assessment for traffic exposure (BC, UFP and noise) in Europe		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	36	**Work Package No**	WP4

Description
This document will present the results of the systematic review on the health effects of long-term exposure to targeted traffic related exposures (Task 4.1). It will also include the results from the burden of disease analysis as described in Task 4.2 for the pairs of associations for which sufficient evidence and confidence in the association is ascertained from 4.1. Building on different scenarios on improvement of air quality, attributed number of cases per selected outcome that could be prevented will be estimated and presented in this document (Task 4.1 and Task 4.2). (Means of verification: Report submitted)

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

Deliverable D4.2 – Use of concentration and dose indices for determining health effects arising from epidemiological studies

Deliverable Number	D4.2	**Lead Beneficiary**	8. TUC
Deliverable Name	Use of concentration and dose indices for determining health effects arising from epidemiological studies		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP4

Description
This document will present the results of the proof-of-concept use of data produced by the monitoring network established within MI-TRAP for dose and health impact assessment (Task 4.3) (Means of verification: Report submitted)

Deliverable D5.1 – Report on the implementation of NBS in demonstration sites, including follow-up manual

Deliverable Number	D5.1	**Lead Beneficiary**	18. POLIMI
Deliverable Name	Report on the implementation of NBS in demonstration sites, including follow-up manual		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	36	**Work Package No**	WP5

Description
This document will provide an overview of the NBS implementation and demonstration actions, while also serving as a manual for users to understand the features of the tool (Task 5.4) (Means of verification: Report submitted)

Deliverable D5.2 – Manual for the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool

Deliverable Number	D5.2	**Lead Beneficiary**	1. NCSR "D"
Deliverable Name	Manual for the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	48	**Work Package No**	WP5

Description
This is a document that will serve as a reference for users to understand the features and proper operation of the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool (Task 5.5) (Means of verification: Manual available)

Deliverable D5.3 – The integrated MI-TRAP toolbox

Deliverable Number	D5.3	**Lead Beneficiary**	15. IST ID
Deliverable Name	The integrated MI-TRAP toolbox		

Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	SEN - Sensitive
Due Date (month)	48	**Work Package No**	WP5

Description
The integrated MI-TRAP toolbox will consist of a web-based platform which will incorporate and give access to the MI-TRAP tools, services and solutions, developed and demonstrated during the project (Task 5.1) (Means of verification: Web-based toolbox available online)

Deliverable D6.1 – MI-TRAP Roadmap for bottom-up actions and preparation for the international LL

Deliverable Number	D6.1	**Lead Beneficiary**	10. AMRN
Deliverable Name	MI-TRAP Roadmap for bottom-up actions and preparation for the international LL		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	9	**Work Package No**	WP6

Description
This document will describe the action plan framework of collaboration and co-creation activities of all the City Pilot Studies (CPS), a preparatory phase to the set-up of the LL, leading to the implementation of the international LL (Task 6.1) (Means of verification: Report submitted)

Deliverable D6.2 – Review report: Evaluation of results of the ILL

Deliverable Number	D6.2	**Lead Beneficiary**	10. AMRN
Deliverable Name	Review report: Evaluation of results of the ILL		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	48	**Work Package No**	WP6

Description
This document will serve as a review report for the three international LL workshops, which will be designed to actively involve citizens and relevant stakeholders in co-creating new knowledge (Task 6.2) (Means of verification: Report submitted)

Deliverable D6.3 – Citizen Science review and analysis of results

Deliverable Number	D6.3	**Lead Beneficiary**	10. AMRN
Deliverable Name	Citizen Science review and analysis of results		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	42	**Work Package No**	WP6

Description
This document will be a review of the citizen science approach followed to facilitate citizen engagement, the experimental

design adopted to maximize citizens' engagement and representativeness, as well as the results of the survey that will be conducted to monitor a number of social attributes (Task 6.3) (Means of verification: Report submitted)

Deliverable D6.4 – Communication and dissemination plan (V.1)

Deliverable Number	D6.4	**Lead Beneficiary**	10. AMRN
Deliverable Name	Communication and dissemination plan (V.1)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	6	**Work Package No**	WP6

Description
The communication and dissemination plan will set out the strategy to maximise the impact of the project, to increase its visibility, and to ensure that project outputs reach a wide audience of relevant stakeholders (Task 6.4) (Means of verification: Initial plan submitted)

Deliverable D6.5 – Communication and dissemination plan (V.2)

Deliverable Number	D6.5	**Lead Beneficiary**	10. AMRN
Deliverable Name	Communication and dissemination plan (V.2)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	18	**Work Package No**	WP6

Description
Updated Communication and Dissemination plan, in alignment with the progress of the project (Task 6.4) (Means of verification: Updated plan submitted)

Deliverable D6.6 – Communication and dissemination plan(V.3)

Deliverable Number	D6.6	**Lead Beneficiary**	10. AMRN
Deliverable Name	Communication and dissemination plan(V.3)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	36	**Work Package No**	WP6

Description
Updated Communication and Dissemination plan, in alignment with the progress of the project (Task 6.4) (Means of verification: Updated plan submitted)

Deliverable D6.7 – Communication and dissemination plan (V.4)

Deliverable Number	D6.7	**Lead Beneficiary**	10. AMRN
Deliverable Name	Communication and dissemination plan (V.4)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	48	**Work Package No**	WP6

Description
Updated Communication and Dissemination plan, in alignment with the progress of the project (Task 6.4) (Means of verification: Updated plan submitted)

Deliverable D7.1 – Data Management Plan (V.1)

Deliverable Number	D7.1	**Lead Beneficiary**	1. NCSR "D"
Deliverable Name	Data Management Plan (V.1)		
Type	DMP — Data Management Plan	**Dissemination Level**	PU - Public
Due Date (month)	6	**Work Package No**	WP7

Description
The Data Management Plan (DMP) will outline how data will be handled throughout the lifecycle of the project. The DMP will ensure that data generated or collected during the project will be effectively managed, preserved, and shared in a responsible and transparent manner (Task 7.3) (Means of verification: Initial DMP submitted)

Deliverable D7.2 – Data Management Plan (V.2)

Deliverable Number	D7.2	**Lead Beneficiary**	1. NCSR "D"
Deliverable Name	Data Management Plan (V.2)		
Type	DMP — Data Management Plan	**Dissemination Level**	PU - Public
Due Date (month)	18	**Work Package No**	WP7

Description
Updated Data Management Plan, in alignment with the progress of the project (Task 7.3) (Means of verification: Updated DMP submitted)

Deliverable D7.3 – Data Management Plan (V.3)

Deliverable Number	D7.3	**Lead Beneficiary**	1. NCSR "D"
Deliverable Name	Data Management Plan (V.3)		
Type	DMP — Data Management Plan	**Dissemination Level**	PU - Public
Due Date (month)	36	**Work Package No**	WP7

Description
Updated Data Management Plan, in alignment with the progress of the project (Task 7.3) (Means of verification: Updated DMP submitted)

Deliverable D7.4 – Data Management Plan (V.4)

Deliverable Number	D7.4	Lead Beneficiary	1. NCSR "D"
Deliverable Name	Data Management Plan (V.4)		
Type	DMP — Data Management Plan	Dissemination Level	PU - Public
Due Date (month)	48	Work Package No	WP7

Description
Updated Data Management Plan, in alignment with the progress of the project (Task 7.3) (Means of verification: Updated DMP submitted)

Deliverable D7.5 – MI-TRAP Exploitation plan (V.1)

Deliverable Number	D7.5	Lead Beneficiary	16. PTB
Deliverable Name	MI-TRAP Exploitation plan (V.1)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	6	Work Package No	WP7

Description
The Exploitation Plan will provide information on the strategy and actions required to maximise the sustainability of the project's solutions for societal, scientific, and economic purposes. The MI-TRAP exploitation plan will ensure the optimal use of the Key Exploitable Results of the project (Task 7.4) (Means of verifications: Initial Exploitation Plan submitted)

Deliverable D7.6 – MI-TRAP Exploitation plan (V.2)

Deliverable Number	D7.6	Lead Beneficiary	16. PTB
Deliverable Name	MI-TRAP Exploitation plan (V.2)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP7

Description
Updated MI-TRAP Exploitation plan, in alignment with the progress of the project (Task 7.4) (Means of verifications: Updated Exploitation Plan submitted)

Deliverable D7.7 – MI-TRAP Exploitation plan (V.3)

Deliverable Number	D7.7	Lead Beneficiary	16. PTB
Deliverable Name	MI-TRAP Exploitation plan (V.3)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	36	Work Package No	WP7

Description
Updated MI-TRAP Exploitation plan, in alignment with the progress of the project (Task 7.4) (Means of verifications: Updated Exploitation Plan submitted)

Deliverable D7.8 – MI-TRAP Exploitation plan (V.4)

Deliverable Number	D7.8	**Lead Beneficiary**	16. PTB
Deliverable Name	MI-TRAP Exploitation plan (V.4)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	48	**Work Package No**	WP7

Description
Updated MI-TRAP Exploitation plan, in alignment with the progress of the project (Task 7.4) (Means of verifications: Updated Exploitation Plan submitted)

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

LIST OF MILESTONES

Milestones

Grant Preparation (Milestones screen) — Enter the info.

Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
1	Completion of instrumentation package for chemical and microphysical characterization	WP1	16-PTB	Package ready to be deployed at measurement sites	18
2	Definition of metric/s to calculate real life emission factors for transport-related combustion processes	WP1	16-PTB	Methodology developed	18
3	Plan for pilot studies implementation	WP2	1-NCSR "D"	Document with details available	12
4	Completion of pilot campaigns	WP2	1-NCSR "D"	Data on air quality, noise and traffic collected	36
5	Completion of data processing for source apportionment	WP2	1-NCSR "D"	Level-3 data products available	42
6	Design of the modelling platform	WP3	7-TUM	Documentation of system design	12
7	Completion of the online dashboard of NRT air pollution and noise modelling	WP3	7-TUM	Dashboard of NRT air pollution and noise modelling operational	42
8	Development of concentration –response functions (CRFs) for source specific pollutants	WP4	6-NKUA	Methodology developed	24
9	Design of the operational platform of the MI-TRAP toolbox	WP5	15-IST ID	Documentation of the operational platform design	12
10	Completion of NBS demonstration pilots	WP5	15-IST ID	NBS applied and data on impact collected	36
11	Launch of the MI-TRAP website	WP6	10-AMRN	Website operational	3
12	Set up of the 1st International LL	WP6	10-AMRN	Material from the workshop (including list of participants and minutes)	18
13	Organization of the Kick-off meeting	WP7	1-NCSR "D"	List of participants and minutes of the meeting	1

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

LIST OF CRITICAL RISKS

Critical risks & risk management strategy

Grant Preparation (Critical Risks screen) — Enter the info.

Risk number	Description	Work Package No(s)	Proposed Mitigation Measures
1	Interdisciplinary dialogue between partners may cause communication difficulties (L/H)	WP1, WP6, WP2, WP3, WP4, WP7, WP5	Partners already dialogued well at the proposal stage and collaborated in previous projects. Mitigate with increased documentation and additional online meetings.
2	Loss of key partner (L/H)	WP7	Effective management procedures to timely intercept problems, and/or reallocate partners. The CA will govern the policies behind this. If needed, replace with new partners with suitable skills and profiles in collaboration with the Project Officer (PO). In the eventuality that the partner loss will also mean a case study cannot be performed, the GA will look for another case in the same region and of a similar nature using our networks and present alternatives to the PO for decision making.
3	Project execution failure, technical problems and delays (key milestones or deliverables delayed), especially the technical Deliverables (M/H).	WP7	The project management team (PMT) will conduct strict monitoring of tasks against the allocated time and monitor progress closely. Milestones and deliverables with a critical a critical path will be handled with special attention. Progress and issues will be discussed regularly within the consortium and necessary schedule adjustments made. In the event of technical problems and time delays, we will produce a priority list working with the Project Officer (PO) and the end-users to adjust the project to achievable timescales and objectives.
4	Problems with access to advanced infrastructure (e.g., overloading of instrument, damage (L/H)	WP2, WP3, WP4, WP5	The consortium possesses sufficient infrastructure capacity to address the requirements for the prompt execution of the city pilots. In most cases, the infrastructure employed is owned by the local or transport authorities themselves. The proposed three-month campaign plan has been arranged, considering the existing availability of instruments, with additional buffer time accounted for. Moreover, the consortium maintains robust collaboration with other research teams, and if necessary, it will fulfill its requirements through its collaborative network.
5	Field studies conducted in different countries provide data which is not comparable (M/H)	WP2	Task 1.5 for the harmonization of the methods is planned as mitigation to this risk.
6	Delay in WP1 (e.g., development of the cost-effective systems) may affect Pilots in WP2 (L/S)	WP2	The products/methods that will be developed have starting TRL ≥6. Partners have long experience of field-work. Four-year project provides flexibility in the timing of the fieldwork.

Associated with document Ref. Ares(2023)7933852 - 21/11/2023

Critical risks & risk management strategy

Grant Preparation (Critical Risks screen) — Enter the info.

Risk number	Description	Work Package No(s)	Proposed Mitigation Measures
7	Poor stakeholders' involvement (L/H)	WP1	Develop a clear communication plan that outlines how, when, and why stakeholders will be informed about project updates and their roles in the project. Conduct a stakeholder analysis to identify key stakeholders and their interests, influence, and level of involvement. This will tailor MI-TPAP communication and engagement strategies to the specific needs of each stakeholder.
8	Delays in the completion of the Integrated Tools e.g., because data are delayed or lacking. (L/H)	WP6	The modelling work can start with literature and previous data. The tool can be implemented for a few cities and then extended. Data from HR-A and CE-C systems is available for modelling in real-time, which is fundamental for tool development.
9	Disputes over the ownership of IPR among partners (L/M)	WP3, WP5	IPR and access right clauses will be integrated in the consortium agreement (DESCA based). The documents will be signed before the start to avoid potential disputes.
10	Problems with access to City- Pilot sites & Inadequate coordination of activities at case study level (M/H)	WP7	The consortium has long experience in fieldwork and is already well connected with the cities authorities. The pilots will be implemented and hosted at locations where the co-operation and co design of local and relevant authorities is planned. The relevant authorities and organizations have already declared their interest to act as stakeholders during the project (section 2.1.2). MI-TRAP will establish clear communication channels with the stakeholders responsible for providing access to the City-Pilot sites at the early stage of the project. Local staff (part of the consortium) form each City-Pilot will be involved in day-to-day management, to keep communication lines short, and interact directly with local stakeholders. Training activities for the operators and the stakeholders have been foreseen as part of WP2 Task 2.2 and WP6 Task 6.4. In any case, the consortium will identify backup sites in case access to the original Pilot sites becomes problematic, as part of WP2 Task 2.1 (Design of the Pilot studies)

PROJECT REVIEWS

Project Reviews

Grant Preparation (Reviews screen) — Enter the info.

Review No	**Timing** (month)	**Location**	**Comments**
RV1	18	Brussels (TBC)	PR1 review
RV2	36	TBD	PR2 review
RV3	48	TBD	Final review

HISTORY OF CHANGES		
VERSION	PUBLICATION DATE	CHANGE
1	25/08/2023	**1. In response to comment 2.1.1** (Comments in the Evaluation Summary Report), the following sentence has been added in ***Section 1.2.2***: *VOC data will become available and evaluated for the aims of the project from the regular measurements provided by National Air Pollution Monitoring stations where most of the MI-TRAP stations will be co-located.*
1	25/08/2023	2. The deadline of the deliverable D3.3 "MI-TRAP repository and dashboard online for visualization of NRT air pollution and noise levels" was extended from M36 to M42 which is the end of the Task 3.4. "Demonstration and dashboard development".
1	25/08/2023	3. The dissemination level of the Deliverables D3.2 and D3.3 "Technical and functional documentation of the modelling platform, including extensions of the MI-TRAP models" (Version 1 and Version 2), has been changed from PU to SEN. These deliverables might contain technical details that are subject to IP rights.
1	25/08/2023	**4. In response to comment 4.8,** periodic reports (Deliverable 7.2: Project progress reports) have been removed from the list of deliverables
1	25/08/2023	**5. In response to comment 4.7**, the following has been added in Task 7.3: *A Data Management Plan (DMP) and its revised versions will be developed at M6 and at the end of each reporting period, respectively, to ensure that data management is consistent and effective throughout the project's lifespan.* The deliverables Data Management Plan (Version 1 – 4, D7.1-D7.4) have been added to the list of deliverables.
1	25/08/2023	**6. In response to comment 2.3.3,** the mitigation actions to risk "Problems with access to City-Pilot sites & Inadequate coordination of activities at case study level" and to risk "Problems with access to advanced infrastructure" have been revised.
1	25/08/2023	**7. In response to comment 2.3.2**, the milestones M12 and M13 have been revised
1	25/08/2023	**8. In response to comment 1.3,** the proposed text has been introduced just above Table 3.1h
1	25/8/2023	9. The total cost for the Associated partner METAS has been increased (from 250,000 € to 312,500 €), in order to account for overhead costs which are eligible by the corresponding funding body (Swiss State Secretariat for Education, Research and Innovation). In addition, the budget breakdown in relevant cost categories for all Associated partners has been added (Table 3.1j).
1	25/8/2023	**10. In response to comments 4.1 and 4.3**, Table 3.1h has been corrected (in order to be consistent with the estimated budget table - Annex 2) and updated (according to comment 4.3). CFS costs are needed and foreseen only for NCSR-D, and they are included in the 'goods and services' cost category.

1	25/8/2023	**11. In response to comment 4.4 and additional comments by the PO**, table 3.1g has been corrected, while a more detailed explanation has been also provided for the subcontract needed by WU.
1	25/8/2023	**12. In response to comment 4.4**, the following text has been added above table 3.1g: *"The beneficiaries must base their contracts/subcontracts according to the principles for best value for money and absence of any conflict of interest (according to Articles 6.2 and 9.3 of GA). Beneficiaries that are 'contracting authorities' or 'contracting entities' (within the meaning of the EU public procurement Directives 2004/18/EC and 2004/17/EC or any EU legislation that replaces these Directives) must moreover comply with the applicable national law on public procurement."*
1	25/8/2023	**13. In response to additional comments by the PO**, table 3.1.i has been updated in order to include the number of units and the average cost per unit for internally invoiced goods and services.
1	25/08/2023	14. Task 6.4 has been updated according to the comment (4.10)
1		**15. In response to comment 4.11**, the Communication and Dissemination (D6.4-D6.8) and MI-TRAP Exploitation (D7.5-D7.8) Plans will be developed (M0.6) and periodically updated in alignment with the project's progress reporting periods (M18, M36, M48). The different versions of the aforementioned deliverables have been added to the list of deliverables.
2	11/09/2023	**16. In response to comment 2.1.3,** Explanations added in section 1.2.3 as suggested
2	11/09/2023	**17. In response to comment 2.1.4,** Explanations added in sections 1.2.2 and 1.2.3
2	11/09/2023	**18. In response to comment 2.3.1,** Explanation added in Task 2.2
2	11/09/2023	**19. Tables 3.1h and 3.1i were updated as requested**
2	11/09/2023	**20. Description of Deliverables and means of verification inserted in the Sygma platform**
3	13/09/2023	**21. Table 3.1h was updated**
4	2/10/2023	**22. Table 3.1h was updated as requested**
5	17/10/2023	**23. In page 34** the total cost for the Associated partner METAS is corrected at 250,000 €, as it was in the initial proposal. **Table3.1.j in page 36** is adjusted to the same amount
5	17/10/2023	**24. In page 36** the justification for the Purchase costs in **table 3.1.h** requested for partner 17. Catalytic Inst. Is given with a more detailed explanation

Contents

1.1.1 Excellence

Air Quality in urban areas and other hot spots, where transport emissions induce a large impact on human exposure, remains an environmental problem of high complexity attracting strong public interest. EU has established a legislative framework that includes the National Emissions Reduction Commitments (2016/2284/EU), the European Green Deal (in particular the **Zero Pollution Plan**), the Ambient Air Quality Directives (2008/50/EC), and Emission Standards (**Euro6** and future **Euro7**) to minimize human impact on the environment. Despite the significant improvements achieved, European's air quality remains poor in many places, according to the European Environment Agency's (EEA) Air Quality in Europe 2022 report. The European Commission has proposed revising the Ambient Air Quality Directive to improve Europe's air quality. New suggested measures [**Air Quality Standards-2022**] include tightening air quality limit values in alignment with WHO levels and improved monitoring of currently unregulated and emerging pollutants. The monitoring of emerging air quality parameters, such as **ultrafine particles (UFP)** and **Black Carbon (BC)**, is beneficial in terms of gaining a better understanding of air pollution. Supporting and complementing the regular observation networks could underpin the efforts of governments and civil society to comply with the sought SDGs for sustainable cities and communities.

Despite the strict Emission Standards, "real world" emissions from transport sources is accepted as a term, indicating a status of only partial success of current fossil fuel emission control, while the high significance of **non-exhaust emissions** is now recognized. A large uncertainty in the assessment and mitigation of these sources arises from their physicochemical transformation from the tailpipe/stack to the ambient environment. The metrics and parameterization employed on the data analyzed from the typical environmental monitoring networks and measurement systems are poorly representing the material initially emitted by the specifications of these engines certified by the manufacturers and the control legislation, especially for the **solid particle** fraction. It is therefore difficult to link the health and other environmental effects to specific sources or modes of transport with a few exceptions. Current advances in geospatial mapping and real time monitoring of transport emission sources coupled with air quality modeling can allow improved dynamic management of emissions especially when coupled with Near Real Time (NRT) Monitoring of ambient air quality.

The **MI-TRAP** project aims to improve the currently available Tools and services for air pollution mitigation from transport sources through a multi-dimensional approach. The project will develop and provide a suite of beyond the state of the art innovative monitoring Instrumentation package, data analysis tools to track emitted pollutants, enable systematic traffic management and evaluate the effectiveness of legislation and control measures. The large consortium of experienced partners, and existing information from previous EU projects and Research Infrastructures will ensure successful implementation of proposed activities. Past and present data will be used for enabling health impact assessment. Additionally, MI-TRAP recognizes the importance of Nature-based Solutions (NBS) and implements pilot NBS in selected sites, in order to facilitate mitigation of air and noise pollution. The project will also incorporate citizen science practices, disseminating findings through open-science and citizen-science approaches with the support of key stakeholders and citizens.

The scale of the impact of MI-TRAP is wide at European level, since the consortium includes partners from Greece, Italy, Slovenia, Czech Republic, Switzerland, Germany, Denmark, France, Portugal, The Netherlands, while it has drawn resources from South Korea. The project will be implemented in ten cities across Europe, aiming to characterize the footprint of transport emission sources and assess their impact on air quality and human health. MI-TRAP will provide the methodologies for collecting and utilizing data for unregulated and emerging transport related air pollutants, including solid particle number (sPN) and bare BC (bBC) (to bridge the gap between lab and real-world conditions), UFPs and number size distributions, non-refractory organics and inorganics, trace and major elements, exhaust gasses, and noise. These data will be complemented with real-time traffic metrics i.e. traffic density and fleet composition. Using novel analytical methodologies and tools, MI-TRAP will a) identify the specific footprint of transport emission sources and traffic-related super-polluters, b) evaluate the impact in ambient air of current emission standards, b) develop tools for short- and long- term assessment of the impact in air quality and human health Integrated (MI-TRAP toolbox, Metabolism-based NBS Planning and Simulation Toolkit, Transport air pollution and noise platform) and e) assess the impact of nature-based solutions in air-pollution mitigation and well-being. MI-TRAP will involve citizens in the research to increase understanding and engagement. Tools, services, and solutions will be developed using a citizen science approach with active role of citizen communities. Results will help assess and mitigate transport emissions' impact on air quality and health and communicate the findings to policymakers and authorities.

1.1.2 Specific project objectives and ambition

Aligned with the objectives and directions of the **EU Green Deal Zero Pollution Action Plan**, MI-TRAP's objectives cover five main axis: "(i) bridge the gap between transport emission standards and ambient air quality limit values, (ii) establish ready to use technologies and solutions, (iii) enable traffic/port/air/rail management by real time air quality monitoring, (iv) support emissions and noise reduction plans and (v) enforce the zero pollution strategy by engaging the citizens through a citizen science methodology as part of open science practices . All the Objectives (OBJs) are components of the implementation package. ER# refers to Expected Results (table below the Objectives), EO# refers to the Expected Outcomes of the call, LI# refers to the expected Long-term Impacts in the call text.

