



Milestone M42 (M7.7)
**RI-URBANS workshop for stakeholders
and science devised in WP6**



RI-URBANS

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

**By
CSIC**



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Milestone M42 (M7.7): RI-URBANS workshop for stakeholders and science devised in WP6

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1. About this document

This document summarises the 3rd RI-URBANS Stakeholder Meeting held on 19th June 2023. The event was an AQUILA-ACTRIS/RI-URBANS-EMEP Information Day for National Air Quality Experts on the implementation of supersites in the proposal for a Directive on Ambient Air Quality.

This is a public document, available at the RI-URBANS website, <https://riurbans.eu/work-package-7/#milestones-wp7>, and distributed to all RI-URBANS partners for their use as well as submitted to the European Commission as an RI-URBANS Milestone 42 (M7.7).

2. Scope

The draft for a new EU Air Quality Directive (AQD) mentions that ACTRIS (Aerosol, Clouds and Trace Gases Research Infrastructure) and EMEP (European Monitoring and Evaluation Programme) have major roles in the implementation of Article 10 on supersite measurements. Furthermore, AQUILA is the network of National Air Quality Reference Laboratories, and it will have a major role there.

This information day has two major goals:

1. **Informing to the National Air Quality Experts** on the capabilities of ACTRIS, EMEP (Chemical Coordinating Center and TFMM) and AQUILA
2. **Informing on and discussing the recommendations sent to DG ENV by ACTRIS/RI-URBANS** for the measurement of advanced air quality (AQ) parameters.

3. Dates of the meeting, format and Organisers

The 3rd RI-URBANS Stakeholder meeting was carried out on 19 June 2023 with online format.

The meeting was organised by:

ACTRIS (<https://www.actris.eu/>)

The Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS) is the pan-European research infrastructure (RI) producing high-quality data and information on short-lived atmospheric constituents and on the processes leading to the variability of these constituents in natural and controlled atmospheres.

EMEP (<https://www.emep.int/>)

The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (unofficially 'European Monitoring and Evaluation Programme' = EMEP) is a scientifically based and policy driven programme under the Convention on Long-range Transboundary Air Pollution (CLRTAP) for international co-operation to solve transboundary air pollution problems.

RI-URBANS (<https://riurbans.eu/>)

The objective of RI-URBANS (Research Infrastructures Services Reinforcing Air Quality Monitoring Capacities in European Urban & Industrial AreaS) is to demonstrate how Service Tools (STs) from atmospheric Research Infrastructures (RIs) can be adapted and enhanced to better address the challenges and societal needs in European

cities and industrial, harbour, airport and road traffic hotspots concerning air quality (AQ), as well as areas with significant levels of air pollution and associated health effects.

AQUILA (https://joint-research-centre.ec.europa.eu/about-aquila_en)

The National Air Quality Reference Laboratories are legally responsible for the quality assurance of air pollutant measurements in their respective Member States, which implies the organisation of national quality assurance and quality control (QA/QC) programmes and the participation in European QA/QC programmes. In addition, they may be actively involved in standardisation activities, the validation of measurement methods and the type approval of instruments. The AQUILA Network is a well-established Network involved in the implementation of existing EU air policy and advising on new developments.

We had 152 attendees. These included DG ENV, WHO, WNO, ACTRIS, EMEP, AQUILA, RI-URBANS, and AQ national experts from numerous countries, regions and cities, RI-URBANS Associated Collaborators, National Research centres and private companies. Below (Annex I) are listed the affiliations of the attendees. Following the RI-URBANS ethics team recommendations, we do not provide publicly the names of attendees.

4. Agenda

<p>09:15 - 09:30 Opening and connecting to the link</p> <p>09:30 - 09:45 Welcome and scope of the meeting P. Laj, J. Geiger, K. Tørseth, X. Querol</p> <p>09:45 - 10:00 ACTRIS presentation P. Laj, J.</p> <p>10:00 - 10:15 Chemical Coordinating Centre and TFMM from EMEP presentation K. Tørseth & Lorenzo Labrador</p> <p>10:15 - 10:30 RI-URBANS presentation X. Querol</p> <p>10:30 - 10:45 AQUILA presentation J. Geiger</p> <p>10:45 - 11:45 Discussion: How can AQUILA-ACTRIS/RI-URBANS-EMEP be determining to support operations at supersites under the current draft of the EU Air Quality Directive</p>

11:45 - 12:00 Coffee break

<p>12:00 – 13:00 Discussion with National Air Quality Experts on the added value of having supersite measurements and on how this should be implemented.</p>
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13:00 – 14:00 Lunch break

<p>14:00 – 15:45 Technical discussion on the items of the ACTRIS/RI-URBANS recommendations</p>
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<p>15:45 – 16:00 Wrap-up and conclusions</p>
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16:00 End of the meeting

5. Summary of the discussions

The meeting has an online format and was recorded (<https://youtu.be/BXGJOxpJKxU>). The ppt presentations are available at: <https://riurbans.eu/results/#presentations>.

