



## D4.4.1: Implementation plan for the enhancement of CNR ISAC Lecce Integrated facility and harmonized with the network [B2]



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## 1. INTRODUCTION

This deliverable is prepared in the context of the ITINERIS project, within the Work Package 4 that deals with the integration of Research infrastructures working in the atmospheric domain through synergistic approaches and cross boundaries developments. This deliverable reports the implementation plan of the Task 4.4 activities for integration and harmonization of CNR-ISAC-LE with the Italian Network of Environment RIs. The main aim of 4.4 is the instrumental strengthening of the observational capacity of the facilities in Lecce in order to reinforce the Italian contribution to ACTRIS Research Infrastructure. In particular, it is planned to extend the observation capabilities for both online and offline chemical and physical characterization of atmospheric aerosols and gases.

The aim of this deliverable is mainly linked to the scientific activities aiming to develop products for aerosol typing and characterization of aerosol sources, and for investigating the impact of atmospheric boundary layer height on aerosol and trace gases concentration at the ground.

The document is structured in five different chapters.  
Annexes and references are reported at the end of the document.

## 2. CNR-ISAC LECCE ATMOSPHERIC OBSERVATORIES AND ITS ROLE IN ATMOSPHERIC RIS

Facilities in Lecce include the fixed station identified as “Environmental-Climate Observatory (ECO)” and the exploratory platform “Mobile Laboratory for Gas and Aerosol Measurements (MAGA)”.

The ECO observatory is an integrated urban background site that provides detailed characterization of the chemical composition of the atmosphere for the aerosol in-situ component and for the main gaseous pollutants. It is operative since 2013, as regional station of the GAW-WMO network and is part of the ACTRIS network. Collected data have been used in several national and international research projects and allowed to study, for example: seasonal and long-term variability of the impacts of natural and anthropogenic pollution sources to air quality and health (Cesari et al., 2018; Giannossa et al., 2022; Guascito et al., 2023); statistics of new particle formation events (Dinoi et al., 2023); influence of long-range transport of dust (Conte et al., 2020); characterisation of specific events such as the COVID-19 lockdown on local air quality (Conte et al., 2023); characterisation of carbonaceous aerosol and its absorption properties (Merico et al., 2019). These potentiality and experience will help in producing reliable and sustainable products in support of air quality and climate change policies.

The MAGA mobile laboratory has been recently upgraded in the framework of the PON project PER-ACTRIS-IT. The research group at ISAC-CNR Lecce Unit has more than 20 years of experience in using mobile laboratory to complement fixed observations and to investigate the role of specific sources in determining composition of the atmosphere (Merico et al., 2016).

The list of currently available instruments is included in the ANNEX 1.

## 3. IDENTIFIED GAPS AND NEEDS FOR INTEGRATION

The main needs of upgrade and harmonization of the facility of ISAC in Lecce are linked to both human capital and technical infrastructure.

- Human capital

The human resources are definitely a key factor for the long-term sustainability of the RIs. A lot of effort is dedicated at the moment to the selection of good personnel: we wish a possible integration with permanent position of a non-negligible fraction of the enrolled personnel. Moreover, the sustainability of the observations and of the products foreseen in the pilot activities of ITINERIS is linked to a good state and continuous maintenance/calibration of instrumentation and technical installations at the observatories (fixed and mobile).

#### - Technical infrastructure

There is the need to install a second shelter at the ECO observatory, with electrical and network connections, UPS, gas inlet and aerosol inlet compliant with the recent standard operating procedures defined in the ACTRIS network.

The instrumental needs for fostering integration include (details in the table in Section 5) instruments focused on:

- online and offline characterization of aerosol chemical composition; upgrade of online detection of aerosol optical properties; detection of mixing layer height and distribution of aerosol in the boundary-layer; characterization of bioaerosol; upgrade of the potentiality of detection of meteorological parameters; detection of the main greenhouse gases.
- upgrade of the potentiality of the mobile MAGA facility for the determination of the particle number size distribution and concentration including an upgrade of the inlet and of the capability of measurement of the optical properties of atmospheric aerosol.

## 4. PROCEDURES FOR THE PERSONNEL

Two positions for personnel with the profile of Technologist (III level) are foreseen in activity 4.4 and they have been published in the Italian “Gazzetta Ufficiale” and ad hoc CNR website. The calls have been published on December 27<sup>th</sup>, 2022, with a deadline on January 26<sup>th</sup>, 2023. The number of applications received was 9 for one call and 18 for the other call. Evaluation committees have been nominated and selections are ongoing following the CNR rules.