MI-TRAP will provide innovative means in terms of monitoring devices and schemes of data analysis and management of transport emission sources in order to remedy a) the traceability of the emitted pollutants from transport emission sources to the atmosphere and b) the assessment of applied legislation and control measures, c) establish and propose the link and impacts on health, d) assess the impact of nature-based solutions on air quality and citizens' wellbeing. The primary objectives and expected results of MI-TRAP (Table 1.1.2.a) are the following:

Table 1.1.2.a: MI-TRAP objectives and ambition

Specific Objective	Expected results	EO/LI	WP
OBJ 1: Provide robust traceability for state of the art and innovative measurement methods for regulated and emerging air quality metrics suitable for monitoring transport-related pollutants and noise for monitoring networks of stations in Europe	>5 innovative instrumentation products to provide tested and traceable measurement methods (solid particles, UFPs, BC, elements in non-exhaust particles and time resolved PM); Development of comprehensive protocols and recommendations for near real-time sampling and analyses of chemical, and physical parameters of transport-related pollutants and noise emissions in traffic junctions, ports, airports and rail stations;	EO1, EO2, LI4	WP1
OBJ 2: Demonstrate the capacity for an established network of stations at key Pilot European cities to provide Near Real Time (NRT) advanced datasets and higher level data products and maps for monitoring pollutants (including both exhaust and non-exhaust traffic related particles) and noise emissions of road vehicles in high traffic-density areas, ports and airports	> Establishment of a network of monitoring stations in 10 European Cities (City-Pilots); 30 monitoring stations in EU cities, including traffic (17), port (6), airport (5) and rail sites (2); Provision of harmonized numerical datasets regarding pollutants: sPN, UFP, BC, bBC, non-refractory organics (OM) ad inorganics, major and trace elements, NO_x/NO_2, CO_2 and noise; Provision of traffic-related parameters (no. of vehicles, type of vehicle); Determination of source-specific transport emission factors and identification of the "super polluter" fraction - Comparison with emission standards	EO1, EO3 / LI1, LI2, LI3, LI4	WP2
OBJ 3: To develop, test and establish in an operational capacity a MI-TRAP system of NRT traffic, air quality and noise models for regulated and emerging pollutants targeting the transport emissions from urban road/port and air in Europe to account for real world emission factors (incl UFPs and BC)	>NRT transport oriented source apportionment service; Development of a Dashboard for combined display of traffic and modeled air quality (short-term forecasts for air pollutants (inlc UFPs) and emissions(traffic, shipping)) at least three urban areas, where data are known to support operations (to be selected from Milan, Copenhagen, Lisbon, Prague, Athens, Zurich, Lille, Rotterdam) (WP3); Real-time mapping of transport-related pollutants, noise and transport emission footprint in the transport hotspots (City-Pilots) (WP5)	EO3, EO4 /LI1, LI3, LI4	WP3, WP5

OBJ 4: Establish the link between human exposure to transport related pollutants and noise and quantitative impact on health (internal dose, burden of disease and hazard risk characterization)	>**Concentration-response functions** for targeted exposures (**BC, UFPs, trace elements and noise** etc); Health impact assessment of long-term exposure to black carbon, ultrafine particles and noise across Europe based on a systematic review of the health effects and real-time data; >Health impact assessment of **short-term exposure** to traffic-related air exposures and use of dosimetry tools for different exposure scenarios and for different age/sex/disease status groups	EO5, LI4	WP4
OBJ 5: Assessment of the impact of nature-based solutions in air pollution mitigation near transport emission hotspots	>Mapping of NB policies; Review of existing NB interventions; NBS impact assessment; >Development of the **Metabolism-based NBS Planning and Simulation Toolkit**, an on-line knowledge platform that will serve as a EU knowledge portfolio; >Design and deployment of NBS in 4 cities (Athens-Piraeus, Lisbon, Milan, Gladsaxe-Copenhagen); Provision of guidelines and recommendations concerning the use of nature-based solutions for mitigating urban air and noise pollutions for different urban environments	EO3, EO6 /LI1, LI2	WP5
OBJ 6: Citizens' and policy makers' awareness raising and engagement in the Zero Pollution Strategy	>Living laboratories and citizen observatories to actively engage citizens and relevant stakeholders in the development of new knowledge; Training materials, guidelines and recommendations for policy makers and citizens; Impact indicators to assess the effectiveness of the citizen science approach towards the engaged actors and the wider society	EO7, LI4	WP6
OBJ 7: To develop dynamically updated web based databases from the MI-TRAP traffic and modeling output so that intervention and management of traffic and emissions are quantified evaluated and documented for short and long term assessments and policy making	>Integrated management tools for air quality monitoring data, model output, traffic management and long-term air quality and health impact assessment; Development of Three Pilot city/harbor/airport web based display and interactive platforms where NRT air-quality, noise and traffic modeling data are stored and are employed to manage transport/traffic on an operational basis; Development of the Integrated Transport Emission Impact assessment tool (MI-TRAP toolbox), a powerful tool for developing cost-effective mitigation policies for transport emissions	EO4 /LI1, LI2, LI3, LI4	WP3, WP5

1.1.3 R&I maturity of the proposed work

MI-TRAP brings together solutions of high technological readiness, in an effort to generate not only novel models, but also potential products close to application. In the following table, the technologies that will be advanced in MI-TRAP project are listed:

Table 1.1.3.a: MI-TRAP Technology Readiness Levels

BRN	**Tool/Product**: Impactor optimized for TXRF analysis	**Start** TRL:7	**End** TRL: 9
Bruker Nano has developed a custom-built impactor, which collects particulate matter (PM10, PM 2.5, PM 1, PM 0.X) directly in the center of a reflective TXRF carrier for trace element analysis to improve the detection limits even for short sampling times down to 1 h. The direct particle collection leads to much faster results for air quality parameters. During the project calibrations for accurate quantification will be developed and certified standards applied for validation.			
CATALYTIC INST	**Tool/Product:** Catalytic stripper for solid Particles including UFP	**Start** TRL:7	**End** TRL: 9
Catalytic Instruments will further develop existing catalytic strippers to meet the specific requirements of ambient monitoring regarding oxidation efficiency as well as particle penetration down to 5 nm without drastic particle losses. The novelty lies in high particle penetration with high oxidation efficiency of (semi)volatile organic matter, very low power consumption for customized sampling flows. Another novel application, the Catalytic Vapor Filter, which removes noxious butanol vapor from CPC will be customized for the CPCs at the MI-TRAP stations. Prototypes will be provided for the Monitoring program in			

WP2 after being standardized in WP1.			
NANODUST	**Tool/Product:** Portable Diffusion Charger for sPN including UFPs	**Start** TRL:6	**End** TRL: 8
nanoDUST will improve the sensitivity towards lower concentrations and detect nanoparticles as small as 10 nm in accordance with the latest Euro 7 proposal with optimized sampling and dilution system for improved sub-23nm particle penetration. Partner nanoDUST will develop 10 prototypes for MI-TRAP WP2 after being tested in WP1.			
HAZE INSTR	**Tool/Product:** Portable Filter tape sampler for NRT $PM_{2.5}$ collection and subsequent EDXRF/TXRF analysis	**Start TRL:5**	**End TRL: 8**
HAZE INSTR will take advantage of their long term experience in automated filter tape sampling and advance technique used for filter photometers to design a PM2.5 device with a continuous rolling tape so that time resolved aerosol deposits (typical hourly) are produced for subsequent ED-XRF analysis for trace and major metals. Filter material and flow rates will be optimized to be suitable for specifications defined in WP1.			
FINCONIT	**Tool/Product:** Nature-Based Solutions Design Tool	**Start** TRL: 6	**End** TRL:8
FINCONIT will deliver a Metabolism-based NBS Planning and Simulation Toolkit: Customized tools and technologies adopted and then integrated during MI-TRAP via principal inputs and outputs to enable metabolism-based assessment of current and future NBS solutions in urban areas			
IVU UMWELT	**Tool/Product:** Coupled Air pollution/Traffic management system	**Start** TRL:7	**End** TRL:8
IVU UMWELT aims to produce a module that is marketable at a TRL 8 inclusive of UFPs, that can be an upgrade of IVU UMWELT's existing Air quality/Traffic management solutions **https://viz.berlin.de/luftqualitaet-clean** already applied to urban areas			
NCSR "D"	**Tool/Product:** MI-TRAP Web based Integrated Transport Emission Assessment tool	**Start** TRL:4	**End** TRL:7
A Web-based Tool where data from WP2, WP3 & WP4 will be collected, analyzed and evaluated so that the long term impact of technology, legislation and behavioral changes are evaluated with respect to the Impact of transport emissions on Air Quality, Human Health, Climate Impact and Quality of life in urban areas in Europe.			

1.2 Methodology

1.2.1 Overall Methodology

MI-TRAP will establish methodology for monitoring transport-related emissions using state-of-the-art combined with innovative techniques for pollutants relevant to exhaust and non-exhaust emissions (**WP1**), including NRT characterization of solid particle number concentration (sPN_{10}) and bare black carbon (bBC) mass concentration, ultrafine particles (UFPs), size-resolved particle number concentration (PNC), non-refractory organics (OM) and inorganics (SO4, NO3, NH4, Cl^-), major and trace elements, CO_2, NO_x/NO_2 and noise. A network of stations (High-Resolution Advanced Stations and Cost-Effective Compact stations) will be established in ten European cities (City-Pilots in Athens, ATH (GR); Rotterdam, ROT (NL); Milan MIL (IT); Lisbon, LIS (PT); Copenhagen/Århus; COP/ÅRH (DK), Prague, PRA (CZ); Florence, FLO (IT); Lille/Dunkirk (FR); Zurich, ZUR; Berlin, BER (DE) (**WP2**) to monitor the impact of transport emission sources on air quality and human health by combining real-time monitoring of air quality metrics and traffic parameters (traffic density, vehicle fleet composition); Real-time characterization of the traffic density and vehicle fleet composition will enable improving the link between vehicle emissions and ambient air quality. The stations will be deployed in sites with heavy traffic (Traffic-Pilots; T-P) (17), around ports (Port-Pilots, P-P) (6), airports (Airport-Pilots; A-P) (5) and rail stations (Railway-Pilots; R-P) (2). MI-TRAP will extend and further develop an advanced management tool for air quality data, model output and traffic management (**WP3**). Four modeling systems will be connected into a transport management support system that will inform decision makers in near real-time (short-term forecasts) on traffic flows, transport emissions, air pollutant concentrations (incl. UFPs) and noise levels attributed to transport modes. As part of WP4, the link between the transport-related pollutants and health will be assessed, concentration-response

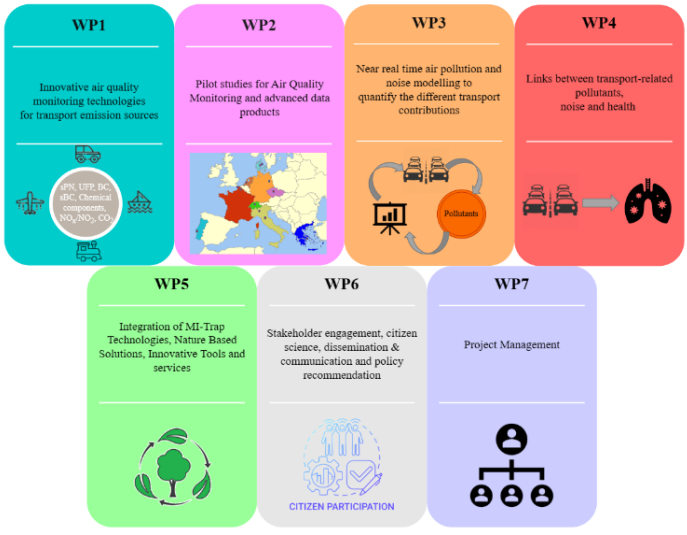


Figure 1.2.1.a. Work Packages (WPs) of the MI-TRAP project

functions will be derived, the burden of disease will be estimated and hazard characterization will be performed. As part of WP5, the impact of the existing NBS will be evaluated at pilot cities and specific NBS will be designed and deployed in Milan, Athens and Lisbon (NBS case studies) as means to mitigate air quality effects of the transport-related emissions. The outcomes from WP2, WP3, and WP4 will feed the MI-TRAP toolbox, a web-based platform for real-time mapping of transport-relevant air quality metrics and assessment of the long-term impact of transport emissions on air quality and human health **(WP5).** The MI-TRAP toolbox will be an innovative long-term supporting tool for policy makers and other relevant stakeholders that will help them to identify measures to improve air quality and develop more efficient emissions and noise reduction plans. MI-TRAP aims to produce a high number of outputs that will be disseminated as guidelines and recommendations to all relevant stakeholders, including Air Quality Managers, policy makers, and the wider society (Citizen engagement, Policy recommendation, Dissemination) in **WP6**. Finally, the project overview will be managed and guided by a dedicated management team whose purpose will be the proper implementation of the project's individual tasks. (**WP7**).

1.2.2 Development of an air quality monitoring network targeting exhaust and non-exhaust emissions and City-Pilot demonstration

Emissions from the transportation sector, i.e. vehicular traffic, aircraft, or ships are known to be a significant source of particulate and gaseous pollutants, albeit with high temporal and spatial variability. Therefore, improved characterization and quantification of the impact of these sources require fast time acquisition. In particular, reference methods for particulate pollutants (based on 24-hour measurements) are not suitable and additional devices need to be deployed with 1-hour time resolution or better. In MI-TRAP, a set of different techniques of variable complexity will be used, to identify the specific footprint of both exhaust and non-exhaust emissions in ambient conditions. Currently, the only aerosol metric required by [**Air Quality Directive 2008/50/EC**] is the mass concentration of different aerosol size fractions (PM2.5 and PM10). Total Aerosol mass concentration, however, does not inform on the sources and the potential of the different PM constituents to cause adverse health effects and does not capture the effects of ultrafine particles whose contribution to total PM mass is negligible. Several European countries (Netherlands, Belgium, Germany and Switzerland) have therefore introduced additional (national) legislation for the emission control of diesel vehicles, setting limit values for the number concentration of solid particles being emitted. This has led to the rapid development of new portable and cost-effective particle counters measuring solid PN concentration directly at the tailpipe. In MI-TRAP, different metrics will be established to link the existing transport emission standards with the real-world emissions and the ambient particulate and gaseous pollutants.

The MI-TRAP consortium will deploy state-of-the-art and novel techniques of variable degree of complexity to monitor, in real-time, key air pollution metrics, and identify the specific footprint of exhaust and non-exhaust emissions from different transport modes. Two partners (ICPF-PACC, INFN-LABEC) are part of the **ACTRIS CAIS-ECAC** (European Center for Aerosol Calibration and Characterization) and will thus be able to ensure reliable and reproducible measurements, four partners (NCSR "D", ICPF, AU, PSI) operating **ACTRIS National Facilities** and two partners (METAS,PTB) are **Metrology Institutes** in air quality. The network of monitoring stations will combine state-of-the-art high resolution advanced (HR-A station) and cost-effective (C-E station) instrumentation. These measurements and methods are summarized in **Table 1.2.2.b**. The High-Resolution Advanced station will contain the most state-of-the-art and advanced instrumentation for detailed characterization of relevant air quality metrics, while the cost-effective one will contain affordable and compact size instrumentation including a core number of air quality metrics. The instrumentation includes condensation particle counters (CPC), counters based on diffusion charging (DC), mobility particle sizer spectrometers (MPSS), Aerosol Chemical Speciation Monitors (ACSM), near-real time X-ray Fluorescence monitors, time-resolved PM sample collectors, NOx/NO2 and CO2 monitors, Cameras and Noise monitors. All the stations will be equipped with Wind Speed/Wind Direction/RH/T sensors. The specifications of the stations and the measurement procedures will be determined in WP1. The MI-TRAP Consortium has long experience in the development and/or standardization of the proposed techniques and measurement methodologies.

The City-Pilots: As part of WP2, a network of air quality and noise monitoring stations will be established and City-Pilot campaigns (WP2) will be organized in selected urban areas across Europe. In each city a network of three monitoring stations will be established around strategically selected sites. The stations will be installed around traffic-junctions of heavy traffic (Traffic-Pilot campaigns; T-P), ports (Port-Pilot campaigns; P-P), airports (A-P) and rail stations (R-P), to monitor the emissions from different transport modes. As presented in **Fig. 1.2.2.1.a**, most of the selected cities represent NOx emission hotspots. **T-P campaigns** will be organized around traffic junctions, ring-roads, highways and/or busy streets of heavy traffic in **ten cities** across Europe: ATH (HR-A, Marousi; CE-C, close to the Aristotelous station (both co-located with the National Air Quality Monitoring Station Network)), COP/ AAR (HR-A, at the highly trafficked curbside station H. C. Andersens Boulevard (HCAB) in the city center), LIL/DUN

(the HR-A and CE-C stations will be deployed at two traffic sites in Lille (operated by the regional air quality monitoring network Atmo HdF)), LIS (HR-A, in the heavy traffic site of Entrecampos), ROT (CE-C, city center (i.e. Statenweg)), MIL (RH-A, Milan ring road; CE-C, Milan city center), PRA (HR-A, next to a major highway in Prague-Holesovice (AHOL ACTRIS station); CE-C, at a crossing of major roads with high traffic density in Prague-Vysočany (AVYS ACTRIS station)), ZUR (CE-C (2); Wiedikon, and Kaserne), BER (CE-C (2); city center i.e. Alexanderplatz and Kurfürstendamm), FLO (CE-C(2); Viale Gramsci and near to the air quality network monitoring FI-MOSSE station). **A-P campaigns** will be organized around airports of high-traffic density in COP/ AAR (Kastrup; CE-C), LIS (Lisbon airport; CE-C), MIL (Milano-Linate; CE-C), FLO (Amerigo Vespucci; HR-A), PRA (Prague, CE-E). **P-P campaigns** will be organized around ports of high-traffic density ATH (Pireaus, the largest port in Greece and one of the largest in Europe; CE-C), COP/AAR (Århus harbor, the biggest commercial harbor of Denmark; CE-C), LIS (Cruise terminal; CE-E), ROT (Port of ROT, the largest port in Europe; HR-A. A CE-E station will be also deployed alongside a major freight corridor from the harbor inland, so that it will focus on measurements of indirect pollution from port activity), LIL/DUN (DUN harbor, targeting primary shipping emissions, combined with road traffic from the urban area and industrial sources; CE-E), and **R-P campaign** will be organized in ZUR (Zurich main train station, the busiest railway station in Switzerland, with over 2000 passenger trains scheduled per day; HR-A), BER (Berlin Ostbahnhof, is one of the largest in Berlin; HR-A). Each three-station city-pilot will provide data for three months minimum or longer.

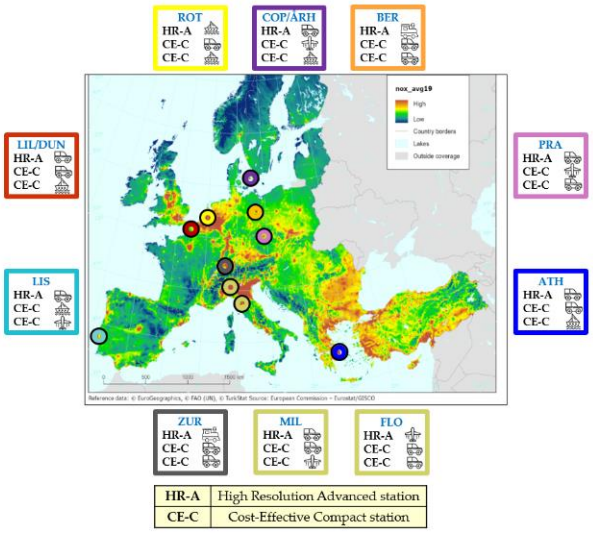


Figure 1.2.2.a. The City-Pilots of the MI-TRAP Project

Aerosol microphysical properties and Black Carbon MI-TRAP will combine state-of-the-art methodology and harmonized approaches for monitoring total **PN_{10}/UFPs** (condensation particle counters and diffusion charge counters), **BC** (aethalometers/absorption photometers) and particle number size distribution (mobility particle size spectrometers), but at the same time obtain these components in conditions equivalent to those for emission specifications of in the tailpipe (i.e. catalytic treatment/heating) so that solid particle number (of sizes > 10 nm instead of the current >23 nm sizes) and bare black carbon (bBC; BC with constant mass-absorption cross section) concentrations can be monitored. The use of the same metric, i.e. sPN concentration, in both air quality monitoring and emission control allows for meaningful comparisons of UFPs expected from tailpipe emissions and those detected in the ambient air, to evaluate the impact of transport sources on air quality. By measuring both total and solid particle number in combination with BC mass, a more detailed source apportionment is established to detect high polluters in selected case studies such as main roads, harbors, and airports. BC refers to the equivalent black carbon as determined from aerosol light absorption using a specific Mass Absorption Cross section (MAC). For ambient aerosols, MAC has been reported within the range of 2.3–15 $m^2\ g^{-1}$ at 550 nm. These variations exist for example due to the BC being mixed non-homogenously with other aerosol components, thus modifying its light absorption. To address this issue highlighted by **Ciupek et al, 2021**, MI-TRAP will build on work in **EPM StanBC** and previous Metrology projects and focus not only on BC measurements but on bBC measurements (constant MAC number).

For the purposes of MI-TRAP, existing systems measuring UFPs and BC will be modified and optimized to meet the needs for real-time monitoring of sPN10 and bBC. Based on valuable experience with emission control technologies, WP1 partners will develop and characterize a) a new portable and cost-effective instrument for the real-time measurement of solid PN (sPN) concentration in ambient air (i.e. close to transport-related emission sources) (NANODUST), b) customized catalytic strippers (CATALYTIC INST) that remove volatile material from the aerosol, leaving only solid particles, to equip common air quality monitoring instruments, such as condensation particle counters and filter-based absorption photometers (both high-end and portable versions); catalytic strippers remove volatile material from the aerosol, thus only solid particles remain. and c) portable fast-response setup for roadside high emitter detection for portable roadside and on-road monitoring of sPN, BC and CO_2 monitoring of traffic exhaust emissions as described by [**Jezek et al., 2015**] (ICPF, HAZE INSTR).

To ensure reliable and reproducible measurements, WP1 will provide SI-**traceable calibration procedures** in the laboratory as well as **guidelines for in-field calibration** and verification of the instrumentation to be deployed. The traceability pathway will include the different primary and secondary standards available in the consortium (PTB,

METAS, HAZE INSTR). Traceable calibration pathways and uncertainty budgets will be provided for each of the air quality metrics. Instruments will be traceably calibrated according to available European or international documentary standards.

Table 1.2.2: Air pollutant measurement methods that will be used in the High-Resolution Advanced monitoring stations and in the compact cost-effective monitoring stations

Metric	Size range	Method of analysis	Instrument High Resolution Advanced Station (HR-A)	Instrument Compact cost-effective station (C-E)
Particle Number (PN)	>10 nm	CN Counter (HR-A) Diffusion Charge (C-E)	CPC-CEN7 (& equivalent) (Total PN)	UFP counter (UFPN)
Total Solid Particle Number (sPN)	>10 nm	CN Counter	Catalytic stripper/Heated inlet CPC	Catalytic stripper/Heated inlet CPC (sUFPN)
PN Size Distribution (PNSD)	10-900	Electrical Mobility Spectrometer	MPSS CEN/TS 16976 (ACTRIS type) & equivalent	-
Absorption/BC mass	PM2.5	Light Absorption	Filter Photometer	Portable Filter Photometer
Absorption/BC mass (Constant MAC)	PM2.5	Light Absorption	Catalytic stripper/Heated inlet Filter Photometer	Catalytic stripper/Heated inlet Portable Filter Photometer
Elements Mass concentration	PM2.5	NRT ED XRF (HR-A) Off-line ED XRF (C-E)	In situ Metal element Analyzer	In situ time resolved filter collector
PM Mass concentration	PM2.5	Beta gauge/optical/TEOM	PM Monitor	PM Monitor
Gas Concentration	-	Chemiluminescence	NOx/NO2 (Clum)	NOx/NO2 (Clum)
Gas Concentration	-	Infrared absorption	CO2	CO2
Noise (dB)			Noise monitor	Microphone(mobile device)
Fleet identification NRT	-	Image processing	Camera	Camera
Mass spectrum of NR-PM	PM2.5	NRT-SA (HR-A)	Aerosol Chemical Mass Spectrometry Monitor	-

Detailed chemical characterization of atmospheric aerosol: The elemental composition of particles is to be characterized by means of near-real time filter-based and size-fractionated non-destructive x-ray spectrometers. X-ray fluorescence (XRF) has been used in different configurations intensively for the reliable characterization for atmospheric aerosol filters and impactor samples. Dedicated studies have demonstrated [**Hulskotte et al., 2014**, **Rhodes et al., 2012**] reliable results for non-exhaust heavy trace metals like Cu, Ba, Pb, Sb (Brake wear emissions, Zn (Tire wear emissions) as well as lighter elements Al, Si, Ca (road wear emissions). The sampling for the XRF analysis is going to be performed on a novel introduced moving filter–tape sample collector for time/resolved PM collection that will be developed by (HAZE INSTR). In this way, measurements are going to be rtaken in high time resolution (1 hour collection basis). The aerosol loaded–filter tape will be then analyzed by means of lab-based XRF for elemental analysis. Apart from the off-line XRF sampling, real-time XRF spectrometers will be used in the HR-

A stations utilizing the same filter–tape sample collection approach to perform real-time, high-resolution analysis for all elements of interest. The XRF metal analysis methodology will be calibrated using transfer standards qualified by methods developed at PTB and INFN-LABEC. The samples or size-fractionated deposits collected in parallel time intervals will be also analyzed for their elemental composition using various techniques, including lab-based calibration with an artificial aerosol standard on Xact filter, grazing-incidence XRF by PTB and by Bruker Nano using adapted size-fractionating impaction, and standard-less Particle Induced X-Ray Emission (PIXE) by INFN-LABEC [**Lucarelli et al., 2018**]. These methods provide reliable quantification of elemental mass depositions in a broad dynamic range. In the HR-A stations, detailed chemical characterization of the non-refractory organic matter (OM) and inorganics (i.e. sulfate, ammonium, nitrate and chloride) will also be performed in selected hotspots sites by means of Aerosol Chemical Speciation Monitors (ACSM). Instruments such as ACSM, for which there exists no international documentary standard yet exists, will be calibrated according to the manufacturer's instructions or guidelines established within the end-user community. In all cases, a rigorous measurement uncertainty budget will be established.