The meeting started at 9:30 h, as planned, with the welcome by P. Laj (ACTRIS), J. Geiger (AQUILA), K. Tørseth (EMEP CC-W), L. Labrador (EMEP-TFMM) and X. Querol (RI-URBANS).

5.1. First block

9:45-10.45. The ACTRIS, EMEP, RI-URBANS and AQUILA were presented in 4 individual oral presentations. ACTRIS, EMEP and RI-URBANS summarised their objectives and tasks, and in the case of RI-URBANS some results on advanced AQ parameters were presented. In the case of AQUILA, the results of a questionnaire sent to AQMNs (Air Quality Monitoring Networks) were presented. These indicated for which parameters the networks were ready to implement measurements, what guidance was needed, and other relevant questions. The results can be found in AQUILA presentation (pptx-file) at the link provided before.

5.2. Second and third blocks

- **How can AQUILA-ACTRIS/RI-URBANS-EMEP be determining to support operations at supersites under the current draft of the EU Air Quality Directive (AQD)?**
- **The added value of having supersite measurements and on how this should be implemented?**

General: there is a need for synergy, harmonisation and identifying additional resources

RI-URBANS made an introduction supporting a lot of measurements at the supersites in the draft for a new AQD (Art 10) and the willingness of ACTRIS-RI-URBANS-EMEP to support the implementation. The need to implement harmonisation of UFP-PNSD (UltraFine Particle - Particle Number Size Distribution), and BC (Black Carbon), and also OP (Oxidative Potential) was suggested already by WHO (World Health Organization) AQ Guidelines in 2021. The Art 10 replies very well to this query.

Three major concepts were continuously repeated along these two blocks:

1. **Synergy** among AQMNs and RIs (Research Infrastructures) is needed to use the available resources and combine the scientific support and instrumentation already existing with the AQMNs' expertise. This is repeated constantly, but it is not clear on how to reach this in Art 10, even though the roles of ACTRIS and EMEP are mentioned (but not defined) in the article.
2. **Harmonisation** is required for implementation of the Art 10's measurements, and this can be reached in some cases, but it is still premature for others (such as OP). This important issue has to be tackled in Art 10.
3. **Instrumental and personnel costs.** The implementation will increase the costs of the AQMNs with large impacts, and there is a need to clarify this and from when and where resources should be coming.

Some AQ national experts expressed that the requirements for measurements of the referred Art 10 can not be carried out by the AQMNs with current resources of budget and personnel dedication, and that this has to be considered when elaborating this article.

It was also clarified that both ACTRIS and EMEP can not run supersites, this is done by the national groups (ACTRIS) and member states (EMEP), but they might contribute in supporting the implementation with their expertise in elaborating protocols for advanced AQ parameters, doing inter-comparisons, calibrations, etc., if needed during the implementation of the AQD.

DEFRA (Department for Environment, Food & Rural Affairs)-RIs' network (note that the Environment Agency manages the UK's national monitoring sites on behalf of the Department for Environment, Food & Rural Affairs and the Devolved Administrations) for these advanced AQ parameters was presented as an example of feasibility, built up and working very well by means of the synergy of Research Grands and the support of the national AQ administration.

Another example was presented from France, where a network of supersites is being run by a specific reference lab from the regional AQMNs, but the impact of the instrumental and personnel costs for implementing the measurements of Art 10 will be very large.

A collaborator or RI-URBANS stated that Marseille has a RI's having measurements of the Art 10 requested measurements and with synergy with the AQMN can be used for implementing these.

From representatives of Italy, Germany, France and the city of Zurich (Switzerland) it was stated that to decide if the measurements of Art 10 might be implemented in the AQMNs, it is required information for each measurement on: at least, the instrument required, the cost, the personnel dedication for long term measurements. Also, a map of the existing supersites in Europe (ACTRIS, EMEP, AQMNs) would help to make the decision.

From Austria it was informed that discussion is ongoing and that if implemented the support will be received from the national Ministry with competence in AQ.

RI-URBANS and ACTRIS stated that there is also a way of building up the network by means of synergistic work between AQMNS and RIs, when existing as RIs already, and to include in ACTRIS new urban supersites.