The Technologists will work in strict collaboration with the two position of researcher (III level) that were foreseen in the activity 4.12. These positions have also been published on December 27<sup>th</sup>, 2022, with a deadline on January 26<sup>th</sup>, 2023. The number of applications received was 17. Evaluation committee has been nominated and selection is ongoing following the CNR rules.

Three Ph.D. positions were also foreseen in activity 4.12 that will work in collaboration with the other recruited employees. The Ph.D. positions were included in the second call for the 38<sup>o</sup> Cycle of Ph.D. at the University of Salento for the Course on “Ingegneria dei Materiali e delle Strutture e Nanotecnologie”. The deadline for applications was on 23<sup>rd</sup> January 2023 and the selection committee examined the applications on February 2023.

## 5. EQUIPMENT PROCEDURES

The Operative Unit of Lecce organized the purchase procedures at ISAC level, together with Bologna and Lamezia Terme Units. We planned 3 EU tender procedures, 11 derogation purchases for uniqueness, 18 procedures under threshold on the Italian market for public administration. The following Table 1 reports the organization into EU procedures, Mepa RdO, Unicity, classified by main CPV, and timing details (category of expenses b). Table 2 reports the activities planned for upgrade of the technical infrastructure (category of expenses d). The 4.4 procedures are those referred

as CNR-ISAC Lecce as such only these are reported in the tables. The table also reports, for completeness, which is the ISAC unit handling the procedure.

The planning of the procedure already started according to the timeline foreseen in ITINERIS.

<b>INSTRUMENT DESCRIPTION</b>	<b>CPV code</b>	<b>ISAC UNIT</b>	<b>PROCEDURE</b>	<b>Internal Organization for EU-Tenders</b>	<b>Activity</b>	<b>Start of procedure</b>	<b>End of procedure</b>
Sistema per cromatografia ionica da laboratorio per anioni e cationi con autocampionatore	38340000-0	LECCE	EU tender	EU-2-ISAC L3	4.4	B5	B11
Analizzatore XRF online	38340000-0	LECCE	EU tender	EU-2-ISAC L4	4.4	B5	B11
High resolution FTIR spectrometer with Raman Module, Near IR Module with integrating sphere, Microsampling,	38340000-0	LECCE	EU tender	EU-2-ISAC L5	4.4	B5	B11

control and analysis software and accessories							
Rilevatore online di bioaerosol su singola particella	38340000-0	LECCE	EU tender	EU-2-ISAC L6	4.4	B5	B11
SMPS - scanning mobility particle sizer (range 10-800 nm)	38340000-0	LECCE	EU tender	EU-1-ISAC L4	4.4	B3	B9
CPC 3750	38340000-0	LECCE	EU tender	EU-1-ISAC L2	4.4	B3	B9
DNA bioaerosol sequence	38340000-0	LECCE	EU tender	EU-2-ISAC L7	4.4	B5	B11
Bio-aerosol sampler	38340000-0	LECCE	EU tender	EU-3-ISAC L1	4.4	B7	B13
Piattaforma radiativa trasportabile composta da: 2 piranometri, 2 pirgeometri, 2 radiometri iperspettrali (albedo spettrale), SKY imager per copertura nuvolosa, MFRSR, banco ottico trasportabile o traliccio	38340000-0	LECCE	EU tender	EU-3-ISAC L2	4.4	B7	B13
Sistema HATPRO	38340000-0	LECCE	EU tender	EU-3-ISAC L3	4.4	B7	B13
Sistema HALO	38340000-0	LECCE	EU tender	EU-2-ISAC L8	4.4	B5	B11
Ceilometer with depolarisation measurements	38340000-0	LECCE	EU tender	EU-1-ISAC L5	4.4	B3	B9
Sun sky-lunar photometer	38340000-0	LECCE	EU tender	EU-1-ISAC L6	4.4	B3	B9
AE33 (aethalometer for black carbon concentration, BB fraction)	38340000-0	LECCE	EU tender	EU-1-ISAC L1	4.4	B3	B9
Nefelometro Aurora 3000	38340000-0	LECCE	EU tender	EU-2-ISAC L1	4.4	B5	B11
Nefelometro Aurora 3000	38340000-0	LECCE	EU tender	EU-2-ISAC L1	4.4	B5	B11
Analizzatore CRD per la rilevazione di CH4, CO2, H2O e CO	38340000-0	LECCE	Unicity		4.4	B4	B11
Sistema per analisi online di OC/EC nel	38340000-0	LECCE	Unicity		4.4	B6	B12

