



# European Metrology Research Programme

## *Environmental Data*

*An overview of the first funded projects from 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.*

*The projects focus at both the local environmental level for air, water and soil pollution, and at the global level for challenges relating to climate change.*

## Supporting the development of EU air quality legislation

### *Improving indoor and outdoor air quality measurements*

Reliable indoor and outdoor measurements of chemical pollutants in air are required to underpin and implement EU air quality policies designed to maintain human health and the environment.

Improvements are required, especially with regards to human exposure to indoor chemical pollutants such as those emitted by building materials. In addition, no harmonised legislation is currently in place for the monitoring of indoor air.

This project will develop: a method for producing stable reference samples for the calibration of instruments for measuring air quality, new measurement methods to detect volatile, highly reactive gases such as ammonia, and a reliable compact nitrogen dioxide micro-sensor using the innovative material graphene.

## Project ENV01: Metrology for chemical pollutants in air

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## Enabling tighter regulation of exhaust emissions

### *Protecting human health and the environment from vehicle pollution*

Certain small particles emitted from car exhausts and other vehicles can damage human health and the environment.

Platinum group elements (PGE) are used in catalytic converters and although they were once thought to be harmless, this is no longer the case and regulatory limits need to be produced. Mercury is also of growing concern; it is toxic and although only present in trace amounts in petrol, the total amount released into the environment is significant.

This project will build expertise in measuring small particle pollutants, particularly PGE and mercury, and will increase the required accuracy and reliability of measurements to allow future regulations to be developed.

## Project ENV02: Emerging requirements for measuring pollutants from automotive exhaust emissions

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## Is UV light from the sun changing our environment?

### *Reducing uncertainty in solar UV measurements*

Solar ultraviolet (UV) light can produce substances in the atmosphere that change the environment. Therefore changes in the amount of solar UV reaching the earth's surface could have an effect on climate change. However, current measurement methods have uncertainties of around 5 % which is too high to detect changes and to model future trends.

This project seeks to develop new methods and cost effective instruments to bring uncertainty levels down to 2 %.

Prototype devices will be commercialised and the methodologies freely disseminated to end-users to support reliable solar UV measurement at both the national and international level

## Project ENV03: Traceability for surface spectral solar ultraviolet radiation

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## Making traceable measurements from space

### *Improving global observations of the Earth for climate change studies*

Global observations of the Earth's atmosphere, oceans and land from space are vital for climate change studies and the successful implementation of mitigation measures by policy makers.

These space-based measurements need to be traceable and consistent to allow comparison with data gathered from other sources, e.g. ground-based monitoring stations, and to form a complete picture. However, this is not the case at present.

This project will develop new standards and will validate the sensors used in satellites so that accurate, laboratory-quality measurements of climate parameters can be made from space.

## Project ENV04: European metrology for earth observation and climate

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## Traceable measurements for mapping ocean circulation

### *New measurements to link salinity to density*

Higher levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere lead to increased levels of CO<sub>2</sub> dissolved in oceans, and an associated increase in acidity and salinity (the amount of salt in water).

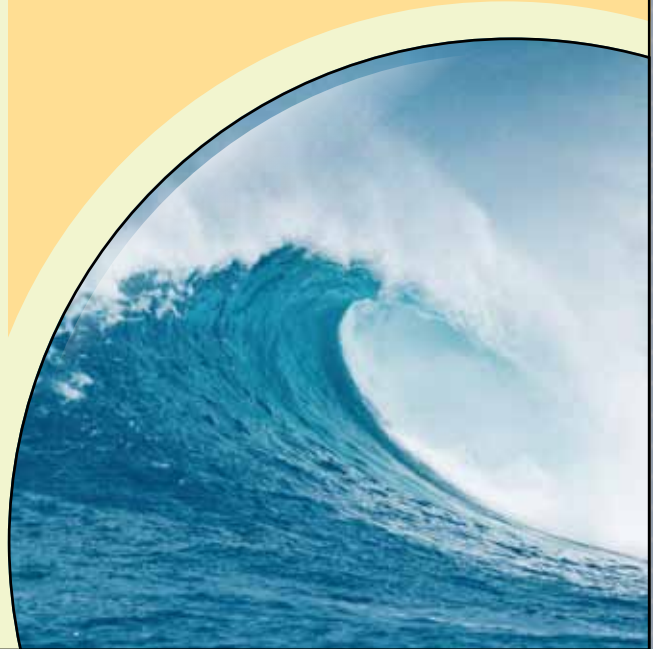
Scientists need to understand water properties such as salinity because they influence ocean circulation patterns, which affect the Earth's climate.

Salinity measurements, inferred from the conductivity of water, currently use a traditional scale not related to SI units that cannot guarantee long-term measurement traceability and stability. This research will link measurements of salinity to measurements of density, which can be traced back to SI units, thereby improving confidence in salinity measurements.

## Project ENV05: Metrology for ocean salinity and acidity

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## Improving the accuracy of data for atmospheric models

### *Better data leads to a better understanding*

Spectro-analytical techniques are used to remotely monitor specific substances in the atmosphere, including gases that are important for assessing climate change and pollution levels.

The accuracy of these measurements relies on 'spectral line data', in particular information on the properties of the molecules to be measured, including how their properties change with temperature, pressure and composition.

Some existing spectral line data does not come from traceable measurements, which leads to high levels of uncertainty in atmospheric models. This research will develop a European spectroscopy infrastructure that is traceable to SI units and a database of the spectral line data for improved atmospheric modelling.

