



Ref. Ares (2020)2496502

A background image showing a magnifying glass held over a yellow coin. The coin has the number "86" at the top, the word "Radon" in the center, and "222" at the bottom. The background is a light blue map of Europe with a grid pattern.

Assessing the effectiveness of Radon Action Plans: searching for a systematic and standardised method

NORM X symposium & RICOMET conference, Utrecht, the Netherlands, May 9 – 13, 2022

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Assessing the development and implementation of national RAPs

Objectives:

- To collect, review and **assess national radon action plans** in all EU MS and the UK according to the requirements laid down in the BSS Directive with a particular **focus on the practical implementation** of the actions defined in these action plans.
- To identify **good practices** to address radon related issues together with experts, regulators, local authorities and other stakeholders from EU MS and the UK.

Task 1. Collection of RAPs, authorities' identification and relationship

Document analysis
Internet search
Snowball technique
Email
Phone calls
Participation in radon-related events

Task 2. Analysis of national RAPs

On-line survey
Group- interviews

Task 3. Comparative horizontal analysis

Comparative analysis
4 regional workshops

Task 4. Final workshop

Participatory workshop

Review and evaluation of national RAP established in EU MS and the UK according to the requirements in the BSS Directive – focusing on the practical implementation of the actions defined in these action plans

Accession countries*

EU-RAP Reference Group

Management and quality control



Council Directive 2013/59/Euratom – the BSS Directive

Reduce lung cancer risk

How to evaluate the extent to which the radon action plan is effective in achieving its objectives?

- In several EU MS, no criteria/indicators defined (yet)
- Most of EU MS focus on completing actions, completeness of RAP



However:

- Some countries define indicators:
 - e.g. numbers of tests conducted, share of buildings remediated reported, number of activities related to public awareness, assessment of the cost effectiveness of the interventions, etc
- Some countries are working to define effectiveness indicators (short and long term) (e.g. Austria, Germany)
- HERCA activities on **effectiveness** indicators (see Bochicchio et al., 2022)



There is not yet a common set of criteria or indicators to measure effectiveness of the different elements of the RAP



Belgian National Radon Action Plan 2020-2025

2.5. Reviewing of the national radon action plan

In order to evaluate the effectiveness and impact of the national radon action plan, indicators will be defined that quantify the effect of preventive- and remedial measures, inspections and measurement campaigns, such as:

- Annual number of measurements performed in dwellings and workplaces.
- Evolution of the statistics of the performed measurements.
- Annual number of remedial actions reported.
- Effectiveness of the remedial actions reported.
- Findings of the annual inspection programme (§5.1.4).
- Survey (every 2 years) of the effectiveness of preventive measures in new buildings.

This information will allow a detailed review of the national radon action plan every 5 years.

Leading Indicators



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National Radon Control Strategy

