

# Deliverable D46 (D6.1)

Information packages for local, regional and  
national AQ administrations



**RI-URBANS**

**Research Infrastructures Services Reinforcing Air  
Quality Monitoring Capacities in European Urban &  
Industrial AreaS (GA n. 101036245)**

**By**



UNIVERSITY OF HELSINKI

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### Deliverable D46 (D6.1): Information packages for local, regional and national AQ administrations

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<b>Comments</b>	<p>This document provides a description of the sixteen Service Tools prepared for the measurement and modelling of novel air quality (AQ) pollutants using advanced and conventional methods. These are prepared in the framework of RI-URBANS and in some cases RI-URBANS/ACTRIS. These guidance documents provide information on the added value of these measurements by compiling existing datasets and further studying their implications. In addition, it provides guidance for the AQ networks, scientists and other stakeholders how to implement the new Directive 2024/2881/EC for an enhanced AQ assessment.</p>

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## 1. About this document

This document was prepared as part of the "Research Infrastructures Services Reinforcing Air Quality (AQ) Monitoring Capacities in European Urban & Industrial Areas" (RI-URBANS) EU-project that connects the atmospheric observation expertise from Aerosols, Clouds and Trace gases Research InfraStructure (ACTRIS) with the urban air quality observation capacities of the regulatory air quality monitoring networks. It is specifically connected to the new European AQ Directive (NAQD) 2024/2881/CE published on 20 November 2024.

The NAQD underlines the importance of emerging pollutants for AQ and the well-being of the citizens. Particularly, novel pollutants such as ultrafine particles (UFP), their particle number size distribution (PNSD), black carbon (BC) and elemental carbon (EC), as well as ammonia (NH<sub>3</sub>), numerous volatile organic compounds (VOCs), and measurements of tracers of potential toxicity of PM (oxidative potential (OP) of particulate matter PM), are required or recommended to be monitored at both rural and urban supersites in order to support scientific understanding of their effects on health and the environment. In order to ensure that the measurements on air pollution are sufficiently representative and comparable across Europe, it is important that standardized measurement techniques and common criteria for the number and location of measuring stations are used for the assessment of ambient air quality.

RI-URBANS produced a number of Service Tools (STs) for specific advanced AQ measurement and modelling variables, a number of these included in Article 10 and Annex VII of the NAQD, and for which no reference methods, or in some cases even no official guidance documents, are available at the moment.

A Service Tool is any tool prepared by the RI-URBANS that the project has reviewed, in some cases developed, tested, and recommends for advanced AQ assessment in urban areas. These tools can be used to assess AQ in accordance with RI-URBANS AQ monitoring and modelling recommendations for novel pollutants. These recommendations include protocols for measuring advanced AQ variables (derived from ACTRIS and CEN or, in specific cases, proposed when not available), mapping protocols, emission inventories, modelling tools, and suggested epidemiological approaches to evaluate the health effects of new pollutants.

This document aims at providing information on and links to the 16 ST guidance documents. They contain sections to support in detail the implementation of these measurements and modelling for relevant stakeholders such as air quality authorities, networks, and scientists. In addition, they describe the added value and its implications obtained by compiling existing datasets of the advanced AQ variables for an enhanced AQ assessment. The work was prepared in the framework of RI-URBANS and in some cases RI-URBANS/ACTRIS. Furthermore, a summary 'RI-URBANS booklet' is being produced for dissemination purposes that will be integrated in a further deliverable.

Thus, all the Service Tool documents build-up the present RI-URBANS deliverable D46 (D6.1). With the support for publication from AXA Research Fund, all these and the booklet will build up the final dissemination D55 (D7.6).

This is a public document, available at the RI-URBANS website, <https://riurbans.eu/work-package-6/#deliverables-wp6>, and distributed to all RI-URBANS partners for their use as well as submitted to the European Commission.