## Project ENV06: Spectral reference data for atmospheric monitoring

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## Improving climate models by improving measurements

### *Improving measurements of pressure, temperature, humidity and airspeed*

Measurements of pressure, temperature, humidity and airspeed are key to understanding the climate of the Earth. This project aims to improve climate models by improving these measurements.

For example, humidity, i.e. water vapour, has a high heat capacity and can absorb and transfer energy in the atmosphere. Humidity measurements are required up to the stratosphere, however levels of water vapour in the stratosphere are so low that traditional techniques lack sufficient accuracy.

By improving such measurements this project will contribute to metrological and meteorological research and a better interpretation of climate data.

## Project ENV07: Metrology for pressure, temperature, humidity and airspeed in the atmosphere

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## Supporting European water policy

### *Developing standards for water pollutants*

The European Water Framework Directive (WFD) aims to improve European water resources and prevent any further deterioration in their quality by the year 2015.

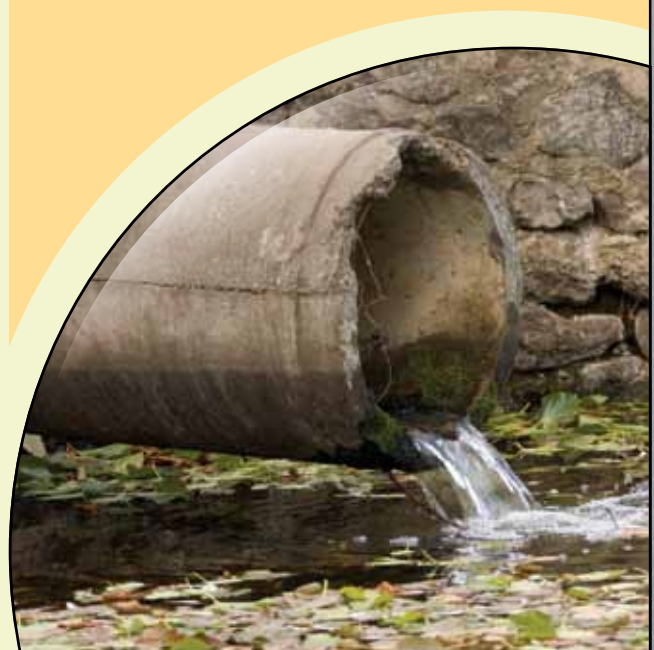
This project will support the WFD by developing reliable reference standards, as close as possible to real-world water samples. The reference standards will be for some of the most important water pollutants previously identified as having a lack of measurement standardisation, e.g. tributyltin (TBT), polybrominated diphenylether (PBDE) and polycyclic aromatic hydrocarbons (PAH).

The research will also improve our understanding of how these pollutants interact with one another, as well as with other chemicals in the water, which is important for the analysis of whole water samples.

## Project ENV08: Traceable measurements for monitoring critical pollutants under the European Water Framework Directive

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## Disposing of nuclear waste safely

### *Aiding the successful decommissioning of nuclear power plants*

Many nuclear power stations in Europe, and across the rest of the world, are in the final stages of their life cycle and are being prepared for the decommissioning process.

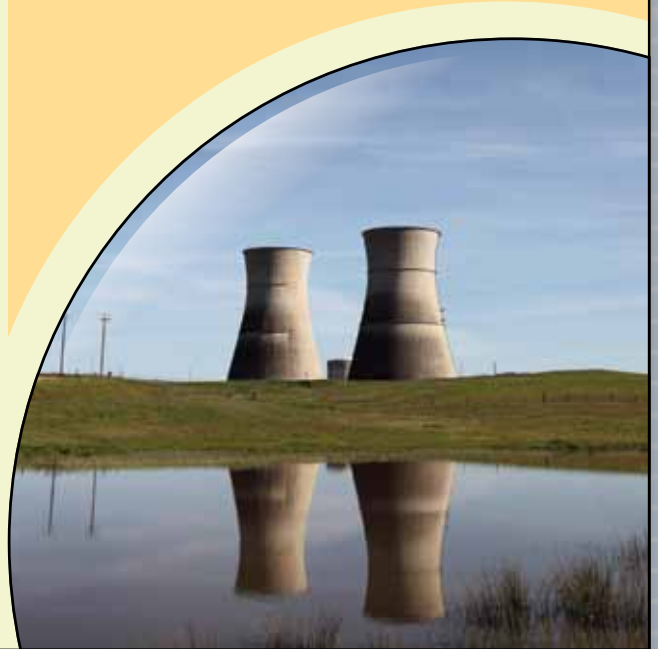
This requires the disposal of thousands of tonnes of nuclear waste and, in order to do this safely and cost effectively, it is necessary to accurately measure the radioactivity of the materials involved.

This project will develop novel methods, standards, decay data, reference materials and instruments for improved radioactive waste measurements and to assist with the successful decommissioning of nuclear power plants.

## Project ENV09: Metrology for radioactive waste management

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## Europe's National Measurement Institutes working together

The majority of European countries have a National Measurement 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.

EURAMET has implemented the European Metrology Research Programme (EMRP), a project programme organised by 22 NMIs and supported by the European Union, which will have a value of over 400 M€. The EMRP facilitates 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.

Full details can be found at: [www.euramet.org](http://www.euramet.org)

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## EMRP

European Metrology Research Programme  
► Programme of EURAMET



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