Transport Exhaust gases: Key exhaust gases (NO_x/NO_2, CO_2) will be analyzed by automated online gas analyzers to track combustion sources. VOC data will become available and evaluated for the aims of the project from the regular measurements provided by National Air Pollution Monitoring stations where most of the MI-TRAP stations will be co-located.

Monitoring of noise: Noise pollution in big cities is not simply correlated to high energy audio signals: in most cases noise pollution is characterized by low-frequency and continuous background sounds. It is therefore not straightforward to automatically assess soundscape quality in urban spaces using simple rules and heuristics that are based on basic features such as sound volume and energy. More advanced techniques are required, that make use of deeper audio features and more sophisticated audio analytics techniques. Such techniques should be based on advanced signal processing and pattern recognition methodologies, such as supervised learning and regression. MI-TRAP will use the methodology proposed by [**Giannakopoulos et al., 2019**] for *the real-time, online recognition of the level and quality of noise pollution* (sound). In all stations, noise will be recorded by means of wireless microphone (5G support) and Cloud/Vm will be used for data processing. The overall methodology includes pre-trained convolutional neural networks in similar tasks, to automatically estimate the "quality" of the soundscape (e.g. in a range of 1-worst to 5-optimal). In Copenhagen and Aarhus, the noise measurements will be complemented with a portable noise monitoring station. Using an electric scooter (light-weight three-wheeler moped), state-of-the art noise monitoring equipment, audio visuals recorder, and a weather monitor, we will measure noise levels (per second) and a-weighted equivalent sound pressure levels (LAeq), along the busiest streets of the Danish Capital, Copenhagen and at Aarhus port, considering diurnal and yearly traffic patterns. These measurements will be combined with the static measurements in order to supplement and enrich portable monitoring data to reflect accurate noise levels.

Traffic fleet monitoring*:* To establish the link between fleet composition (types/brands of vehicles) and traffic-related emissions, individual car monitoring is required. In MI-TRAP, the image processing procedure will be based on the innovative methodology introduced by [**Sarafianos et al., 2018**]. The overall approach combined the advantages of both multi-task and curriculum learning in a visual attribute classification framework. The required equipment includes a high-definition wireless camera (5G support) and Cloud/Vm to process the data with a low-cost GPU. Off-the-shelf deep learning models will be used for object detection and recognition (e.g. YOLO). To fine-tune the traffic- and noise- models some data gathering will be required, following some active learning pipeline to incrementally update the models. Results will be compared to traffic counters (using inductive loop technology).

The Institute of Informatics and Telecommunications, NCSR Demokritos, and the IEEE Standards Association have signed an MoU concerning the implementation of IEEE certification schemes for AI systems. NCSR personnel have already been certified by IEEE as competent testers of AI systems regarding their robustness and socio-technical sustainability. Using this expertise, NCSR will both externally test and internally audit the AI solutions as they are being developed, in order to certify their robustness or propose corrective actions.

Marine/Port traffic and air emission monitoring: Spatial mapping of ship air emission inventory: The PAQman© system uses Automatic Identification System (AIS) Ship activity data to estimate ship emissions based on the recording vessel location according to the operation of the ship **(EEA/EMEP, 2019**). By using the coordinates of each instant, it is possible to produce accurate spatial allocation for air emission per vessel, and allowing to produce a high-resolution ship air emission map can be produced to calculate regional emissions. Representative data on ship traffic will be collected in NRT by INU installing the PAQman©-watcher to run and collect AIS data in five target ports, including the MI-TRAP Pilot ports Piraeus, Rotterdam, Aarhus, Dunkirk, and Lisbon, and to be complemented in other major ports in various countries for analyzing ship air emission in port-cities.

Emission footprint from different types of transport sources: In MI-TRAP, the emission footprint of the different types of transport sources will be assessed. This includes source apportionment of air pollutant and the use of tracer ratios. The normalized concentrations of transport-related pollutants with respect to CO2 (or source apportioned CO2) will be further used to assess the comparability of the measured values with manufacturing or national emission standards (i.e. theoretical emission footprint). Thus deviations from these theoretical emission footprint will reveal "super polluters". Such third level data can be aggregated on a long-term basis to evaluate implemented policies on transport emission sources and may trigger corrective actions by relevant authorities.

Near real-time source apportionment (NRT-SA): Deconvolution and statistical source-receptor modeling of the datasets obtained will allow for the identification of different sources of particulate matter, such as road traffic (tailpipe vs non-exhaust), shipping, and others. ***MI-TRAP will apply novel SA modeling techniques*** to quantify the contribution of the transport-related factor to the observed air pollutants levels (either from vehicles or ships, trains etc). Specifically for the vehicles traffic factors, the contributions of the predominant engine-type vehicle groups (e.g. gasoline, diesel, etc) to primary carbonaceous aerosol will be evaluated with multiple linear regression. The factor related to traffic emissions, namely identified as Hydrocarbon-related Organic Aerosol (HOA), is very often resolved not only at traffic sites, but even at remote ones. Most participating sites already have knowledge of this source's mass spectrum, to be used for the relevant datasets. For those sites with no prior information, as well as for high-end stations at ports, railways and airports, conventional off-line PMF will first take place to obtain the profiles of the factors contributing to OA concentrations (HOA, shipping factor etc) **[**Chen et al., 2022]. These profiles will later be used as reference profiles for the real-time PMF where a rolling window of 5 days, moving in 1-day increments, is enabled [Chen et al., 2022].

MI-TRAP will adopt the novel methodology developed in the framework of **RI-Urbans** enabling real-time assessment of the organic and carbonaceous aerosol sources. Specifically, real-time PMF source apportionment will be performed on the ACSM organic aerosol (OA) mass spectra, on the near real-time XRF data, as well as on equivalent black carbon (BC) decomposing it to its fossil fuel combustion (BCff) and biomass burning (BCbb) fractions. These results will also be combined with CO_2 source apportionment data to determine the source-specific emission factor in real world situations [Alfoldy et al., 2023]. The main challenge in the case of elemental SA from NRT XRF is that the traffic related profiles are more dissimilar at each site when compared to that of the organic fraction. To have a realistic source profile that is relevant to European traffic sites, the knowledge gathered within the **RI-Urbans** project will be used; the relevant working group in RI-Urbans is currently led by PSI and the Imperial College of London.

Then, a new approach will be followed, according to which the data from the three instruments (ACSM/AMS, near real-time XRF, Aethalometer), that when combined provide information for a very high percentage of PM mass, will be used together as a single dataset in a real-time approach. Combining the components of PM in a single source profile will enhance the results and assist the separation between exhaust and non-exhaust traffic emissions. This separation is always a challenge and it is impossible when OA data are used alone in a single dataset. By applying this methodology in several sites of strategic interest around Europe, a base case will be established that will allow future investigation of the evolution of vehicular emission not only regarding their contributions but also regarding the chemical fingerprint that might change due to the use of new technologies on cars and fuel.

Source-specific emission factors and identification of super-polluters: This task focuses on the emission ratio determination from road vehicles and the identification of the super-polluter fraction of exhaust emissions (i.e. vehicles that may not comply with manufacturing or national emission standards). Building on the techniques and methodologies developed within H2020 projects **uCARe** and **CARES**, MI-TRAP will determine the emission ratios in diluting plumes from local combustion events. The short-term continuous regression approach presented by **[Farren et al., 2023]** will be applied to the high-resolution data sets for the quantification of different emission ratios. For example, NOx/CO2 ratios should remain approximately constant from the point of emission to the diluted plume, since both species are affected similarly by dilution. Detection of changes in NOx/CO2 ratios may be associated with aftertreatment system tampering. NOx / CO2 ratios were found to increase when the SCR systems of a range of diesel vehicles were switched off. In MI-TRAP, this approach will not be limited to NOx and CO2 as regression variables Instead, additional emission ratios will be investigated (e.g. sPN/ffCO2, bBC/ffCO2, where ffCO2 is the fossil-fuel related CO2; [Alfoldy et al., 2023]), and associated with different engine operating conditions and aftertreatment tampering. This approach can be used to quantify emissions from a range of mobile and stationary fuel combustion sources, including non-road vehicles, aircrafts, ships, and trains. At the HR-A City-Pilots, the BC and UFPs monitors will be operated at a fast time resolution mode of 1sec. Advanced analytical algorithms will be applied for high time resolution signal processing, allowing for the identification of rapidly changing events and extremes. This approach is particularly useful as it enables the detection of sudden changes or spikes in the signal that may indicate the presence of "super-polluters". Different signal processing techniques, such as Singular Spectrum Analysis, time-

frequency analysis, numerical deconvolution etc. will be used to identify deviation from expected emission factors for key pollutants

Data handling and curation. All data produced during the project will be available according to **FAIR** principles We will create a MI-TRAP database for the further exploitation in the project tools and services, which will link with different data centers (e.g. **ACTRIS**-EBAS). The **ACTRIS** parameters (Ambient PNSD, Absorption Coeff (eBC), ACSM Chemical components) will be submitted in EBAS, whereas for remaining data MI-TRAP will use the **ATMO-ACCESS** portal for homeless data. MI-TRAP project will request access for homeless data and its request will be forwarded to a respective data curator. A specific workflow will be created for the curation and storage of data. After data storage, a DOI will be assigned to each dataset.

Table 1.2.2.b: Overview of emerging datasets that will be used in MI-TRAP

Database	Short description	Link
MI-TRAP	Internal database for data management and usage within the project and higher level data products	MI-TRAP Tool web-platform
ACTRIS - EBAS	The Aerosol, Clouds and Trace Gases Research Infrastructure. Database with global atmospheric measurement.	https://ebas.nilu.no
ATMO-ACCESS	The Homeless data portal is set up to serve scientists producing atmospheric measurements resulting from research campaigns and/or TNA activities that are normally not included in any other data management system and activity.	https://www.atmo-access.eu/the-atmo-access-virtual-access-portal-has-been-launched/

1.2.3 MI-TRAP integrating management tool for air quality monitoring data, model output and traffic management

Four modeling systems with complementary capabilities will be connected into a transport management support system that informs decision makers in near real-time on traffic flows, air pollutant concentrations and noise levels attributed to transport modes in the nominated cities. We will specifically address the provision of actionable data and information on new air pollutants.

The system design consists of a chain of coordinated models controlled by a core software component. A scheduler controls the workflow including tasks like data supply, data transfer to archive and web map services for e.g. citywide pollution maps. All in- and output data are passed to and from repository holding both static (e.g. road network) and dynamic data (e.g. station measurements or traffic values. The repository runs on a high performance client/server database and stores input and result data for each calculation. Using a separate simulator module all calculations can be repeated, if desired with adjusted parameters for scenario analyses.

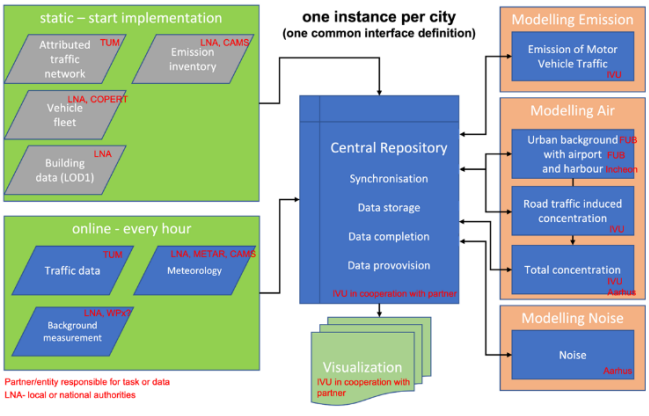


Figure 1.2.3.a. MI-TRAP integrating management tool for air quality monitoring data, model output and traffic management

To quantify the contributions the different transport modes at the regional and urban background scale we will apply the source apportionment functionality of the **LOTOS-EUROS CTM**. This open source model has been intensively used to study the particulate matter, ozone, nitrogen oxides and reactive nitrogen deposition in Europe. The model contains a labelling approach for particulate matter, nitrogen oxides and ozone, allowing to flexibly track the contributions of regions, sectors or combinations thereof. **LOTOS-EUROS** is operationally applied within the regional CAMS ensemble to provide air quality analyses, forecasts, and source apportionment information. In MI-TRAP we will setup a NRT transport oriented source apportionment service by provision of a daily analyses and short term forecasts. We will track the contributions of road traffic (separating petrol / diesel / electric; LDV / HDV; exhaust / non-exhaust), Shipping (sea going & inland), Airports and Railways. Through a nesting procedure we are able to provide this information for all major cities in Europe (as regional background) and on a 1x1 Km grid across all MI-TRAP cities.

Specifically, to quantify the contributions the different transport modes at the regional and urban background scale we will apply the source apportionment functionality of the LOTOS-EUROS CTM. These simulations will provide 1x1 Km2 calculations with source contributions of different transport modes (such as HDV/LDV, shipping, etc) including the local contribution of the sources within each 1x1 Km grid cell. The local scale modelling based on

dispersion models and AI will replace local contributions in the urban background with maps at a 25m resolution (which is a reasonable scale for traffic and shipping hotspots), enabling to address hotpots depending on activity information and urban landscape. For example, potential air-quality hotspots due to road traffic emissions will be identified using traffic data and building information as input for a segment-based detailed modelling with the monitoring system IMMISmt, thus providing concentrations along specific roads (cf. Figure 1.2.3c 'Example of using IMMISmt for city wide air pollution monitoring in Berlin' in the proposal). For some sectors, i.e. residential combustion, the emission density likely to be much more evenly distributed across urban areas making a 1x1 Km resolution sufficient. Given the importance of transport related emission in the urban background and the variability of these contributions in time, a CTM is required to arrive at a full picture required for policy support. The summed concentrations of urban background levels and local modelling will of course be evaluated against local monitoring data and the MI-TRAP observations to evaluate the performance. In addition, since our primary target are the air quality hotspots, we will apply our specialized local-scale modelling through the AirGIS System. It has the capability to predict pollution at a few meters scale and for each street. This is also why I suggested during the application preparation process that we should focus more on high-resolution modelling if our aim is to explore hotspots. AI and measured data will be seamlessly integrated into the modelling process, potentially leading to improved pollution estimates (Roode et al. 2019, Desai et al., 2022, Fu et al., 2023).

LOTOS-EUROS is applied in CAMS and within recent transport related EU projects (e.g. Scipper [**Fink et al., 2023**], **EASVOLEE**) warranting access to latest (emission) information. Evaluation against detailed PM chemical composition data and subsequent receptor modelling has shown that combustion sources are well reproduced by **LOTOS-EUROS**, except for the traffic contributions which are systematically underestimated with a hint on non-exhaust contributions. This issue will be addressed in MI-TRAP by incorporating the latest emission factors on wear and resuspension (including those derived from the intensive observations in WP2) into its emission modules that allow to calculate the spatiotemporal variability in emissions for e.g. cold starts and resuspension.

Traffic data are indispensable for air or noise emission modeling at local scales. Conventional real-time traffic flows data are collected from (expensive) stationary detectors at selected locations in the road network. Many cities do not have such a real-time data collection mechanism in place. Hence, it is challenging to obtain a reliable real-time emission analysis due to the unavailability or sparsity of the real-time traffic data. Therefore, we propose a traffic modeling approach that can be scaled to multiple cities without excessive reliance on city-specific proprietary data sources. This will be addressed by using non-conventional data (dynamic traffic volumes, link speeds, traffic composition) from commercial providers (e.g. **TomTom**, **HERE**, and **INRIX**) across cities. These data will be combined with open source data (OpenStreetMaps, traffic statistics on open data portals) and non-public traditional data (licensed data with restricted use) from cities, if available. We will use state-of-the-art machine learning models (such as Graph Neural Networks) to predict the current and future traffic volumes and speeds [**Ma et al., 2020**]. We will use these models to fill up the information missing from the traditional data sources. For data-efficient learning, we will apply transfer learning to apply these pre-trained models from one city to another city [**Mahajan et al, 2023**].

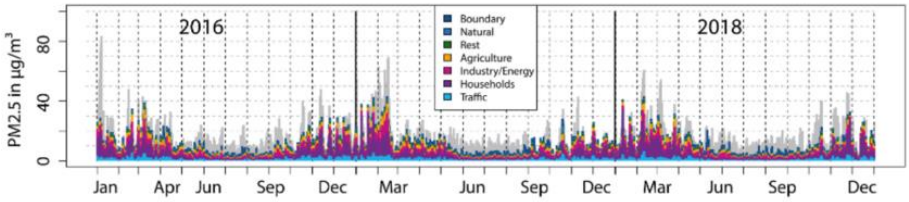


Figure 1.2.3.b. Sector contributions to PM2.5 in Berlin using LOTOS-EUROS

Several techniques exist to address the robustness of GNNs during the pre-training, training, and inference stages. For example, before model training, data pre-processing or anomaly detection can help to correct the underlying training data. During training, adversarial training (where slight noise is added to the training data) can be used to enhance the robustness of the model. These steps will be part of the overall development pipeline of the graph neural network/ deep learning model. Depending on the feedback during the model training and validation, models will be fine-tuned for their robustness (Xu et al., 2021, Jin et al., 2020, Guo et al., 2016).

IMMISmt is a real time monitoring system for urban air pollution using online traffic data, air quality measurements and weather data. We will feed the novel traffic data into IMMISmt to enable an optimized, environmental sensitive traffic management. Based on traditional data, such a system is currently operational at hourly resolution for the entire urban area of Berlin, solutions https://viz.berlin.de/luftqualitaet-clean also providing the information to the general public through a smartphone app. Operated in planning mode, IMMISmt can be used to assess the effects of intended control scenarios, thus offering important assistance in the search for suitable and effective control measures. By avoiding the use of city-specific proprietary data and connection to the urban background of LOTOS-EUROS we will create a highly scalable solution for NRT mapping and air quality management throughout European cities, which we will demonstrate for three cities (i.e. Copenhagen, Milan, Lisbon). By using the local fraction labelled with LOTOS-EUROS double counting can be avoided. The IMMISmt system will be expanded with black carbon and resuspension estimates.

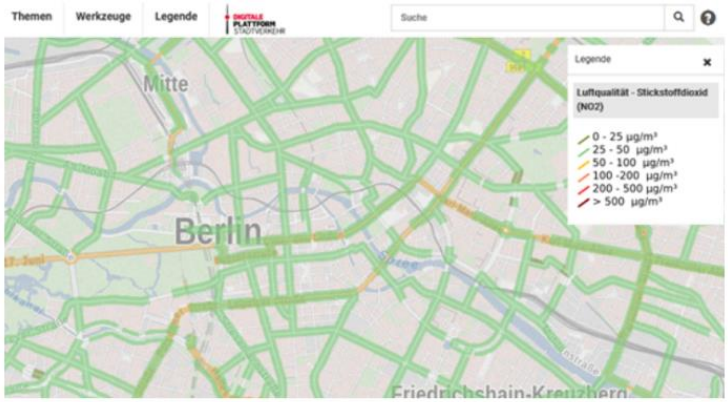


Figure 1.2.3.c. Example of using IMMISmt for city wide air pollution monitoring in Berlin

To devise a generic methodology to provide high resolution mapping of UFP and noise levels for cities in Europe we will pursue the construction of a surrogate model using statistical and machine learning methods. Recently, the functionality of predicting Particle Number Concentrations (PNC) (as a proxy of Ultrafine Particles) has been implemented in the Danish DEHM-UBM-AirGIS model system [Khan et al. 2019]. The system combined eulerian modelling (DEHM), gaussion plume modelling (UBM) and street level modelling (AirGIS), providing also the traditional pollutants NOx, NO2, PM10, PM2.5, and O3. The final air pollution estimates at address, or any location of interest, are produced via spatial aggregation of the three aforementioned model results. The system is extensively validated [Khan et al. 2019], achieving correlations with reference data up to >0.90, and has been under continuous developments and refinements. Although the system is not capable to run in NRT, the local model components can be used for training the surrogate model to be used in NRT. This approach to predict UFP will be elaborated in MI-TRAP as already implemented for Amsterdam. W.r.t noise, we will incorporate the Nord2000 model, a worldwide used and extensively validated model for noise mapping and assessment, into the modeling chain. Copenhagen and Aarhus in Denmark are the training cities for UFP and noise mapping and the model will be applied to the three cities where IMMISmt will be set up. After evaluation, the transfer modelling approach will be expanded to all core cities for both noise and air quality.

For airports MI-TRAP will integrate emission information produced in the AVIATOR EU project (Copenhagen) and the Ultrafleb project in Berlin and air quality data and emission factors from the MI-TRAP WP2 airports.

Reducing the level of uncertainty on port emissions is critical for management of these emissions in real time and assessment of how port pollution interacts with surrounding urban pollution. MI-TRAP will employ real-time ship movement information in and around ports through the Port Air Quality management (PAQman©) system (**Figure 1.2.3.d**) developed by the Incheon National University (INU). This system calculates ship air pollutant emissions by employing AIS-based Tier 3, the methodology for estimating ship air pollutant emissions that originated from the Port of Los Angeles report [Kwon et al., 2019] and is currently being proposed by the International Maritime Organization (IMO) Greenhouse Gas Study [IMO, 2014,IMO 2020,]. PAQman uses AIS to record the location coordinates and operation data to estimate ship emissions. The high-resolution emission maps will also be used as the basis for effective air quality management in port cities, and INU with FREIE U BERLIN will integrate the PAQman© application in its the modelling chain by feeding these into the highest resolution nest of LOTOS-EUROS to refine the quantification of the current (and future) contribution (by exploring mitigation options) of the "maritime traffic" source to air pollution in a city.

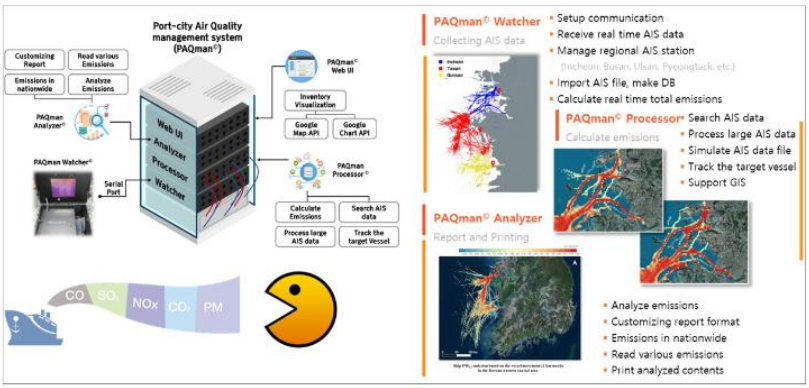


Figure 1.2.3.d. Port Air Quality management (PAQman©) system by Air/Climate Group, INU

1.2.4 Health effects

WP4 will address the link between the traffic related pollution and health. This will be accomplished by informed health impact assessment of the selected exposures and a proof of concept application of the derived exposure indices with natural mortality in a time-series design. Depending on studies availability, we will apply meta-analyses to derive the concentration –response functions (CRFs) for Europe for the association between source specific pollutants and selected health outcomes, including mortality and diseases incidence both for associations with short-term and long-term exposures. The burden of disease will be estimated, based on the framework of WHO's AirQ+ health impact assessment tool for the environmental burden of disease assessment .

Hazard quotients (HA)(exposure levels divided by the toxicological threshold) will be calculated for the pollutants under study. The uncertainty of toxicological threshold values will be evaluated, potentially considering assessment factors. Hazard quotients will be calculated using exposure and toxicological thresholds estimates. For pollutants with no known toxicological thresholds, qualitative hazard categorizations can be used, associated with a score for the risk assessment. In addition, metabolic pathways will be studied in relation to exposure and health outcomes in relation also to overlapping pathways using the meet-in-the-middle approach [**Vineis et al.,, 2020**]. Hazard Quotient (HA) and Cancer Risk Burden of disease coefficients available in the scientific literature for PM and specific chemical compounds will be used in the current study incorporating the new data on exposure – dose. Input data from Regional Screening Level (RSL) Summary Table November 2021 (Toxicity and Chemical-specific Information) will be also used in the health study. Besides, the relative risk for all-cause mortality associated with short-term exposure to Particulate Matter will be calculated using the equation provided by WHO [**Ostro, B. 2004**] and Attributable Fraction (AF). For pollutants with unknown toxicological thresholds, qualitative hazard categorizations can be used, associated with a score for the risk assessment.

We will further employ dosimetry tools to calculate the dose and retention of particles in the respiratory tract during and after exposure and clearance to the blood, esophagus and lymph nodes. This will be evaluated for different age/sex/disease status groups at the time intervals of the measurements. In the current approach the exposure – dose relationship for specific particles and the metabolized doses will be calculated by suitably adapting Physiologically Based Toxicokinetic modules[**Harapan et al., 2020**; **Rostami et al., 2022**; **Teeguarden et al., 2013**; **Phalen and Raabe, 2016**; **Sarkar et al., 2015**], in particular for estimating doses of particles. A "person-oriented modeling" approach will be followed for populations/subpopulations of interest. Total personal exposure for selected population subgroups will be calculated. Results of simulations for all virtual individuals will be aggregated to obtain statistical distributions characterizing population/subpopulation exposures and doses, and provide distributions of population variability in exposures and doses together with uncertainties[**Christou et al., 2021**]. The result of this work task will be to build a broad but precise picture (incl. uncertainty) of how we currently understand internal dose of chemicals and their clearance dynamics in the human body**.** The ExDoM2[**Chalvatzaki, and Lazaridis, 2015**] platform which will be further developed to incorporate variable lung morphologies and specific chemical species for the PBPK modelling [**Eriksson et al., 2020**, **Armitage et al., 2021**, **Idakwo et al., 2018**] will be adopted in the calculations. The respiratory tract model includes a particle clearance mechanism which allows a realistic modeling of particle transport from the nasal passage, bronchial tree and alveolar region. Materials accumulated in the tracheobronchial airways are mainly transported on the surface of the mucus layer towards the larynx, where it is swallowed and moved into the gastrointestinal tract (GIT). Deposited particles are also subject to slow clearance and subsequent uptake from the mucus layer. Translocation and disintegration assist clearance of particles deposited in small nonciliated airways and alveoli. The ExDoM2 model has a capability to predict the kinetic behavior of specific chemicals such as particle-bound metals within the body.and accounts for processes involved in absorption, distribution, metabolism and elimination in human tissues. The importance of ultrafine particles movement along the olfactory nerves in the nose to the brain and elimination pathways will be incorporated in the dosimetry models using state of the art research data. The elimination pathways in the model will include sweat, urine, biliary and feces excretion.

