

RadonNET Newsletter

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EURAMET 23IND07 RadonNET project

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them into networks that automatically provide regular and reliable measurements in large buildings, in line with the requirements of Directive 2013/59/Euratom. The project responds to the challenge of optimising ventilation in energy-efficient buildings without increasing the risk of radiation exposure.



1. Introduction to the Project

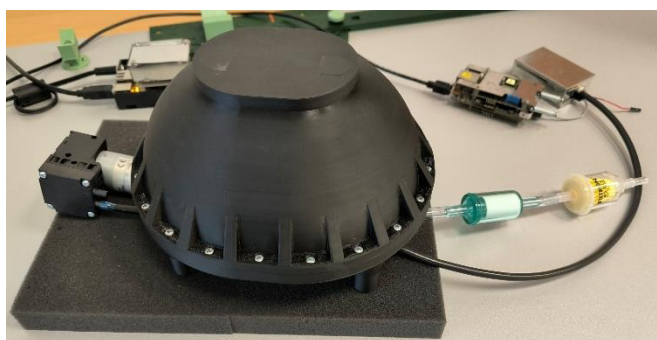
RadonNET (23IND07) is a three-year project that started in September 2024. It is funded by the European Partnership on Metrology (EPM) under the Horizon Europe programme. The consortium comprises 15 institutes from 11 countries - national metrology institutes, universities and industrial partners.

The project's goal is to develop new and improved sensors for measuring the activity concentration of radon (^{222}Rn) and to connect

2. News from WP1 – New Sensors for Radon Detection

By month 18 (M18) of the project, the work had progressed from the conceptual phase to the production of the first functional prototypes and validated measurement methods. Three complementary families of detectors are currently being developed: semiconductor sensors, ionisation chambers and scintillator systems - each of which has already yielded concrete results.

In the field of semiconductor technology, CMI and NUVIA have developed and optimised a PIN diode detector for radon daughter products, and NUVIA has produced an initial integrated prototype that clearly has the potential to become a cost-effective commercial radon sensor, whilst the CEA has built a fast, silicon-based laboratory instrument with a response time of less than one minute, intended for investigating the response times of other radon measuring devices.



PIN diode-based detector

Two complementary approaches have emerged in the field of ionisation chambers. USIEG has demonstrated a highly sensitive and accurate cylindrical pulsed proportional ionisation chamber suitable for reference measurements and on-site calibration. Its active chamber volume of approximately 8 litres enables time-resolved measurements of less than 30 minutes. PTB has developed a networked, low-cost ionisation chamber with an estimated hardware cost of around €40, suitable for deployment in dense sensor networks.



Low-cost LVIC Rn-222 detector

SUBG, CEA and UCBL have developed and validated modelling tools and prototypes for scintillator-based detectors. Porous scintillators have so far proved uncompetitive for cost-effective radon detection, although they remain very promising for other radioactive gases. LivAir is pursuing a simpler scintillation approach based on an improved Lucas-cell-type vial, with an initial prototype planned for testing in 2026, during the second half of the project.



CIPIC in a test setup

The task of energy-optimised ventilation in large buildings requires accurate sensors with high temporal resolution. Of all the proposed solutions, USIEG's CIPIC appears to be suitable for this purpose. At the end of 2026, USIEG will present a prototype of a small, portable ionisation chamber with a chamber volume of 3 litres. This is cost-effective to manufacture, simple to assemble and can be operated on the move.

3. News from WP2 – Calibration

Calibration of radon instruments has so far relied mainly on laboratory exposures in dedicated chambers, which are costly and poorly suited to low-cost connected sensors. During the first half of the project, RadonNET reviewed European calibration practices and existing in-situ approaches, including background, gain and non-linearity corrections, quality assurance, traceability and uncertainty evaluation.

