



Environment – Projects

An overview of the set of projects funded under the Targeted Programme Environment.

The aim of these projects is to improve data quality for policy making, underpin environmental research activities and stimulate technological innovation.

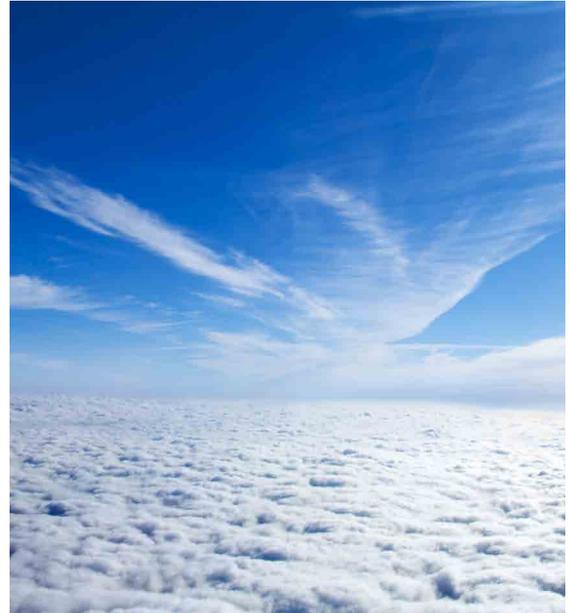
Focus is placed at both the local environmental level for air, water and soil quality and at the global level for challenges relating to climate change.

Monitoring complex forms of mercury pollution

New measurements of reactive forms of mercury will support enforcement of effective air pollution monitoring

Mercury, emitted by both natural and anthropogenic sources, is highly toxic to humans, animals and ecosystems, and as such is regulated by numerous EU Directives, including the Industrial Emissions Directive, the Air Quality Directive and the Waste Incineration Directive. In addition to its elemental form, mercury exists in reactive oxidized forms that can be transformed into other species, such as methylmercury - the most toxic mercury species and the one most prone to bioaccumulation in aquatic systems. However, currently, traceable calibration methods only exist for elemental mercury.

This project will use results from EMRP projects ENV02 PartEmission and ENV51 MeTra to address this gap in capability and develop traceable measurements, monitoring and control of mercury and its different chemical forms, in both industrial flue gases and in the atmosphere, to improve measurement comparability and uncertainties. This will provide crucial support to the enforcement of future global and European regulations governing mercury pollution, and the protection of human health and the environment.



Project 16ENV01

Metrology for oxidised mercury

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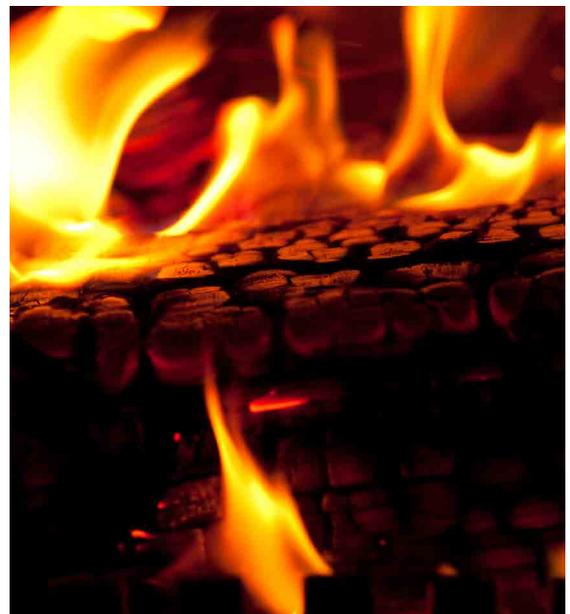
www.euramet.org/project-16env01

Harmonising measurements of black carbon

Harmonised measurements of black carbon will help refine climate models and mitigation proposals

Black carbon, emitted from sources such as diesel engines and wood burning, is a major contributor to climate change, second only in importance to carbon dioxide, and a primary component and key indicator of particulate matter, known to cause hundreds of thousands of premature deaths across Europe each year. However, the different instruments currently in use for measuring the amount of black carbon in the atmosphere give results that differ by up to 30 % and there is no way to link measurements to the SI.