Phase 2

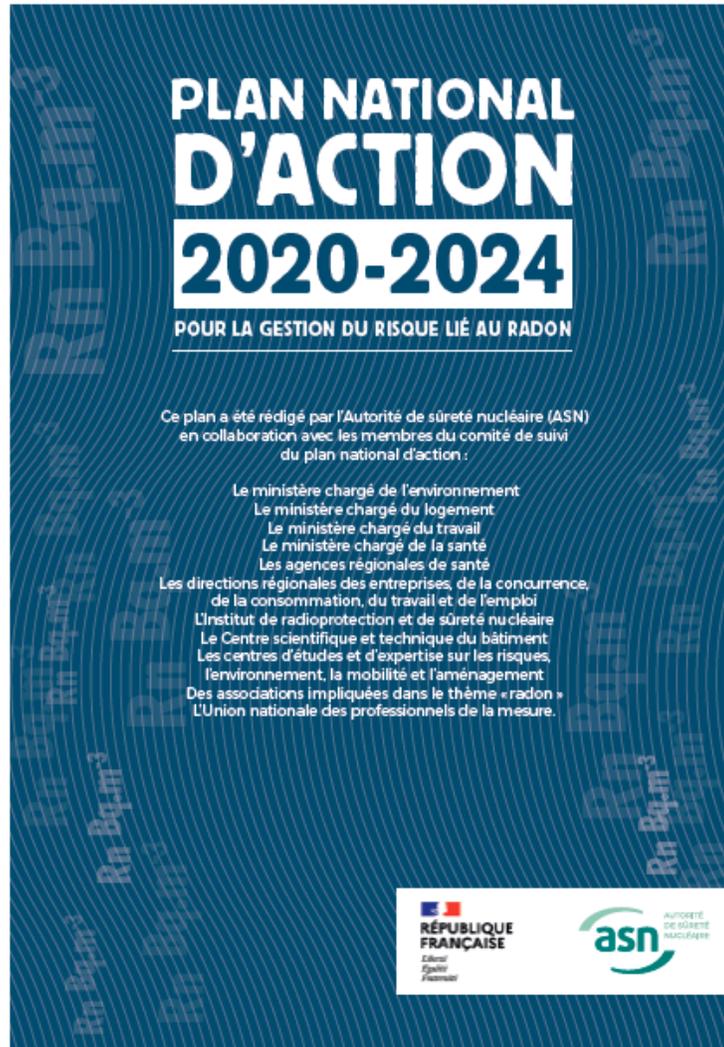
2019 - 2024

Metric	Metric Value	Year Measured	Repeat Frequency
No. of domestic radon tests	1327	Average for 2014 -2017	Annually
No. of radon tests linked to conveyancing	To be established	N/A	Annually
Remediation rate	22%	2015	5 years
Rate of successful outcome for those who remediate	70% on first attempt	2015	5 years
No. of courses held & attendance at Remediation Training	5 courses held 87 attendees	2016	Dependent on scheduling of training course
No. of courses held & attendance at Radon Prevention Training	5 courses held (including 1 pilot) 78 attendees	2017	Dependent on scheduling of training course
No. of businesses that include radon in H&S assessment using BeSmart	1506	Annual average for 2012-2018	Annually
Website hits	Almost 100,000	Average for 2017 and 2018	Annually

Example: Ireland

Lagging Indicators

Metric	Metric Value(s)	Year measured	Repeat frequency
Population weighted national average indoor radon concentration	98 Bq/m ³ (Arithmetic mean)	2017	8 years
Geographic weighted national average indoor radon concentration	77 Bq/m ³ (Arithmetic mean) Mean for homes built pre-98 98 vs post-98 86 Bq/m ³ vs 64 Bq/m ³	2015	8 years
Radon awareness levels	75% with 21% likely to test their home	2017	3-5 years



Indicators		
1	Public buildings	1a- Number of buildings open to the public screened.
		1b- Number of buildings exceeding the reference level of 300 Bq/m ³ .
		1c- Number of buildings exceeding the threshold of 1000 Bq/m ³ .
2	Public buildings	Number of buildings in which work has been carried out.
		Number of buildings in which additional measurements have been carried out as part of an assessment process.
3	Public buildings	
4	Workplaces	Number of workplaces with a result 300Bq/m ³ after concentration reduction work.
		Number of workers who receive to radon exposure individual dosimetry monitoring.
		Number of workers who have exceeded 20 mSv effective dose over 12 consecutive months.
		Number of radiation protection advisors trained on radon.
5	Workplaces	
6	Workplaces	
7	Workplaces	
8	General public	Number of local information events on radon.
		Number of dwellings screened during local radon information operations.
		Perception of radon risk among the French population.
9	General public	
10	General public	



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- **Core or efficiency indicators** - refer to the achievement of the measures within the stipulated timeframe;
- **Secondary or effectiveness indicators** - complementary indicators to the previous ones that provide evidence that the long-term objective will be achieved.
 - Radon exposure of the population
 - Quality of building stock
 - **Governance (example in the next slide)**



