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The Implementation of the Portuguese Radon Action Plan

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GENERAL CONFERENCE
GLOBAL COOPERATION IN THE NUCLEAR FIELD

68th IAEA General Conference

16 – 20 September 2024, Vienna International Centre, Vienna



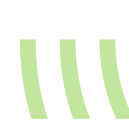
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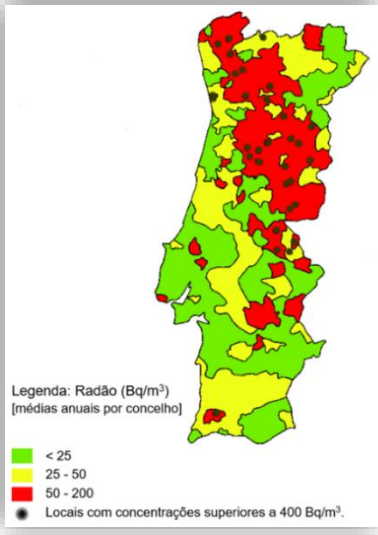



What is a NRAP and its purpose?

- Plan that **addresses long-term risks from radon** in buildings and workplaces for any source of radon ingress, whether from soil, building materials or water.
- The overall objective is to significantly **reduce the number of lung cancer cases** caused by radon exposure.
- The government appointed **APA** as the designated **lead authority to coordinate** the various parties involved.
- **Several institutions involved** (Health institutions, public laboratories, universities, research centers, national institute for accreditation, municipality national association; National Laboratory of Civil Engineering, National institute of Statistics, Energy Agency, Institute of Housing and Urban Rehabilitation)
- **5 years** initiative



Steps taken

Reference Situation in 2019	National Capacitation	National Survey	Development and Approval of the National Radon Action Plan
<ul style="list-style-type: none"> Radon concentration map  <ul style="list-style-type: none"> 1 measurement service accredited 	<ul style="list-style-type: none"> Training the competent authority through IAEA courses and workshops Training the involved parties through national courses and workshops 	<p>Phase 1 (January 2020 - May 2020):</p> <ul style="list-style-type: none"> Look for volunteers Installation of radon detectors <p>Phase 2 (June 2020 - September 2020):</p> <ul style="list-style-type: none"> Collection and retrieval of detectors Processing the detectors <p>Phase 3 (October 2020 - January 2021):</p> <ul style="list-style-type: none"> Data analysis Establishment of the radon map 	<p>2020: Initiation of the drafting process</p> <p>2021: Finalization of the NRAP</p> <p>2021: Start of the Strategic Environmental Assessment (SEA) for the Plan</p> <p>2022: Public consultation phase for the SEA</p> <p>2022: Completion of the SEA</p> <p>2022: Publication of the Environmental Declaration</p> <p>December 2022: NRAP approved by the Council of Ministers</p>

Key issues to address in a NRAP

Identification of situations with potentially high exposure to radon.

Strategy for reducing exposure to radon (remediation and prevention).

Information, communication and public awareness.

Adapted from the *Radiation Protection N.º 193. Annex 3. European Commission 2020.*