There was a discussion started by RI-URBANS on the possibility of reducing supersites for urban areas to ½ of the proposal of Art 10 keeping still a good climate and urban patterns coverage, and this might facilitate implementation by reducing costs. Later on ACTRIS stated that additional evaluations of the coverage are needed. DG ENV defended the current numbers on this because this was open to public comments and major issues were not raised on this. RI-URBANS still recommend to reach a balance between coverage and costs and that validation of current models with supersites might allow large coverages.

Another RI-URBANS member reported that reduction to ½ is acceptable at this stage in view of this equilibrium. But of was highlighted that supersites have multiple objectives, such as:

- Understanding atmospheric processes relevant for urban AQ.
- Obtaining reliable source apportionment studies.
- Used for public health protection.
- Obtaining key data for health studies and toxicity of pollutants.
- Providing data for validation of modelling results and emission inventories.

Furthermore, the use of triplet supersites: regional background/urban background/traffic close to each other is giving very relevant additional information. Thus, if numbers are reduced it should be stated that growing the supersites networks might take these considerations into account.

DG ENV: Requested that if we would like to contribute to support Art 10 we should focus outputs on methods for measuring the parameters than on the costs. Also highlights the WHO AQ Guidelines' request to this end.

It seems that BC, UFP, PNSD, PM (Particulate Matter) speciation is ready to be **harmonised** and ACTRIS-RI-URBANS-EMEP-AQUILA, but specially CEN (European Committee for Standardization) can contribute to this. Emphasis was put on the need of following CEN recommendations when existing. But it was proposed that if new methods are developed, ACTRIS might be a good platform to evaluate these. An EMEP representative stated that harmonisation is very important also for data management (centres, format, flows, validation, etc)

RI-URBANS might contribute with reporting on how to monitor the advanced AQ parameters, also because there are already documents available (see below) on these issues, always taking CEN and ACTRIS recommendations in.

It was stated in some the AQUILA presentation that OP is still at the level of scientific research, more than at the one allowing implementation of harmonised long-term AQ measurements by the AQMNs. The experts on OP from RI-URBANS exposed that there is a large inter-comparison exercise for OP that will yield key results to propose protocols for measuring OP and then to start harmonisation or discussion on a possible reference method. Other RI-URBANS suggested that if OP at the end is not mandatory, it is important that it remains recommended, because in this case harmonisation will be induced. But if it is excluded, it will be difficult to harmonise protocols.

A national expert from France requested that Art 10 and all recommendations that are sent to DG ENV on this issue should consider the methods already implemented and those suggested in Annex 7 to be comparable and compatible. For example, ACMS (Aerosol Chemical Speciation Monitor) mostly focuses on specific components and PM1, while Annex 7 defines PM2.5 as a target and different PM components to be analysed.

Two experts from RI-URBANS stated that if some of the parameters are suggested to perform epidemiological studies, it is important to have supersites in large cities (high statistics) with data on mortality and morbidity available and also with cohorts already established.

The discussion on this issue of implementation and synergies seems to suggest that there is a need to reach synergies, and that inter-operation of supersites by AQMNs together with RIs is a very good approach as shown on examples in UK, Germany, France, among others. The problem is to identify actions to promote and support this synergy.

Many of the above questions are replied in the important documents from the EC supporting the proposal of AQD:

- Multiple reports supporting the proposal of the directive ca https://environment.ec.europa.eu/topics/air/air-quality/revision-ambient-air-quality-directives_en
- The specific report on Systematic assessment of monitoring of other air pollutants not covered under Directives 2004/107/EC and 2008/50/EC: https://environment.ec.europa.eu/document/download/d911d8d6-5f46-4cc5-b5c4-06504ac98ea5_en
- And the annex, including Survey of the Costs: https://environment.ec.europa.eu/document/download/884deeac-4dd4-4db8-9257-4854c344a343_en

The list of a list of measurement guidelines and the standard operating procedures (SOPs) relevant for observations reported to EBAS, recommended by EMEP, ACTRIS and GAW, can be found at: <https://ebas-submit.nilu.no/SOPs>.