1.2.5 The integrated MI-TRAP toolbox

In the framework of WP5, the innovative tools, services and technological and nature based solutions, developed and demonstrated during the project, will be integrated into the MI-TRAP toolbox. The different modules of this Toolbox include: (i) Real-time maps from measurement monitoring networks for transport-related pollutants and noise and transport emission footprint; (ii) Real-time mapping tool for air and noise pollution; (iii) the Metabolism-based NBS Planning and Simulation Toolkit; (iv) the MI-TRAP Integrated Transport Emission Impact Assessment and Management tool. This toolbox is intended for different audience groups (i.e. policy makers, researchers and citizens); thus, it integrates citizen input through targeted Citizen Science experiments and is co-designed and co-created with the input of a wide range of stakeholders that are engaged in an international Living Lab setting (WP6). The toolkit will be built upon a user-friendly interface that will allow its use by non-experts, and will be made available to all relevant stakeholders.

The **first module** of the MI-TRAP Toolbox will provide near real-time (with a time resolution of 1h or better) mapping of key air pollutants (including sN10 and UFP number concentration, size resolved number concentration, OM, BC, non-refractory organics and ions, heavy and trace elements, CO2, and NOx) and noise in transport hot spots. The data will be automatically collected by the MI-TRAP pilot stations in the 10 project cities, as well as by urban traffic stations operated by the respective National Monitoring Networks (NMN) (including conventional air quality metrics, such as PM10, PM2.5, NOx and CO2). In addition, the emission footprint of the different types of transport sources (vehicular exhaust and non-exhaust, airport, port and railway) will be assessed and presented on a continuous basis. This includes source apportionment of aerosol pollution, performed within WP2 in the pilot stations (Task 2.3), the transport focused source apportionment information for the urban background (WP3) and the use of tracer ratios of emerging pollutants (as defined by the outcome of WP1). The normalized concentrations of transport-related pollutants with respect to CO2 will be further used in order to assess the comparability of these measured values with the theoretical ratios defined by city-specific emission factors (depending on vehicle fleet composition and port, airport or railway activities in the city). Deviations from the theoretical emission footprint at a transport site will reveal heavy emitters in the area (deviations from regulated emission standards, e.g. due to poorly maintained vehicles or use of "dirty" fuel) and may trigger corrective actions by relevant authorities. This data will be valuable in identifying areas where additional mitigation measures may be required. Module 1 will be critical in providing accurate and timely data on ambient concentration levels and specific emission footprints. The measured data, together with the generated level-3 data, can be aggregated on a long-term basis in order to evaluate implemented policies on transport emission sources and derive further mitigation measures.

Module 2 will link the MI-TRAP toolbox with the modeling repository (available from WP3) and will provide near real time mapping of air and noise pollution, transport focused air pollution source apportionment information for the urban background levels and local contributions for air and noise pollution. The source apportionment information will allow us to derive the impact of measures for non-reactive primary pollutants on urban background and hotspot concentrations as they behave linearly. For the response to chemical active species like NOx, a small number of scenario simulations will be performed to diagnose the non-linearity following the ACT approach [**Colette et al., 2022**] and to be able to incorporate their impact through a simple surrogate model in the mitigation tool (Module 4).

Module 3 will include the Metabolism-based NBS Planning and Simulation Toolkit for mitigating urban air and noise pollution, an on-line knowledge platform that will serve as a EU knowledge portfolio, including case studies, tools, documents, manuals, technology descriptions, training materials, info on benchmarks, standards, guidelines. It will also serve as means for conducting participatory processes and enabling communication with all relevant stakeholders. In the framework of the project, NBS will be demonstrated and assessed in 6 sites in 4 European cities. MI-TRAP approach connects NBS interventions for open public spaces with citizens' needs for improved Public Health (PH) and Wellbeing (WB). The case studies will include traffic hot spots (Milan, Gladsaxe-Copenhagen), port areas (Athens-Piraeus) and areas near airports (Milan, Lisbon). Among the NBS to be implemented are: vegetation shaded urban canopies conditioned corridors, green walls with specific species for air pollution and sound absorption, green parking areas, rows of live vegetation for shaded, heat island mitigated and microclimate-controlled environment, urban linear parks, green bus stops with vertical green panels and vertical climbing vegetation, air pollution and noise abatement green pads and vertical green curtains made of carefully selected trees and shrubs with trees increased capacity for settling of airborne particles and absorption of gases (e.g., CO2, NOX, etc.), creation of recognized open green spaces into airports with a value of calm, natural spaces in which passengers can relax and recharge, and pocket parks with green spaces. In addition, NBS already implemented in the demonstration cities in the framework of other EU projects (such as, **euPOLIS**, **Clever Cities**, **ARSINOE** and **HARMONIA**) will be also considered. NBS impact will be assessed with respect to PH and WB, as well as social and environmental results. A mixed-method approach will be utilised, which combines traditional questionnaires, ethnographies and interviews with quantitative data collected through wearable devices, behavioural games and mobile questionnaires. In addition, the solutions will be assessed through air quality and noise metrics through pilot measurement campaigns with cost effective stations established in WP2 and transported at the NBS pilot sites.

Module 4 will include an innovative long-term policy support tool which will incorporate the multiple scientifically based transport-related emission data and air quality and noise impacts collected in WP1 - 4, together with Citizen-generated data, with the objective to assist policy makers and other relevant stakeholders to identify measures to improve air quality and develop more efficient emissions and noise reduction plans, specifically targeting transport emissions. The MI-TRAP Integrated Transport Emission Impact Assessment and Management tool will (i) display long-term trends of yearly emissions (including traffic, harbor and airport emissions) and emission footprint, air pollutant concentration data from NMN stations, mapping of air pollution and transport-related pollution, population exposure to transport-related pollutants and health impacts assessment, including internal dose of pollutants, burden

of disease and hazard characterization; (ii) assess the impact of pre-defined emission control scenarios and nature based solutions on emissions, urban air quality (focusing on transport hot spots), population exposure, associated health benefits and citizen sentiment and overall health and well-being. A cost-benefit analysis will also be provided. The Tool will be based on the existing policy **LIFE Index**-Air tool. The significant experience and computational infrastructure from the **LIFE Index**-Air project will provide a valuable base for the development of the novel Tool, which will focus on transport emissions. The display function will allow for easy comparison of air quality metrics and emission footprints across different cities and regions, while the scenarios function will provide quantitative information on the impact of current or future mitigation measures. Overall, Module 4 will provide a powerful tool for cost-effective mitigation policies for transport emissions.

1.2.6 Living Lab and Citizens science

The community has been consolidated with the different Citizen Science Associations, such as the European Citizen Science Association (**ECSA**), and also different EU projects such as a Citizen Science **COST Action**, the CSA **We Observe** and the recently funded CSA EU-Citizen Science, which started in January 2019. The Citizen Science infrastructures in Europe takes the form/name of Citizen Observatories (CO), characterised by their focus on observing the urban environment (rather than other phenomena), the scale of their activities (typically local) and their timeline (typically long term). Thanks to the vast array of ubiquitous information and data they can provide, Citizen Observatories can enable authorities to obtain evidence and inform policy making actors, complementing more authoritative in-situ observation and monitoring networks and systems with a very positive cost-benefit ratio. MI-TRAP will build on existing mature co-creation activities [**Gignac et al., 2022**]for the identification of topics that affect daily life and well-being of citizens with regards to air pollution and health (citizen engagement and monitoring of social attributes). A major online survey for citizens is planned, providing reports on different cognitive and mental health responses and relate them to the air pollution concentrations. The experimentation design will consider typical relevant challenges, such as maximization of citizen engagement and representativeness. The surveys will feed MI-TRAP citizen science observatory.

Stakeholder engagement and Living Labs: Living Labs are defined by **ENoLL** as "real-life test and experimentation environments that foster co-creation and open innovation among the main actors of the Quintuple Helix Model", namely: Citizens, Government, Industry, and Academia. The LL methodology is one of the most well-known and successful approaches for developing innovations. The LL approach offers benefits to companies, users, developers, public administrations, and funders. From a territorial perspective, LL can help European Regions identify and valorise their respective economic niches and competitive advantages in the perspective of Smart Specialisation. With the participation of AMRN Social cooperative, the LL methodology of co-creation will be applied across the entire project to develop mutually valued outcomes that are the results of all stakeholders being actively engaged in the process from project initiation. MI-TRAP introduces a participatory methodology to involve multiple key stakeholders for envisioning the quality of life of citizens, outlining transformative pathways, and validating recommended solutions, towards the realization of the Zero Pollution Action plan. The LLs will take the form of participatory regular workshops, where stakeholders will work together to better understand the objectives of MI-TRAP for their territory via an analytical approach of a multi-level perspective. We propose an international LL involving stakeholders from all the case studies (in WP6). LL ecosystems operate along a systematic co-creation approach, integrating research and innovation processes in real life communities and settings, in accordance with the **living-in.eu** concept. In LLs, User-Centered Design (UCD) is promoted as a development approach in which end-users influence and are involved in design. This increases the functionality, quality, usability, and acceptability of resulting technologies and services. It typically involves identifying the intended users of a technology, or system, then ascertaining and prioritizing their needs and requirements; developing and testing prototypes; evaluating design alternatives; analyzing and resolving usability problems; and testing the design and its features with users in an iterative manner. A multi-stakeholder participation across the Quintuple Helix needs to be included since the beginning of each activity of a LL, enabling all actors to participate in the overall process from the analysis of the context, evaluation of potential barrier, co-design of the products/service, testing and development/deployment to the market. The novelty of the LL approach is indeed related to the fact that the citizens and the users are placed at the core of the overall life cycle of a living lab process.

1.2.7 National and international research and innovation activities whose results will feed into the project

Project	Funding	How is it related to MI-TRAP	Partners involved
EASVOLEE	EC	Health-related metrics, mitigation strategies, and policies are developed and identified to improve air quality, limiting the concentrations of aerosol (organic, inorganic, nanoparticles)	PSI

RI-URBANS	H2020	Service Tools from atmospheric Research Infrastructures are adapted and enhanced to better address the challenges and societal needs concerning air quality by real-time source apportionment of non-refractory particulate matter, black carbon and elemental concentration. Data and methodologies of this project will be applied in WP2.	PSI, NCSR "D" (LTP-NOA), IMT, ICPF
Port Inventories in ReAl TimE (PIRATE) & SHIPAIR	ADEME & ANR	The outcomes of these projects will help with a better real-time assessment of ship emissions in port areas and the investigation of ship plume reactivity and oxidative potential to improve atmospheric models.	IMT
EPM StanBC	EMPIR/ EURAMET	The standardization of Black Carbon-related metrics for the aerosol light absorption and the equivalent Black Carbon (eBC) mass concentration will ensure that the absorption photometers used in the MI-TRAP project comply with the new CEN procedures.	PTB, METAS, NCSR "D", HAZE INSTR
EMPIR AEROMET I & II	EMPIR/ EURAMET	The know-how of traceable calibration procedures for air quality monitoring systems, including condensation particle counters and mobility particle size spectrometers developed under this project will be transferred to WP1 of MI-TRAP by PTB, METAS and NCSR Demokritos.	NCSRD, DTI, PTB, METAS
COST COLOSSAL	EU	Data and methodologies of this project will be used in WP2 to study the online chemical composition and source apportionment of fine aerosol	PSI, IMT, NCSR "D", ICPF
MOMENTUM	H2020	The expertise of this project is directly linked to WP3 in formulating, calibrating and validating data-driven models of mobility systems, including the incorporation of new technologies and in developing interactive tools for mobility monitoring, intervention, and management	TUM
EU-LIFE Index-Air	EU-LIFE	The management tool developed by this project will have an important role in WP4 and WP5 in quantitatively evaluating the impacts of policies on human exposure to air pollutants, as well as plan new ones.	NCSR "D", TUC, IST ID
EXHAUSTION	H2020	The outcomes of this project in cardio-pulmonary impacts and benefits of mitigation and adaptation of the exposure to air pollution in Europe will be linked to WP4.	NKUA
ExpoLIS	FCT	The air quality exposure sensing system, composed by a network of sensor nodes deployed on public transportation to obtain the real-time air pollution distribution in urban areas developed by expoLIS will give an important support to WP2.	IST ID
DivAirCity	H2020	The results in terms of NBSs and their impact assessment will constitute a solid basis for the MI-TRAP project.	DTI, AU
ATMO ACCESS	H2020	Solutions for Sustainable Access to Atmospheric Research Facilities	NCSR "D", ICPF, AU, PSI
ACTRIS IMP	H2020	Aerosol, Clouds and Trace Gases Research Infrastructure Network Implementation Project	NCSR "D", ICPF, AU, PSI
PINETI-IV	PINETI-IV	FREIE U BERLIN participates as model developer to improve the meteorological driver and process descriptions of LOTOS-EUROS, which will be useful for WP3 of MI-TRAP.	FREIE U BERLIN
MOSAIK-II	BMBF	The development of the emission interfaces and the atmospheric chemistry and deposition modules for this project will be applied in WP5 of MI-TRAP.	FREIE U BERLIN
HOT-C	BMVI	The emission model of this project incorporates the gridding procedures of the CAMS emission inventory and extends it with routines to determine the temporal emission variability based on meteorological conditions for e.g. traffic.	FREIE U BERLIN
ARSINOE	H2020	The outcomes of this project creating climate-resilient regions through systemic solutions and innovations will be advantageous for WP5.	AMRN
DivAirCity	H2020	The results in terms of NBSs and their impact assessment will constitute a solid basis for the project.	DTI, AU
HARMONIA	H2020	NBSs for people's wellbeing in terms of climate, ecological and socio-economic conditions developed in this project will be of importance for WP5 of MI-TRAP	POLIMI

1.2.8 Multi- and interdisciplinary characteristics of the project and integration of social sciences

The structure of planned activities, the work packages, the expected results, the tools to be developed, tested and implemented in MI-TRAP project are interdisciplinary. To deliver the objectives and expected results of the project we brought together a wide range of expertise needed to develop, apply, test and validate the MI-TRAP tools and solutions as well as to communicate, disseminate and exploit the innovations produced to ensure real and lasting impact for the project. MI-TRAP brings together air quality and modelling experts, epidemiologists, citizen science and citizen engagement experts, Data analytics/ AI experts (incl. Machine Learning) and IT integration, experts on NBS, as well as public authorities, utilities, local authorities, NGOs and local partners involved in the Case Studies. **Social science** is a relevant part of the project. In the 2030 Agenda for Sustainable Development, ***sustainable transport*** is mainstreamed across several SDGs and targets, especially those related to food security, health, energy, economic growth, infrastructure, and cities and human settlements. The importance of transport for climate action is further recognized under the **UNFCCC** - the transport sector will be playing a particularly important role in the achievement of the Paris Agreement, given the fact close to a quarter of energy-related global greenhouse gas emissions come from transport and that these emissions are projected to grow substantially in the years to come. *MI-TRAP will support efforts towards improved air quality* in urban environments by developing and demonstrating innovative technologies, tools and services that allow for real-time monitoring of climate- and health-relevant air pollutants (WP1, WP2), *transport emissions and management of transport traffic* (WP3), health impact assessment (WP4) and air *pollution mitigation by nature based interventions* (WP5). The products and solutions proposed will support Sustainable Development Goals (SDGs) for ***good health and well-being*** by promoting different intervention approaches to improve air quality and reduce exposure to health-relevant pollutants (e.g. PM2.5, black carbon, UFPs, NOx, noise). MI-TRAP will follow a ***citizen science approach*** to raise environmental awareness, promote a future of healthier quality of life and increase public engagement in scientific research, which will in turn encourage individuals to take an active role in their communities. Air pollution is a major public health issue and is often linked to inequality, as marginalized communities are often exposed to higher levels of air pollution. MI-TRAP can help reduce inequality within and among countries, by ensuring that all individuals, regardless of their location or socio-economic status, have access to clean and healthy air.

1.2.9 The gender dimension

Regarding the MI-TRAP activities, the project essentially addresses the needs of both sexes. The various activities are generally sex/gender neutral, while its work will address the needs of both female and male stakeholders. Epidemiological analyses have shown gender differences in the health effects of air pollution, due to both socially derived gendered exposures and sex-linked physiological differences [**Clougherty, 2010**]. Different gender specific health effects will be elaborated in the analysis of WP4. This will be done by using the latest results about the sex/gender response to transport-related pollutants and the corresponding population distributions in Europe. All gender-related data will be treated in a privacy preserving manner and will be managed according to the legislation and in compliance with the EC data directive. It is important to ensure aspects of all genders have a balance of gender representatives among end users and stakeholders. Thus, the engagement activities in WP6 will address all genders. The project will consider gender dimension on its research outputs, ensuring that the solutions are not gender biased and are not discriminatory. In MI-TRAP, we aim to address gender equality as well as diversity during the recruitment of postdocs and PhDs, following the **European Charter and Code for Researchers**. To this end, care will be taken to word the position advertisements in such a way that they appeal equally to all genders.

1.2.10 Open science practices and research data management

In line with the expected outcomes of this funding call, MI-TRAP will impact on society by providing scientifically based knowledge that will support authorities and citizens, resulting in healthier environment. The MI-TRAP consortium recognizes the importance of **Open Science** and considers its practices as an integral part to the project methodology. Thus, it will provide unlimited open access to its research outputs. MI-TRAP will ensure Open Access (preferably "gold or diamond") to peer-reviewed publications. All publications will be published under an open license, ideally the Creative Commons Attribution license (CC BY) or equivalent. At the same time, the consortium will deposit the research data needed to validate the results presented in the deposited scientific publications. MI-TRAP will be encouraged to publish project results under **Open Research Europe** and the **European Open Research Cloud**. Hence the data and publication strategy will be aligned with the policy and recommendations on "**Reproducibility of scientific results in the EU**".

A large amount of data will be produced in the framework of MI-TRAP implementation. MI-TRAP data will be produced both in the form of numbers, videos, images. All data will be stored primarily on the institutional secured servers, supported by regular backups, as well as to a cloud server accessible by all partners. The consortium institutions hold high security standards, and data is stored in password-protected environments that ensure secured access to the data only to authorised users. Datasets will be documented with descriptive metadata (e.g., the title/name

of the data set(s), data creator(s)/author(s), abstract, keywords, date of data production, publisher, and persistent identifier). If needed, README files for Meta data will be created to ascertain reusability, reading and interpretation of datasets. We will create a MI-TRAP database, which will link these different sources of observations hosted at different data centers (**ACTRIS**/**EBAS**, **ATMOS-ACCESS**) and trusted repositories (e.g. **Zenodo**), using the metadata standards and formats required by the repositories. All data collected will be shared following the Findable, Accessible, Interoperable and Reusable (FAIR) data principles and the Data Management Plan (DMP) (WP7). We will create a MI-TRAP metadata base, which will link these different sources of observations hosted at different data centers. DMP will address (a) data set reference and name (unique identifier for the data produced), (b) data set description (description, origin, nature, scale, reuse, integration, publish ability, etc.), (c) Confidentiality (by data set, to enable successful exploitation), (d) standards and metadata (reference to standards, how metadata will be created, etc.), (e) data dissemination and policies for data sharing and public access (policies and provisions for re-use, re-distribution and production of derivatives, access procedures, data sharing practices etc.), (f) plans for archiving and preservation (including storage/backup), (g) a comprehensive data-protection policy; and (h) IP protection, including the selection of data streams for external publication, to avoid conflicts with IP protection.

Ethical Aspects and Privacy Issues: Concerning data security and privacy issues, the DMP will consider the EU directives related to both users' rights relating to electronic communications networks and services, to the processing of personal data and the protection of privacy in the electronic communications sector. The key EU directives are the 2002/58/EC, otherwise known as **ePrivacy Directive (ePD)**, and the (EU) 2016/679, also known as **General Data Protection Regulation (GDPR)**. The project's Ethic Board (WP7) will ensure that the datasets are properly anonymised to permit their release. Further, Consortium members will be bound by their institutional ethics structures, while in general, the DMP principles are designed with the aim to ensure integrity, quality and transparency.

2. Impact

2.1 Project's pathways towards impact

2.1.1 Contribution of the project results to the outcomes from the call topic

The contribution of MI-TRAP towards the expected outcomes of the call and how these will be achieved are described below (EO# refers to Expected Outcome):

EO#1: Real-time Monitoring and Characterization of Transport-related Emissions in Urban Areas
Aiming to bridge the gap between transport-emission standards and real-world emissions, MI-TRAP will develop, evaluate and deploy innovative technologies and methodologies for in-situ real-time monitoring of the transport – related emission sources (City Pilots), targeting not only on regulated air pollutants but also on non-regulated and emerging ones (solid PN, UFP, bBC, BC, non-refractory organics and inorganics, elemental composition, NOx/NO2, CO2, and noise). To ensure maximum uptake, MI-TRAP will invest on innovative technologies with high time resolution. The proposed techniques will be translated into two complete instrumentation packages to form the High-Resolution Advanced stations and the Cost-Effective Compact stations that will be deployed in the hotspots during the City-Pilots. The specifications of these stations and the measurement procedures will be derived within the WP1. To establish the link between fleet composition and traffic-related emissions, individual car monitoring and image processing will be conducted by means of state-of-the-art approaches. Using NRT source apportionment and fast signal processing techniques the source-specific emission factors will be determined and "super polluters" will be identified. The Data Management Plan will outline how data will be collected, organized, stored, shared and reused throughout the course of the project.
Assessment Indicators: No of new datasets for air pollutants (microphysical properties, chemical components), GHGs, noise, emission factors, NRT-SA, traffic-relevant metrics (n ≥7), No of innovative products/methodologies to be developed/improved (n ≥5) (e.g. Impactor optimized for TXRF analysis, Catalytic stripper for solid Particles, Portable Diffusion Charger for sPN including UFPs, portable filter tape sampler, PTAAM-2λ)
EO#2: Providing recommendations concerning the standardization effort of sensing/monitoring technologies
In order to ensure reliable and reproducible measurement, the consortium will provide traceable calibration materials, uncertainty budgets for each of the air quality metrics and measurement methods, and guidelines for in-field calibration and verification of the instrumentation to be deployed (in WP1). MI-TRAP will leverage the advantages of high-end technologies, to optimize and fine tune the performance of cost-effective systems, ensuring that accurate and reliable results will be provided. The proposed measurement methods will be either selected from previous work and CEN standard methods or currently running projects for the emerging pollutants, or state of the art methods implemented for the regulated parameters.
Assessment Indicators: No of measurement protocols (n ≥2) (D1.3, D1.4)

EO#3: Real-Time Maps and Networks for Monitoring Noise, sPN and Emerging Pollutants and GHGs Including Nature-Based Solutions
As part of WP2, City-Pilot studies will be organized in ten cities across Europe. In each city, a network of three stations will be established at selected sites. The stations will be situated in locations that are heavily impacted by vehicular traffic, such as motorways, ring roads (Traffic-Pilots), as well as around ports (Port-Pilots), airports (Airport-Pilots), and rail-stations (Rail-Pilots) for monitoring noise, GHGs and emerging pollutants. The network of pilot monitoring stations will be demonstrated to operate in a reciprocal feedback mode in order to provide NRT data (WP2) and become operational in the WP3 (Four modeling systems with complementary capabilities will be connected into a transport management support system that informs decision makers in near real-time on traffic flows, air pollutant concentrations and noise levels attributed to transport modes), WP5 data products and traffic management solutions. The MI-TRAP toolbox (WP5) will make use of the ambient concentration data (module 2) from two sources: the National Monitroring Networkds (NMN) for conventional metrics, and the data from the City-Pilots (incl sPN, PN, BC), to provide real-time mapping of the air quality in the MI-TRAP sites. As part of WP3, air pollution (incl. UFPs) and noise information that is being collected and modelled will be visualized on an online dashboard, whereas a highly scalable solution for NRT mapping and air quality management (IMMIS^{nrt}) throughout European cities will be created, which we will demonstrated for selected data-rich cities (No 3). For shipping emissions MI-TRAP will build an API server for displaying ship traffic by means of their PAQman©-watcher. In the framework of MI-TRAP, evidence, good practices and lessons learned on NBS will be collected. NBS will be designed and applied in traffic hot spots (Milan, Gladsaxe-Copenhagen), port areas (Athens-Piraeus) and areas near airports (Milan, Lisbon) and their impact will be assessed through air quality and noise metrics (i.e. pilot measurement campaigns will be organized), as part of WP5.
Assessment Indicators: No. of City-Pilots (n= 10), No. of monitoring sites (n = 30), No of maps (n=2) (i.e. one map with modelled data and one map with observations from the city pilots)
EO#4: Real-time Data Integration for Dynamic Emissions and Noise Reduction Plans in Transport Management
MI-TRAP will develop dynamically updated web-based databases from MI-TRAP traffic and modeling output, so that intervention and management of traffic and emissions are quantified, evaluated and documented for short- and long term assessment and policy making. The MI-TRAP integrating management tool (WP3) for air quality monitoring data, model output and traffic management, is a transport management support system that informs decision makers in near real-time on traffic flows, air pollutant concentrations and noise levels attributed to transport modes. NRT transport oriented source apportionment will provide daily analyses and short term forecasts and will track the contributions of road traffic (separating petrol / diesel / electric; LDV / HDV; exhaust / non-exhaust), Shipping (sea going & inland), and Airports. The MI-TRAP repository containing transport, air pollution and noise information that will be collected and modelled within WP3 will be visualized on an online dashboard equipped with functionalities that will allow a degree of user interaction based on pre-calculated scenario data. The dashboard will be used in the MI-TRAP toolbox (WP5) for displaying the scenarios for the support of policy decisions.
Assessment Indicators: No.of simulation runs/scenarios (n ≥5), No of integrated tool for dynamic emissions and noise reduction (n=2), Technical and functional documentation of the tools/manuals (n=2)
EO#5: Supporting health studies about the impact of ultrafine particles according to recent WHO guidance
MI-TRAP will address the link between the transport related pollutants and health (in WP4, WP5). As part of WP4, we will perform a systematic review of existing epidemiological studies to assess current evidence on the association between short- and long- term exposures for the targeted air pollutants, focusing on UFPs and BC. This will be accomplished in a time-series design. A systematic review of the health effects of long and short-term exposure to source specific pollutants (UFP, BC, metals etc) and noise in Europe will inform meta-analyses to derive the concentration-response functions for the associations between them and selected health outcomes, including mortality and diseases incidence. The health burden and impact of UFP and BC will be quantified based on the framework of WHO's AirQ+ health impact assessment tool for the environmental burden of disease assessment. The Integrated MI-TRAP toolbox will combine field and modelled emission data to estimate the exposure risk of population in the urban environments, providing much new knowledge about the interactions between the transport emission sources, ambient concentrations of air pollutants, related exposures and dose estimates, and impacts human health.