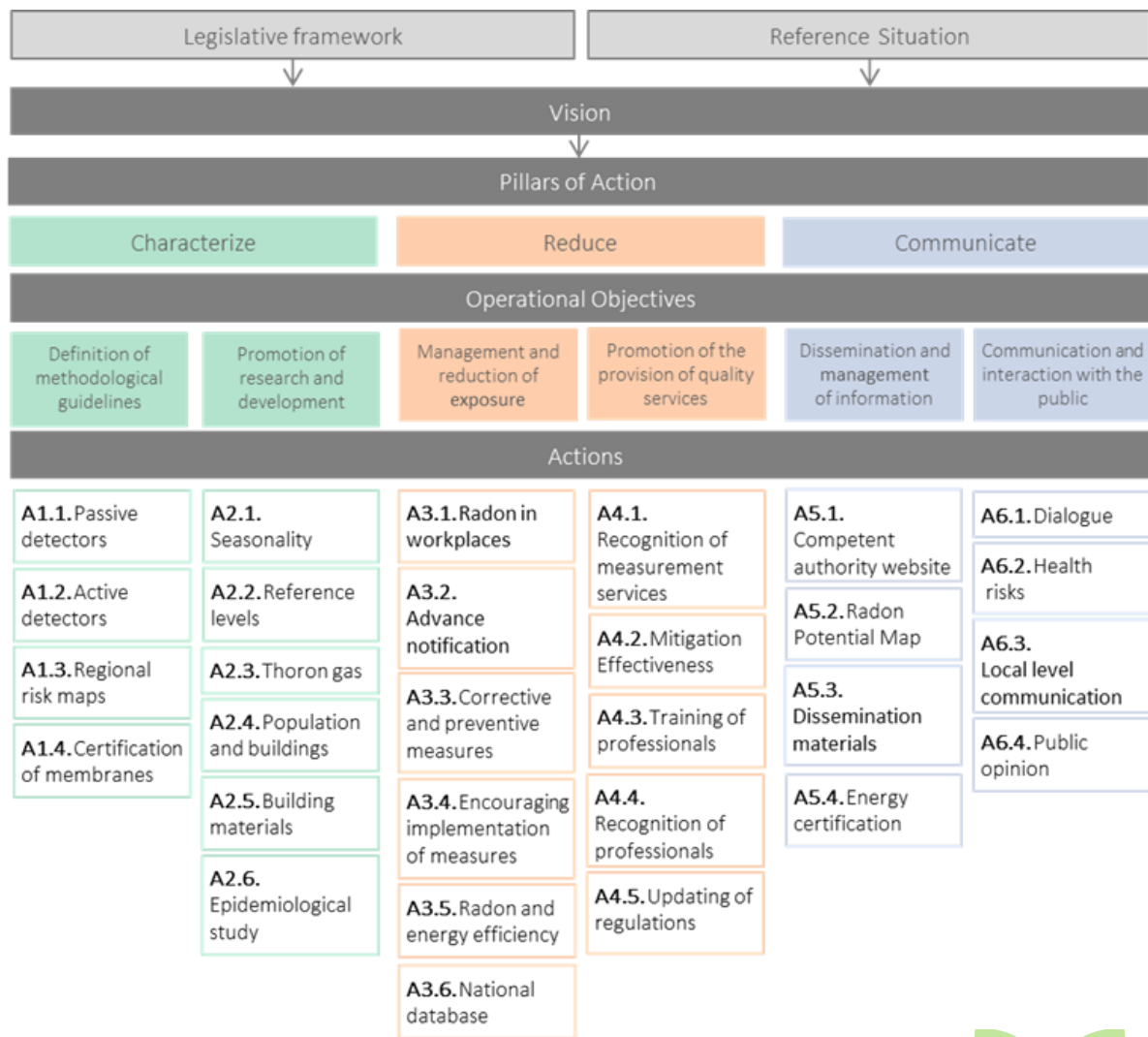


Structure of the Portuguese RAP

VISION

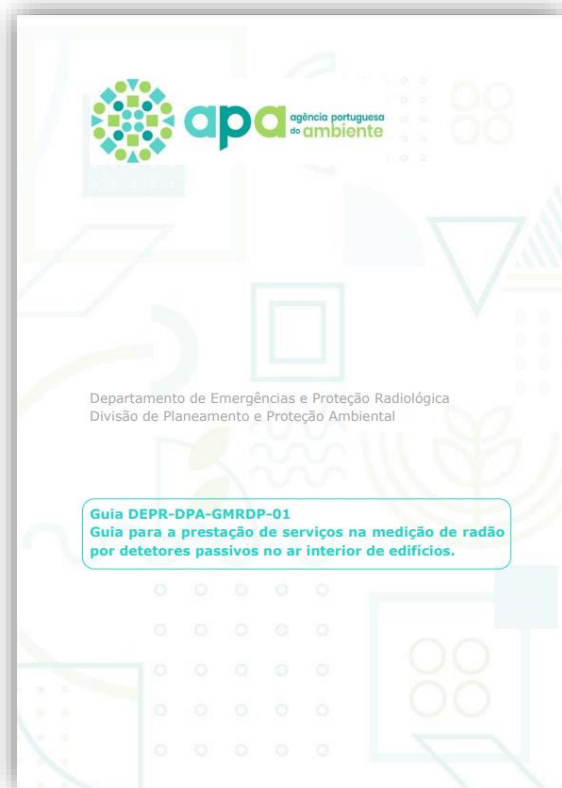
Ensure multi-sector protection against the risks of exposure to radon and sustainably reduce its effects on health.

5-year timescale with arrangements made for regular review and assessment.