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

## 2. Service tools prepared and open access to the guidance documents

As stated above, a ST in RI-URBANS is any tool by the project that has been reviewed, in some cases developed, tested, and is recommended for advanced AQ assessment in urban areas. Table 2.1 shows the 16 STs and associated guidance documents (grouped according to aims/method: surface or profile measurements, source apportionment, health assessment, mapping, emission inventories, and modelling). The specific detailed guidance documents can be downloaded from <https://riurbans.eu/project/#service-tools>. Once accessed through this link, the 6 groups of STs will be listed and by clicking on each of these the links for the specific STs will be available for download.

**Table 2.1.** The sixteen Service Tools (STs grouped according to aims/method: surface or profile measurements, source apportionment, health assessment, mapping, emission inventories, and modelling) provided by RI-URBANS for which the respective associated guidance documents can be downloaded from <https://riurbans.eu/project/#service-tools>.

Number	Guidance document topic
<b>Protocols for the measurement of novel AQ pollutants</b>	
ST1	Ultrafine-Particle Number Size Distributions (UFP-PNSD)
ST2	Black Carbon (BC)
ST3	Offline and online particulate matter (PM) speciation
ST4	Oxidative potential of particulate matter (OP of PM)
ST5	Volatile Organic Compounds (VOCs)
ST6	Ammonia (NH <sub>3</sub> )
<b>Methodologies for vertical profiles of pollutants and meteorology</b>	
ST7	Measurements of boundary level height
ST8	Measurements of vertical profiles of aerosols
ST9	Measurements of vertical IAGOS vertical profiles by commercial aircrafts
<b>Methodologies for source apportionment receptor modelling</b>	
ST10	Source apportionment techniques for particulate matter
ST11	Source apportionment of eBC, UFP, OP and VOCs
<b>Methodologies for urban mapping of novel air quality pollutants</b>	
ST12	Deterministic urban modelling of fine PM and PNC
ST13	Mapping ultrafine particles and citizen science
<b>Methodologies for evaluating the health effects of novel AQ pollutants</b>	
ST14	Evaluation of health effects of novel air quality parameters
<b>Obtaining emission inventories for novel AQ pollutants</b>	
ST15	First UFP-PNSD and non-exhaust vehicle PM EU emission
<b>Modelling methodologies for novel AQ pollutants</b>	
ST16	UFP-PNSD multiscale modelling

**ST1:** The aim of this RI-URBANS/ACTRIS document on **UFP and PNSD measurements** (included as mandatory at urban supersites in the NAQD) is to facilitate upscaling of measurement techniques within the AQ monitoring networks (AQMNs). It contains an up-to-date report of the harmonised methodologies related to UFP and PNSD measurements, with additional information on sampling and data management. Furthermore, discrepancies between CEN standards and ACTRIS recommendations with AQ guidelines are identified. A Pan-European report

on UFP-PNSD observations is also included with the most relevant results reported. Finally, a concise recommendations section on the measurements of UFP and PNSD in urban environments is provided.

**ST2:** The aim of this RI-URBANS/ACTRIS document on **equivalent BC (eBC) determinations** (included as mandatory in urban supersites in the NAQD) is to facilitate upscaling of measurement techniques within the AQMNs. It contains an up-to-date report of the harmonised methodologies related to BC measurements, with additional information on how to obtain eBC data and data management. Furthermore, discrepancies between ACTRIS recommendations are identified. A Pan-European report on eBC observations is also included, with most relevant results reported. Finally, a concise recommendations section on the determination of eBC in urban environments is provided.