Assessment Indicators: Scientific publications (n ≥2), Report on Health Impact Assessment for traffic exposure (n=1), Report on the use of concentration and dose indices for determining health effects arising from epidemiological studies (proof-of-concept) (n=2)
EO#6: Providing recommendations concerning the use of nature-based solutions for mitigating urban air and noise pollution
MI-TRAP will collect evidence, good practices and lessons learnt on nature based solutions (NBS) and related processes in urban planning through extensive literature review, relevant projects, meaningful participatory processes, results of experts-and-citizens exchange and experiences from cities and involved partners. MI-TRAP solutions will be demonstrated in 6 sites in 4 European cities. Customized spatial solutions will be designed and implemented at each site. Their impact will be monitored and assessed, with respect to Public Health (PH) and Wellbeing (WB), as well as social and environmental results. In addition, they will be assessed through air quality and noise metrics with pilot measurement campaigns with cost effective stations established in WP2 and transported at the NBS pilot sites. The knowledge collected, will be made available in a systematic manner through the Metabolism-based NBS Planning and Simulation Toolkit MI-TRAP Toolbox. module 3), that will serve as an EU knowledge portfolio, including case studies, tools, documents, manuals, technology descriptions, training materials, info on benchmarks, standards, guidelines and offering fully integrated solutions and tools to planners, community organizers and policymakers ready to use in future interventions.
Assessment Indicators: No. of NBS-tools (n=1) (i.e. Metabolism-based NBS Planning and Simulation Toolkit), No of NBS applied (4 cities, 6 sites) (n ≥25), Policy relevant recommendation document (including policy briefs) (n=1)_
EO#7: Stimulate citizen awareness and engagement in the Zero Pollution strategy (also through citizen science approach)
MI-TRAP will foster a two-fold citizen awareness and engagement approach (WP6). Firstly, it will follow a top-down approach through the participatory processes of an International Living Lab (LL) consisting of high-level stakeholders. The LL will take the form of participatory regular workshops, where stakeholders will work together to better understand the objectives of MI-TRAP for their territory via an analytical approach of a multi-level perspective. Secondly, MI-TRAP will also implement a bottom-up citizen awareness and engagement strategy, through the use of citizen science tools, initiating and establishing a digital communication channel between citizens and MI-TRAP for a dialogue on the basis of the main objectives of the Zero Pollution strategy for air, building awareness on the effects of air pollution on people's health, the loss of biodiversity, and the ability of ecosystems to provide services, socio-economic and moral implications, as well as potential documented systemic solutions and interventions, such as nature-based solutions. Policy briefs will be shared with strategically selected policy dissemination channels in EU and national levels, aiming at the smooth implementation of the Zero-Pollution strategy. The policy briefs will include circles relevant to raising awareness, capacity building, and solutions uptake, replicability and scalability.
Assessment Indicators: newsletters (n=8), press release (n=4), factsheets and inforgraphisc (n=5), LLs (n ≥3)

2.1.2 Description of the target groups

MI-TRAP aims to demonstrate the critical role of traffic-related pollutants in air quality and human health and the subsequent need for setting threshold and standards for both regulated and unregulated ones. The project is very multidisciplinary, and our results target multiple professional groups, policy makers and public authorities, and the public. The project's targets groups are summarized below:

Scientific Community/Academic Institutions: The MI-TRAP project aims to provide new scientific knowledge and a new methodology to evaluate air pollution from transportation emissions and its impact on air quality and human health, while also providing recommendations for mitigation measures with the use of innovative nature-based solutions. Higher education institutions and research organizations, epidemiologists, air quality scientists, Climate Specialists, engineers, social and political scientists are among the key target groups of the project.

Local/regional authorities, policy makers, regulators: MI-TRAP will establish a novel methodology and guidelines to strengthen air quality monitoring by means of state-of-the-art instrumentation of emerging transport-related pollutants with health-relevant impact. The Integrated Transport Emission Impact Assessment tool has a considerable scientific and technological impact in modelling the connection between the transport emissions, air pollutants concentrations and exposure. The tool will incorporate modelled transport emissions and measured emission factors for regulated and emerging pollutants, to provide relevant exposure and health impact assessment outputs, while allowing for different scenarios to be tested. MI-TRAP will bring together different enforcement authorities (e.g., environmental, transportation, health) to exchange best practices. Among this target group local and regional authorities' managers and practitioners, health authorities, air quality, as well as transport authorities, climate authorities, and environmental managers are included. More specifically The Piraeus Municipality in the Athens

Metropolitan area, Loures Municipality in Lisbon, the Department of City Resilience - Environmental Transition Direction in Milan and several Regions like the Regione Toscana (Tuscany Region) the Regione Lombardia – Giunta, Direzione generale ambiente e clima have declared their interest to act as stakeholders during the project. Regional and National Air quality Monitoriong Networks like YPEN in Greece (NCSR "D" is already contracted for PM10 metal monitoring), Atmo Haute-de-France, the Danish Centre For Environment And Energy (AU is contracted for air monitoring), Senatsverwaltung für Umwelt, Mobilität, Verbraucher- und Klimaschutz in Berlin, Gemeente Rotterdam with their Luchtclub, will act as stakeholders and collaborate in many occasions in data sharing and co-locating the MITRAP station network at their measurement sites

***Technology developers and providers**:* This target group includes Small and Midsize Enterprises (SMEs), automotive industries, as well as instrument development companies and smart solution providers. This targeted group will gain new insights from MI-TRAP concerning exhaust emissions and will benefit from the new methodology proposed.

International, European and national networks, clusters and multipliers: The characterization of emissions of regulated as well as non-regulated metrics based on traffic load and vehicle types will lead to new breakthrough scientific discoveries that will alter mitigation strategies and legislation. Innovative technologies Associations, Environmental platforms, and stakeholders (WHO, UNECE, UN, OECD, EEA, industries and companies, listed in more detail in **Table 2.2.1.c**) are among the parts interested in this target group.

Investors, Entrepreneurs and banks: Investors, banks, trust funds, participatory funds, and foundations will share great interest in MI-TRAP project.

NGOs, citizens, public: MI-TRAP will assess the impact of transportation emissions on air quality and human health. MI-TRAP will foster the spread of the obtained knowledge through dissemination, adopting a strategy of open science and active participation in the project implementation. The results of MI-TRAP will generate significant benefits for the public and population subgroups (means of transport workers or users, drivers) by improving citizens' quality of life, promoting attitude change towards pollution-free environment, encouraging the creation of tools to support Zero-Pollution strategy and health-oriented environmental policies.

2.1.3 Scale and significance

The transport sector is one of the largest contributors to air pollution, with road transport alone responsible for more than 73.1% of all greenhouse gas (GHG) emissions in the EU [**EEA, 2019a**]. Additionally, the transport sector accounts for about a quarter of the EU's total CO2 emissions, with 71.7% of those emissions coming from road transportation [**EEA, 2019b**]. The impact of the transport sector on air pollution is not limited to GHG emissions. The sector is responsible for more than half of all nitrogen oxide (NOx) emissions, with road transport accounting for more than 30% of NOx emissions, particularly in urban areas [**EEA, 2021**]. International shipping and aviation account for 16% and 6% of NOx emissions, respectively. The transport sector is also responsible for 20% of total PM2.5, with road dust being the main contributor (12% of the EU's exhaust and non-exhaust PM2.5 emissions come from road transport; [**EEA, 2016**]), along with international shipping (7%). Non-exhaust emissions are a growing concern as a share of all primary emissions in the EU28, increasing from 2.9% in 2000 to 5.2% in 2018 in the case of PM2.5 and 4.0%–6.7% in the case of PM10 [**EEA, 2019c**]. Recent estimates reported by the [**OECD, 2020**] suggest that the total amount of non-exhaust particulate matter (PM2.5) emitted by passenger vehicles worldwide is likely to rise by 53% by 2030 from a 2017 baseline. For road transport emissions of PM2.5, exhaust emissions are the principal source (24%), with road dust contributing 11%, brake wear 9%, and tire wear 2%. Non-tailpipe emissions are not actively regulated and are expected to exceed tailpipe emissions to become the primary source of PM pollution in near-road environments. Noise pollution also has significant health impacts. Around 100 million people are exposed to road traffic noise above 55 dB in the 33 member countries of the **EEA**, with 32 million exposed to very high noise levels (above 65 dB). Railways are the second-largest source, with 19 million people exposed above 55 dB. Despite efforts by Member States to reduce transport-related emissions, air pollution remains one of the largest environmental health risk in Europe. The scale and significance of the challenges posed by air pollution and noise require a coordinated and comprehensive response. MI-TRAP will address these challenges through a multi-level approach that combines innovative monitoring devices and data analysis tools, Nature-based Solutions (NBS), and citizen science practices. By doing so, MI-TRAP will significantly contribute to improving air quality and addressing environmental challenges in urban areas.

2.1.4 Long-term impact towards the destination and mission targets (wider impacts)

The contribution of MI-TRAP towards the Long-Term Impact goals (LI#) are described below:

Reference in the direct call of the destination/mission:

The expected impact, in line with the Strategic Plan, is to contribute "*Towards climate-neutral and environmentally friendly mobility through clean solutions across all transport modes while increasing global competitiveness of the EU transport sector*", through:

LI#1: Transforming Road transport to zero-emission mobility through a world-class European research and innovation and industrial system, ensuring that Europe remains world leader in innovation, production and services in relation to road transport.

The MI-TRAP project proposes innovative air pollution monitoring and transport management systems and tools (WP3, WP5), as well as the implementation of Nature-based Solutions (NBS) in selected sites (WP5), to minimize the impact of road emission on air quality and health and promote zero-emission mobility across Europe's transport system. The project's interdisciplinary approach and comprehensive strategies will help adopt new technologies and policies to reduce emissions, monitor their impact and effectiveness and enhance sustainability, thus ensuring that Europe remains a world leader in this field.

LI#2: Accelerating the reduction of all aviation impacts and emissions (CO2 and non-CO2, including manufacturing and end-of-life, noise), developing aircraft technologies for deep reduction of greenhouse gas emissions, and maintaining European aero-industry's global leadership position.

In WP2, city-pilots will be conducted at 5 European Airports. Data collected will be used in the MI-TRAP toolbox to map air pollutants and noise in real-time. MI-TRAP will also integrate emission information produced in the **AVIATOR** EU project (Copenhagen) and the **Ultrafleb** project in Berlin and air quality data and emission factors from the MI-TRAP WP2 airports (WP3). The specific footprint of aviation emissions will be assessed and deviations from theoretical values may prompt corrective actions by authorities. NBS will be designed and applied at Lisbon and Linate airports to assess their impact on Public Health and Wellbeing. The Metabolism-based NBS Planning and Simulation Toolkit (MI-TRAP toolbox, module3) will serve as an EU knowledge portfolio offering fully integrated solutions and tools to planners, community organizers and policymakers ready to use in future interventions. The innovative Integrated Transport Emission Impact Assessment Tool (WP5) will assess the long-term impact of technology and legislation on air quality and human health, and identify effective measures and sustainable practices to improve air quality and reduce emissions and noise from transport sources, including airports.

LI#3: Accelerate the development and prepare the deployment of climate neutral and clean solutions in the inland and marine shipping sector, reduce its environmental impact (on biodiversity, noise, pollution and waste management), improve its system efficiency, leverage digital and EU satellite-navigation solutions and contribute to the competitiveness of the European waterborne sector.

Reducing the level of uncertainty on port emissions is crucial for the development of tools to manage these emissions in real time and to better analyse the interactions between port pollution and surrounding urban pollution. Collection of vessel activity at the harbor Pilots will be implemented by installing PAQman©-watcher (INU). It will collect data for ship activity to estimate ship air emissions in all MI-TRAP port cities. As part of WP3, MI-TRAP aims to integrate the Port Air Quality management (**PAQman©**) system (AIS-based) in its modelling chain (real-time ship movement information), so that the current (and future) contribution (by exploring mitigation options) of the "maritime traffic" source to air pollution in a city can be defined and relevant mitigation strategies can be assessed (WP5). High-resolution modelling and maps of ship air emissions (shipping emission modeling) that will be produced in WP3 may be used as the basis for effective air quality management in selected ports. Thus, by developing innovative technologies that will help mitigate the environmental impact of shipping activities, MI-TRAP aims to promote the adoption of clean and sustainable solutions in the shipping industry, including the reduction of noise pollution.

LI#4: Devising more effective ways for reducing emissions and their impacts through improved scientific knowledge.

Innovative monitoring devices and data analysis tools will be developed by MI-TRAP to track emitted pollutants, including unregulated and emerging transport-related air pollutants. The project will identify the contribution (through modelled and in-situ data) and specific footprint of transport emission sources, evaluate the compliance of the measured emissions with current emission standards, and develop tools for short- and long-term assessment of the impact on air quality and human health. The project's tools, services, and solutions (e.g. MI-TRAP toolbox, Coupled Air pollution/Traffic management system, NBS, Living Labs and Citizen Science) will support the Zero Pollution action plan targets, while exploring ways to raise greater awareness among target groups and relevant stakeholders.

2.1.5 Requirements and potential barriers for the desired outcomes and impacts

MI-TRAP will take strong action to ensure its visibility as a reliable source of scientific information, through transparency, inclusivity and close collaboration with the relevant authorities. In Table 2.1.6 specific barriers and planned countermeasures are summarized for different impact levels.

Table 2.1.5.a Barriers and planned countermeasures for different impact levels

Level	Specific Barrier	Countermeasure
Technological	Lack of reliable cost-effective technologies for real time monitoring of key unregulated and emerging pollutants Difficulty in coordinating and integrating data from multiple sources to develop a real-time monitoring and traffic management tool. Limited availability of data and analytics tools to support data-driven decision making.	Building on existing knowledge and experience, MI-TRAP will invest in developing and optimizing innovative measurement technologies; develop laboratory-based and field validation standards; perform pilot testing and fine-tuning of the instrumentation in real-world settings to gather data and optimize effectiveness; MI-TRAP will built on previous knowledge to upgrade, expand and develop innovative tools to monitor and assess the short- and long-term impacts of transport-related emission on air quality and human health ; collaborate with transportation agencies and departments to gather and share traffic-relevant data
Policy and Regulatory Environment	Lack of supportive policies or regulations to encourage the implementation of the proposed solutions. Resistance to change and lack of political will to enact meaningful policy reforms	Engagement with policymakers and decision makers to advocate for supportive policies and regulations that incentivize and facilitate the implementation of the proposed solutions; work with regulatory agencies to identify and address any barriers to implementation; bring together a coalition of stakeholders at early project stages, including industry leaders, community groups, and public authorities, to advocate for policy changes; engagement in initiatives to influence policymakers and decision makers; communication of the MI-TRAP products, services and solutions to relevant stakeholders in a comprehensive and non-technical way (policy briefs, recommendations etc)
Societal	Limited public awareness of the impact of air pollution on human health and the environment, and the potential benefits of nature-based solutions. Difficulty in engaging and motivating citizens to participate in communication and dissemination efforts.	Development of targeted outreach campaigns to raise awareness; collaboration with target groups and stakeholders to promote engagement and participation, development of user-friendly and accessible tools that allow citizens to easily receive updates on the project's progress; collaborate with community groups to build a network able to help with communication efforts and increase awareness
Business/Market Exploitation	Difficulty in identifying viable business models or commercializing the proposed solutions. Lack of awareness or interest from potential investors or industry partners	Adoption of measures to increase awareness; develop partnerships with the private sector to help bring solutions to market, explore innovative financing models; develop a targeted outreach campaign to promote the benefits of investing in the proposed technologies that can be readily used in practice in large scale

2.2 Measures to maximise impact - Dissemination, exploitation and communication

2.2.1 Dissemination, communication and exploitation plan

The plan for the Communication, Dissemination and Exploitation of the project's results encompasses a comprehensive series of actions to ensure uptake of the results of the widest audience possible. MI-TRAP will develop and execute from the very beginning a comprehensive communication, dissemination and exploitation strategy to maximise the impact of the project's activities and outcomes. These measures will cut across all WPs, and WP6 activities will specifically aim to maximise the impact of project activities through the dissemination of project results to a wide range of stakeholders helping drive innovation in improving human health and protecting the natural environment.

Communication plan: In order to ensure a smooth interaction and flow of information from the initial stage so that partners can share information, get updated on activities and relevant documents in a timely manner, there are several communication platforms and project management tools that will be used, including: 1) mailing lists, 2) documents sharing platform, 3) face-to-face or online meetings, 4) teleconference meetings. The communication plan that will be followed in MI-TRAP project aims to implement activities that inform the public regarding the key objectives of the project. The key message to be communicated will focus on the priority and relevance given the impact of transport-related emissions on air quality and human health. Communication activities will ensure the branding of the MI-TRAP project and will support consortium members to communicate key messages of the project in uniform, consistent and professional manner. The main communication activities to be implemented during the project are described in **Table 2.2.1.a**.

Table 2.2.1a: Communication plan

COMMUNICATION MATERIALS		
Project logo & templates	Time: M2	Target: 1 visual identity kit
A visual identity for the project will be defined and adapted to the different materials that will be used to communicate and disseminate. It will include a project logo and different templates (Word, PPT, deliverables, attendance list, agenda, etc.)		
Flyer and Poster	Time: M5	Target: 2 flyers & 2 posters
A first flyer & poster will be developed at the beginning of the project to present its main activities in a visual way. The flyer & poster will be used to communicate with external stakeholders and facilitate the comprehension of the project. A second version of the flyer and poster will be produced in Year 3 to put forward the results and outcomes of the project.		
Roll-up and banner	Time: M5	Target: 1 customizable roll-up & 1 banner
Generic and customizable roll-ups and banners will be created to be used for specific exhibitions, conferences and events.		
Project documentation	Time: Ongoing	Target: all public deliverables
All public deliverables will be made available on the project's website and short extracts of the deliverables will be summarised in the website's news and advertised on social media for publicity.		
COMMUNICATION CHANNELS		
Website	Time: M3	Target: 1 website / 2 news per month / 10,000 visitors
The dedicated project website will be constantly updated and will provide all information on the development of the project, including objectives, partners, results, publications, news, and events. The website will also include links to the social media sites of the project (e.g. Twitter, LinkedIn).		
Social media	Time: M3	Target: 3 social media accounts with over 400 followers
MI-TRAP will primarily use LinkedIn, Twitter and YouTube. If needed, additional social media accounts on different platforms (Facebook, Instagram, etc.) could be created according to trends and needs.		
COMMUNICATION ACTIVITIES		
Newsletters	Time: every 6 months	Target: 8 newsletters
One newsletter every 6 month is planned, consisting of a short summary of work and progress made and next events in the project, including scientific related news in an easy-to-read format.		
Press release / project communication	Time: continuous	Target: 1 per year

Short 'press release-style' project communications will be prepared, one at the beginning, one at the end, and after important milestones.		
Factsheets and infographics	Timing: ongoing	Target: 5+
Factsheets and infographics revolving on Case Studies developments will also be edited and updated during the project for promoting its developments.		
Videos & interviews	Timing: ongoing	Target: 5+
Multiple videos will be created to communicate about the project in a visual manner to increase awareness and interest in the project. It will notably enable the project to reach specific target groups (including the general public), especially through local and regional media.		
Scientific publications	Timing: ongoing	Target: 10+
MI-TRAP partners aim to create several scientific publications during the project. They will be in open access and published on the project's website and social media.		
Workshops and Training	Timing: ongoing	Target: 3+
Workshops and training will be designed to bring together local and international stakeholders to work together and better understand the objectives of MI-TRAP for their territory via an analytical approach of a multi-level perspective.		
Scientific events	Timing: ongoing	Target: 10+
Submit papers and attend to scientific physical or online events focusing on relevant topics.		
Non-scientific events	Timing: ongoing	Target: 5+
Events will be organised by the project partners for communicating about the project developments towards specific / specialised stakeholders alongside major related events. Local events gathering citizen scientists will notably involve local government, local policy makers and final users.		

Dissemination plan: For performing the dissemination strategy and activities for the results and outcomes of MI-TRAP, the consortium will establish cost-effective monitoring technologies, nature-based control strategies along with a user-friendly alert systems and communication via citizen science to influence social behavior. Each partner will get in contact with organizations and entities that might have an interest in improving human health and protecting the environment. The main objective of MI-TRAP dissemination activities is to reach relevant actors of all the target groups through the effective flow of information, publicity, and promotion activities. Special attention will be paid to disseminating the key outcomes for Citizens' and policy makers' awareness raising and engagement in the Zero Pollution Strategy which are critical points for innovation solution integration.

The appropriate audience identification within such a database is one of the key elements of the MI-TRAP targeting dissemination strategy, as it will allow making dissemination tasks in an efficient process. The organization of events, such as workshops will ensure the effective retrieval of stakeholders' feedback (through appropriate monitoring and evaluation processes) during all cycles of the project. The dissemination strategy of MI-TRAP will be formalized in a communication and dissemination plan (D6.4-D6.7) and will follow the 6W approach: Why, What, to Whom, Where, When and How to disseminate. This deliverable will include the key messages and outputs to be disseminated towards the different TGs. Dissemination tools and channels will include:

(i) Online dissemination: MI-TRAP results will be disseminated through many communication tools such as the website, social media accounts, videos, audio recordings, etc.); (ii) Non-scientific dissemination: project flyer and posters will be designed and used for dissemination at various events; (iii) Physical interactive dissemination: Three workshops of the international LL will be organized by MI-TRAP partners, where stakeholders will work together to better understand the objectives of MI-TRAP for their territory via an analytical approach of a multi-level perspective and offer networking opportunities among parties willing to further engage in cooperation activities. In order to announce next research steps partners will participate at diverse conferences presenting and disseminating the project results; (iv) Partners' specific roles in dissemination: NCSR "D" and AMRN will be responsible for the general dissemination activities of the project but all other partners, particularly WP and City-Pilots (CPS) leaders will be directly involved in dissemination tasks maximizing opportunities related to their profile, action field and geographical location through their own network. The communication and dissemination strategy of MI-TRAP will also look beyond the lifetime of the project, investigating how a sustainable and long-term connection can be maintained and information provision can be achieved. A schematic presenting the preliminary Communication and Dissemination plan of MI-TRAP appears below, along with a list of materials used for impact maximization (**Figure 2.2.1b**).