particolato atmosferico							
PBL mixing monitor- Sistema di campionamento del particolato atmosferico-Testa di campionamento con essiccatore LEN- Aerosol particle collector- Stereomicroscope	38340000-0	LECCE	Mepa RdO		4.4	B3	B10
Sistema UPS per alimentazione controllata della strumentazione	31680000-6	LECCE	Mepa RdO		4.4	B4	B7
PCs per gestione strumenti ad attività di pre-elaborazione dati	30230000-0	LECCE	Mepa RdO		4.4	B3	B6
Licenze IDL	48000000-8	LECCE	Mepa RdO		4.4	B4	B7
Refrigeratore da laboratorio con due range di temperature	39711100-0	LECCE	Mepa RdO		4.4	B3	B7
Upgrade inlet stazione mobile con aspirazione ad alto volume e rilevazioni temperatura ed umidità	38340000-0	LECCE	Mepa RdO		4.4	B3	B6

**Table 1:** Procedures for acquisition of equipment. The start and end are given in terms of bimesters starting from the beginning of the project. Analysis of the market are still going on and there is the possibility to further optimize the internal organization of the EU tenders, unicity, and Mepa RdO.

DESCRIPTION	CPV code	ISAC UNIT	PROCEDURE	Internal Organization for EU-Tenders	Activity	Start of procedure	End of procedure
Shelter con condizionamento, linee gas tecnici, illuminazione, impianto elettrico interno	45200000-9	LECCE	Mepa RdO		4.4	B3	B9
Progettazione, realizzazione ed installazione di inlet per aerosol e kit di installazione	38340000-0	LECCE	Mepa RdO		4.4	B3	B9
Progettazione, realizzazione ed installazione di inlet per gas e kit di installazione	38340000-0	LECCE	Mepa RdO		4.4	B3	B9

**Table 2:** Procedures for upgrade of technical infrastructure. The start and end are given in terms of bimesters starting from the beginning of the project.

## ANNEX 1 – ISAC-CNR LECCE AVAILABLE INSTRUMENTS

### ECO Observatory

- Samplers for PM2.5 and PM10 in continuous operation with potentiality to collect samples on different substrates.
- MPSS for the determination of the particle size distribution in the range 10-800 nm.
- Condensation particle counter (CPC) for the determination of number particle concentrations.
- Two optical particle counters and an Aerodynamic Particle Sizer (APS) for the determination of the coarse particle number size distribution.
- A NAIS system and a PSM system for the characterization of nanoparticle size distributions.
- An aethalometer AE33 and a MAAP for the determination of black carbon and aerosol absorption.
- A total carbon analyzer (TCA08) for the online determination of total carbon concentration in PM10.
- A nephelometer Aurora3000 for the determination of the aerosols scattering coefficients.
- Q-TOF ACSM for the online determination of non-refractory chemical composition of PM1.

- Gas analyzers for the detection of the main gaseous pollutants (NO, NO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>, O<sub>3</sub>, N<sub>2</sub>O, SO<sub>2</sub>).
- Meteorological and micrometeorological station.

#### Laboratory for offline characterisation of particulate matter

This is a facility that operates in coordination with the ECO and MAGA facilities and it is devoted to the characterisation of the composition of particulate matter, and it is also used for check/calibration of online instruments. The current available instruments are: an ED-XRF system for determination of elemental composition of aerosol; and UV-VIS spectrometer used for the determination of the oxidative potential of aerosol; an OC/EC analyzer for the determination of the carbonaceous aerosol in terms of both organic (OC) and elemental (EC) carbon; a TOC for the determination of the content of water soluble organic and inorganic carbon and of total nitrogen.

#### MAGA mobile facility

The facility is a van equipped with PM<sub>2.5</sub> and PM<sub>10</sub> samplers; an Optical Particle Counter for the determination of the size distribution of coarse particles; a SMPS system for the determination of the size distribution in the range 10-800 nm; gas analyzers for the detection of NO-NO<sub>2</sub>-NO<sub>x</sub>, O<sub>3</sub>, SO<sub>2</sub> concentrations; a meteorological station with a 10m mast. The van is equipped with conditioning system, UPS, and PC to manage the instruments and a modem to allow remote control of the instruments.

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