Radon measurements

A.1.1 Passive detectors



A.2.1 Seasonality

- Development of seasonal correction factors to estimate the annual average radon activity concentration for indoor air measurements taken over periods shorter than one year.
- To be concluded in the end of 2024.

A.4.1 Recognition of measurement services

The image is a screenshot of a table titled 'ENTIDADES PRESTADORAS DE SERVIÇOS NA MEDIÇÃO DE RADÃO POR DETETORES PASSIVOS NO AR INTERIOR DE EDIFÍCIOS'. The table lists four entities with their contact information and service capabilities. The table is as follows:

ENTIDADE	DADOS DE CONTACTO	VALÊNCIAS DA ENTIDADE			
		Produção de detetores passivos de radão	Processamento de detetores passivos de radão	Análise de detetores passivos de radão	Fornecimento de resultados de ensaios
Universidade de Coimbra – Laboratório de Radioatividade Natural da Faculdade de Ciências e Tecnologia www.ucp.pt/ucp/ucp/investigacao/rn	Rua Sá de Melo, Pólo II, 3050-790 Coimbra, Portugal Telefone: +351 239 640 563 Email: rn@ucp.pt		✓	✓	✓
LABS & TECHNOLOGICAL SERVICES AG S.L. www.ags.com.es	CTRA, A-433 km 24, 300 43200 Burguillos – Sevilla, Espanha Telefone: +351 239 563 014 Email: info@ags.com		✓	✓	✓
Instituto Superior Técnico – Campus Tecnológico e Nuclear, Laboratório de Proteção e Segurança Radiológica www.lcs.tecnico.ulisboa.pt/en/ps/index.html	Estrada Nacional 10, km 139,7, 2695-066 Beja, Portugal Telefone: +351 239 946 292 +351 239 946 330 Email: rad@lcs.tecnico.ulisboa.pt	✓	✓	✓	✓
A. Ramalhão - Consultoria, Gestão e Serviços, LDA www.aramalhao.com	Rua Senhora do Porto, 825, 4250-456 Porto Telefone: +351 228 348 130 Email: geral@aramalhao.com		✓		✓

ACTUALIZADO EM 14.06.2023 (1/2)

- 23 listed companies for radon measurements that followed APA recommendations

<https://apambiente.pt/prevencao-e-gestao-de-riscos/medicao-de-radao>

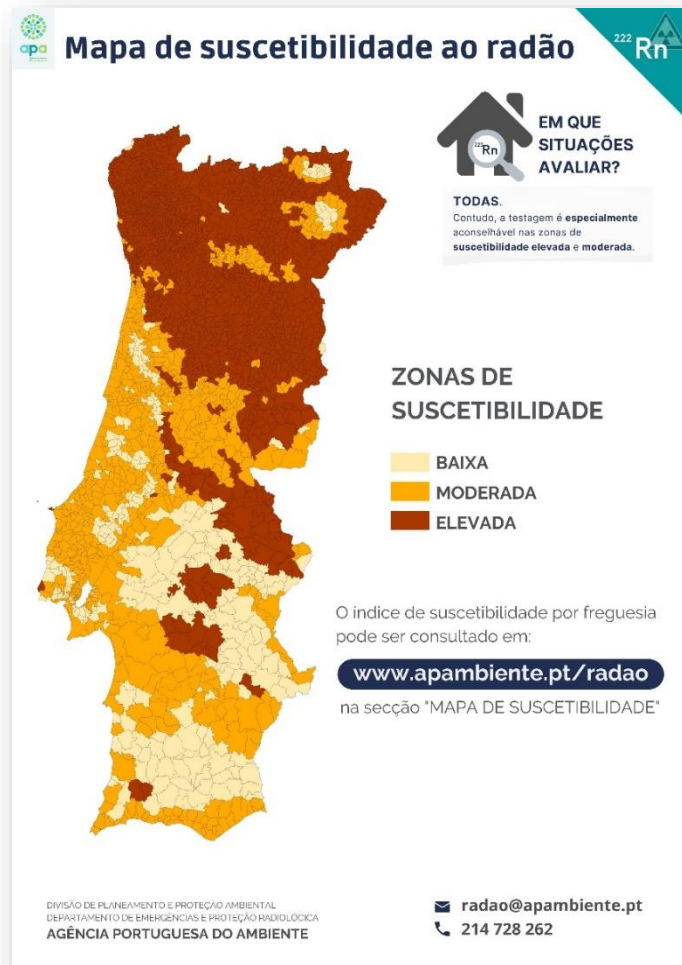
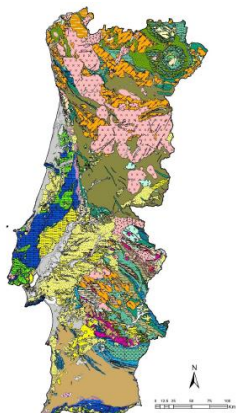