**ST3:** The new EU AQ Directive (NAQD, CEU, 2024) requires or recommends the analysis of specific PM<sub>10</sub> and PM<sub>2.5</sub> components, such as metals (arsenic, As; cadmium, Cd; nickel, Ni; lead, Pb), polyaromatic hydrocarbons (PAH), levoglucosan, elemental and organic carbon (EC and OC) as well as inorganic ions (sulphate, SO<sub>4</sub><sup>2-</sup>; nitrate, NO<sub>3</sub><sup>-</sup>; chloride Cl<sup>-</sup>; ammonium NH<sub>4</sub><sup>+</sup>; calcium, Ca<sup>2+</sup>; potassium, K<sup>+</sup>; magnesium, Mg<sup>2+</sup>; sodium, Na<sup>+</sup>). Protocols for specific sampling and analytical reference methods are supplied to this end in the NAQD, which shall be followed. However, in addition to these, for an advanced air quality assessment, including source apportionment, additional PM inorganic and organic components might be required. This guidance document by RI-URBANS/ACTRIS supplies detailed recommendations for **offline** (24 h sampling followed by laboratory analyses) and **online** (<1 h) **PM speciation**. A Pan-European report on PM speciation is also included, with the most relevant results reported. Finally, a concise recommendations section is provided.

**ST4:** This RI-URBANS guidance document describes the steps needed to conduct **measurements of OP of PM** and it provides an update on the state of the art on this harmonisation. This guidance document describes the different OP assays. It also provides information of the last studies comparing data and elucidates its connection with emission sources, chemical composition and size of PM. Furthermore, it gives recommendations to follow in the implementation of OP PM measurements according to the conclusions obtained in the first international interlaboratory comparison exercise developed in the framework of the RI-URBANS project. Finally, it shares a simplified measurement protocol developed for the most widely used **OP-dithiothreitol (DTT)** assay where the most critical steps have been optimised and harmonised in the framework of a dedicated task of RI-URBANS by a set of expert laboratories.

**ST5:** Annex VII of the NAQD recommends the measurement of 45 **VOC species** that are precursors of ozone (O<sub>3</sub>). The aim of this RI-URBANS/ACTRIS guidance document is to facilitate upscaling of measurement techniques for VOCs within air quality monitoring networks. It provides an up-to-date summary of the methodologies related to VOCs, summarizes recent scientific synthesis of Pan-European observations and provides recommendations on the measurements of VOCs.

**ST6:** In the NAQD, measurements of **NH<sub>3</sub>** are requested for rural supersites, but not for the urban ones, where this is only recommended. However, in the urban pollution hotspots measurements of NH<sub>3</sub> are very relevant to evaluate possible effects of AQ policy actions to abate fine particulate matter (PM<sub>2.5</sub>), since this pollutant has a key role in the generation of secondary PM (particulate matter). This RI-URBANS guidance document reviews the methods for measuring NH<sub>3</sub> ambient concentrations, compiles and interprets spatial and time variability based on the datasets from 69 sites, and gives recommendations on the measurement of NH<sub>3</sub>.

**ST7:** Currently, most Air Quality Monitoring Networks (AQMNs) miss information about important processes and quantities in the vertical dimension that are necessary to better understand surface-level pollution data. The vertical dimension is especially relevant when considering potential non-local sources of aerosols (e.g. those arriving via medium-to-long-range transport) or for evaluating vertical dilution of locally emitted pollutants (for example to forecast exceedances of specific daily limit values), among others. This RI-URBANS/ACTRIS guidance

document highlights the added value provided by information from measurements of atmospheric boundary layer heights and profiles of wind and turbulence. The main instruments allowing these measurements are briefly outlined, as well as the operation requirements. The document presents a few selected examples of measurements and retrievals that are applied in different RI-URBANS pilot cities and beyond.

**ST8:** Similarly, to ST7, this RI-URBANS/ACTRIS guidance document focuses on the added value of vertical measurements. The aim of this document is to facilitate the consideration of aerosol profiling within AQMNs. A concise summary of the currently available methodologies is provided, focusing on very precise methods, as well as a synthesis of Pan-European observations.

**ST9:** RI-URBANS connects the atmospheric observation expertise from In-service Aircraft for a Global Observing System (IAGOS). This document describes the available AQ parameters from IAGOS profiling, the data access, and examples of the use of IAGOS profiles over RI-URBANS pilot cities.