The SOPs recommended by ACTRIS can be found at: <https://www.actris-ecac.eu/measurement-guidelines.html>

The RI-URBANS recommendations for AQ advanced parameters and list of available supersites providing these already:

- UFP-PNSD, eBC, NH₃, VOCs, PM speciation (offline and on-line): https://riurbans.eu/wp-content/uploads/2022/10/RI-URBANS_D1_D1_1.pdf
- https://riurbans.eu/wp-content/uploads/2022/10/RI-URBANS_M1.pdf
- Oxidative potential: https://riurbans.eu/wp-content/uploads/2023/03/RI-URBANS_D11_D2_3.pdf
- Near real time (NRT)- UFP and PNSD
- https://riurbans.eu/wp-content/uploads/2022/02/RI-URBANS_MS3.pdf
- NRT-PM chemical speciation: https://riurbans.eu/wp-content/uploads/2023/01/RI-URBANS_D4_D1_4.pdf
- Design of epidemiological studies for advanced AQ parameters: https://riurbans.eu/wp-content/uploads/2022/09/RI-URBANS_D9_D2_1.pdf
- European emission inventory for UFP-PNSD and non-exhaust vehicle PM emissions: [https://riurbans.eu/wp-content/uploads/2022/11/RI-URBANS_M13 .pdf](https://riurbans.eu/wp-content/uploads/2022/11/RI-URBANS_M13.pdf)
- Guidelines for urban mapping of pollutants and citizen involvement: https://riurbans.eu/wp-content/uploads/2022/10/RI-URBANS_D13_D2.5.pdf

Need for clarifying in the text of AQD the objectives of each advanced AQ parameter included in Art 10.

RI-URBANS and DG ENV expressed that many of these parameters are suggested by WHO AQ Guidelines.

Several AQ national experts reported that there is a need to clarify for each advanced AQ parameter implemented, what will be the objective and application of the measurements. This was specially needed for specific measurements of atmospheric deposition, speciation of Hg, but for all in Art 10 in general. If this is included for each parameter it will better allow a correct implementation of sites and measurements.

An ACTRIS—RI-URBANS expert states that one of the main roles of RI-URBANS is showing the added value of these advanced AQ measurements with a pan-European perspective and that RI-URBANS might support this.

Experts from France stated that including OP would be of great interest and novelty, even to develop alarm systems. A German expert recommended keeping OP but the passing from science to AQMN levels should be facilitated, and currently this has not been done yet.

Experts from RI-URBANS reported that SOA (Secondary Organic Aerosol), non-vehicle exhaust metals might be the drivers of OP, and that the OP measurements coupled with organic chemistry of PM might allow us to identify what are the SOA components causing most of OP.

A review on the available PM speciation (online and offline datasets) is given by a RI-URBANS representative. Results show scarcity of long datasets of complete offline PM speciation, mostly in S Europe, France and UK, and that the online PM speciation with ACMS and AMS (Aerosol Mass Spectrometer) is growing in urban areas across Europe.

Discussion of VOCs (Volatile Organic Compounds): Why not recommend having this in the supersites, where PM speciation will be implemented and the origin of SOA studied. An expert from ACTRIS-RI-URBANS reported that 45 VOCs are suggested in the directive and that CEN 35 WG is recommending online GC-MS (Gas Chromatography - Mass Spectrometry) speciation, with other co-located instruments, such as the one specific for formaldehyde and other offline systems. She informed that no instrument is available to measure 45 VOCs, and only the one for formaldehyde costs around 60,000 Euros.

ACTRIS VOCs measurement guidelines can be found at:

https://www.actris.eu/sites/default/files/inline-files/WP3_D3.17_M42_0.pdf

A UK representative from RICARDO indicated that there are supersites in the UK measuring a large number of VOCs and that two instruments, at least, are necessary; that the list of AQD is adequate for O₃ (ozone) precursors but many are missing if tackling also SOA precursors. These UK supersites for VOCs were supported by UK research institutions and DEFRA also contributed (again synergy). At least, Birmingham, Manchester and London can already contribute with data for a very large list of VOCs. He suggested examining the UK AQ Expert Group report on NMVOCs (Non-methane Volatile Organic Compounds) that is at https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240803_Non_Methane_Volatile_Organic_Compounds_in_the_UK.pdf.

For NH₃ it was shown an example of the interest of detecting current urban NH₃ (ammonia) increase in urban areas, as a RI-URBANS study recently showed.

A national AQ expert from France highlighted that measurements of NH₃ are already by several networks and that the reference methods used there should be considered when suggesting this in Art 10. Furthermore, the selection of offline or online NH₃ protocols should be as a function of the objectives (not defined in Art 10). AQUILA reported that passive dosimeters are at the level of long-term AQ measurements implementation, but not the online methods. Similar opinions were reported by two RI-URBANS experts (including the trapping, but another one reported good results for 2 types of instruments used online). In any case for online methods it is not only important the instrument but the effects of the NH₃ trapping in condensing water droplets in the inlet during the night (decreasing contents artificially) and the re-emission from the inlet in the morning with the sunshine warming (increasing contents suddenly).