Areas with potentially high exposure to radon

A.5.2 Radon Potential map

Geogenic & anthropogenic characterization

- 74 geological units were characterized
- 3084 indoor radon measurements
- 1: 1 000 000



A.1.3 Regional Risk Maps

- Guidelines for establishing local radon monitoring companies aimed at creating local radon potential maps
- At the scale of the parish.
- Expected to be concluded by the end of 2024.



Requirements

- Reference level 300 Bq/m³
- ICRP 65 and ICRP137 under discussion
- All workplaces must be measured
- Frequency: every year for radon prone areas and specific workplaces (underground workplaces, mines, touristic caves, groundwater treatment, spas, etc)
- annual effective dose >6 mSv shall be treated as planned exposure situations
- ≤ 6 mSv/y exposures are kept under review.

A.3.1 Guidance for workplaces



A.3.2 Notification

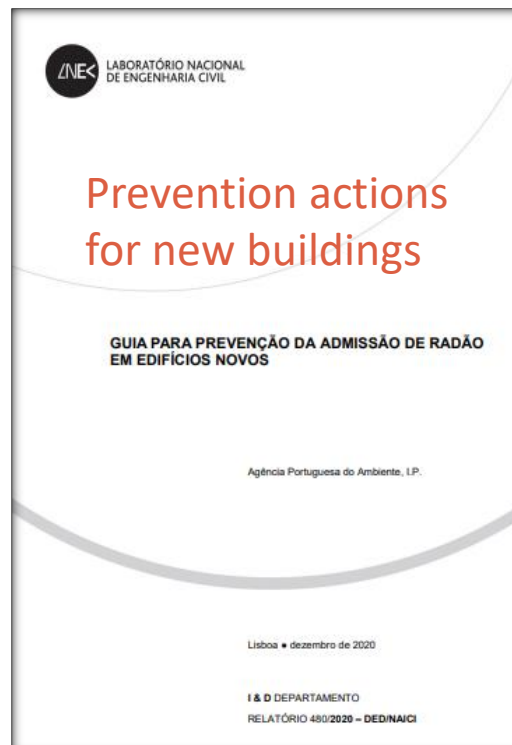
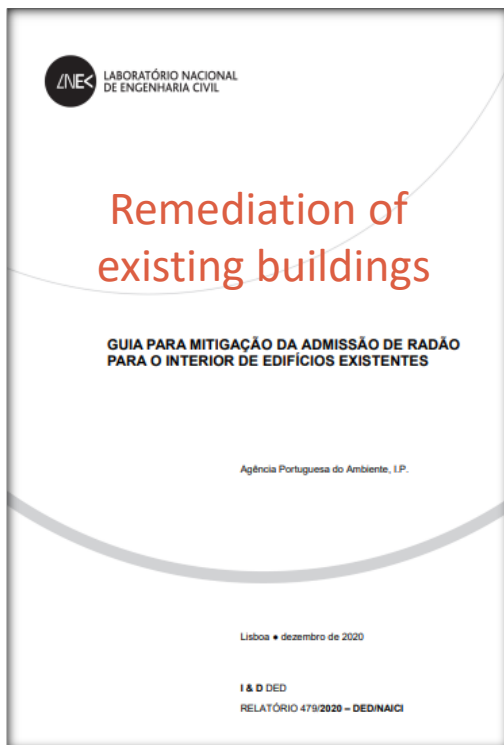


<https://apambiente.pt/prevencao-e-gestao-de-riscos/medicao-de-radao>



Prevention and remediation

A 3.3 Guidance on remediation and prevention actions



A 4.5 Building Codes

- Specific requirements in national building codes for new buildings and for the remediation of existing buildings.
- Expected to be concluded by the end of 2024.