This project will put traceability and calibration mechanisms in place for black carbon measurements for the first time, improving their accuracy and comparability. The improved measurements resulting from this work will be used to refine climate change models and mitigation proposals, and improve the quality of conclusions from population studies investigating the health effects of air pollution.



Project 16ENV02

Metrology for light absorption by atmospheric aerosols

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Improving climate observations from space

Further improvements to measurements from remote climate sensors will provide reliable data for policy makers

The full extent of the impact of climate change on society and the most effective strategies to mitigate it remain uncertain. A key limitation is the performance of forecast models and the quality of the data that drives them. Remote sensing from space is the major means of obtaining climate data on a global scale, but the challenging conditions faced during launch and in space severely limit the accuracy of measurements made there.

This project will use results from EMRP projects ENV04 Met-EOC1 and ENV53 Met-EOC2 to improve pre- and post-launch calibration and validation of remote climate sensors, by improving the usability of standards in space and ground-based test sites. The project will also establish a method for assigning quality metrics to climate data. This will further improve the reliability of evidence concerning the scale and timescale of climate change for policy makers, and provide essential support to mitigation and adaptation strategies that ensure a sustainable environment and quality of life for European citizens.



Project 16ENV03

Further metrology for earth observation and climate

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Ensuring fast, effective action in nuclear events

New radioactivity measurements will support fast, effective protection of the environment following nuclear events

After a nuclear or radiological event, radiation protection authorities and other decision makers need quick and credible information, based on reliable radiological data, on the areas affected. However, the potentially large areas affected and risks to people in the vicinity pose difficult measurement challenges.

This project will develop new measurement techniques and traceable calibration methods for determining ground surface activity concentrations using data collected by unmanned aerial vehicles, and for radioactivity in air measurements using transportable air-sampling systems. This will support timely, effective action that protects the public and environment against the effects of ionising radiation in the aftermath of nuclear and radiological emergencies. The project will also ensure the new instrumentation and procedures are taken up by nuclear regulatory bodies, environmental agencies and international standards organisations.



Project 16ENV04

Metrology for mobile detection of ionising radiation following a nuclear or radiological incident

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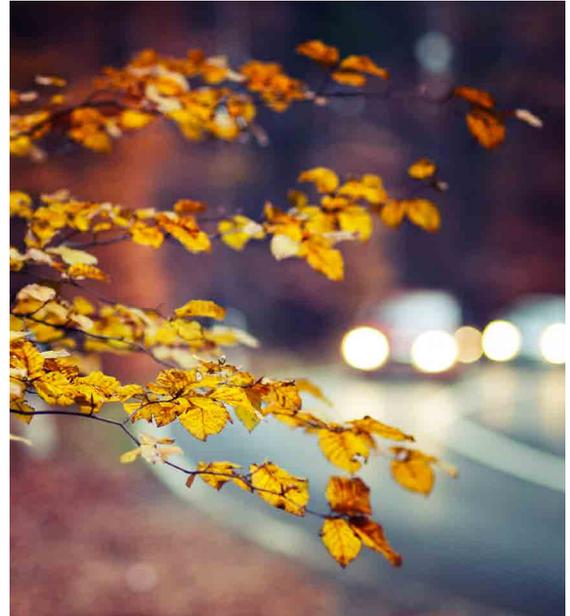
www.euramet.org/project-16env04

Direct measurements of nitrogen dioxide pollution

First direct measurements of harmful pollutant will aid the development of evidence-based mitigation policies

Nitrogen dioxide (NO₂) is produced when fuels are burned - for example, in car engines and power stations - and has one of the greatest impacts on human health of all air pollutants. Levels of NO₂ in the atmosphere must be reduced to improve quality of life for European citizens and reduce the economic burden of health problems caused by NO₂ exposure. However, NO₂ is the only regulated air pollutant that is not directly measured, resulting in more uncertain and less accurate measurements.

This project will use results from EMRP project ENV01 MACPoll to develop capabilities for the direct measurement of NO₂ using innovative techniques and direct calibration with more accurate and stable primary reference standards. More accurate measurements of NO₂ will bring greater confidence in identified trends in emissions and air quality, and support the development and implementation of the effective, evidence-based mitigation policies that are needed to reduce pollution levels.



