

RI-URBANS

The pilots

- **P1: Innovative near-real-time (NRT) aerosol source apportionment for online PM and BC measurements in urban environments**

- Athens, Helsinki, Milan-Bologna, Paris, Zurich -

This pilot will focus on piloting NRT source apportionment tools combining ACSM, organic aerosol and aethalometer BC online measurements. This will address the challenge of using advanced online PM speciation and BC measurements to yield NRT information on source apportionment. STs will be provided by WP1. If implemented, this will allow us to determine the origin of the PM in NRT. RIs may have these services in operation and the linked AQMNs-RIs will make it possible to obtain this advanced PM speciation and source apportionment data implemented in cities to support AQ management and AQ policies. The NRT source apportionment ST is not developed, even at the RI level, so this will be an innovative contribution to the project.

- **P2: NRT data provision of nanoparticles and their size distributions**

- Barcelona, Birmingham, Helsinki -

This pilot provides PNSD (including the nanoparticle range) data from different cities' environments in Europe. As the first step, the pilot study size distribution measurements within the urban supersites are verified to follow ACTRIS requirements for aerosol size distribution measurements. This is done to ensure compatibility of the observational data between ACTRIS and AQMN aerosol size distribution measurements. The instrument setups are checked with regards to, for example, their sampling protocols, sample drying, instrument maintenance, size classification and standard operating procedures. STs will be provided by WP1 and will provide NRT data on nanoparticles in a harmonised way.

- **P3: Innovative tools for the urban mapping of nanoparticles and other pollutants on the urban scale, coupled with regional modelling tools, and validated using mobile measurement units and citizen involvement with smart sensors**

- Birmingham, Bucharest, Paris, Rotterdam-Amsterdam -

This pilot will benefit from the different advanced STs developed in specific AQMNs scientific collaborations in urban areas of Europe to describe the urban variability of outdoor exposure to nanoparticles and other pollutants using modelling tools, mobile measurements with nanoparticles, BC and PM mid-cost sensors and the citizens' participation. Citizens will measure NO₂ and PM_{2.5} with low-cost sensors calibrated by RI-URBANS and provide data to the local AQMNs-RIs to embed these

data in the official database to achieve better spatial coverage and support the interpretation of the pollution exposure maps. The required STs will be provided by WPs2-3. These can be very sophisticated approaches in terms of instruments, mobile units, modelling tools and citizen's participation, but such high levels of complexity would limit the sustainable and interoperable needs of the provided tools. RI-URBANS will seek a balance between the benefits and the sustainability of the implementations.

- **P4: Health effects of novel AQ metrics and their source contributions, including PM components (mass concentrations) and nanoparticles (number concentrations)**

- Athens, Barcelona, Zurich -

This pilot will include cities with long time series data of novel AQ variables obtained in combination with AQMNs and RIs and will apply source apportionment tools to the collected data to obtain the source contributions to nanoparticles and PM and BC. These data will be used to evaluate premature mortality and morbidity by cause, gender and age, and compared with the health outcomes of conventionally measured AQ pollutants. Furthermore, time series of PM_{2.5} and PM₁₀ speciation and source apportionment will also be used to assess the oxidative potential (OP) and the sources and components with the highest OP. STs to be implemented here will be supplied by outcomes from WPs1-3. The information provided here will be very relevant for AQ and AQ-health policies. In terms of epidemiology, because the time series data of these novel AQ metrics and source contributions are available in several cities, the STs to evaluate the associated health effects will be assessed and proposed for sustainable operation.

- **P5: Characterising nanoparticle contributions from urban hot spots and characterising levels of nanoparticles in urban hotspots: roadsides, airports, industry and harbours**

- Bucharest, Milano-Bologna, Rotterdam -

In the pilot for pollution hot spots, activities will be focused on large emission sources in and around urban areas. These include roadsides, harbours, airports, and industrial plants. Exposure estimates in the hotspots will be obtained in the urban areas closest to the emission sources by using targeted fixed-site measurements, mobile measurements, and modelling. The pollutants addressed will be number concentrations of ultrafine particles, mass concentrations of PM_{2.5}, PM₁₀, BC, and NO₂, using a similar approach to Pilot 3 and WP2. Furthermore, source contributions to pollutants obtained with receptor and direct modelling tools from WPs1-3 will be used together with the exposure results from WP2 to evaluate the contributions of hotspots to the urban background. Background concentrations will be taken from regional models, while for the hot spots themselves, high resolution models will be used.