Prevention and remediation

A 4.3 and A 4.4 Professionals and remediation services

Learn4LIFE

Learning Radon



Co-funded by
the European Union



Objectives:

- Qualification of professionals
- Replication (training professionals)
- Public Awareness

<https://learn4lifeproject.eu/>

- **3 courses** tailored for different audiences as building workers, contractors, real estate business, health professionals, civil engineers and architects.
- Theoretical parts supported by slides and animations
- Exercises and projects to develop communication strategies mitigation plans
- Practical component mainly hands-on

Urgeiriça, Portugal




Salamanca, Spain



Prevention and remediation

A.3.4 Financial support for radon remediation

- Exclusive for the remediation of residential buildings with radon concentrations above the national reference level.
- The budget for this financial support was €750,000 in 2023.



SABE O VALOR DA CONCENTRAÇÃO DE RADÃO NA SUA HABITAÇÃO ?

SIM O valor é superior a 300 Bq/m³?
Então **faça a remediação** da sua habitação.

O FUNDO AMBIENTAL COMPARTICIPA A 90% A SUA **REMEDIAÇÃO** ATÉ UM VALOR DE 8800€

NÃO Mora ao nível do subsolo, solo ou 1º andar?
Então **faça a medição** da concentração de radão na sua habitação.

O FUNDO AMBIENTAL COMPARTICIPA A 90% A SUA **MEDIÇÃO** ATÉ UM VALOR DE 100€

sou elegível para o apoio? Pode receber este apoio se for proprietário do imóvel.

como posso candidatar-me? Através do preenchimento do formulário disponível em fundoambiental.pt

Para mais informações consulte o [Aviso n.º 9253/2023](#) ou fundoambiental.pt
Para mais informações sobre radão: ambiente.pt/radao

REPUBLICA PORTUGUESA SECRETARIA-GERAL DO AMBIENTE FUNDO AMBIENTAL apa

Advertising Flyer



FUNDO AMBIENTAL

Sobre Nós Prestação de Contas Apoios 2023 Apoios PRR Apoios Anteriores Candidaturas Comunicação

Apoios 2023 » Proteção do ambiente, proteção radiológica e gestão de riscos e danos ambientais

Proteção do ambiente, proteção radiológica e gestão de riscos e danos ambientais

- Gestão de resíduos e transição para uma economia circular
- Mitigação às Alterações Climáticas
- Cooperação Internacional

Proteção do ambiente, proteção radiológica e gestão de riscos e danos ambientais



radão Rn

ENQUADRAMENTO

O radão é um gás radioativo de origem natural, incolor e inodoro, estando classificado como um agente carcinogénico. Segundo a Organização Mundial de Saúde, a exposição prolongada ao radão no interior de edifícios é a segunda causa de cancro do pulmão, depois do tabaco e a primeira em não -fumadores. Estimativas recentes apontam que entre 3 a 14 % dos cânceros do pulmão a nível mundial sejam atribuídos à exposição ao radão.

O radão presente nos edifícios provém essencialmente do urânio contido nas rochas e solos. O radão entra

Call for financial support in 2023

Communication and Awareness

Communication strategy tailored to each group stakeholders

Building Industry

Public

Householders
Employers
Employees/unions
Landlords
Students

Builders, **architects**, etc
Solicitors, insurers, etc
Professional education establishments
Rn measurement companies
Rn remediation companies

Researchers

Geology
Civil engineering
Radiation protection
Epidemiology

Governmental/State

Local authorities
Health professionals
Central government/agencies
Regulatory body

Adapt from IAEA radon training course. Module 3:
Developing and Implementing a National Radon Action Plan.

A 5.1 Competent authority website



Radon
measurements



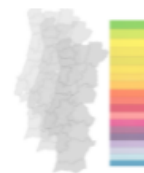
Workplaces



Prevention
and
remediation



National
Survey



Radon
potential
Map



Radon action
Plan

Website: www.apambiente.pt/radao

Email: radao@apambiente.pt

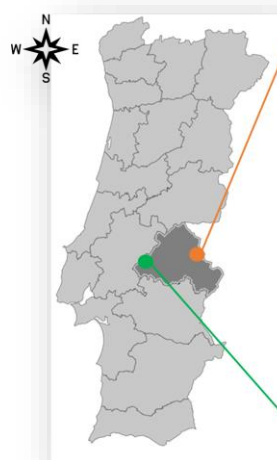
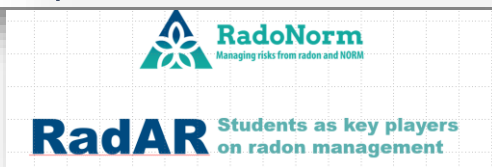
Telephone: +351 214 728 262

Communication and Awareness

A 6.1 and A 6.3 Local level Communication

OBJECTIVES:

- Inform the community about radon risks and how to reduce exposure
- Conduct the community to measure their dwellings and to take action to reduce indoor radon exposure



Communication and Awareness

Public Events:

- Workshops on radon organized by universities, research institutes, and national laboratories.
- European Radon Day celebration on November 7th.
- Participation in national and international congresses and conferences.