A survey of European laboratories confirmed that radon calibration services are available in many countries, but it also revealed limited capacity for thoron and a lack of harmonisation of calibration intervals and procedures. Building on this, PTB developed and demonstrated a new traceable laboratory calibration procedure for commercial ionisation-chamber detectors at low activity concentrations, overcoming the limitations of classical decaying-atmosphere approaches. The consortium also established decision criteria for selecting sensors for network deployment and transfer calibration, and examined the influence of temperature, humidity and pressure on sensor response, environmental effects were found to be technology-dependent, and CO₂ was shown not to be a significant direct influence parameter. To support future in-situ operando calibration and AI-assisted correction methods, CEA is currently setting up an extended calibration chamber, in which several commercial and project sensors will be tested under controlled conditions for the remainder of the project.

4. News from WP3 – Testbed and Sensor Network

Europe has so far lacked a quality-assured radon sensor network specifically designed for monitoring large buildings. In RadonNET, this goal has moved from concept to implementation. Testbed criteria were defined, candidate sites were assessed, and the first stage of the main testbed was established at the University of Helsinki, chosen for its favourable radon conditions and building characteristics. In late August 2026, the original test network was expanded to include a test network in the Sähköotalo building, implemented by Granlund.

The first testbed nodes are already operating, combining reference and connected instruments: AlphaGUARD with Raspberry Pi readout and communication, Aranet sensors, and RadonEye detectors. In parallel, the consortium analysed data quality, communication protocols, MQTT-based solutions, network security requirements, and lessons learned from existing radon and radiation monitoring networks. These results provide a practical foundation for future work on transfer calibration, anomaly detection, and AI/ML-supported analysis.

5. News from WP4 – Integration with Indoor Air Quality (IAQ)

RadonNET has also made progress in integrating radon monitoring with broader indoor air quality (IAQ) networks. A review of 44 scientific articles identified the key pollutants most commonly monitored in existing IAQ systems, namely CO₂, CO, NO₂, NO, O₃, particulate matter (PM) and VOCs, while the consortium also compiled an overview of the European legislative,

normative and methodological framework relevant to IAQ and radon, including the updated EU air quality legislation and the radon-related context of Directive 2013/59/Euratom.

6. Dissemination and Outreach

The consortium has so far carried out a broad dissemination and communication campaign, delivering 32 oral presentations, invited talks and posters at conferences and seminars, with 10 peer-reviewed papers already published and 4 more under review. A public project website, a leaflet and a poster have been created and made available to all stakeholders, and the project has launched a LinkedIn discussion group while remaining active on ResearchGate and X. A one-day online stakeholder workshop, organised by PTB and CEA, was held on 29 April 2026, with the aim of presenting the results from the first half of the project and gathering feedback. Two training and educational activities have also taken place: a measurement course using RadonEye detectors for students of the Helsinki Upper Secondary School of Natural Sciences, and participation in Journée de la Science 2025 at LNE-Paris, aimed at end users. Throughout, the consortium has maintained active collaboration with a stakeholder committee including metrology institutes, calibration laboratories, radiation protection organisations, instrument manufacturers, the construction sector and universities.

7. Past and Upcoming Events

Past:

WP1 and WP2 results were presented at international conferences and seminars,

contributing to the consortium's 32 presentations to date. Educational activities took place in Helsinki with local students and at Journée de la Science 2025 (LNE-Paris).

From 3 to 5 February 2026, the M18 meeting for the RadonNET project was held at the University of Helsinki, Finland.

On 29 April 2026, a one-day online workshop for stakeholders, organised by PTB and CEA, took place, presenting results from the first half of the project. The workshop received more than 200 registrations and had an average attendance of over 100 participants.

A WP2 Progress Meeting was also held on 4 March 2026 (online), reviewing the status of calibration tasks and planning the stakeholder workshop.



M18 Project meeting at the University of Helsinki

Upcoming:

The M27 project meeting, organised by CLOR, is scheduled to take place in Warsaw on 3–4 December 2026.