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Example: Portugal

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Criteria	Indicators
Institutional articulation	<ul style="list-style-type: none">Organisational structureHuman resources (no.)Financial Allocation/Costs (€)Financial support for testing and mitigation (€)
Technical skills	<ul style="list-style-type: none">Existence of technical documentation supporting radon management (nº)Training/awareness-raising actions for main actors (nº)Specialists in radon management (no.)Radon mitigation specialists (no.)
Accreditation of measurement and mitigation services	<ul style="list-style-type: none">Accredited/recognised services (nº)Accredited/recognised companies (nº)Certified materials (no.)
Awareness raising among society and stakeholders	<ul style="list-style-type: none">Communications in the media (no.)Communications directed to target audiences (no.)Engagement actions for target audiences (no.)Stakeholder associations for radon (no.)

Developed a **code book (methodological document and protocol for the analysis)**:

- a set of guiding questions per each element of the 14 elements of Annex XVIII of BSS (and education and training) with regards to 2 phases:
 - i) the strategy development
 - ii) implementation phase
- Questions defined based on the BSS directive and additional documents relevant for the specific element (IAEA documents; other Council directives; WHO documents; etc)
- For each element: *have you considered any indicators to measure the effectiveness of this element?*

Strategy

Does the RAP define or include information regarding:

- the strategy for conducting surveys of indoor radon concentration for the purpose of estimating distribution of indoor radon concentration?
- the strategy for conducting surveys of soil gas concentration for the purpose of estimating distribution of indoor radon concentration?
- the strategy for management of measurement data?
- the strategy for establishment of other relevant parameters allowing to estimate distribution of indoor radon concentration?

Implementation

Has your country implemented:

- a representative survey of indoor radon concentration?
- surveys of indoor radon concentration (local/national)?
- surveys of soil gas measurement?
- surveys of other parameters relevant to radon indoors measurement?
- measured data management (national radon database)?
- or considered indicators to measure the effectiveness of this element?

Example:

1) Strategy for conducting surveys

Annex XVIII (1)

Strategy

- communication goals and specific and measurable objectives to increase public awareness and inform the risks of radon?
- relevant target groups?
- messages related to the risks of radon, including in relation to smoking?
- different channels, means and events to communicate (press releases, websites, manuals, newsletters, group discussions, meetings, workshops, conferences, etc)?
- ways of measuring communication efforts and impact (indicators such as n^o of articles in press, website visits, behavioural change, etc)
- resources to be allocated (timeline, professional communicators involved and funding) to communication?
- involvement of stakeholders in decisions regarding the development of the RAP?
- GDPR issues

Implementation

How is all the above implemented in practice?

Example:

10) Strategy for communication and stakeholder engagement

*Annex XVIII (10)
Article 102
The General Data
Protection
Regulation (EU)
2016/679 (GDPR)*

Strategy

- Number, type and audience of training courses or plans for:
 - professionals and workers in the construction industry
 - professionals who carry out radon measurements
 - Workers in potentially affected workplaces
 - those with responsibility for radon (e.g. local authorities)
- Inclusion of radon in schools as part of the curricula
- Inclusion of radon in higher education institutions as part of the curricula
- Accreditation of radon courses
- Training materials or training tools or applications on radon

Implementation

How is all the above implemented in practice?

Example:

10) Education and training

*HERCA
&
EUTERP
recommendation*

- Purpose of evaluation is to make judgment about implementation of RAP, to improve its effectiveness, and/or to inform programming decisions. For this, independent evaluators may be more appropriate than those who are responsible for the strategy and its implementation.
- A common set of indicators to evaluate the effectiveness of RAPs would be of benefit to the owners of RAP and to cross-national organisations.
- However, the country context (e.g. climate, geology, building practices, economic situation, etc) should be taken into account when using and comparing these indicators.
- A set of guiding questions for the implementation phase proved to be a useful mechanism to help countries evaluate the effectiveness of the actions included in the RAP.



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Strategic thinking

A large magnifying glass is centered over a yellow coin. The coin has the word "Radon" and the number "222" on it. The background is a light blue and white pattern of topographic lines and a grid.

THANK YOU!

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