**ST10:** This RI-URBANS/ACTRIS guidance document offers an overview of state-of-the-art procedures to conduct Positive Matrix Factorization (PMF) analyses for the source apportionment of PM<sub>10</sub> and PM<sub>2.5</sub>, as well as submicron organic aerosols (OA, the major fraction of fine aerosols) and trace elements (which are good tracers for a wide variety of PM sources).

**ST11:** This RI-URBANS/ACTRIS guidance document offers overviews on the source apportionment of online measurement data of UFP-PNSD, BC, and VOCs and OP of PM. The added value of obtaining results of receptor modelling for these novel AQ pollutants is shown by supplying Pan-European overviews.

**ST12:** This RI-URBANS guidance document focuses on the application of deterministic modelling for mapping PM and UFP at urban scale. Pollutants such as NO<sub>2</sub>, PM<sub>2.5</sub>, BC and UFP may strongly impact the health of the population, with their concentrations being often particularly high over cities, with strong urban heterogeneities. In cities, the concentration of NO<sub>2</sub>, BC and particle number (PN) and to a lesser extent PM<sub>2.5</sub> are particularly high along traffic axes and in streets. To estimate the outdoor concentration exposure of the population, maps are required at spatial scales below 100 m, at the minimum, to be able to differentiate the street from the urban background concentrations. Hourly time resolution is desirable.

**ST13:** This RI-URBANS guidance document describes methods that AQMNs, researchers and other groups can use to develop fine spatial resolution maps of urban air pollution derived from monitoring. The methods described in this document are complementary to routine monitoring with reference equipment at one or a few monitoring sites across the city. The described methods are also complementary to deterministic dispersion models which are often applied by AQ agencies for regulatory purposes. The methods for the involvement of citizen science for such mappings are also reviewed.

**ST14:** This RI-URBANS document guides on the steps needed to conduct an epidemiological analysis linking novel AQ pollutants with health effects. Estimates of short-term associations between air pollution and health are usually based on studying the relationship between daily variations of air pollutant concentrations and daily counts of health outcomes such as mortality and/or morbidity (e.g. hospital admissions or hospital visits by various causes). This document reports on the different options that can be followed to conduct epidemiological studies, the data needs and the statistical methodologies that can be applied. Lastly, it illustrates, using the data compiled by the RI-URBANS project, the feasibility of implementing such analyses and the added value of the novel AQ pollutants to determine health effects.

**ST15:** This RI-URBANS document guides on the steps needed to produce consistent emission inventories for regional and urban scale modelling applications. It describes the specific improvements that have been made to existing European emission inventories for RI-URBANS at a horizontal resolution of ~ 6x6 km<sup>2</sup> to better represent

road transport emissions and include estimations of UFP, among others. This document also describes a downscaling tool to detail the European emission dataset to a 1x1 km<sup>2</sup> resolution over urban areas in a consistent way. The specific RI-URBANS emission inventories are elaborated for: UFP-PNSD, non-exhaust PM, other anthropogenic sources of PM and its components, including BC, and NO<sub>x</sub>, SO<sub>x</sub>, NH<sub>3</sub> and VOCs. The European wide emission inventories can be obtained directly through access to a FTP repository, or by requesting them via email ([Jeroen.Kuenen@tno.nl](mailto:Jeroen.Kuenen@tno.nl) or [Marya.ElMalki@tno.nl](mailto:Marya.ElMalki@tno.nl)), while urban (1x1 km<sup>2</sup>) emission datasets for Amsterdam, Athens, Birmingham and Helsinki can be obtained by the same FTP repository or by requesting them via email ([eathana@noa.gr](mailto:eathana@noa.gr)).

**ST16:** This RI-URBANS document focuses on guidance to adequately model the spatial-temporal variation of UFP (and their particle size distribution, PNSD). To this end, primary UFP-PNSD emission inventories are required (see [ST15](#) on the first UFP-PNSD EU emission inventory), but also complex physical-chemical processes for nucleation should be implemented in the modelling tools. Multiscale approaches are also needed to account for emission and particle formation if the urban UFP-PNSD are intended to be modelled. This document summarises methodologies for multiscale modelling of UFP using two approaches, PMCAMx-UF (a three-dimensional chemical transport model focusing on the simulation of the UFP-PNSD and composition; Jung et al., 2010) and CHIMERE (a multi-scale chemistry-transport model for atmospheric composition analysis and forecast).

