

# THE EUROPEAN RADON MAPPING PROJECT

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**ABSTRACT:** Indoor radon (Rn) and its progenies are widely acknowledged as the second most important source of lung cancer after smoking. Therefore, as part of their Rn policy, many countries have visualized the geographical distribution and extent of the Rn hazard as maps of indoor Rn or other Rn-related quantities. For some years Rn has also become an issue in radioprotection legislation; in the proposed radioprotection basic safety standards of the EU, member states will be required to submit Rn action plans including geographical assessment and delineation of Rn-prone areas. As part of its mission, the JRC of the EC contributes by creating European Rn maps and generating harmonized data bases. This activity, as part of the European Atlas of Natural Radiation project, is under way since 2006, with a European indoor Rn map existing, if still incomplete, and a geogenic Rn map in the phase of methodological investigation and final planning.

The most important sources of Rn are rock and soil; therefore spatial assessment and mapping of Rn is naturally related to geology. Indoor Rn concentration, however, which generally poses the most important contribution to Rn exposure, results from the geogenic Rn potential (RP) plus factors related to house and room characteristics, climate and living habits. These factors are subject to changes with time, if over different time scales, contrary to the RP which is constant over geological eras.

We present the status of the European indoor Rn map, to which 25 countries have contributed with more than 800,000 individual measurements so far (mid-2012). While also the indoor Rn map involves a number of questions related to statistics, harmonization of data and procedures and QA, the geogenic map turned out to be a more complicated endeavour. Problems range from defining a variable which quantifies the RP, its spatial estimation from different input quantities - differently available in participating countries -, to actual mapping procedures. Also the harmonization of operational quantities, resulting from the implementation of different measurement protocols, is an issue to be investigated in detail.

As the geogenic Rn map should be based on geology, a main task is to harmonize geological classification systems and legends between participants, to establish a set of geological units with regard to classifying the RP. Its values, computed out of available input variables or proxies, should be then assigned to these units. Also tectonic structures which may have high influence on the RP locally should be accounted for.

European Rn maps are never meant to substitute national maps, but rather to visualize the larger-scale extent of the problem and help to develop methodology and QA, and provide data and methods for further research. Geogenic Rn maps in particular can help to identify regions where additional Rn screening efforts are advisable for the sake of suggesting provisions against Rn by implementing building codes or remediation of existing buildings.

**KEYWORDS:** RADON, MAPPING, EUROPE.