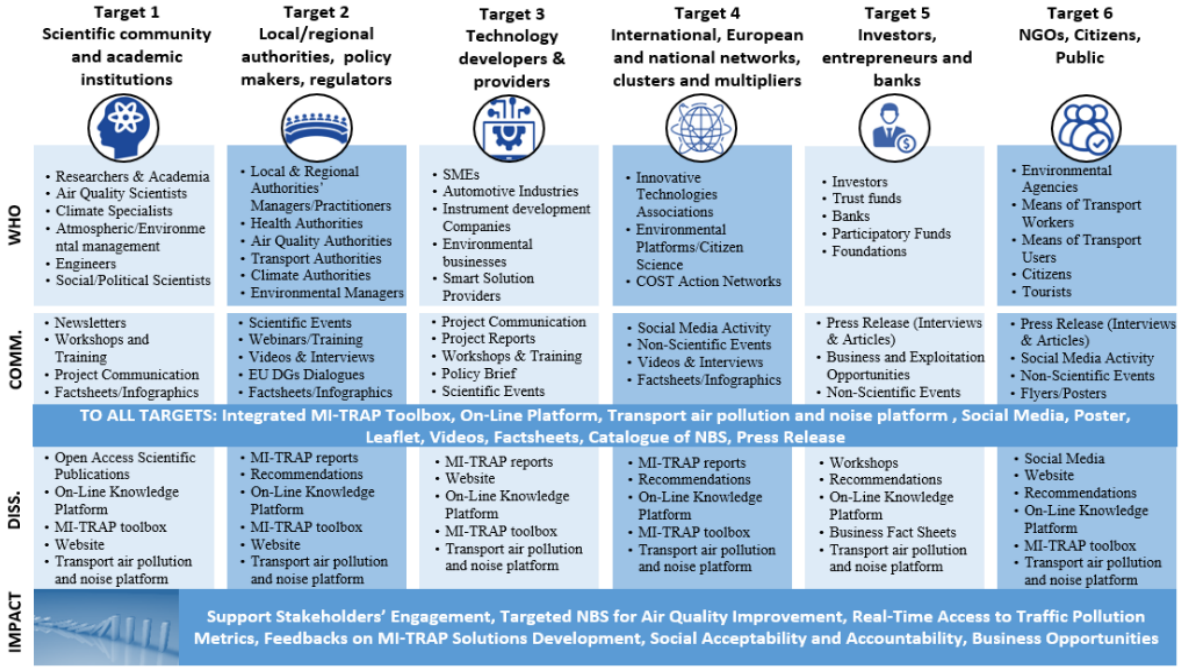


Figure 2.2.1.b. Overall Dissemination plan of the MI-TRAP project

Exploitation activities: The MI- project faces the challenge of building a shared exploitation strategy among its partners, who tend to prioritize their own individual plans, while jointly managing intellectual property rights adds another layer of complexity. However, past collaboration and trust among partners provide an advantage for future exploitation; partners see opportunities to advance the state-of-the-art in air quality impact assessment and technological development. MI-TRAP aims to advance theoretical and practical know-how and technological development in air quality impact assessment, while providing skills and expertise that facilitate knowledge transfer and synergies between scientific, industrial, and environmental domains. The consortium will exploit the MI-TRAP resutls for researh, policy support and awareness raising. Dissemination activities foster exploitation of MI-TRAP results based on an open science approach. The technical improvements in analytical tools and monitoring methodologies will be transferred to the private sector opening new market opportunities and leading to the creation of new jobs. The project will produce a roadmap for exploitation (MI-TRAP Exploitation plan; Task 7.4) to synthesize partners' core competencies and market positioning in a sustainable market roadmap.

MI-TRAP Joint Exploitation Strategy: An Exploitation Plan will be delivered and will provide information on the strategy and actions required to maximise the sustainability of the project's solutions for societal, scientific, and economic purposes. The MI-TRAP exploitation strategy will ensure the optimal use of the Key Exploitable Results (**KERs**) of the project which are presented in the following Table, with a preliminary list of ownership. This is foreseen to speed up the KERs uptake by targeted stakeholders, ensuring wide use and maximum impact to the society, science and technology, through formulating and communicating their Unique Value Proposition (UVP).

Table 2.2.1.c: MI-TRAP preliminary list of Key Exploitable Results

KER 1: MI-TRAP multi-module Monitoring and Management Toolbox
Unique Value Proposition (UVP): The ultimate all-in-one-stop shop modular tool kit for advanced urban air quality monitoring and management, that targets exhaust and non-exhaust emissions, monitors in real-time SPN10 and BC, as well as level and quality of noise pollution, traffic fleet and marine/port emissions, performing near-real time source apportionment and identifying super-polluters. **Customers**: The MI-TRAP integrated toolbox includes 4 modules, targeting mainly policy makers at different levels: local and regional authorities responsible for monitoring traffic and in charge of drafting traffic and pollution management plans (Module 1 and 2); cities and other local authorities that may make use of NBS (Module 3); National authorities responsible for the implementation of long-term policies for mitigating transport emissions (Module 4). In addition, the MI-TRAP toolbox contributes towards European and international initiatives supporting sustainable transport (such as, the EU Clean Power for Transport package, the use of Intelligent Transport Systems, promoted by EU and UNECE, the ReFuelEU Aviation initiative, the European Sustainable Shipping Forum and the

Green Shipping Guarantee (GSG) programme), and mitigation of urban environmental challenges (such as, Urban Innovative Actions).
Partners: NCSR "D", IST ID, TUC, FREIE U BERLIN, TUM, AU, POLIMI, AMRN, IMT, INFN, IVU UMWELT, UMIL.

KER 2: Innovative instrumentation products for tested and traceable measurement of transport-related pollutants

Unique Value Proposition (UVP): 5 innovative instrumentation products will be made available by the project, for traceable measurement of transport-related pollutants (sPN10, UFPs, BC, elements in non-exhaust particles and time resolved PM), together with comprehensive measurement protocols.

Customers: Cities, airports and port authorities who wish to monitor the impact of transport activities on local air quality, companies undertaking emission measurements (such as, European emission analytics company), as well as industries who wish to monitor the impact of combustions processes in the vicinity of their facilities. Non-exhaust particle emission such as originating of electrical vehicle (EV) brakes and tires, which will be part of the upcoming Euro7 regulation, must be expected a relevant characterization topic for the automotive and public transportation industry in Europe. Current customers of European aerosol networks such as the Palas, Haze Instr and Grimm can be expected to take up improved analytical methodologies in the field of sPN10, UFPs and BC.

- European Union Aviation Safety Agency (https://www.easa.europa.eu/en)
- Stellantis automotive group, Volkswagen, Audi, BMW, Ford and MAN (automotive manufacturers)
- UNECE PMP group (automotive and instrument manufacturers with exhaust and non-exhaust emission interests and capabilities)
- Stadler rail (public transportation manufacturer)
- European particle and aerosol instrument manufacturer such as Palas, Haze Instr and Grimm
- Emission analytics companies such as AVL, AIP, and Dekati

Partners: PTB, Bruker Nano GmbH. INFN, METAS, DTI, ICPF, NCSR "D"

KER 3: Informed health impact assessment of exposure to transport-related air pollution

Unique Value Proposition (UVP): MI-TRAP will provide concentration-response functions specifically for transport-related air pollutants (including BC, UFPs, trace elements) and noise. Moreover, apart from typically used exposures to ambient air pollution, alternative exposure indices (including internal inhalation dose in different parts of the human respiratory tract, blood and lymph nodes and oxidative potential of PM) will be used for health impact assessment. This unique health analysis will deliver a proof of concept application of the derived exposure indices for assessing the long and short-term health impacts of transport.
This is potentially a critical contribution for the formulation of the EU air quality legislation: Setting a zero pollution objective for air.
Customers: All cities and other local and regional authorities responsible for developing plans to achieve the EU zero pollution action plan. The data and methods provided by the project may be also exploited by international organizations promoting the protection of public health from air pollution, such as the World Health Organization, the Organization for Economic Co-operation and Development, and the UNECE Transport, Health and Environment Pan-European Programme.

Partners: NCSR "D", IST ID, TUC, FREIE U BERLIN, TUM, AU, POLIMI, AMRN, IMT, INFN, IVU UMWELT, UMIL, NKUA

Taking into consideration the above-mentioned KERs, all the partners have developed initial individual exploitation plans. SME partners will use MI-TRAP's KERs to improve and broaden their current portfolios of commercial services in the domain of urban air pollution monitoring and managing technologies, as well as Nature-based solutions for urban air pollution, capacity development projects, training and education activities and creating products and services to acquire new customers. R&I partners will disseminate the results among the scientific community via their research and/or, international cooperation activities, highlighting advances made in urban air pollution monitoring. To facilitate the impact and exploitation of the project's outputs, in addition to our communication and dissemination activities we will undertake a specific set of IMPACT activities and measures towards the project stakeholders (public authorities and private sector). To ensure the legacy of the project beyond the projects lifecycle, we will develop a MI-TRAP Exploitation plan a roadmap for all of our developed tools with

user guidelines and as a Catalogue of MI-TRAP solutions that will be made available in the ARSINOE Climate innovation window

2.2.2 Intellectual property management and foreseen protection measures

Innovation management will deal with understanding/accelerating the market, to convert the outputs in sustainable assets. MI-TRAP planned Innovation Management activities will lead to the protection of intellectual property (IP) created and will assist partners innovate, following the roadmap of the innovation initiatives and EU strategy to compete in the global economy. **Intellectual property (IPR) management:** The consortium is aware that transparency and clarity in terms of results ownership is needed to strengthen the deployment and exploitation of innovative solutions. The consortium will follow relevant legislation and the requirements posed by the Horizon Europe Grant Agreement. All IPR issues shall be agreed in the Consortium Agreements (CA); The CA will be based on the **DESCA Model**. *At the beginning of the project, all parties will identify their IP background*. The CA will address background and foreground knowledge and establish the rules concerning management of IP, ownership, disclosure, protected third party components, and protection, commercialization, dissemination, and exploitation of results and access rights. As a basic ownership principle, *the party that generated the results will be the owner of the results*. If any result is created jointly by at least two project partners and it is not possible to distinguish between the contribution of each of the project partners, such work will be jointly owned by the contributing project partners. Data and metadata provided by partners will be collected and organized regarding the proposed licenses in line with the **FAIR data principles**. Dissemination activities will be compatible with the protection of intellectual property rights, confidentiality obligations, ethical considerations and the legitimate interests of the owner(s) of the results. The creator's right to execute the original project plan before opening the data for further use will be considered. Before publication and open access sharing, the consortium reserves the possibility of registering intellectual property included in the results. MI-TRAP is expected to identify and propose IP-protective measures, based on partner's need, as well as based on different technologies and end-products that will be generated in the course of the project. Confidentiality obligations, transfer of results, obligations to protect results capable of commercial exploitation will have to be considered also after the successful end of the project. IPR management/activities will be addressed by WP7. #§COM-DIS-VIS-CDV

2.3 Summary

SPECIFIC NEEDS	EXPECTED RESULTS	D&E&C MEASURES
- Identify the specific footprint of transport emission sources and traffic-related super-polluters. The metrics and parameterization employed on the data analysed from the typical environmental monitoring networks and measurement systems are poorly representing the material initially emitted by the specifications of these engines certified by the manufacturers and the control legislation. - Evaluate the compliance of the measured emissions with current emission standards - Develop tools for short- and long- term assessment of the impact in air quality and human health - Assess the impact of nature-based solutions in air-pollution mitigation and well- being and support the Zero Pollution Action plan	- New methodology to evaluate air pollution from transportation emissions and its impact on air quality and human health - Open and Fair Data and functional database - MI-TRAP monitoring Tools - Pilot Demonstrators - User uptake, Capacity building and policy recommendations - Ten fully characterized prototypes of the new portable, mid-cost instrument for the online, real-time measurement of solid-particle number (SPN) concentration in ambient air - Two different catalytic stripper designs, optimized for CPCs and aethalometers (both portable and conventional ones)	- MI-TRAP branding: logo, templates - Leaflet, poster, roll up, banner - Project documentation - Official website - Social media accounts (Twitter, Instagram, YouTube and LinkedIn) - Press releases and newsletter - Factsheets and infographics - Videos & interviews - Local workshops, training and outreach events - Printed information material - Living Labs using the ENoLL methodology to bring stakeholders together - Scientific publications, conferences and datasets - Exploitation: commercialization of new instruments
TARGET GROUPS	**OUTCOMES**	**IMPACTS**
The field of improving air quality and develop more efficient emissions and noise reduction plans spans local, national, and international institutions. The stakeholders actively involved by the European Commission in the implementation of these policies are environment agencies, national authorities, policy makers. The following Target groups have been identified as major stakeholders that will be engaged and consulted throughout the project lifetime; they will also validate project outcomes. - **Scientific community** - **International initiatives and networks** - **Policy makers** - **Private sector-Investors** - **General public** - **Environmental agencies and institutes**	- Feed multiple real time systems and databases for air quality and environmental noise monitoring, anti-tampering enforcement, market surveillance and policy support at local, national and EU level - Recommendations on the standardization of sensing/monitoring technologies - Real-time maps and networks capable of measuring noise and solid particle number to support local, regional and national emissions and noise reduction plans - Health studies to provide recommendations on the use of NBS for mitigating urban air and noise pollution and contribute to the standardization effort of sensing/monitoring technologies - Citizen awareness and engagement in the Zero Pollution strategy.	**Scientific:** emerging Pollutants such as sPN, UFPs, BC and bBC, will be monitored in order to support scientific understanding of their effects on health and the environment **Societal:** Society is informed on mitigation strategies for air pollution and negative impacts on health and environment. Real-time data and open data practices, along with citizen science projects and workshops get citizens involved to learn about the operations that will provide daily repeated measures of different cognitive and mental health outcomes and relate them to the air pollution concentrations. **Economic:** The Integrated real-time air-quality, noise and traffic modelling platform for transport pollution within the participating cities and managing traffic in MI-TRAP is attractive for investors, as it will provide a comprehensive investment and site planning methodology, supported by scientific and data analytics. Decrease in healthcare costs due to reduced morbidity/mortality from new clean air regulations Maintenance and extension of EU instrument manufacturer market share in increasingly important global market.

3. Quality and efficiency of the implementation

3.1 Work plan and resources

The project is structured in 7 WPs: **WP1** refers to the Innovative air quality monitoring technologies for transport emission sources, **WP2** includes all the Pilot studies for air quality monitoring and advanced data products, **WP3** includes the Real time traffic air pollution and noise platform, **WP4** includes the Links between transport-related pollutants, noise and health, **WP5** comprises the Integration of MI-Trap Technologies, Nature Based Solutions, Innovative Tools and services, **WP6** refers to the Citizen engagement, policy making and dissemination and finally, **WP7** refers to the Project management.

Duration of the project: **48 months (4 years)**

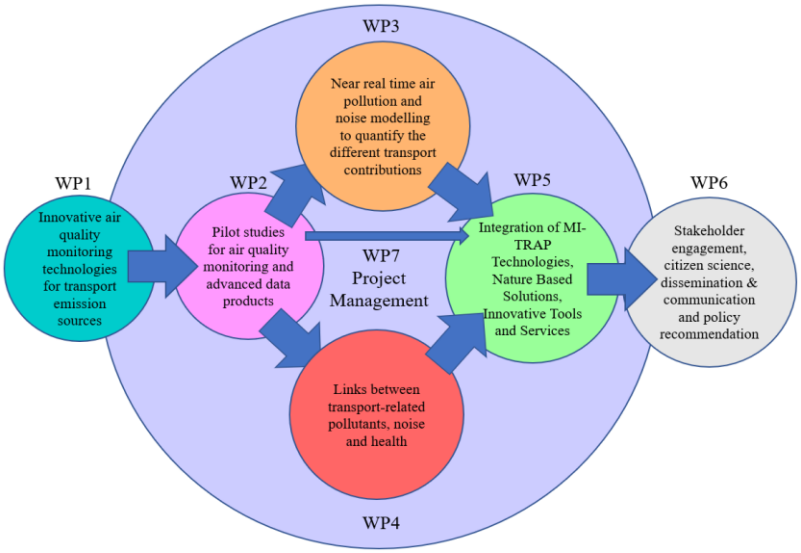
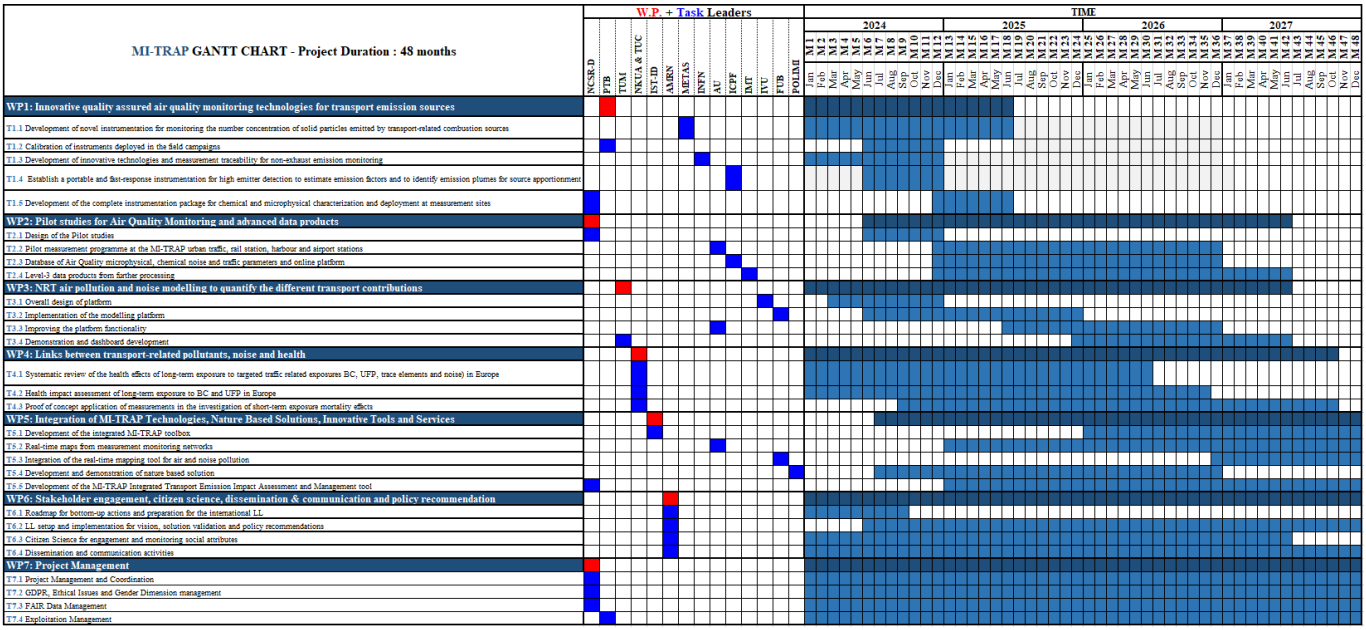


Table 3.1 Gantt chart



Tables for section 3.1

Total cost for the Associated partner METAS is estimated at 250,000 € and for PSI at 500,000 €. These partners will be funded by the Swiss State Secretariat for Education, Research and Innovation (see Financial Guarantee for Swiss Participants in Collaborative Projects 2023). Total cost for the Associate partner INU is estimated at 430,000 €. INU will be funded by the Ministry of Science and ICT of Korea through the Korea-EU Joint Research Program of the National Research Foundation, Korea. The budget breakdown in relevant cost categories for the Associated partners is shown in Table 3.1j.

The beneficiaries must base their contracts/subcontracts according to the principles for best value for money and absence of any conflict of interest (according to Articles 6.2 and 9.3 of GA). Beneficiaries that are 'contracting authorities' or 'contracting entities' (within the meaning of the EU public procurement Directives 2004/18/EC and 2004/17/EC or any EU legislation that replaces these Directives) must moreover comply with the applicable national law on public procurement.

Table 3.1g 'Subcontracting costs' items

Partner Subcontracting	Cost (€)	Description of tasks and justification
1. NCSR "D"	55,000	Logistical support for the P-P campaign in Athens (WP2 Task 2.2) (30,000 €) and Software developer for the web-based integrated MI-TRAP toolkit (WP5 Task 5.1) (25,000 €)
11. WU	9,000	3 months usage of an ACSM instrument (including provision of instrument, running costs, maintenance and data analysis) (WP2 Task 2.2)
12. IMT	11,560	Logistical support for the T-P campaigns in Lille (WP2 Task 2.2)
17. CATALYTIC INST	3,000	Metal works (WP1 Task 1.1)

All depreciation costs for equipment, infrastructure or other assets in the project are in compliance with Article 6 and will be recorded in the appropriate beneficiary's accounts, purchased in accordance with Article 6.2.C of the grant agreement and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

Table 3.1h 'Purchase costs' items (travel and subsistence, equipment and other goods, works and services)

1. NCSR "D"	Cost (€)	Justification
Equipment	30,000	NOx monitor (Monitoring stations in WP2) (Total purchase cost: 30,000 €; Total depreciation period: 36 months; Time used for the project: 36 months; Percentage of use: 100 %)
	27,000	Aethalometer (Monitoring stations in WP2) (Total purchase cost: 27,000 €; Total depreciation period: 36 months; Time used for the project: 36 months; Percentage of use: 100 %)
Remaining purchase costs (<15% of pers. Costs)	50,000	
Total	107,000	
3. Haze Instr	**Cost (€)**	**Justification**
Other goods, works and services	35,000	Costs of parts (28,000 €) and costs of services (7,000 €) to make or modify instrumentation to establish methodology for monitoring transport-related emissions using state-of-the-art combined with innovative techniques for pollutants relevant to exhaust and non-exhaust emissions including NRT characterization of bare black carbon (bBC) - Task 1.2; and automated filter tape sampling and advance technique used for filter photometers to design a PM2.5 device with a continuous rolling tape so that time resolved aerosol deposits (typical hourly) are produced for subsequent ED-XRF analysis for trace and major metals - Task 1.3.
Remaining purchase costs (<15% of pers. Costs)	8,600	
Total	43,600	
5. ICPF	**Cost (€)**	**Justification**

Other goods, works and services	20,000	Running costs for measurement campaigns and monitoring stations (16,000 €), container rental (800 €), electricity supply bills (400 €), public land occupation (800 €), insurance (2,000 €) (WP2)
Remaining purchase costs (<15% of pers. Costs)	12,500	
Total	32,500	
7. TUM	**Cost (€)**	**Justification**
Other goods, works and services	35,000	Traffic data for 3 cities from INRIX/TomTom etc (WP3)
Remaining purchase costs (<15% of pers. Costs)	10,000	
Total	45,000	
8. TUC	**Cost (€)**	**Justification**
Equipment	30,000	Particle number counter (Monitoring stations in WP2) (2 units) (Total purchase cost per unit: 15,000 €; Total depreciation period: 36 months; Time used for the project: 36 months; Percentage of use: 100 %)
Other goods, works and services	18,000	Consumables for measurements and field campaigns (11,000 €), computer spare parts (3,500 €), open access publication fees (2,000 €), conference fees (1,500 €)
Remaining purchase costs (<15% of pers. Costs)	18,000	
Total	66,000	
9. INFN	**Cost (€)**	**Justification**
Other goods, works and services	17,500	Instrument rental for cost effective sampling stations (4,000 €); container rental (7,000 €); running costs for sampling (1,000 €) (WP2) and sample analysis (1,500 €) (WP1); public land occupation (2,000 €); instrumentation maintenance and calibration (2,000 €)
Remaining purchase costs (<15% of pers. Costs)	10,000	
Total	27,500	
12. IMT	**Cost (€)**	**Justification**
Other goods, works and services	9,248	Consumables (3500 euros), maintenance (4500 euros), equipment transport (500 euros), insurance costs (748 euros) for measurement campaigns (WP2)
Remaining purchase costs (<15% of pers. Costs)	10,624	
Total	19,872	
13. DTI	**Cost (€)**	**Justification**
Other goods, works and services	22,000	WP1: Maintenance of instruments 7,000 €. Purchase of tracer gasses, small tools, PM sensors 5,000 €, WP2: Maintenance of instruments incl. mobile reference trailer station, and sensor setup - 10,000 €
Remaining purchase costs (<15% of pers. Costs)	11,000	
Total	33,000	
14. AU	**Cost (€)**	**Justification**
Equipment	40,268	Noise equipment (Good quality, class 1, noise equipment with individual cost above 5,000 euros but below 10,000 euros); monitoring will cover many (> 1) pilot cities stations
Remaining purchase costs (<15% of pers. Costs)	19,329	
Total	59,597	
15. IST ID	**Cost (€)**	**Justification**
Travel and subsistence		
Equipment	14,000	Ultrafine particles (UFP) monitor (Monitoring stations in WP2) (Total purchase cost: 32,666 €; Total depreciation period: 84 months; Time used for the project: 36 months; Percentage of use: 100 %; Eligible cost: 14,000 €)

Other goods, works and services	15,000	Spare parts (8,000 €) and consumables (2,000 €) for the sampling campaigns (WP2); Spare parts (2,500 €) and consumables (2,500 €) for the implementation of NBS (WP5)
Remaining purchase costs (<15% of pers. Costs)	12,000	
Total	41,000	
17. Catalytic Inst	**Cost (€)**	**Justification**
Other goods, works and services	12,590	CE-mark approval is needed for the safety and operational standards for the developed prototypes. It is service contracted by special agencies for this purpose. It includes testing for Electro Magnetic Interference (EMI) and conformity with the standards for CE specifications
Remaining purchase costs (<15% of pers. Costs)	12,000	
Total	24,590	
21. nanoDUST	**Cost (€)**	**Justification**
Equipment	8,230	Compressor & gas supply for Lab Equipment
	5,000	Mass Flow Controllers for Aerosol Dilution
	9,900	Nanoparticle Generator
	5,869.57	Reference Particle Monitor (needed for instrument calibration in WP1 and WP2) (Total purchase cost: 15,000 €; Total depreciation period: 92 months; Time used for the project: 36 months; Percentage of use: 100 %; Eligible cost: 5,870 €)
Other goods, works and services	30,000	Material costs for 10 prototypes
Remaining purchase costs (<15% of pers. Costs)	6,800	
Total	65,799.57	

Table 3.1i 'Other costs categories' items (e.g. internally invoiced goods and services)

17. CATALYTIC INST	Cost (€)	Justification
Internally invoiced goods and services	86,000	Materials for the catalytic strippers (including in total 32 units with an average unit cost of about 2,687.5 €)