**In addition to these guidance documents**, we elaborated another document (RI-URBANS BOOKLET) that can be downloaded at the same link as that of the STs (<https://riurbans.eu/project/#service-tools>), which contains a summary of the contents of the 16 STs guidance documents, the links to download these, and a summary of the added value of measuring the novel AQ parameters in urban Europe.

We have received financial support from the **AXA Fund** to produce documents with a nice format for the final dissemination. That will compose the final dissemination D55 (D7.6).

### 3. Contributors for the Service Tools

The ST have been developed and reviewed by a large group of experts in the field of AQ management and research. The authors and reviewers are given in Table 3.1. These STs have been produced RI-URBANS by experts from WP1, WP2 and WP3, but also from WP4 by including results of the pilot testing of the STs.

**Table 3.1.** The authors and reviewers of the sixteen Service Tools.

Number	Authors	Reviewers
<b>Protocols for the measurement of novel AQ pollutants</b>		
ST1	Meritxell García-Marlès (CSIC), Pedro Trecehera (CSIC), Xiansheng Liu (CSIC), (CNRS), Tuukka Petäjä (UHEL), Roy Harrison (UoB), Phillip Hopke (Clarckson University), Alfred Wiedensohler (TROPOS), Andrés Alastuey (CSIC) & Xavier Querol (CSIC)	Karri Saarnio (FMI), Elli Suhonen (FMI), Oliver Bischof (TSI), Carsten Kykal (TSI), Sebastian Schmitt (TSI), Torsten Tritscher (TSI), Joonas Vanhanen (Airmodus), Aki Pajunoja (Airmodus), Imre Salma (ELTE), Katrianne Lehtipalo (UHEL), Christoph Hüglin (EMPA)
ST2	Marjan Savadkoohi (CSIC), Marco Pandolfi (CSIC), Andres Alastuey (CSIC), Tuukka Petäjä (UHEL), Jean Philippe Putaud (JRC), Olivier Favez (INERIS), Xavier Querol (CSIC)	Hilkka Timonen (FMI), Karri Saarnio (FMI), Katriina Kyllönen (FMI), Elli Suhonen (FMI), Christoph Hüglin (EMPA)
ST3	Andrés Alastuey (CSIC), Xiansheng Liu (CSIC), Barend L. Van Drooge (CSIC), Clara Jaén (CSIC), Marta Via (CSIC), Benjamin Chazeau (AMU/PSI), Anja Tremper (ICL), Manos Manousakas (PSI), André S.H. Prevot (PSI), Jean-Eudes Petit (CNRS), Jean-Philippe Putaud (EC-JRC), Olivier Favez (INERIS), Xavier Querol (CSIC)	Hilkka Timonen (FMI), Katriina Kyllönen (FMI), Elli Suhonen (FMI), Falk Mothes (TROPOS), Anja Tremper (ICL), Gang Chen (ICL), Hasna Chebaicheb (INERIS)



