

RI-URBANS

Extended summary

The objective of **RI-URBANS** 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.

RI-URBANS responds to the urgent need to substantially reduce air pollution across the EU and reduce the associated health impacts. We develop and enhance synergies between AQ Monitoring Networks (AQMNs) and RIs in the atmospheric domain to enhance AQ observations in support of advanced AQ policy assessment. The project combines advanced scientific knowledge and innovative technical work to develop pilot STs that will enhance the capacity of the AQMNs to provide the necessary observations to evaluate, predict and abate urban air pollution. This project will also deploy tools and information systems in the hands of citizens and communities to support decision-making by AQ managers and regulators.

RI-URBANS focuses on **human exposure to outdoor ambient nanoparticles** (in number concentration) **and atmospheric particulate matter (PM, in mass concentration)** in terms of their sizes and constituents, as well as their source contributions and gaseous precursors. The project builds on existing initiatives for advanced research-driven observations of aerosol properties currently carried out in European cities to identify, develop and test the innovative STs that will serve a more effective AQ monitoring supporting AQ management in a 2030 horizon timeline. RI-URBANS will evaluate novel AQ parameters and source contributions, and their associated health effects, to demonstrate the European added value of implementing these enhanced observations. The project addresses all aspects of sustainability, including efficient curation, preservation and provision of access to data, training and capacity building, and how the use of tools will be secured in the future. The implementation of **5 pilots** involving **9 cities** is used to demonstrate the ability to integrate complementary measurement systems and methods, as well as data quality control, managing and communication using FAIR (Findable, Accessible, Interoperable, Re-usable) principles. The final goal is to provide upscaling and sustainability to the offered AQMNs-RIs interoperable STs, using advanced instrumentation, modelling and source apportionment, and integrating citizen's observatories and mobile measurements. RI-URBANS strongly relies on the expertise of **AQMNs, AQ experts and the European RIs ACTRIS and IAGOS** to apply existing methodologies to the urban areas, developing new suited STs, enhancing the synergies with AQMNs through knowledge transfer and offering a sustainable framework for providing dedicated and focused urban STs.

To reach these objectives, RI-URBANS builds upon **4 major strategic pillars (SP)**:

- **SP1** compiles available **RIs and AQMNs advanced observations and tools; evaluates the datasets and operational conditions, new monitoring and modelling tools; and develops STs in work packages (WPs) 1-3** to be demonstrated in SP2 and upscaled in SP3.
- **SP2 (WP4) demonstrates the sustainable and interoperable implementation of STs** developed in SP1. **5 pilot** concepts are implemented with the participation of the RIs and AQMNs from **9 cities** (Athens, Barcelona, Birmingham, Bucharest, Milan, Paris, Rotterdam-Amsterdam, Helsinki and Zurich), representing a wide variety of **environments**.
- **SP3 proposes the roadmap for upscaling the implementation (by RIs-AQMNs in Europe) of the STs and data management (WP5)** provided by SP1 and demonstrated by **SP2, as well as the transfer of these to stakeholders (WP6)**.
- **SP4 includes the support actions** on communication, exploitation, dissemination, management and coordination (**WP7-8**).

Furthermore, a **WP 9** will cover all issues related with **Ethics** according the requirements of the EC.

The main expected **impact** is the enhancement of AQ observations in European urban areas including industrial and other hotspots by providing tools for advanced AQ evaluations that build upon research **primarily** applied by science teams and RIs. This advanced AQ monitoring and assessment strategy will yield a dramatic change in assessing the development and implementation of cost-effective AQ policies at the local, national and European level in an integrated way, which at the same time will support the growth of local, national and European companies that provide the services for these tools.

RI-URBANS is highly **interdisciplinary**, incorporating RIs experts on sophisticated measurements and data management, AQMNs experts, modellers and atmospheric, aerosols and health effects scientists. RI-URBANS relies on a very strong and established network of stakeholders, including CAMS (Copernicus Atmosphere Service) and AQUILA (National Air Quality Reference Laboratories) to ensure rapid and cost-effective applicability of the project's solutions. The project covers the main geographic regions of Europe, including 25 beneficiaries from 13 EU countries.