Table 3.1j Associated partners' budget

COST CATEGORY	METAS budget (€)	PSI budget (€)	INU budget (€)
b) Direct personnel costs	190,000.00	374,815.62	320,500.00
d) Direct costs of subcontracting			
f) Other direct costs	10,000.00	25,184.38	23,500.00
f.1) Travel	*10,000.00*	*15,000.00*	*15,000*
f.2) Consumables		*6,430.00*	*5,000*
f.3) Other goods and services		*3,754.38*	*3,500.00*
i) Indirect costs (= 0.25* (a + b + f + h))	50,000.00	100,000.00	86,000.00
k) Total costs (= a + b + d + e + f + h + i))	**250,000.00**	**500,000.00**	**430,000.00**

3.2 Capacity of participants as a whole. Specific tasks / expertise of partners:

The MI-TRAP project brings together a consortium of exceptional organizations, each with unique and valuable expertise. ENRACT (ENvironmental Radioactivity & Aerosol technology for atmospheric and Climate impacT Lab) is a founding unit of NCSR 'Demokritos' (NCSR "D") -coordinator (involved in all WPs, WP2 Leader, WP7 Leader)- and has been a pioneer on the physicochemical properties of atmospheric aerosol, air quality, radiation protection,

and source apportionment of pollutants since its founding in 1959. The Federal Institute of Metrology (METAS) – WP1, WP2, WP6, WP7 - has a proven track record of over 15 years in developing measurement methods for transport-related emissions and the traceable calibration of technologies for emission monitoring. The laboratory of Atmospheric Aerosols at the Technical University of Crete (TUC) – WP4 co-Leader, WP3, WP5, WP6, WP7 - is a leading research institution in the area of atmospheric pollution, exposure and dose assessment, aerosol modeling, and health effects of air pollution on humans. The Working Group (WG) "Aerosol and particle Measurements " of Physikalisch-Technische Bundesanstalt (PTB) – WP1 Leader, WP6, WP7 - has developed facilities for traceable measurements of particle number concentration and a test-bed for particle counting instruments, while PTB's X-ray spectrometry group has expertise in the traceable elemental analysis of particles and coordinated two European Metrology projects. HAZE INSTR Instruments (HAZE INSTR) – WP1, WP2, WP6, WP7 - has developed PTAM a novel technique for calibrating Aerosol absorption instrument and has extensive experience on characterization studies of Black Carbon type aerosol. The Environmental Physics research group at the University of Milan (UMIL) - WP2, WP5, WP6, WP7 - brings expertise in atmospheric aerosol sampling and characterization, development of new instrumentation, and implementation of advanced receptor modeling approaches to better exploit data collected during monitoring campaigns devoted to source apportionment. The Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (IST ID) – WP5 Leader, WP2, WP6, WP7 - Air Quality team has studied air pollutants' physical and chemical characteristics and their formation processes for 30 years. Their research aims to aid environmental management decision-making, and they have published extensively and conducted international training and personnel exchanges. AMARANTHUS (AMRN) - WP6 Leader, WP5, WP7 - is a Social Cooperative Enterprise that promotes innovation, sustainability, citizen engagement, and human wellbeing through European research projects and multinational collaboration. The Institute of Chemical Process Fundamentals of the ASCR (ICPF) –WP1, WP2, WP6, WP7 - will provide measurement campaigns at a traffic site and at an airport site, drawing on their at least two decades of experience in ambient aerosol measurement and data analysis, including ten years of experience in using PMF methods. Catalytic Instruments (CATALYTIC INST), – WP1, WP6, WP7 - a leading manufacturer of catalytic stripper and catalytic vapor filters, brings cutting-edge technology that meets regulatory requirements for combustion processes, including the latest draft of the GTR brake GPRE-2023-4e. The National and Kapodistrian (NKUA) – WP4 co-leader, WP5, WP6, WP7 - specializes in epidemiology, preventive medicine, and occupational medicine. Their Environmental Epidemiology Unit has expertise in large-scale projects funded by the EC on environmental health issues, including air pollution, noise, and climate change. The Danish Technological Institute (DTI) – WP2, WP6, WP7 - is a non-profit institution and a major technological service provider in northern Europe. The Center for Air and Sensor Technology has extensive expertise in air quality measurements across various contexts, using state-of-the-art instruments and low-cost sensor networks. Institut Mines-Telecom (IMT) – WP1, WP2, WP6, WP7 - Europe's CERI EE scientists specialize in atmospheric aerosol physical and chemical characterization, source-receptor modeling, and source apportionment. They have expertise in both long-term observations and intensive field campaigns in various environments. The group can provide an air-conditioned trailer for deployment at multiple sites within the project timeline. They are currently coordinating the PIRATE project and are funded by the French Agency for Ecological Transition and the French National Research Agency. IMT's contribution to the proposal is their expertise in source-receptor modeling and their ability to provide specialized equipment for field campaigns. Wageningen University (WU) – WP2, WP6, WP7 - has expertise in atmospheric aerosol chemistry, source apportionment, and measurements related to air pollution and aerosol formation. WU's strong relationship with the city of Rotterdam and the Ruisdael Observatory allows for coordinated instrument usage and monitoring stations within the project timeframe. Aarhus University (AU) – WP2, WP3, WP5, WP6, WP7 - will develop a portable noise monitoring station using state-of-the-art equipment and an electric scooter. This approach combines fixed-site and portable measurements to reflect near real-time noise levels. AU will perform similar measurements in Copenhagen and Aarhus, including additional measurements in the harbor. AU's contribution is a cutting-edge approach to monitoring noise levels. The Technical University of Munich (TUM) – WP3 Leader, WP5, WP6, WP7 - will lead transport modeling tasks for MI-TRAP, leveraging their expertise in transportation modeling and previous projects to quantify impact on air quality and noise. The National Institute of Nuclear Physics (INFN) – WP1, WP2, WP6, WP7 - brings decades of experience in developing new technologies based on particle accelerators and ionizing radiation for studying aerosol composition and sources. The Paul Scherrer Institute (PSI) - WP1, WP2, WP5, WP6, WP7 - is a global leader in source apportionment of PM, with expertise in both offline and real-time analysis, and is actively involved in global studies on the impact of vehicular emissions on human health and secondary species formation. They have the necessary infrastructure and instrumentation to support the proposal's objectives. The Institute of Meteorology at the Free University of Berlin (FREIE U BERLIN) – WP3, WP5, WP6, WP7 - focuses on environmental research related to particulate matter and reactive nitrogen. The team develops

regional and hyper-local modeling systems (LOTOS-EUROS and PALM4U to understand concentration levels and source-receptor relationships. Dynamic emission modeling and source apportionment are key areas of focus. IVU UMWELT Umwelt GmbH (IVU UMWELT) – WP3, WP5, WP6, WP7 - is a SME that has been working in the field of air pollution management for more than 30 years. In this context, IVU UMWELT has been developing the software system IMMISmt, a monitoring and management system for air pollution in cities. IMMISmt calculates air quality levels along streets in near real time and is being operationally used e.g. in Berlin - (https://viz.berlin.de/luftqualitaet-clean/). Politechnico Di Milano (POLIMI) – WP5, WP6, WP7 - will be an essential partner in our consortium, providing expertise in the design and implementation of NBS technologies for Green Walls, Green Bus Stops, and Green Parking Areas. FINCONIT Consulting Italia srl - WP5, WP6, WP7 - is an experienced company in civil engineering, architecture, landscape, nature protection, and urban ecology. They will contribute to NBS technologies for Green Walls, and play a crucial role in the exploitation and business plan. They will also participate in the analysis of NBS scaling up potential, particularly concerning their developed NBS technologies. Bruker Nano GMBH (BRN) – WP1, WP6, WP7 - has a long record of TXRF novel analytical methods on PM10, PM2.5, and accurate quantification using certified standards for validation. NanoDUST (NANODUST) – WP1, WP6, WP7 - is an engineering consulting business specializing in aerosol and nanoparticle measurements. They have extensive experience in the field, having worked as a product manager for nanoparticle emission testing and as an active member of the PMP group. They aim to develop and license diffusion charging sensors for ambient particle monitoring, in accordance with the latest Euro 7 proposal. Incheon National University (INU) – WP3, WP5, WP6, WP7 - will help to improve tools and services for air pollution mitigation from transport sources through a multi-level approach. INU brings expertise in air quality and climate change research, and specifically, their PAQman© system for estimating marine vessel emissions in port-cities, which will be utilized as part of the project's data analysis tools. Finally, the University of Nova Gorica (UNOVAGOR) - WP2, WP3, WP6, and WP7 - will play a critical role in the City's pilot campaigns and will also make valuable contributions towards the evaluation of emission footprint factors. The MI-TRAP consortium comprises a diverse group of experts with extensive knowledge in various areas related to air pollution research. This collective expertise will enable the consortium to approach the project from multiple angles and achieve its goals effectively.

4. Ethics self-assessment

4.1 Ethical dimension of the objectives, methodology and likely impact

MiTRAP foresees the involvement of human participants in the following activities:
a) workshops and events that will take place during the dissemination activities of the project, and b) use of the platform that will be created by MiTRAP project. Specifically, the following target groups will participate providing environmental and noise pollution data to the platform end users, technology providers, stakeholders, municipalities, academia and general public. The project will ensure that the process of recruitment in the research activities: is impartial and justifiable; minimises the potential for bias; protect individual rights to privacy; is free from coercion and influence; and allows sufficient time for prospective participants to consider whether they are interested in proceeding to the consent process or not. In order to ensure transparency in the selection process, the project will define in advance inclusion and exclusion criteria, which will be communicated to the targeted audience. The following exclusion criteria will apply: 1) Individuals who are under 18 years old. 2) Individuals who are above 75 years old. 3) Individuals who do not wish to participate. 4) Individuals who do not sign an informed consent form. 5) Individuals who are not in good physical and mental health. 6) Individuals who did not obtain authorisation to participate in the research from their sending institution (for participants employed in institutions requesting within their internal procedure a separate authorisation for participation to research activities). The participation of humans is subject to the freely given and fully informed consent of participants. MI-TRAP will also deliver a Data Management Plan to clearly detail how data will be managed within the project duration and beyond. The project will avoid the collection and processing of personal data whenever possible, for example by using anonymized data. In the case an activity implies processing of data that can relate to identified or identifiable persons, adequate measures to ensure personal data protection and confidentiality will be taken, according to the Regulation (EU) 2016/679. All data processing activities are subject to the freely given and fully informed consent of data subjects, which may be revoked at any stage during the research process. NON-EU COUNTRIES: The project involves the participation of two non -EU countries Switzerland and South Korea. The partners will be mainly involved in measurements and environmental data collection No risks concerning ethics is foreseen Artificial Intelligence: AI will be exploited to analyse only the data produced by the project to support the platform which will be developed. The workbench will also enable collaboration amongst environmental organizations, municipalities, scientists and

urban experts to review the AI models and examine preventive measures and interventions. No risks concerning ethics is foreseen.

4.2 Compliance with ethical principles and relevant legislations

During the initial stages, a Data Protection Impact Assessment will be performed which will include: 1) Assessment of the risks of personal data and privacy; 2) assessment of any ethical risks and application of ethics standards and principle; and 3) assessment of application of AI ethical principles and standards. Moreover, all institutions will appoint a Data Protection Officer (DPO), ensuring that the contact details of the DPO are made available to all data subjects involved in the research. For institutions not required to appoint a DPO under the GDPR a detailed data protection policy will be approved and submitted.

Moreover, the consortium will define an internal policy for the identification, analysis and communication of unexpected findings. A separate risk assessment will be performed prior the conduct of any research activity. Privacy and protection of personal data of all will be ensured throughout the whole lifetime of the project. As foremost important is the question of ethics in research which is covered by the European Code of Conduct for Research Integrity (2017) which will be the bases for establishing the ethical principles of the project and make sure that the principle "research integrity" is fully respected. Other relevant document include: Charter of Fundamental Rights of the European Union; Regulation (EU) No 1291/2013 of the European parliament and of the Council of 11 December 2013 establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC; Council of Europe Convention for the Protection of Human Rights and Fundamental Freedoms (1950); Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (1981); Council of Europe Additional Protocol to the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data, regarding supervisory authorities and transborder data flows, (2001); ENISA Recommendations on shaping technology according to GDPR provisions: An overview on data pseudonymisation (2018 and 2019); ENISA, Data Pseudonymisation: Advanced Techniques and Use Cases (2021); OECD Guidelines Governing the Protection of Privacy and Transborder Data Flows of Personal Data. Paris: Organisation for Economic Co-operation and Development (1980); United Nations

General Assembly Resolution 45/95 (1990) on computerized personal data; United Nations General Assembly Guidelines for the Regulation of Computerized Personal Data Files. Resolution 45/95 of 14 December 1990 (Annex 2) (1990). The Ethics Guidelines for Trustworthy AI, issued in 2019 by the Independent High-Level Expert Group on Artificial Intelligence, will be fully considered within the project, making sure that the work of the project follows the four ethical principles: respect for human autonomy, prevention of harm, fairness and explicability. The project will make sure that the AI development will drive its way from the principle that AI systems should be human-centric, allowing individuals and society to perform old and new activities in better and simpler ways, without causing harm or other limitations to individual and collective freedom.

ANNEX 2

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible[1] costs (per budget category)										Estimated EU contribution[2]			
	Direct costs								Indirect costs	Total costs	EU contribution to eligible costs			Maximum grant amount[6]
	A. Personnel costs			B. Subcontracting costs	C. Purchase costs			D. Other cost categories	E. Indirect costs[3]		Funding rate %[4]	Maximum EU contribution[5]	Requested EU contribution	
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners and natural person beneficiaries	B. Subcontracting	C.1 Travel and subsistence	C.2 Equipment	C.3 Other goods, works and services	D.2 Internally invoiced goods and services	E. Indirect costs					
Forms of funding	Actual costs	Unit costs (usual accounting practices)	Unit costs[7]	Actual costs	Actual costs	Actual costs	Actual costs	Unit costs (usual accounting practices)	Flat-rate costs[8]					
	a1	a2	a3	b	c1	c2	c3	d2	e = 0,25 * (a1 + a2 + a3 + c1 + c2 + c3)	f = a + b + c + d + e	U	g = f * U%	h	m
1 - NCSR "D"	430 000.00	0.00	0.00	55 000.00	20 000.00	57 000.00	30 000.00	0.00	134 250.00	726 250.00	100	726 250.00	726 250.00	726 250.00
2 - UNOVAGOR	28 000.00	0.00	0.00	0.00	3 200.00	0.00	0.00	0.00	7 800.00	39 000.00	100	39 000.00	39 000.00	39 000.00
3 - Haze Instr	106 800.00	0.00	0.00	0.00	8 600.00	0.00	35 000.00	0.00	37 600.00	188 000.00	70	131 600.00	131 600.00	131 600.00
4 - UMIL	77 300.00	0.00	0.00	0.00	4 500.00	0.00	5 000.00	0.00	21 700.00	108 500.00	100	108 500.00	108 500.00	108 500.00
5 - ICPF	102 960.00	0.00	0.00	0.00	12 500.00	0.00	20 000.00	0.00	33 865.00	169 325.00	100	169 325.00	169 325.00	169 325.00
6 - NKUA	128 110.00	0.00	0.00	0.00	9 000.00	0.00	2 000.00	0.00	34 777.50	173 887.50	100	173 887.50	173 887.50	173 887.50
7 - TUM	262 400.00	0.00	0.00	0.00	10 000.00	0.00	35 000.00	0.00	76 850.00	384 250.00	100	384 250.00	384 250.00	384 250.00
8 - TUC	176 000.00	0.00	0.00	0.00	18 000.00	30 000.00	18 000.00	0.00	60 500.00	302 500.00	100	302 500.00	302 500.00	302 500.00
9 - INFN	132 500.00	0.00	0.00	0.00	10 000.00	0.00	17 500.00	0.00	40 000.00	200 000.00	100	200 000.00	200 000.00	200 000.00
10 - AMRN	330 000.00	0.00	0.00	0.00	25 000.00	0.00	0.00	0.00	88 750.00	443 750.00	70	310 625.00	310 625.00	310 625.00
11 - WU	0.00	101 201.00	0.00	9 000.00	4 300.00	0.00	10 000.00	0.00	28 875.25	153 376.25	100	153 376.25	153 376.25	153 376.25
12 - IMT	108 167.00	0.00	0.00	11 560.00	6 000.00	4 624.00	9 248.00	0.00	32 009.75	171 608.75	100	171 608.75	171 608.75	171 608.75
13 - DTI	95 225.00	0.00	0.00	0.00	11 000.00	0.00	22 000.00	0.00	32 056.25	160 281.25	100	160 281.25	160 281.25	160 281.25
14 - AU	220 618.00	0.00	0.00	0.00	8 054.00	40 268.00	11 275.00	0.00	70 053.75	350 268.75	100	350 268.75	350 268.75	350 268.75
15 - IST ID	111 007.00	0.00	0.00	0.00	12 000.00	14 000.00	15 000.00	0.00	38 001.75	190 008.75	100	190 008.75	190 008.75	190 008.75
16 - PTB	190 765.00	0.00	0.00	0.00	8 800.00	0.00	8 435.00	0.00	52 000.00	260 000.00	100	260 000.00	260 000.00	260 000.00
17 - Catalytic Inst	118 089.00	0.00	0.00	3 000.00	12 000.00	0.00	12 590.00	86 000.00	35 669.75	267 348.75	70	187 144.13	187 144.13	187 144.13
18 - POLIMI	112 905.00	0.00	0.00	0.00	11 300.00	0.00	0.00	0.00	31 051.25	155 256.25	100	155 256.25	155 256.25	155 256.25
19 - Freie U Berlin	141 750.00	0.00	0.00	0.00	7 000.00	1 000.00	2 200.00	0.00	37 987.50	189 937.50	100	189 937.50	189 937.50	189 937.50
20 - IVU Umwelt	448 000.00	0.00	0.00	0.00	10 000.00	10 000.00	0.00	0.00	117 000.00	585 000.00	70	409 500.00	409 500.00	409 500.00
21 - nanoDUST	117 000.00	0.00	0.00	0.00	6 800.00	28 999.57	30 000.00	0.00	45 699.89	228 499.46	70	159 949.62	159 949.62	159 949.62
22 - FINCONIT	65 700.00	0.00	0.00	0.00	9 800.00	0.00	0.00	0.00	18 875.00	94 375.00	70	66 062.50	66 062.50	66 062.50
23 - METAS														
24 - PSI														
25 - INU														
26 - BRUKER NANO														
Σ consortium	3 503 296.00	101 201.00	0.00	78 560.00	227 854.00	185 891.57	283 248.00	86 000.00	1 075 372.64	5 541 423.21		4 999 331.25	4 999 331.25	4 999 331.25

[1] See Article 6 for the eligibility conditions. All amounts must be expressed in EUR (see Article 21 for the conversion rules).
[2] The consortium remains free to decide on a different internal distribution of the EU funding (via the consortium agreement; see Article 7).
[3] Indirect costs already covered by an operating grant (received under any EU funding programme) are ineligible (see Article 6.3). Therefore, a beneficiary/affiliated entity that receives an operating grant during the action duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless they can demonstrate that the operating grant does not cover any costs of the action. This requires specific accounting tools. Please immediately contact us via the EU Funding & Tenders Portal for details.

[4] See Data Sheet for the funding rate(s).
[5] This is the theoretical amount of the EU contribution to costs, if the reimbursement rate is applied to all the budgeted costs. This theoretical amount is then capped by the 'maximum grant amount'.
[6] The 'maximum grant amount' is the maximum grant amount decided by the EU. It normally corresponds to the requested grant, but may be lower.
[7] See Annex 2a 'Additional information on the estimated budget' for the details (units, cost per unit).
[8] See Data Sheet for the flat-rate.

ANNEX 2a

ADDITIONAL INFORMATION ON UNIT COSTS AND CONTRIBUTIONS

SME owners/natural person beneficiaries without salary (Decision C(2020) 7115[1])

Type: unit costs

Units: days spent working on the action (rounded up or down to the nearest half-day)

Amount per unit (daily rate): calculated according to the following formula:

{EUR 5 080 / 18 days = **282,22**}
multiplied by
{country-specific correction coefficient of the country where the beneficiary is established}

The country-specific correction coefficients used are those set out in the Horizon Europe Work Programme (section Marie Skłodowska-Curie actions) in force at the time of the call (see Portal Reference Documents).

HE and Euratom Research Infrastructure actions[2]

Type: unit costs

Units[3]: see (for each access provider and installation) the unit cost table in Annex 2b

Amount per unit*: see (for each access provider and installation) the unit cost table in Annex 2b

* Amount calculated as follows:

For trans-national access:

$$\frac{\text{average annual total trans-national access costs to the installation (over past two years[4])}}{\text{average annual total quantity of trans-national access to the installation (over past two years[5])}}$$

For virtual access:

$$\frac{\text{total virtual access costs to the installation (over the last year[6])}}{\text{total quantity of virtual access to the installation (over the last year[7])}}$$

Euratom staff mobility costs[8]

Monthly living allowance

Type: unit costs

---

1 Commission Decision of 20 October 2020 authorising the use of unit costs for the personnel costs of the owners of small and medium-sized enterprises and beneficiaries that are natural persons not receiving a salary for the work carried out by themselves under an action or work programme (C(2020)7715).

2 Decision of 19 April 2021 authorising the use of unit costs for the costs of providing trans-national and virtual access in Research Infrastructure actions under the Horizon Europe Programme (2021-2027) and the Research and Training Programme of the European Atomic Energy Community (2021-2025).

3 Unit of access (e.g. beam hours, weeks of access, sample analysis) fixed by the access provider in proposal.

4 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

5 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

6 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

7 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

8 Decision of 15 March 2021 authorising the use of unit costs for mobility in co-fund actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025).

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit*: see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

* Amount calculated as follows from 1 January 2021:
{**EUR 4 300** multiplied by
country-specific correction coefficient** of the country where the staff member is seconded}[9]

**Country-specific correction coefficients as from 1 January 2021[10]

EU-Member States[11]

Country / Place	Coefficient (%)
Bulgaria	59,1
Czech Rep.	85,2
Denmark	131,3
Germany Bonn Karlsruhe Munich	101,9 95,8 98 113,9
Estonia	82,3
Ireland	129
Greece	81,4
Spain	94,2
France	120,5
Croatia	75,8
Italy Varese	95 90,7
Cyprus	78,2
Latvia	77,5
Lithuania	76,6
Hungary	71,9
Malta	94,7
Netherlands	113,9
Austria	107,9
Poland	70,9
Portugal	91,1
Romania	66,6
Slovenia	86,1

[9] Unit costs for living allowances are calculated by using a method of calculation similar to that applied for the secondment to the European Commission of seconded national experts (SNEs).

[10] ⚠ For the financial statements, the amount must be adjusted according to the actual place of secondment.
The revised coefficients were adopted in the Decision authorising the use of unit costs for the Fusion Programme co-fund action under the Research and training Programme of the European Atomic Energy Community 2021-2025. They are based on the 2020 Annual update of the remuneration and pensions of the officials and other servants of the European Union and the correction coefficients applied thereto (OJ C 428, 11.12.2020) to ensure purchasing power parity. The revised coefficient are applied as from 1 January 2021 through an amendment to the grant agreement.

[11] No correction coefficient shall be applicable in Belgium and Luxembourg.

Slovakia	80,6
Finland	118,4
Sweden	124,3

Third countries

Country/place	Coefficient (%)
China	82,2
India	72,3
Japan	111,8
Russia	92,7
South Korea	92,3
Switzerland	129.2
Ukraine	82.3
United Kingdom	97.6
United States	101,4 (New-York) 90,5 (Washington)

Mobility allowance

Type: Unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit: **EUR 600** per person-month; see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

Family allowance

Type: unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit: **EUR 660** per person-month; see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

Education allowance

Type: Unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit*: see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

*Amount calculated as follows from 1 January 2021:
{EUR 283.82 x number of dependent children[12]**}**

[12] For the estimated budget (Annex 2): an average should be used. (⚠ For the financial statements, the number of children (and months) must be adjusted according to the actual family status at the moment the secondment starts.)