ST4	Pamela Dominutti (CNRS), Jean-Luc Jaffrezo (CNRS), Roy Harrison (UoB), Xavier Querol (CSIC) & Gaëlle Uzu (CNRS)	Katriina Kyllönen (FMI), Elli Suhonen (FMI), Tuukka Petäjä (UHEL)
ST5	Thérèse Salameh (IMT Nord Europe) with the collaboration of Xiansheng Liu and Xavier Querol (CSIC)	Katriina Kyllönen (FMI), Jean-Philippe Putaud (JRC), Heidi Hellén (FMI), Elli Suhonen (FMI)
ST6	Marsailidh M. Twigg (CEH), Katriina Kyllönen (FMI), Ulla Makkonen (FMI), Xiansheng Liu (CSIC), Xavier Querol (CSIC)	Wenche Aas (EMEP), Jean Philippe Putaud (JRC)
<b>Methodologies for vertical profiles of pollutants and meteorology</b>		
ST7	Simone Kotthaus (CNRS), Melania Van Hove (CNRS), Martial Haeffelin (CNRS), Francesca Barnaba (CNR), Annachiara Bellini (CNR, now at ARPA VdA), Lucia Mona (CNR)	Xavier Querol (CSIC), Ewan O'Connor (FMI), Adolfo Comerón (UPC), Iwona Stachlewska (UW), Arnaud Apituley (KNMI)
ST8	Lucia Mona (CNR), Doina Nicolae (INOE), Francesca Barnaba (CNR), Annachiara Bellini (CNR, now ARPA Val d'Aosta) Simone Kotthaus (CNRS), Martial Haeffelin (CNRS)	Xavier Querol (CSIC), Ewan O'Connor (FMI), Adolfo Comerón (UPC), Iwona Stachlewska (UW), Arnaud Apituley (KNMI), Andreas Petzold (Jülich)
ST9	Hannah Clark (IAGOS-CNR), Christoph Mahnke (ZI), Andreas Petzold (FZJ)	Xavier Querol (CSIC), Christoph Gerbig (MPI-BGC)
<b>Methodologies for source apportionment receptor modelling</b>		
ST10	Fulvio Amato (CSIC), Marta Via (CSIC), Mannos Manousakas (PSI), Benjamin Chazeau (AMU), Gang Chen (ICL), Barend L. van Drooge (CSIC), Jean-Luc Jaffrezo (University of Grenoble, UGA), Olivier Favez (INERIS), Cristina Colombi (ARPA Lombardia), Eleonora Cuccia (ARPA Lombardia), Guido Lanzani (ARPA Lombardia), André S.H. Prevot (PSI), Andrés Alastuey (CSIC) & Xavier Querol (CSIC)	J. Eudes Petit (CNRS), Katriina Kyllönen (FMI), Hilikka Timonen (FMI), Anja Tremper (ICL), Elli Suhonen (FMI)
ST11	<i>BC</i> : Marjan Savadkoohi (CSIC), Marco Pandolfi (CSIC), Olivier Favez (INERIS), Mohamed Gherras (INERIS), Andres Alastuey (CSIC), Tuukka Petäjä (UHEL), Xavier Querol (CSIC) <i>UFP</i> : Meritxell Garcia-Marlès (CSIC), Phil Hopke (University of Clarkson), Roy Harrison (UoB), Andres Alastuey (CSIC), Tuukka Petäjä (UHEL), Xavier Querol (CSIC) <i>OP of PM</i> : Gaëlle Uzu (IGE), Kaspar Daellenbach (PSI), Vy Dinh Ngoc Thuy (IGE), Andre Prevot (PSI), Jean-Luc Jaffrezo (IGE) <i>VOC</i> : Thérèse Salameh (IMT Nord Europe), Marvin Dufresne (IMT Nord Europe), Marten In't Veld (CSIC, RIVM), Stéphane Sauvage (IMT Nord Europe), Michelle Jessy Müller (EMPA), Stefan Reimann (EMPA)	Xavier Querol (CSIC), Katriina Kyllönen (FMI), Imre Salma (ELTE), Olivier Favez (INERIS), Hilikka Timonen (FMI), Heidi Hellén (FMI), Elli Suhonen (FMI)
<b>Methodologies for urban mapping of novel air quality pollutants</b>		
ST12	Karine Sartelet (ENPC), Jian Zhong (University of Birmingham, UoB), Eleni Athanasopoulou (NOA), Lya Lugon (ENPC), Soo-Jin Park (ENPC), Roy Harrison (University of Birmingham, UoB)	Augustin Colette (INERIS), Elli Suhonen (FMI)
ST13	Gerard Hoek (Utrecht University, UU), Jules Kerckhoffs (Utrecht University, UU), Martine van Poppel (Flemish Institute for Technological Research, VITO), Jelle Hofman (Flemish Institute for Technological Research, VITO), Roy Harrison (University of Birmingham, UoB), Sef van den Elshout (DCMR Environmental Protection Agency)	Tuukka Petäjä (UHEL), Xavier Querol (CSIC), Elli Suhonen (FMI)