Project 16ENV05

Metrology for nitrogen dioxide

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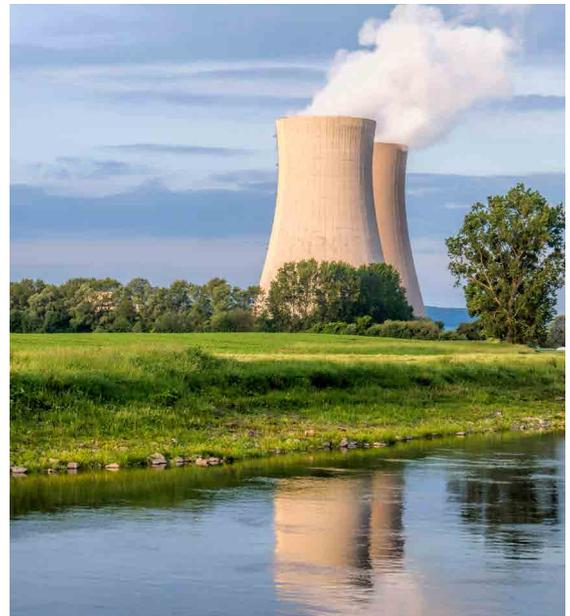
www.euramet.org/project-16env05

Identifying the source of greenhouse gas emissions

New capabilities to identify source of carbon dioxide and nitrous oxide will improve emissions monitoring

Immediate action is required to prevent irreversible changes to the Earth's climate due to greenhouse gas emissions. Researchers need to be able to discriminate man-made from natural emissions in the atmosphere, to provide governments with accurate emissions inventory data and verify progress towards emissions reduction targets. However, this cannot be achieved with the existing measurement infrastructure.

This project will develop a new infrastructure including methods and instrumentation to underpin measurements of stable isotopes of carbon dioxide and nitrous oxide, two major greenhouse gases, which enable their origin to be identified. This will be instrumental in providing more accurate, comparable data to separate various man-made sources of greenhouse gas emissions from each other, as well as from natural sources. This will enable governments to develop accurate emissions inventories and models to comply with legislation, and inform new policy and better abatement strategies to help prevent dangerous climate change.



Project 16ENV06

Metrology for stable isotope reference standards

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Better measurement of airborne particles

Improved measurements will support the enforcement and introduction of air pollution regulation to protect European citizens

Accurate measurements of airborne particles are vital for enforcing EU air quality regulations aimed at protecting human health and understanding and limiting the effects of climate change. Current methods for the measurement of mass of PM₁₀ and PM_{2.5} (airborne particles less than 10 and 2.5 microns in diameter, respectively) specified by the Air Quality Directive need improving to ensure results given by instruments based on different working principles (such as gravimetric and optical measurement) can be compared. In addition, knowledge of the size and number concentration of unregulated nanoscale ultra-fine particles (UFP) is needed as a prerequisite to any future regulatory limits.

This project will use results from EMRP project ENV02 PartEmission to support CEN standardization on EU guidelines for PM and UFP measurement by improving the uncertainty of particle mass, size and number concentration measurements. It will also support the characterization of regulated components in airborne particles as needed by Europe's air quality networks to better understand health risks, and local and global trends.



Project 16ENV07

Aerosol metrology for atmospheric science and air quality

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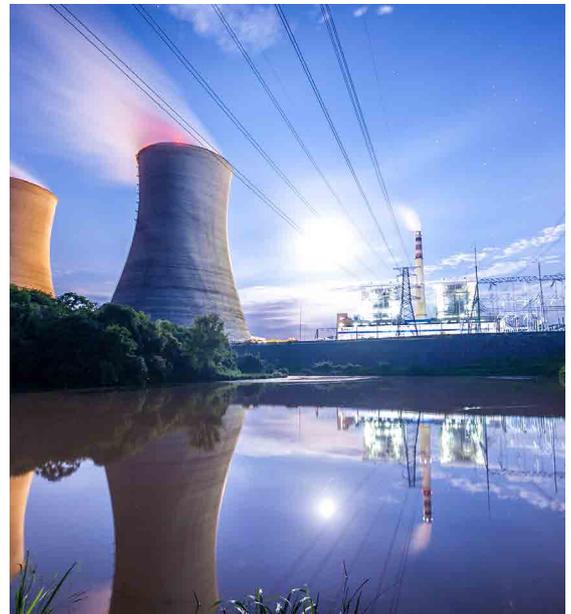
www.euramet.org/project-16env07

Future-proof emissions monitoring

Standardised pollutant measurements to meet the requirements of current and future air quality regulations

Air pollution is responsible for around 400,000 premature deaths and €330-€949 billion in health-related costs each year in Europe. In an effort to protect citizens' quality of life, limits on air pollutants are continually becoming more stringent, and limits continue to be introduced for previously unregulated pollutants. However, the necessary framework of standardised measurement methods to meet these requirements is not fully in place.