Communication and Awareness

Organization of national and international courses to raise awareness and enhance knowledge about radon within the Portuguese community.



APA coorganizou curso sobre prevenção contra a exposição ao radão em edifícios



Realizou-se de **22 a 26 de janeiro**, na Faculdade de Ciências e Tecnologia da Universidade de Coimbra, o **Regional Training Course on prevention and mitigation methods for protection against radon exposure in buildings**. Neste curso da Agência Internacional de Energia Atómica (AIEA) participam enquanto formadores, peritos da Agência Portuguesa do Ambiente (APA), do Laboratório de Radioatividade Natural (LRN) da Universidade de Coimbra, da Empresa de Desenvolvimento Mineiro (EDM) e da European Radon Association, entre outros.

The poster is for a course titled "CURSO TEÓRICO-PRÁTICO SOBRE RADÃO" (Theoretical-Practical Course on Radon). It is the 2nd edition ("2ª EDIÇÃO") and is organized by SPPCR (Sociedade Portuguesa de Proteção Contra Radiações) and the University of Coimbra (1290). The course dates are June 22 and 23, 2023, at the Department of Earth Sciences, University of Coimbra. The fee is 40 € for SPPCR members and 75 € for non-members. The course includes theoretical and practical components, a visit to the Natural Radioactivity Laboratory, coffee breaks, a meal, and a participation certificate. Guest speakers include IATV, ERA, ZNEC, and SIC. The poster also lists the course topics: "O que é o radão?", "Como estamos expostos?", "Quais os efeitos na saúde?", "Técnicas de medição", and "Técnicas de prevenção e remediação".





Current challenges

Dose conversion factor

- Transition from ICRP65 to ICRP137
- Impact on Exposed Workers: Significant increase in the number of workers classified as exposed

Remediation Services

- Lack of companies offering remediation services
- Definition of clear criteria for the accreditation / certification of remediation service providers

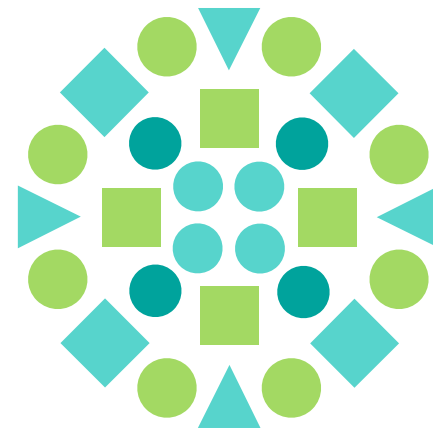
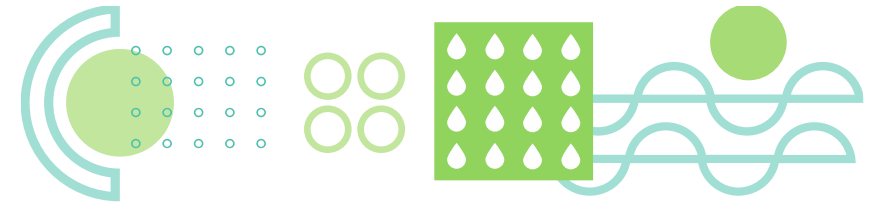
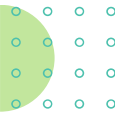




Conclusions

- Radon mitigation is not a quick fix; addressing radon exposure **requires sustained effort**, especially in regions with radon concerns.
- The implementation of **an effective radon programme requires input from many national agencies and other stakeholders.**
- **Communication is a crucial component of the NRAP.** Various factors will drive communication efforts, including the need to raise general awareness about radon among key stakeholders and motivating these groups to take active roles in addressing the radon issue.
- **Learn with the experience** of countries with well-established radon management programs.
- **The NRAP should be continuously monitored** and regularly reviewed to ensure its effectiveness and successful outcomes.





THANK YOU

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