



LIFE RESPIRE - RESPIRE - Radon rEal time monitoring System and Proactive Indoor Remediation

LIFE16 ENV/IT/000553



[Project description](#) [Environmental issues](#) [Beneficiaries](#) [Administrative data](#)  
[Read more](#)

#### Contact details:

Contact person: Salvatore Lombardi  
Tel: 390649914922  
Email: [sabina.bigi@uniroma1.it](mailto:sabina.bigi@uniroma1.it)

---

#### Project description:

##### Background

Radon (Rn) is a gaseous trace element, chemically inert and ubiquitous in soil and groundwater. It occurs naturally as an intermediate step in normal radioactive decay, through which thorium and uranium slowly decay into lead. Radon gas is colourless, tasteless and odourless, even at high concentrations. It is generally unreactive and eliminated from the body. Given that it is radioactive and easily inhaled, however, it represents a concrete health hazard. According to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), radon is the most important source of ionizing radiation related to indoor air quality. Indeed, it is often the single largest contributor to an individual's background radiation dose; though radon-gas hazard level is dependent on local geological differences. Despite its short half-life (3.8 days), radon gas from natural sources can accumulate in buildings and especially, due to its high density, in low areas such as basements and crawl spaces. Epidemiological studies have shown a clear link between breathing high concentrations of radon and incidence of lung cancer, childhood leukaemia, pancreatic cancer and other forms of cancer. Radon is hence a contaminant that affects indoor air quality worldwide and a remediation system is necessary to guarantee good air quality within buildings.

##### Objectives

The LIFE RESPIRE project aims to develop a system for the real-time monitoring of indoor radon, to help direct appropriate remediation actions. This will contribute to the implementation of the European directive regarding human exposure to natural radiation (2013/59/EURATOM) which deals primarily with indoor radon, and encourages national action plans to identify areas where a significant number of buildings have average radon levels exceeding national reference levels (i.e. Radon Prone Areas, RPAs) and to propose remediation. The project will also help in the direct measurements of soil gas radon, which coupled with geological data, are widely used to define the geogenic radon potential (GRP) of an area (i.e. an estimate of Rn originating from geological sources). The GRP can then be used to guide indoor surveys, as indoor radon values are often highly variable.

The main specific objectives of the RESPIRE project are to:

- Demonstrate in four representative areas in Italy and Belgium, with different GRPs, a cost-effective and eco-friendly solution for the real-time measurement and remediation of radon, to keep indoor radon levels below 100 Bq/m<sup>3</sup>;
- Construct a real-time geodatabase of continuously collected radon measurements, coupled with other geological, geochemical and building characteristics data; and
- Provide local authorities with radon hazard guidelines and real-time WebGis radon maps for land use planning and health risk assessment, thus facilitating the preparation of national action plans.

Expected results: The main expected result of the LIFE RESPIRE project, linked to radon measurement, will be the WebGis real-time updated European map of radon concentrations indoors, including geological-geochemical characteristics, soil gas radon activity, radon flux from soil, dissolved radon in groundwater and public waters, GRP and Radon Prone Areas (RPA), and building characteristics (e.g. year of construction, building materials, type of foundations, floor and ventilation).

The main expected results regarding radon remediation:

- An integrated system for the remediation of natural radon hazard indoors, able to reduce indoor concentrations at demonstration sites to below 100 Bq/m<sup>3</sup> (compared to a current value of 500 Bq/m<sup>3</sup>);
- Questionnaire of risk perception, with over 80% of people living at demonstration sites and exposed to natural hazards informed about the project and radon risks;
- Manuals and guides for dealing with radon risks, and their distribution around Europe;
- Information and dissemination material, integrating field data and modelling results, distributed to inform local authorities about radon and radon-prevention measures during remediation activities and new construction; and
- RESPIRE WebGis radon map produced as an instrument for both researchers and policy-makers, for evaluation of radon risks and to aid the implementation of effective counter measures.

Results

[Top](#)

---

Environmental issues addressed:

Themes

Risk management - Risk assessment and monitoring

Risk management - Human health protection

Industry-Production - Chemicals

Keywords

chemical industry, decontamination, human exposure to pollutants, monitoring

Natura 2000 sites

Not applicable

[Top](#)

---

Beneficiaries:

Coordinator	Centro di Ricerca, Previsione, Prevenzione e Controllo dei Rischi Geologici
Type of organisation	Research institution
Description	CERI is a multidisciplinary research centre within the University of Rome 'La Sapienza' (established 2003), and presently hosted in the Department of Earth Sciences. It promotes, coordinates and carries out research in the fields of geological risks (flooding, pollution, landslides, earthquakes and volcanic eruptions), the reclamation of polluted sites, and the development of innovative methodologies and technologies.
Partners	Elica S.p.A., Italy Federal Agency for Nuclear Control, Belgium Consiglio Nazionale delle Ricerche, Istituto di Geologia Ambientale e Geoingegneria, Italy Istituto Nazionale di Geofisica e Vulcanologia, Italy

[Top](#)

---

Administrative data:

Project reference	LIFE16 ENV/IT/000553
Duration	01-SEP-2017 to 31-AUG -2020
Total budget	2,239,158.00 €
EU contribution	1,313,254.00 €
Project location	Vlaams Gewest(België - Belgique) Région Wallonne(België - Belgique) Bruxelles-Brussel(België - Belgique) Piemonte(Italia) Valle d'Aosta(Italia) Liguria(Italia) Lombardia(Italia) Trentino-Alto Adige(Italia) Veneto(Italia) Friuli-Venezia Giulia(Italia) Emilia-Romagna(Italia) Toscana(Italia) Umbria(Italia) Marche(Italia) Lazio(Italia) Campania(Italia) Abruzzo(Italia) Molise(Italia) Puglia(Italia) Basilicata(Italia) Calabria(Italia) Sicilia(Italia) Sardegna(Italia)

[Top](#)

---

Read more:

Project web site	<a href="#">Project's website</a>
Slides Presentation	Title: "The mapping of Radon in Italy and in the Lazio region: from the Geogenic Radon Potential to Indoor Risk" (1.26 MB) Author: Ciotoli G., Voltaggio M., Giustini F. Editor: Consiglio Nazionale delle Ricerche No of pages: 23
Slides Presentation	Title: "L'esperienza INGV nello studio sul Radon: tecniche di misurazione e monitoraggio. = The INGV experience in the Radon study: measurements and monitoring techniques" (1.64 MB) Author: Alessandra Sciarra Editor: RESPIRE No of pages: 21
Slides Presentation	Title: "LIFE RESPIRE: Radon rEal time monitoring System and Proactive Indoor Remediation" (409 KB) Author: Sabina Bigi Editor: RESPIRE No of pages: 20
Slides Presentation	Title: "Radon in Belgium and experience in remediation" (1.15 MB) Author: Boris Dehandschutter, Jean Klerkx Editor: RESPIRE No of pages: 15

Slides Presentation

Title: "Stato dell'arte delle conoscenze sul Radon S. Lombardi" (1.48 MB) Author: Aula Lucchesi Year: 2017 Editor: RESPIRE No of pages: 18

[Top](#)

---

[Project description](#) [Environmental issues](#) [Beneficiaries](#) [Administrative data](#)  
[Read more](#)