<b>Methodologies for evaluating the health effects of novel AQ pollutants</b>		
ST14	Vanessa Nogueira dos Santos, Ioar Rivas, Xavier Basagaña (ISGlobal)	Roy Harrison (UoB), Gerard Hoek (UU), Xavier Querol (CSIC), Elli Suhonen (FMI)
<b>Obtaining emission inventories for novel AQ pollutants</b>		
ST15	Jeroen Kuenen (TNO), Eleni Athanasopoulou (NOA), Marc Guevara (BSC)	Augustin Colette (INERIS), Maria Kanakidou (FORTH), Elli Suhonen (FMI)
<b>Modelling methodologies for novel AQ pollutants</b>		
ST16	Evangelia Siouti (FORTH), Karine Sartelet (ENPC), Elena Poulidikidi (FORTH), David Patoulis (FORTH), Lya Lugon (ENPC), and Spyros N. Pandis (FORTH)	Augustin Colette (INERIS), Maria Kanakidou (FORTH), Elli Suhonen (FMI), Martijn Schaap (TNO), Xavier Querol (CSIC)

#### 4. Dissemination of the Service Tools

The STs have been disseminated in a series of events where different stakeholders have been involved and informed on the upcoming guidance documents that have been made available in November–December 2024. As previously stated, we have received financial support from **AXA Fund** to produce documents with a nice format for the final dissemination. That will compose the final dissemination D55 (D7.6). The dissemination will continue in later deliverables in WP6 and WP7 including events and the previously mentioned booklet. The draft of the upcoming Commission guidance for AQ measurements has been shared with the RI-URBANS, and the draft version includes several references to the specific STs greatly enhancing the use of the STs by AQ stakeholders in the future.

The events organised so far where the STs have been introduced in presentations, talks or other advertisements are listed below. They include events organised in European, regional and national level.

- The 1<sup>st</sup> Stakeholder Meeting (12/05/2022) succeeded in involving staff of EC-DG ENV, AQUILA, WHO, EEA, WMO, EMEP, as well as numerous national AQ administrations and cities.
- A remote conference on RI-URBANS STs was given to EC-DG-ENV, JRC and EEA staff, by request of EC-DG-ENV in 08/12/2022, to supply information for the review of the EU AQ Directive.
- Information packages on the RI-URBANS STs of advanced AQ parameters were supplied to C. Nagl working for the review of the AQ Directive. Most of these STs are included in the NAQD, 2024/2881 from 20 November 2024, and cited in [the base documents of the proposal of the NAQD at DG ENV \(page 16\)](#), with AQUILA and ACTRIS, source of information to set up measurements.
- Since then, RI-URBANS, in collaboration with ACTRIS ESFRI developed a document with recommendations for this NAQD, 2024/2881, as far as the advanced STs proposed are concerned. This was sent to DG ENV and AQUILA on 08/02/2023. On 06/03/2023 this document was updated and sent to DG ENV again.
- On 23<sup>rd</sup> February 2023, a 2<sup>nd</sup> Stakeholder meeting took place for the Polish Stakeholders to improve awareness, communicate on status, and assess the needs in relation to RI-URBANS STs within the Polish community. Subsequently we elaborated a document on how to implement these STs in Poland to reply the requirements of the NAQD on advanced AQ pollutants.
- On 19/06/2023 we had the [3<sup>rd</sup> stakeholder \(online\)](#) meeting of RI-URBANS, organised in collaboration with [ACTRIS, AQUILA and EMEP to discuss with AQUILA and national AQMNs experts](#) on the recommendations sent. We had 152 attendees from 69 institutions. These included DG ENV, WHO, WMO, ACTRIS, EMEP, AQUILA, RI-URBANS, and AQ national experts from numerous countries, regions and cities, RI-URBANS Associated Collaborators, National Research centres and SMEs.
- 04/12/2023 we co-organised with the [Green Deal \(GD\) Support Office \(GD-SO\)](#) the [Webinar Clearing the Air: Research Findings on New Additions to the EU AQ Directive](#). The webinar can be reproduced online in the GD-