Mandatory vs recommended vs excluded.

Art 10 contains mandatory and recommended measurements. The mandatory ones should be supported by adding the added value/objectives for including them. Others can be suggested as recommended, specially if harmonisation is not still ready, but if excluded from Art 10, these will be much more difficult to harmonise in terms of protocols for measurements.

5.3. Fourth block

This block was devoted to a **technical discussion on the items of the ACTRIS/RI-URBANS recommendations.**

These recommendations were explained, supported and discussed, but these can be found at <https://mycore.core-cloud.net/index.php/s/PDrURALWS2QxJMA>

Annex I. List of the affiliations of the attendees

AQUILA delegates

EMEP delegates:

1. CHEMICAL COORDINATION CENTRE
2. TASK FORCE ON MEASUREMENTS AND MODELLING

World Health Organization (WHO)

World Meteorological Organization (WMO)

European Commission Directorate-General for Environment (EC-DG ENV)

RI-URBANS/ACTRIS delegates:

1. AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS, CSIC (Spain)
2. HELSINGIN YLIOPISTO, UHEL (Finland)
3. CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, CNRS, (France)
4. CONSIGLIO NAZIONALE DELLE RICERCHE, CNR (Italy)
5. ILMATIETEEN LAITOS, FMI (Finland)
6. THE UNIVERSITY OF BIRMINGHAM, UoB (United Kingdom)
7. IDRYMA TECHNOLOGIAS KAI EREVNAS, FORTH (Greece)
8. PAUL SCHERRER INSTITUT, PSI (Switzerland)
9. LEIBNIZ INSTITUT FUER TROPOSPHAERENFORSCHUNG e.V., TROPOS (Germany)
10. VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V., VITO (Belgium)
11. FORSCHUNGSZENTRUM JULICH GMBH, FZJ (Germany)
12. NILU STIFTELSEN NORSK INSTITUTT FORLUFTFORSKNING, NILU (Norway)
13. INSTITUTUL NATIONAL DE CERCETARE DEZVOLTARE PENTRU OPTOELECTRONICA INOE 2000, INOE (Romania)
14. INSTITUT NATIONAL DE L ENVIRONNEMENT ET DES RISQUES, INERIS (France)
15. IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE, ICL (United Kingdom)
16. INSTITUT MINES-TELECOM, IMT (France)
17. ETHNIKO ASTEROSKOPEIO ATHINON, NOA (Greece)
18. NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK, TNO (The Netherlands)
19. UNIWERSYTET WARSZAWSKI (University of Warsaw), UW (Poland)
20. JOINT RESEARCH CENTRE- EUROPEAN COMMISSION, JRC – EC

RI-URBANS Associated Collaborators:

1. CARE-C CYPRUS
2. AIRMODUS
3. EÖTVÖS LORAND UNIVERSITY (ELTE)
4. ISTANBUL UNIVERSITY-CERRAHPAŞA
5. UNIVERSITY OF A CORUÑA
6. AIX-MARSEILLE UNIVERSITY (FRANCE)
7. CIEMAT

National experts from:

1. Republic of Austria
2. Belgium
3. Switzerland
4. Croatia
5. Cyprus
6. Czech Republic
7. France
7. Ireland
8. Germany
9. Finland
10. Italy
11. Hungary
12. Latvia
13. Luxemburg
14. The Netherlands
15. Malta
- 16 Norway
17. Poland
18. Portugal
19. Slovakia
20. Romania
21. Spain
22. UK
23. Sweden

National Research Centres:

1. AARHUS UNIVERSITY DENMARK
2. UNIVERSITÉ DE LILLE, France
3. DWD · METEOROLOGICAL OBSERVATORY HOHENPEISSENBERG, Germany
4. INSTITUTE OF ENVIRONMENTAL ENGINEERING OF THE POLISH ACADEMY OF SCIENCES, Poland.
5. INSTITUTO DE SALUD CARLOS III, Spain
6. KOREA UNIVERSITY, Korea
7. LUND UNIVERSITY, Sweden
8. INSTITUTE OF GEOPHYSICS, Poland
9. INSTITUTE OF METEOROLOGY AND WATER MANAGEMENT NATIONAL RESEARCH INSTITUTE, Poland
10. INSTITUTE FOR EARTH SCIENCES - UNIVERSITY OF EVORA (ICT-UE), Portugal
11. INSTITUTE OF ENVIRONMENTAL PROTECTION - NATIONAL RESEARCH INSTITUTE, Poland
12. INSTITUTE OF PUBLIC HEALTH BELGRADE, Serbia.