This project will use results from EMRP projects ENV01 MACPoll and ENV02 PartEmission to address this measurement gap by developing measurement methods for newly regulated pollutants, such as ammonia and hydrogen fluoride, address the lack of uncertainty characterisation in flow measurements and develop next-generation techniques for increasingly-stringent pollution limits. The results will enable regulators, process plant operators, manufacturers and measurement service providers to comply with emission limits and monitoring requirements, supporting efforts to ensure cleaner air across Europe for the benefit of public health and the environment.



Project 16ENV08

Metrology for air pollutant emissions

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Safe and cost-effective disposal of nuclear waste

Improved radioactivity measurement capabilities will help nuclear site operators manage waste quickly and effectively

One of the most significant environmental challenges facing Europe is ensuring the safe disposal of radioactive waste from decommissioned nuclear sites, the cost of which is estimated to be in excess of €150 billion. The key to safe and cost-effective disposal of this waste is accurate quantification of its radioactivity content, so that decommissioning can be most effectively planned and implemented.

This project will use results from EMRP projects ENV09 MetroRWM and ENV54 MetroDecom to enable nuclear site operators to characterise waste material rapidly and accurately, throughout all stages of the disposal process, by providing validated techniques for measuring radioactivity on site, and segregating and monitoring waste. The results will better allow waste to be consigned to the most cost-effective disposal option, improve staff safety through the use of remote and automated measurements, and prevent costly delays to decommissioning projects with more rapid turnaround of results, minimising the risk of radioactive exposure to the public and the environment.



Project 16ENV09

In situ metrology for decommissioning nuclear facilities

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Supporting introduction of new radon regulation

New radon measurements will enable regulators to reliably assess and limit public exposure

Radon is estimated to cause between 3 % and 14 % of all lung cancer cases, depending on the average radon level in the country - in Europe, this corresponds to around 15,000 to 20,000 deaths every year. Over the coming years, as part of the new EU Basic Safety Standards (BSS) Directive, public exposure to radon will become part of legal metrology in Europe. All member states will be required to demonstrate that levels of radon activity concentration do not exceed 300 becquerels per cubic metre. To achieve measurements at this low level, new calibration procedures for existing commercial radon monitors must be developed.

This project will provide traceable measurement and calibration resources for the monitoring of radon, which will enable regulators to meet the new requirements and support implementation of the new EU-BSS across Europe. Improvements in the reliability of radon measurements resulting from the project will provide a better basis for the development of effective strategies to mitigate and prevent the serious health effects of this pollutant.



Project 16ENV10

Metrology for radon monitoring

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EMPIR - joint research projects for Europe

Europe's National Measurement Institutes working together

The majority of European countries have a National Metrology Institute (NMI) that ensures national measurement standards are consistent and comparable to international standards. They also investigate new and improved ways to measure, in response to the changing demands of the world. It makes sense for these NMIs to collaborate with one another, and the European Association of National Metrology Institutes (EURAMET) is the body that coordinates collaborative activities in Europe.

The European Metrology Programme for Innovation and Research (EMPIR) follows on from the successful European Metrology Research Programme (EMRP), both implemented by EURAMET. The programmes are jointly funded by the participating countries and the European Union and have a joint budget of over 1000 M€ for calls between 2009 and 2020. The programmes facilitate the formation of joint research projects between different NMIs and other organisations, including businesses, industry and universities. This accelerates innovation in areas where shared resources and decision-making processes are desirable because of economic factors and the distribution of expertise across countries or industrial sectors.

EURAMET wants to involve European industry and universities at all stages of the programme, from proposing Potential Research Topics to hosting researchers funded by grants to accelerate the adoption of the outputs of the projects.



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