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UNIVERZA V NOVI GORICI (UNOVAGOR), PIC 998298102, established in VIPAVSKA CESTA 13 ROZNA DOLINA, NOVA GORICA 5000, Slovenia,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

HAZE INSTRUMENTS, RAZVOJ IN PROIZVODNJA MERILNIH INSTRUMENTOV DOO (Haze Instr), PIC 902852818, established in DERMOTOVA ULICA 6, LJUBLJANA 1000, Slovenia,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UNIVERSITA DEGLI STUDI DI MILANO (UMIL), PIC 999995796, established in Via Festa Del Perdono 7, MILANO 20122, Italy,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

USTAV CHEMICKYCH PROCESU AV CR, v. v. i. (ICPF), PIC 998590072, established in ROZVOJOVA 135, PRAHA 6 165 02, Czechia,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON (NKUA), PIC 999643007, established in 6 CHRISTOU LADA STR, ATHINA 10561, Greece,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

TECHNISCHE UNIVERSITAET MUENCHEN (TUM), PIC 999977463, established in Arcisstrasse 21, MUENCHEN 80333, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLYTECHNEIO KRITIS (TUC), PIC 924773848, established in BUILDING E4, TECHNICAL UNIVERSITY CAMPUS COUNOUPIDIANA, CHANIA 731 00, Greece,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ISTITUTO NAZIONALE DI FISICA NUCLEARE (INFN), PIC 999992789, established in Via Enrico Fermi 54, FRASCATI 00044, Italy,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

KOINONIKI SYNETAIRISTIKI EPICHEIRISI SYLLOGIKIS KAI KOINONIKIS OFELEIAS AMARANTHUS (AMRN), PIC 884254717, established in DELIGIANNI 7, ATHINA 106 83, Greece,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

WAGENINGEN UNIVERSITY (WU), PIC 999981634, established in DROEVENDAALSESTEEG 4, WAGENINGEN 6708 PB, Netherlands,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

INSTITUT MINES-TELECOM (IMT), PIC 999849326, established in 19 PLACE MARGUERITE PEREY, PALAISEAU 91120, France,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

TEKNOLOGISK INSTITUT (DTI), PIC 999460356, established in GREGERSENSVEJ 1, TAASTRUP 2630, Denmark,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AARHUS UNIVERSITET (AU), PIC 999997736, established in NORDRE RINGGADE 1, AARHUS C 8000, Denmark,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

IST-ID ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E O DESENVOLVIMENTO (IST ID), PIC 954983722, established in AVENIDA ANTONIO JOSE DE ALMEIDA 12, LISBOA 1000-043, Portugal,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP (‘the Agreement’)

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** (‘EU executive agency’ or ‘granting authority’), under the powers delegated by the European Commission (‘European Commission’),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB), PIC 999596544, established in BUNDESALLEE 100, BRAUNSCHWEIG 38116, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

CATALYTIC INSTRUMENTS GMBH & CO KG (Catalytic Inst), PIC 882609791, established in ZELLERHORNSTR. 7, ROSENHEIM 83026, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLITECNICO DI MILANO (POLIMI), PIC 999879881, established in PIAZZA LEONARDO DA VINCI 32, MILANO 20133, Italy,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FREIE UNIVERSITAET BERLIN (Freie U Berlin), PIC 999994826, established in KAISERSWERTHER STRASSE 16-18, BERLIN 14195, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

IVU UMWELT GMBH (IVU Umwelt), PIC 926854983, established in EMMY-NOETHER-STRASSE 2, FREIBURG 79110, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

NANODUST GMBH (nanoDUST), PIC 882193564, established in BRENTANOSTRASSE 27, ASCHAFFENBURG 63739, Germany,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FINCON CONSULTING ITALIA SRL (FINCONIT), PIC 962928313, established in VIA VOLTURNO 46, MILANO 20124, Italy,

hereby agrees

to become beneficiary

in Agreement No 101138449 — MI-TRAP ('the Agreement')

between NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NCSR "D") **and** the **European Climate, Infrastructure and Environment Executive Agency (CINEA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

FINANCIAL STATEMENT FOR [PARTICIPANT NAME] FOR REPORTING PERIOD [NUMBER]

	Eligible[1] costs (per budget category)																EU contribution[2]				Revenues
	Direct costs															Indirect costs	Total costs	EU contribution to eligible costs			Total requested EU contribution	Income generated by the action
	A. Personnel costs			B. Subcontracting costs	C. Purchase costs			D. Other cost categories								E. Indirect costs[2]		Funding rate %[3]	Maximum EU contribution[4]	Requested EU contribution		
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners and natural person beneficiaries	B. Subcontracting	C.1 Travel and subsistence	C.2 Equipment	C.3 Other goods, works and services	[D.1 Financial support to third parties]	D.2 Internally invoiced goods and services	[D.3 Transnational access to research infrastructure unit costs]	[D.4 Virtual access to research infrastructure unit costs]	*[OPTION for HE PCP/PPI:* D.5 PCP/PPI procurement costs*]*	*[OPTION for Euratom Programme Cofund Actions:* D.6 Euratom Cofund staff mobility costs*]*	*[OPTION for HE ERC Grants:* D.7 ERC additional funding*]*	*[OPTION for HE ERC Grants:* D.8 ERC additional funding (subcontracting, FSTP and internally invoiced goods and services)*]*	E. Indirect costs						
Forms of funding	Actual costs	Unit costs (usual accounting practices)	Unit costs[5]	Actual costs	Actual costs	Actual costs	Actual costs	[Actual costs]	Unit costs (usual accounting practices)	[Unit costs[5]]	[Unit costs[5]]	[Actual costs]	[Unit costs[5]]	[Actual costs]	[Actual costs]	Flat-rate costs[6]						
	a1	a2	a3	b	c1	c2	c3	[d1a]	d2	[d3]	[d4]	[d5]	[d6]	[d7]	[d8]	e = 0,25 * (a1 + a2 + a3 ~~+b+~~ c1 +c2 + c3 ~~+ d1a + d2 + d3 + d4 (+ d5][+ d6]~~ [+d7] ~~[+ d8]~~)	f = a+b+c+d+e	U	g = f*U%	h	m	n
XX – [short name beneficiary/affiliated entity]																						

The beneficiary/affiliated entity hereby confirms that:

The information provided is complete, reliable and true.

The costs and contributions declared are eligible (see Article 6).

The costs and contributions can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 19, 20 and 25).

For the last reporting period: that all the revenues have been declared (see Article 22).

① Please declare all eligible costs and contributions, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account lateron, in order to replace costs/contributions that are found to be ineligible.

[1] See Article 6 for the eligibility conditions. All amounts must be expressed in EUR (see Article 21 for the conversion rules).

[2] If you have also received an EU operating grant during this reporting period, you cannot claim indirect costs - unless you can demonstrate that the operating grant does not cover any costs of the action. This requires specific accounting tools. Please contact us immediately via the Funding & Tenders Portal for details.

[3] See Data Sheet for the reimbursement rate(s).

[4] This is the *theoretical* amount of EU contribution to costs that the system calculates automatically (by multiplying the reimbursement rates by the costs declared). The amount you request (in the column 'requested EU contribution') may be less.

[5] See Annex 2a 'Additional information on the estimated budget' for the details (units, cost per unit).

[6] See Data Sheet for the flat-rate.

ANNEX 5

SPECIFIC RULES

CONFIDENTIALITY AND SECURITY (— ARTICLE 13)

Sensitive information with security recommendation

Sensitive information with a security recommendation must comply with the additional requirements imposed by the granting authority.

Before starting the action tasks concerned, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task. The documents must be kept on file and be submitted upon request by the coordinator to the granting authority. If they are not in English, they must be submitted together with an English summary.

For requirements restricting disclosure or dissemination, the information must be handled in accordance with the recommendation and may be disclosed or disseminated only after written approval from the granting authority.

EU classified information

If EU classified information is used or generated by the action, it must be treated in accordance with the security classification guide (SCG) and security aspect letter (SAL) set out in Annex 1 and Decision 2015/444[1] and its implementing rules — until it is declassified.

Deliverables which contain EU classified information must be submitted according to special procedures agreed with the granting authority.

Action tasks involving EU classified information may be subcontracted only with prior explicit written approval from the granting authority and only to entities established in an EU Member State or in a non-EU country with a security of information agreement with the EU (or an administrative arrangement with the Commission).

EU classified information may not be disclosed to any third party (including participants involved in the action implementation) without prior explicit written approval from the granting authority.

ETHICS (— ARTICLE 14)

Ethics and research integrity

The beneficiaries must carry out the action in compliance with:

- ethical principles (including the highest standards of research integrity)

[1] Commission Decision 2015/444/EC, Euratom of 13 March 2015 on the security rules for protecting EU classified information (OJ L 72, 17.3.2015, p. 53).

and

- applicable EU, international and national law, including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.

No funding can be granted, within or outside the EU, for activities that are prohibited in all Member States. No funding can be granted in a Member State for an activity which is forbidden in that Member State.

The beneficiaries must pay particular attention to the principle of proportionality, the right to privacy, the right to the protection of personal data, the right to the physical and mental integrity of persons, the right to non-discrimination, the need to ensure protection of the environment and high levels of human health protection.

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:

- aim at human cloning for reproductive purposes
- intend to modify the genetic heritage of human beings which could make such modifications heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed)
- 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, or
- lead to the destruction of human embryos (for example, for obtaining stem cells).

Activities involving research on human embryos or human embryonic stem cells may be carried out only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the granting authority.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out in the European Code of Conduct for Research Integrity[2].

This implies compliance with the following 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

[2] European Code of Conduct for Research Integrity of ALLEA (All European Academies).

- 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 including ensuring, where possible, openness, reproducibility and traceability and refrain from the research integrity violations described in the Code.

Activities raising ethical issues must comply with the additional requirements formulated by the ethics panels (including after checks, reviews or audits; see Article 25).

Before starting an action task raising ethical issues, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task, notably from any (national or local) ethics committee or other bodies such as data protection authorities.

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

VALUES (— ARTICLE 14)

Gender mainstreaming

The beneficiaries must take all measures to promote equal opportunities between men and women in the implementation of the action and, where applicable, in line with the gender equality plan. 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.

INTELLECTUAL PROPERTY RIGHTS (IPR) — BACKGROUND AND RESULTS — ACCESS RIGHTS AND RIGHTS OF USE (— ARTICLE 16)

Definitions

Access rights — Rights to use results or background.

Dissemination — The public disclosure of the results by appropriate means, other than resulting from protecting or exploiting the results, including by scientific publications in any medium.

Exploit(ation) — The use of results in further research and innovation activities other than those covered by the action concerned, including among other things, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardisation activities.

Fair and reasonable conditions — 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.

FAIR principles — ‘findability’, ‘accessibility’, ‘interoperability’ and ‘reusability’.

Open access — Online access to research outputs provided free of charge to the end-user.

Open science — An approach to the scientific process based on open cooperative work, tools and diffusing knowledge.

Research data management — The process within the research lifecycle that includes the organisation, storage, preservation, security, quality assurance, allocation of persistent identifiers (PIDs) and rules and procedures for sharing of data including licensing.

Research outputs — Results to which access can be given in the form of scientific publications, data or other engineered results and processes such as software, algorithms, protocols, models, workflows and electronic notebooks.

Scope of the obligations

For this section, references to ‘beneficiary’ or ‘beneficiaries’ do not include affiliated entities (if any).

Agreement on background

The beneficiaries must identify in a written agreement the background as needed for implementing the action or for exploiting its results.

Where the call conditions restrict control due to strategic interests reasons, background that is subject to control or other restrictions by a country (or entity from a country) which is not one of the eligible countries or target countries set out in the call conditions and that impact the exploitation of the results (i.e. would make the exploitation of the results subject to control or restrictions) must not be used and must be explicitly excluded from it in the agreement on background — unless otherwise agreed with the granting authority.

Ownership of results

Results are owned by the beneficiaries that generate them.

However, two or more beneficiaries own results jointly if:

- they have jointly generated them 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.

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

- at least 45 days advance notice and
- fair and reasonable compensation.

The joint owners may agree — in writing — to apply another regime than joint ownership.

If third parties (including employees and other personnel) may claim rights to the results, the beneficiary concerned must ensure that those rights can be exercised in a manner compatible with its obligations under the Agreement.

The beneficiaries must indicate the owner(s) of the results (results ownership list) in the final periodic report.

Protection of results

Beneficiaries which have received funding under the grant must adequately protect their results — for an appropriate period and with appropriate territorial coverage — if protection is possible and justified, taking into account all relevant considerations, including the prospects for commercial exploitation, the legitimate interests of the other beneficiaries and any other legitimate interests.

Exploitation of results

Beneficiaries which have received funding under the grant must — up to four years after the end of the action (see Data Sheet, Point 1) — use their best efforts to exploit their results directly or to have them exploited indirectly by another entity, in particular through transfer or licensing.

If, despite a beneficiary's best efforts, the results are not exploited within one year after the end of the action, the beneficiaries must (unless otherwise agreed in writing with the granting authority) use the Horizon Results Platform to find interested parties to exploit the results.

If results are incorporated in a standard, the beneficiaries must (unless otherwise agreed with the granting authority or unless it is impossible) ask the standardisation body to include the funding statement (see Article 17) in (information related to) the standard.

Additional exploitation obligations

Where the call conditions impose additional exploitation obligations (including obligations linked to the restriction of participation or control due to strategic assets, interests, autonomy or security reasons), the beneficiaries must comply with them — up to four years after the end of the action (see Data Sheet, Point 1).

Where the call conditions impose additional exploitation obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) grant for a limited period of time specified in the request, non-exclusive licences — under fair and reasonable conditions — to their results to legal entities that need the results to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

Additional information obligation relating to standards

Where the call conditions impose additional information obligations relating to possible standardisation, the beneficiaries must — up to four years after the end of the action (see Data Sheet, Point 1) — inform the granting authority, if the results could reasonably be expected to contribute to European or international standards.

Transfer and licensing of results

Transfer of ownership

The beneficiaries may transfer ownership of their results, provided this does not affect compliance with their obligations under the Agreement.

The beneficiaries must ensure that their obligations under the Agreement regarding their results are passed on to the new owner and that this new owner has the obligation to pass them on in any subsequent transfer.

Moreover, they must inform the other beneficiaries with access rights of the transfer at least 45 days in advance (or less if agreed in writing), unless agreed otherwise in writing for specifically identified third parties including affiliated entities or unless impossible under the applicable law. This notification must include sufficient information on the new owner to enable the beneficiaries concerned to assess the effects on their access rights. The beneficiaries may object within 30 days of receiving notification (or less if agreed in writing), if they can show that the transfer would adversely affect their access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

Granting licences

The beneficiaries may grant licences to their results (or otherwise give the right to exploit them), including on an exclusive basis, provided this does not affect compliance with their obligations.

Exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights.

Granting authority right to object to transfers or licensing — Horizon Europe actions

Where the call conditions in Horizon Europe actions provide for the right to object to transfers or licensing, the granting authority may — up to four years after the end of the action (see Data Sheet, Point 1) — object to a transfer of ownership or the exclusive licensing of results, if:

- the beneficiaries which generated the results have received funding under the grant
- it is to a legal entity established in a non-EU country not associated with Horizon Europe, and
- the granting authority considers that the transfer or licence is not in line with EU interests.

Beneficiaries that intend to transfer ownership or grant an exclusive licence must formally notify the granting authority before the intended transfer or licensing takes place and:

- identify the specific results concerned
- describe in detail the new owner or licensee and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or licence on EU interests, in particular regarding competitiveness as well as consistency with ethical principles and security considerations.

The granting authority may request additional information.

If the granting authority decides to object to a transfer or exclusive licence, it must formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information it has requested).

No transfer or licensing may take place in the following cases:

- pending the granting authority decision, within the period set out above
- if the granting authority objects
- until the conditions are complied with, if the granting authority objection comes with conditions.

A beneficiary may formally notify a request to waive the right to object regarding intended transfers or grants to a specifically identified third party, if measures safeguarding EU interests are in place. If the granting authority agrees, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

Granting authority right to object to transfers or licensing — Euratom actions

Where the call conditions in Euratom actions provide for the right to object to transfers or licensing, the granting authority may — up to four years after the end of the action (see Data Sheet, Point 1) — object to a transfer of ownership or the exclusive or non-exclusive licensing of results, if:

- the beneficiaries which generated the results have received funding under the grant
- it is to a legal entity established in a non-EU country not associated to the Euratom Research and Training Programme 2021-2025 and
- the granting authority considers that the transfer or licence is not in line with the EU interests.

Beneficiaries that intend to transfer ownership or grant a licence must formally notify the granting authority before the intended transfer or licensing takes place and:

- identify the specific results concerned
- describe in detail the results, the new owner or licensee and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or licence on EU interests, in particular regarding competitiveness as well as consistency with

ethical principles and security considerations (including the defence interests of the EU Member States under Article 24 of the Euratom Treaty).

The granting authority may request additional information.

If the granting authority decides to object to a transfer or licence, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

No transfer or licensing may take place in the following cases:

- pending the granting authority decision, within the period set out above
- if the granting authority objects
- until the conditions are complied with, if the granting authority objection comes with conditions.

A beneficiary may formally notify a request to waive the right to object regarding intended transfers or grants to a specifically identified third party, if measures safeguarding EU interests are in place. If the granting authority agrees, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

Limitations to transfers and licensing due to strategic assets, interests, autonomy or security reasons of the EU and its Member States

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security reasons, the beneficiaries may not transfer ownership of their results or grant licences to third parties which are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless they have requested and received prior approval by the granting authority.

The request must:

- identify the specific results concerned
- describe in detail the new owner and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or license on the strategic assets, interests, autonomy or security of the EU and its Member States.

The granting authority may request additional information.

Access rights to results and background

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

Requests to exercise access rights and the waiver of access rights must be in writing.

Unless agreed otherwise in writing with the beneficiary granting access, access rights do not include the right to sub-license.

If a beneficiary is no longer involved in the action, this does not affect its obligations to grant access.

If a beneficiary defaults on its obligations, the beneficiaries may agree that that beneficiary no longer has access rights.

Access rights for implementing the action

The beneficiaries must grant 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 —:

- informed the other beneficiaries that access to its background is subject to restrictions, or

- agreed with the other beneficiaries that access would not be on a royalty-free basis.

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

Access rights for exploiting the results

The beneficiaries must grant each other access — under fair and reasonable conditions — to results needed for exploiting their results.

The beneficiaries must grant each other access — under fair and reasonable conditions — to background needed for exploiting their 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 restrictions.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

Access rights for entities under the same control

Unless agreed otherwise in writing by the beneficiaries, access to results and, subject to the restrictions referred to above (if any), background must also be granted — under fair and reasonable conditions — to entities that:

- are established in an EU Member State or Horizon Europe associated country

- are under the direct or indirect control of another beneficiary, or under the same direct or indirect control as that beneficiary, or directly or indirectly controlling that beneficiary and

- need the access to exploit the results of that beneficiary.

Unless agreed otherwise in writing, such requests for access must be made by the entity directly to the beneficiary concerned.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

Access rights for the granting authority, EU institutions, bodies, offices or agencies and national authorities to results for policy purposes — Horizon Europe actions

In Horizon Europe actions, the beneficiaries which have received funding under the grant must grant access to their results — on a royalty-free basis — to the granting authority, EU institutions, bodies, offices or agencies for developing, implementing and monitoring EU policies or programmes. Such access rights do not extend to beneficiaries' background.

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

For actions under the cluster 'Civil Security for Society', such access rights also extend to national authorities of EU Member States for developing, implementing and monitoring their policies or programmes in this area. In this case, access is subject to a bilateral agreement to define specific conditions ensuring that:

- the access rights will be used only for the intended purpose and
- appropriate confidentiality obligations are in place.

Moreover, the requesting national authority or EU institution, body, office or agency (including the granting authority) must inform all other national authorities of such a request.

Access rights for the granting authority, Euratom institutions, funding bodies or the Joint Undertaking Fusion for Energy — Euratom actions

In Euratom actions, the beneficiaries which have received funding under the grant must grant access to their results — on a royalty-free basis — to the granting authority, Euratom institutions, funding bodies or the Joint Undertaking Fusion for Energy for developing, implementing and monitoring Euratom policies and programmes or for compliance with obligations assumed through international cooperation with non-EU countries and international organisations.

Such access rights include the right to authorise third parties to use the results in public procurement and the right to sub-license and are limited to non-commercial and non-competitive use.

Additional access rights

Where the call conditions impose additional access rights, the beneficiaries must comply with them.

COMMUNICATION, DISSEMINATION, OPEN SCIENCE AND VISIBILITY (— ARTICLE 17)

Dissemination

Dissemination of results

The beneficiaries must disseminate their results as soon as feasible, in a publicly available format, subject to any restrictions due to the protection of intellectual property, security rules or legitimate interests.

A beneficiary that intends to disseminate its results must give at least 15 days advance notice to the other beneficiaries (unless agreed otherwise), together with sufficient information on the results it will disseminate.

Any other beneficiary may object within (unless agreed otherwise) 15 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 results may not be disseminated unless appropriate steps are taken to safeguard those interests.

Additional dissemination obligations

Where the call conditions impose additional dissemination obligations, the beneficiaries must also comply with those.

Open Science

Open science: open access to scientific publications

The beneficiaries must ensure open access to peer-reviewed scientific publications relating to their results. In particular, they must ensure that:

- at the latest at the time of publication, a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication, is deposited in a trusted repository for scientific publications

- immediate open access is provided to the deposited publication via the repository, under the latest available version of the Creative Commons Attribution International Public Licence (CC BY) or a licence with equivalent rights; for monographs and other long-text formats, the licence may exclude commercial uses and derivative works (e.g. CC BY-NC, CC BY-ND) and

- information is given via the repository about any research output or any other tools and instruments needed to validate the conclusions of the scientific publication.

Beneficiaries (or authors) must retain sufficient intellectual property rights to comply with the open access requirements.

Metadata of deposited publications must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: publication (author(s), title, date of publication, publication venue); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the publication, the authors involved in the action and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for any research output or any other tools and instruments needed to validate the conclusions of the publication.

Only publication fees in full open access venues for peer-reviewed scientific publications are eligible for reimbursement.

Open science: research data management

The beneficiaries must manage the digital research data generated in the action ('data') responsibly, in line with the FAIR principles and by taking all of the following actions:

- establish a data management plan ('DMP') (and regularly update it)

- as soon as possible and within the deadlines set out in the DMP, deposit the data in a trusted repository; if required in the call conditions, this repository must be federated in the EOSC in compliance with EOSC requirements

- as soon as possible and within the deadlines set out in the DMP, ensure open access — via the repository — to the deposited data, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would in particular:

    - be against the beneficiary's legitimate interests, including regarding commercial exploitation, or

    - be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under this Agreement; if open access is not provided (to some or all data), this must be justified in the DMP

- provide information via the repository about any research output or any other tools and instruments needed to re-use or validate the data.

Metadata of deposited data must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: datasets (description, date of deposit, author(s), venue and embargo); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

Open science: additional practices

Where the call conditions impose additional obligations regarding open science practices, the beneficiaries must also comply with those.

Where the call conditions impose additional obligations regarding the validation of scientific publications, the beneficiaries must provide (digital or physical) access to data or other results needed for validation of the conclusions of scientific publications, to the extent that their legitimate interests or constraints are safeguarded (and unless they already provided the (open) access at publication).

Where the call conditions impose additional open science obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) immediately deposit any research output in a repository and provide open access to it under a CC BY licence, a Public Domain Dedication (CC 0) or equivalent. As an exception, if the access would be against the beneficiaries' legitimate interests, the beneficiaries must grant non-exclusive licenses — under fair and reasonable conditions — to legal entities that need the research output to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

Plan for the exploitation and dissemination of results including communication activities

Unless excluded by the call conditions, the beneficiaries must provide and regularly update a plan for the exploitation and dissemination of results including communication activities.

SPECIFIC RULES FOR CARRYING OUT THE ACTION (— ARTICLE 18)

Implementation in case of restrictions due to strategic assets, interests, autonomy or security of the EU and its Member States

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security, the beneficiaries must ensure that none of the entities that participate as affiliated entities, associated partners, subcontractors or recipients of financial support to third parties are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless otherwise agreed with the granting authority.

The beneficiaries must moreover ensure that any cooperation with entities established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) does not affect the strategic assets, interests, autonomy or security of the EU and its Member States.

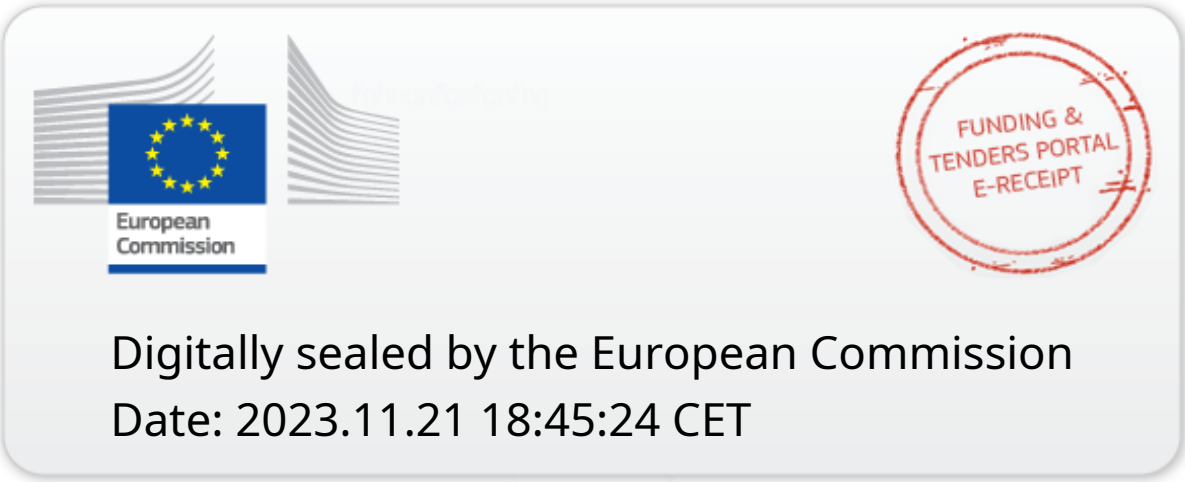
Recruitment and working conditions for researchers

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 Researchers[3], in particular regarding:

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

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

[3] 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).



This electronic receipt is a digitally signed version of the document submitted by your organisation. Both the content of the document and a set of metadata have been digitally sealed.

This digital signature mechanism, using a public-private key pair mechanism, uniquely binds this eReceipt to the modules of the Funding & Tenders Portal of the European Commission, to the transaction for which it was generated and ensures its full integrity. Therefore a complete digitally signed trail of the transaction is available both for your organisation and for the issuer of the eReceipt.

Any attempt to modify the content will lead to a break of the integrity of the electronic signature, which can be verified at any time by clicking on the eReceipt validation symbol.

More info about eReceipts can be found in the FAQ page of the Funding & Tenders Portal.

(https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq)