

**apa**

portuguese  
environment  
agency



# What has been done in Portugal related to radon and the Radon Action Plan

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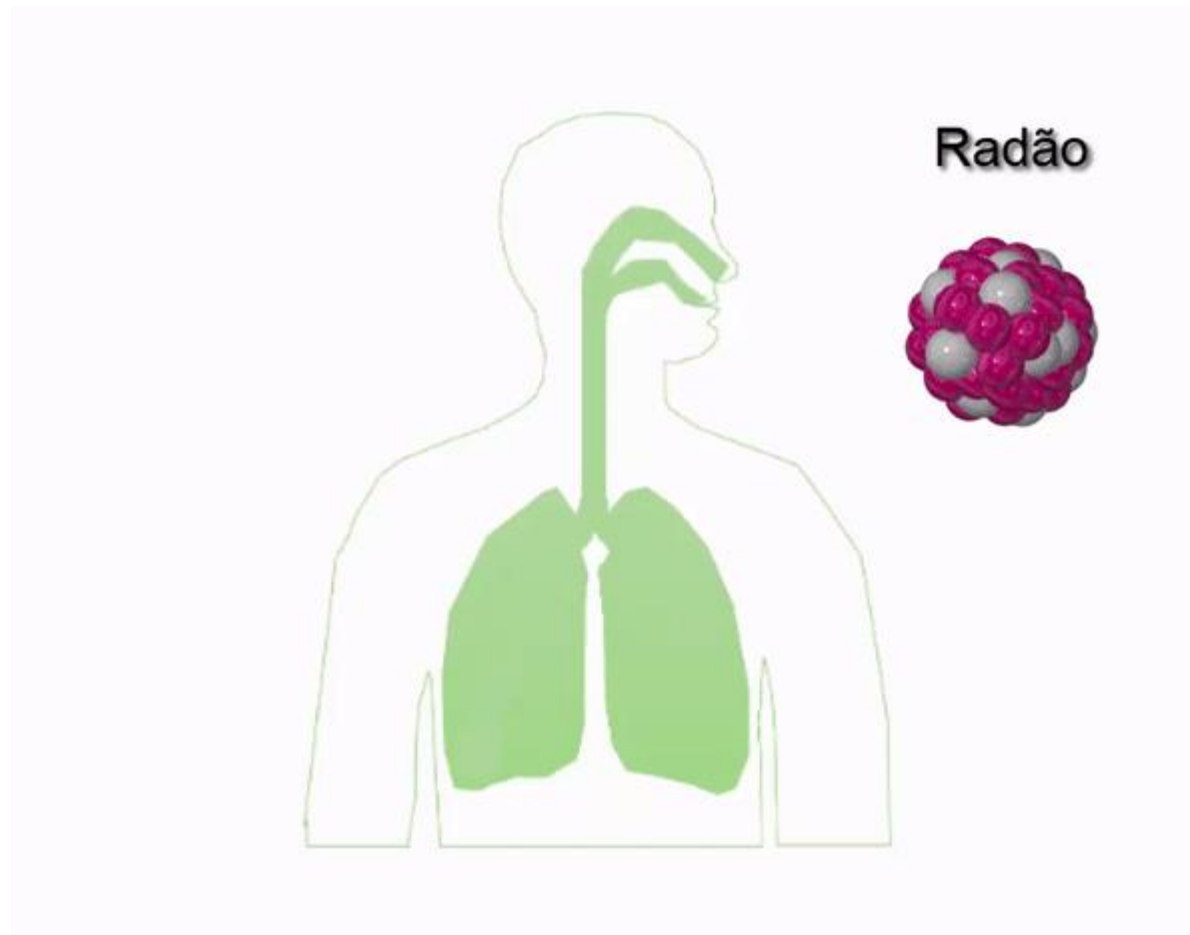


**REPÚBLICA  
PORTUGUESA**

ENVIRONMENT AND  
CLIMATE ACTION

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1. Legal Framework
2. Reference level
3. Radon Action Plan





# Legal Framework

# Legal Framework related to radon

## Decree-Law n.º 118/2013 / 20 August

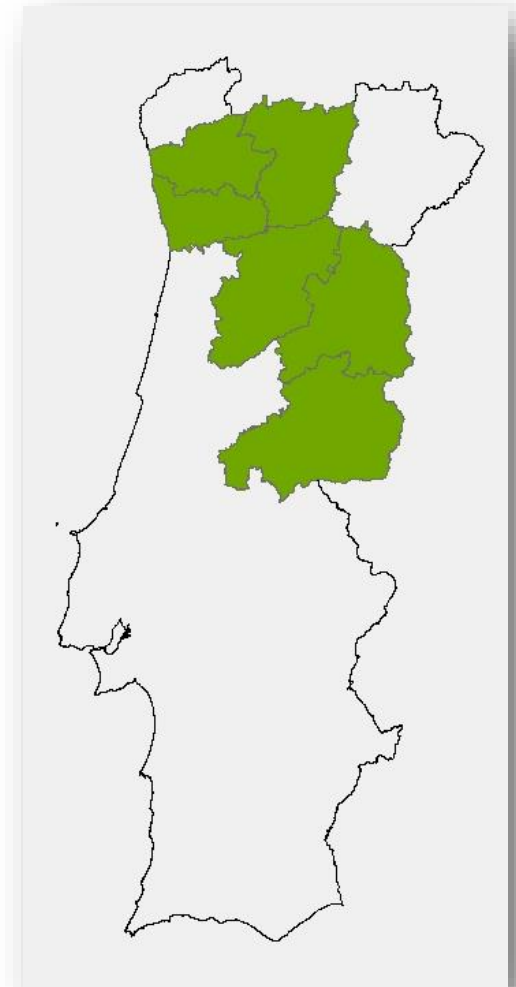
- National System of Energy Certification and Indoor Air Quality in Buildings
- ADENE – Energy Agency

## Ordinance n.º 5

- Buildings built in granitic areas, Porto, Guarda, Viseu and

## Methodology for the assessment of indoor air quality in commercial and service buildings linked to Ordinance 353-A/2013 / February 2015

- Sampling
- Analysis
- Reporting



**It is going to be repealed !**



## Decree-Law 108/2018 of December 3<sup>rd</sup>

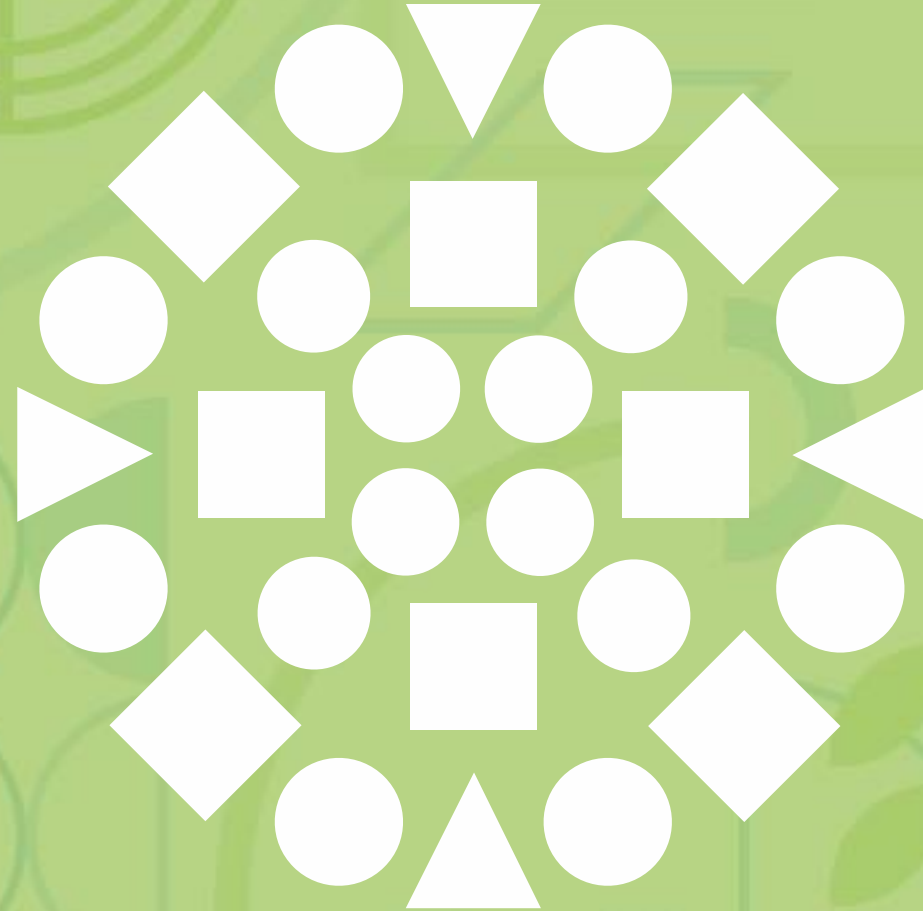
Establishes the legal regime for radiation protection and nuclear safety

### Chapter VI - Existing Exposures Situations

- Article 145<sup>o</sup>: Reference level for indoor radon concentrations in workplaces and dwellings
- Article 146<sup>o</sup>: Employers' obligations
- Article 147<sup>o</sup>: Radon monitoring in workplaces
- Article 148<sup>o</sup>: Arrangements in workplaces
- Article 149<sup>o</sup>: Protection strategies
- Article 150<sup>o</sup>: Radon Action Plan (RAP)



# Reference Level



# National Reference Level for indoor radon concentrations

## Previous

- 400 Bq/m<sup>3</sup> for commerce and services buildings
- No reference level for dwellings

## Current

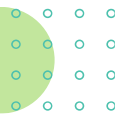
- 300 Bq/m<sup>3</sup> for workplaces
- 300 Bq/m<sup>3</sup> for dwellings and public buildings



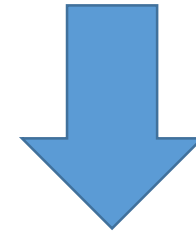


# Radon Action Plan



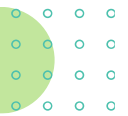


*i) The basis for the establishment of reference levels for dwellings and workplaces. If applicable, the basis for the establishment of different reference levels for different uses of buildings (dwellings, buildings with public access, workplaces) as well as for existing and for new buildings.*



The same reference level for all buildings, 300 Bq/m<sup>3</sup>.





*b) Characterize at national level the most susceptible areas exposure to radon*

*f) Strategy for conducting surveys of indoor radon concentrations or soil gas concentrations for the purpose of estimating the distribution of indoor radon concentrations, for the management of measurement data and for the establishment of other relevant parameters (such as soil and rock types, permeability and radium-226 content of rock or soil).*

*g) Approach, data and criteria used for the delineation of areas or for the definition of other parameters that can be used as specific indicators of situations with potentially high exposure to radon.*





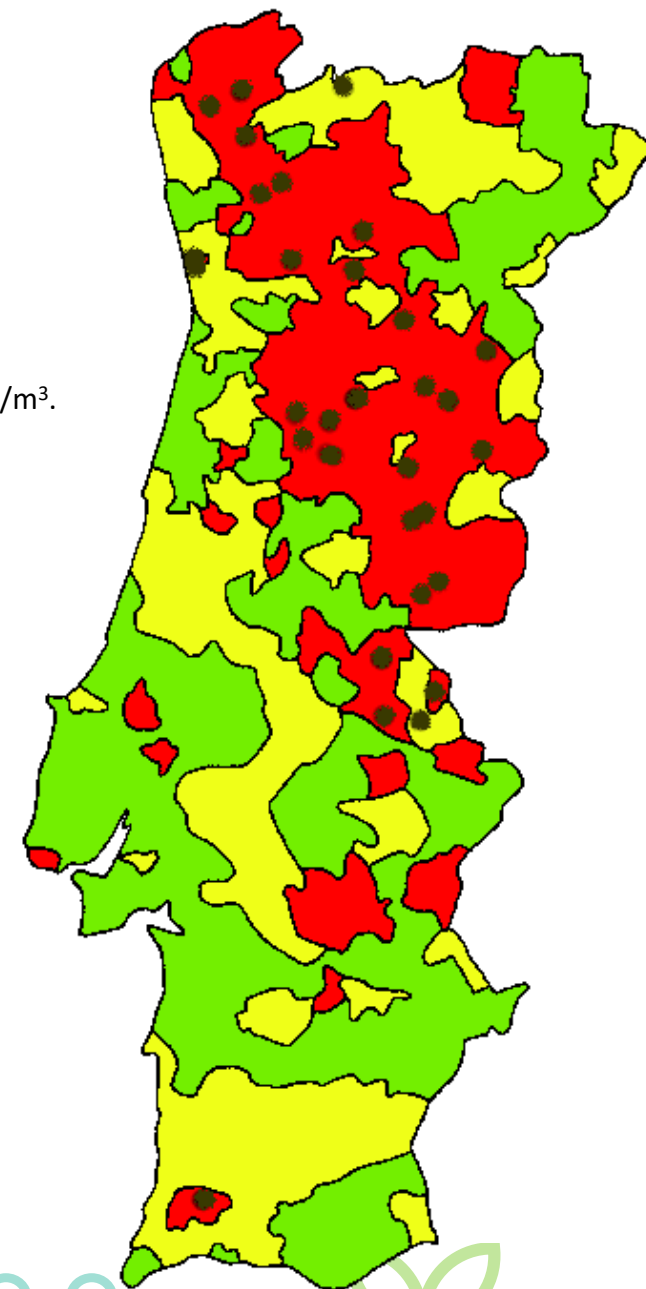
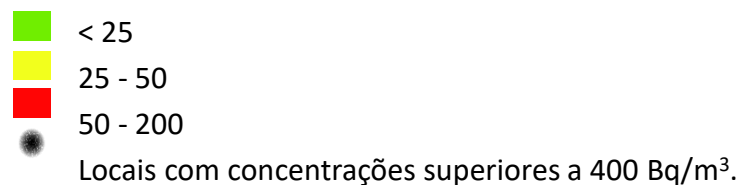
# Radon Mapping

## Previous Radon Map

- ✓ 4200 dwellings

## Methodology

- ✓ LR-115 open detectors
- ✓ Spark counter
- ✓ Average concentrations by council
- ✓ Hot spots



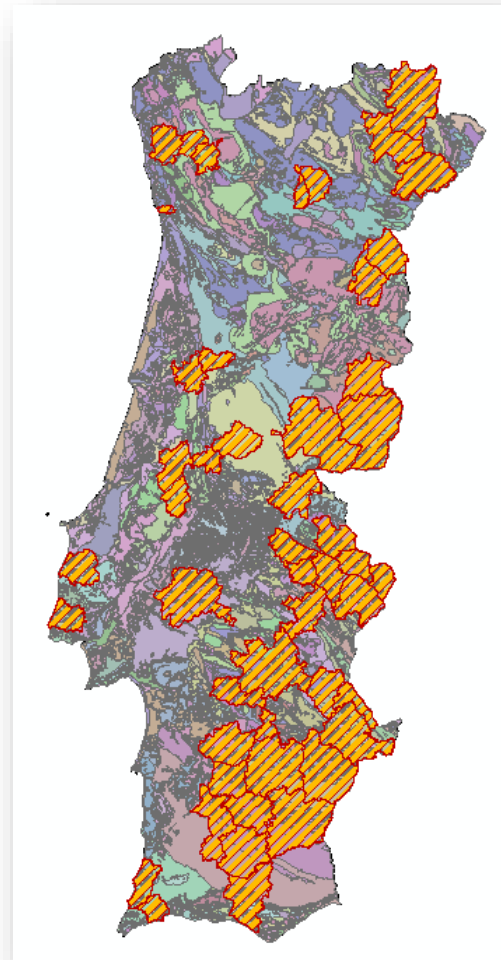
## Radon Mapping

### New survey

- 4000 dwellings
  - ✓ historical data
  - ✓ new survey

### New methodology

- CR-39 detectors
- Geology based sampling
- High population density areas



Flyer



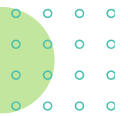
Poster



*h) Identification of types of workplaces and buildings with public access, such as schools, underground workplaces, and those in certain areas, where measurements are required, on the basis of a risk assessment, considering for instance occupancy hours.*

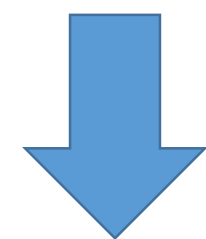
*s) Where appropriate, consideration of other related issues and corresponding programmes such as programmes on energy saving and indoor air quality.*





*Guidance on methods and tools for measurements.*

*Criteria for the accreditation of measurement.*



- Guide on methods and tools for indoor radon measurements
- Guide for measurements at workplaces



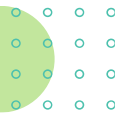


q) Where appropriate, provision of financial support for radon surveys and for remedial measures, in particular for private dwellings with very high radon concentrations.

l) Strategies for facilitating post construction remedial action.

m) Strategy, including methods and tools, for preventing radon ingress in new buildings, including identification of building materials with significant radon exhalation





## Remediation & Prevention

In preparation by LNEC (National Laboratory for Civil Engineering):

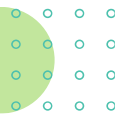
- Guide on remediation techniques for buildings with high concentrations of radon.
- Guide on technical specifications for radon prevention in new buildings

Next year:

Building Codes for radon



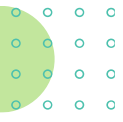




New challenges on radon research, like:

- ❑ seasonal corrections on remediated buildings when retesting,
- ❑ smart buildings,
- ❑ live style changes and radon exposure (homeworking).





Research

✓ 1<sup>st</sup> study 1988

✓ Mainly in:

Granitic areas

Radon in water

✓ National survey 1992

✓ One epidemiologic study

Year	Number published articles
2019	2
2018	1
2017	5
2016	3
2015	2
2014	4
2013	2
2012	3
2011	2
2010	3
2009	1
2007	2
2005	1
1999	1
1995	1
1992	1
1988	1
<b>Total</b>	<b>35</b>





*o) Strategy for communication to increase public awareness and inform local decision makers, employers and employees of the risks of radon, including in relation to smoking.*

*r) Long-term goals in terms of reducing lung cancer risk attributable to radon exposure (for smokers and non-smokers).*



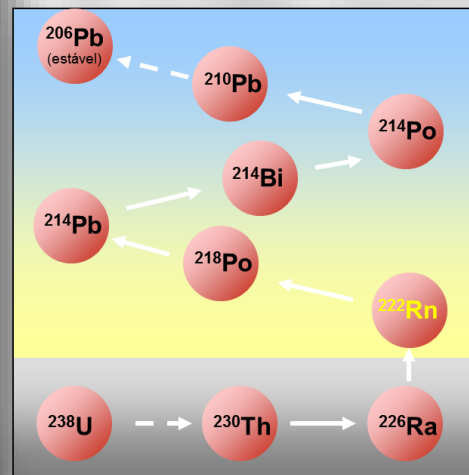
# Communication

- ✓ Flyer ITN/DPRSN
- ✓ Deco/Proteste
- ✓ Schools / Universities
- ✓ Councils



# Radão

Um gás radioactivo de origem natural



Instituto Tecnológico e Nuclear  
Departamento de Protecção Radiológica e Segurança Nuclear



## RADÃO

**UJI TÉCNICO LISBOA** **C<sup>2</sup>TN**

Inodoro, Insípido, Incolor

Radioactivo

Carcinogénico

O **radão** é um gás que está particularmente presente em regiões graníticas e resulta do decaimento radioactivo do urânio (<sup>238</sup>U).

**Elevada exposição ao radão** dentro de edifícios (como casas, escolas e locais de trabalho) pode contribuir para o aumento do risco do cancro do pulmão.

A inalação de produtos de decaimento do radão.

Pode causar lesões no DNA e provocar o cancro do pulmão. (WHO, 2009)

**AGIR CONTRA O RADÃO É FUNDAMENTAL FAZER A SUA MEDIÇÃO É ESSENCIAL**

ORIGEM	MEDIÇÃO	MITIGAÇÃO
<ul style="list-style-type: none"> <li>Solos e rochas (zonas de contacto com a superfície do terreno);</li> <li>Materiais de construção;</li> <li>Água.</li> </ul>	<ul style="list-style-type: none"> <li>Solicitar um ou mais dosímetros de radão ao IST – CTN.</li> <li>Os dosímetros são enviados por correio e acompanhados por um folheto informativo, com as instruções.</li> </ul>	<ul style="list-style-type: none"> <li>Selar/Tapar as fendas existentes;</li> <li>Favorecer a ventilação natural;</li> <li>Colocar membranas impermeáveis ao radão ou ventilação mecânica.</li> </ul>

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## Dedicated web page

Topics:

- Facts: What is radon
- Health effects of radon
- Radon sources and radon transport mechanisms
- Radon measurement
- Radon remediation: common solutions
- Maintenance

apambiente.pt/index.php?ref=17&subref=1544&sub2ref=1548&sub3ref=1609



INSTITUIÇÃO POLÍTICAS INSTRUMENTOS SISTEMAS DE INFORMAÇÃO DIVULGAÇÃO

Pesquisar no site



Proteção Radiológica e Segurança Nuclear

Resíduos radioativos

Proteção radiológica ambiental

Radão

Campanha Nacional de Monitorização do Gás Radão

Perguntas Frequentes

Materiais de Construção

Eventos

Processos de registo, licenciamento e autorizações

Segurança Nuclear

Divulgação e FAQ

Radão

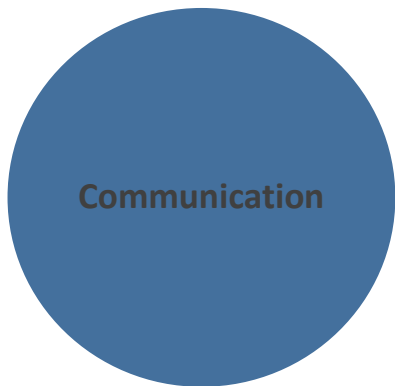
Instrumentos > Proteção Radiológica e Segurança Nuclear > Proteção radiológica ambiental > Radão

## Os factos

O radão é um gás radioativo de origem natural, sem cor e sem cheiro. Provém do urânio presente nas rochas e solos.

O radão é um gás radioativo de origem natural, não tem cor e não tem cheiro.

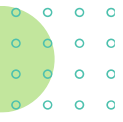




Dedicated:

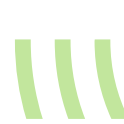
- Email
- Phone

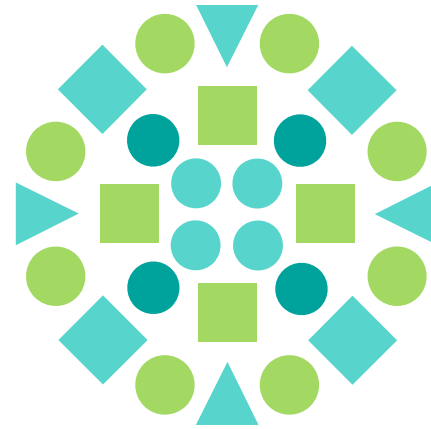
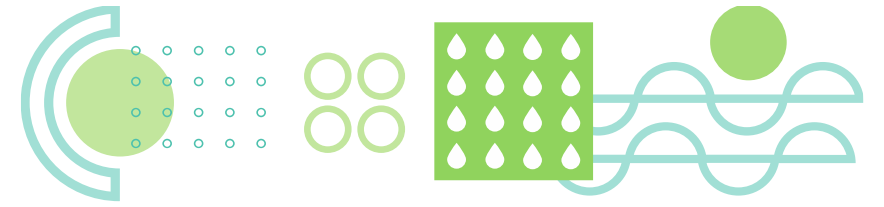
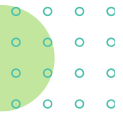




Promote webinars for dedicated targets:

- On the 25th of June, between 10 am and 12:30 pm, the webinar "The Radon in our daily lives - the National Radon Gas Monitoring Campaign".
- On the 24<sup>th</sup> of September, 4:00 pm - 6:30 pm, the Webinar "Constructive solutions to the problem of radon"





**THANK YOU**

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