SO website at: <https://projects.research-and-innovation.ec.europa.eu/en/strategy/strategy-2020-2024/environment-and-climate/european-green-deal/green-deal-projects-support/green-deal-resources/clearing-air-research-findings-new-additions-eu-air-quality-directive-proposal>. The webinar was addresses to show the phenomenology of new pollutants in Europe, and how the GD projects contribute to the elaboration of the AQ Directive. More than 450 attendees were registered and 250 attended, due in part to a GD-SO' error in the link of the webinar.

- On 04 and 22/10/2024, we presented the guidance for STs for advanced AQ parameters (most included in the NAQD) in an [AQ stakeholder webinar organised by ATMO-ACCESS-RI-URBANS](#).
- We are in contact with AQUILA and the RICARDO's consortium elaborating [recommendations for such type of measurements for DG ENV](#). We sent them all the guidance documents we are producing for these advanced AQ parameters. In the [second draft of these DG-ENV documents](#) RI-URBANS is mentioned 11 times. The documents were sent to RI-URBANS for comments and these were sent to them on 02/08/2024.
- On 08/07/2024 RICARDO-driven consortium sent the draft documents to us for RI-URBANS comments. A complete list of comments was sent on 04/09/2024 for this consortium. Thus, we still expect to have RI-URBANS guidance more cited in the final version.
- On 28/08/2024 the STs were presented in European Aerosol Conference for the scientific community.
- On 21-22/10/2024 the STs were presented remotely to the Serbian Stakeholders, and the Polish document for upscaling guidance was suggested as a procedure to be followed.
- On 21/10/2024 afternoon the same presentation was given to the Romanian Stakeholders in an AQ webinar organised by the Ministry of the Environment.
- From January to March 2025, three seminars (one already scheduled in Italy) will be organised for the relevant stakeholders together with AQUILA and ACTRIS. Wide participation from different stakeholders such as national reference laboratories, researchers, AQ networks and authorities is expected. In the seminars, the STs will be presented by RI-URBANS.
- A success story was published in the Green Deal Portal. RI-URBANS has been spotlighted in the "13 Success Stories of Green Deal Projects" publication: [Improving AQ monitoring in Europe](#). This recognition highlights our innovative efforts in monitoring and improving air quality in urban areas, contributing significantly to the goals of the European Green Deal.
- The STs were presented in the Black Carbon Footprint seminar, taking place in Tampere, Finland (hybrid), on 7.10.2024 including e.g. scientists and companies from several European countries.
- The STs were advertised in the Nordic Air Pollution workshop, taking place in Copenhagen, Denmark (onsite), on 7.10.2024 including audience from the Ministries, EPAs, and scientific institutes from all the Nordic countries.
- The STs were presented in the National Air Quality meeting, in Imatra, Finland (onsite), on 15.-16.5.2024 for the national networks.
- The STs were presented in the national ACCC-FASN 2024 Science Conference in Helsinki, Finland (hybrid), on 11.11.2024 for the national scientific community of atmospheric research.
- The STs were presented in the national (AQ) Standardisation Group meeting, in Helsinki, Finland (hybrid), on 22.10.2024 for stakeholders working with AQ standardisation.
- The presentation of the STs have been carried out to the Spanish AQ Monitoring networks on a meeting in the Ministry for Ecological Transition in 2023 and in another in 2024.

We will continue inviting these stakeholders for the meetings. In addition, in WPs 6-7 we will produce specific guides, a final stakeholder meeting and in situ visits to the main ones to present the guides along 2025.