

Radon national action plan workshop
From the 30th September 2014 to the 02nd October 2014

Radon, a public health priority

The concept of national radon programs in the WHO Radon Handbook

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Determinants of Health



**World Health
Organization**

World Health Organization

- **Function:** act as the UN directing and coordinating authority on international health work
- **Objective:** attainment by all peoples of the highest possible level of health
- **Definition:** "HEALTH is a state of COMPLETE physical, mental and social well-being and not merely the ABSENCE of disease or infirmity" (*Constitution, 1948*)



WHO actions on radon

1979: A WHO/EURO working group on indoor air quality first drew attention to the health effects from residential radon exposures

1988: Radon classified as a human carcinogen by IARC

1993: An international WHO workshop on indoor radon considered for the first time a unified approach to control radon exposures and advised on communication of associated health risks

2005: WHO established the *International Radon Project*

- to identify effective strategies for reducing the health impact of radon
- to raise awareness about the consequences of long-term radon exposures





RADON AND CANCER

Radon is a chemically inert, naturally occurring radioactive gas without odour, colour or taste. It is produced from radium in the rocks and soil all over the world. Radon disintegrates through short-lived progeny, which are electrically charged and attach to dust particles. As a result, radon progeny may be inhaled and can damage the DNA and potentially cause cancer.

When radon gas itself is inhaled, it can cause cancer. But the corresponding dose is very low, and the risk is small.

Due to dilution in the air, outdoors, the concentration of radon is very low. Radon levels are higher in places such as mines, caves, and basements. However, to which large populations are exposed, the greatest exposure to radon is in homes.

Radon in homes
The concentration of radon in the air is determined by the underlying rocks and soils, the exchange between indoor air and outdoor air, and the cracks at concrete floor-wall junctions, through sumps and drains. Other structural areas in contact with the ground can also contribute to radon entry.

Exchange of indoor air with outdoor air, through habits of the inhabitants, and adjacent to each other can be time of the year, from day to day, and of the annual mean concentration of radon. Concentrations for radon measurements give only limited information.



INTERNATIONAL RADON PROJECT

SURVEY ON RADON GUIDELINES, PROGRAMMES AND ACTIVITIES

FINAL REPORT

Health Security and Environment
Public Health and Environment
Radiation and Environment Health

Geneva, 2007

How does the project work?

IRP working groups:

- Risk Assessment
 - WHO Exposure Guidelines
 - Cost Effectiveness
 - Measurement and Mitigation
 - Risk Communication
 - Coordination and Evaluation
- Network and working group meetings
Production of Radon-related databases, reports

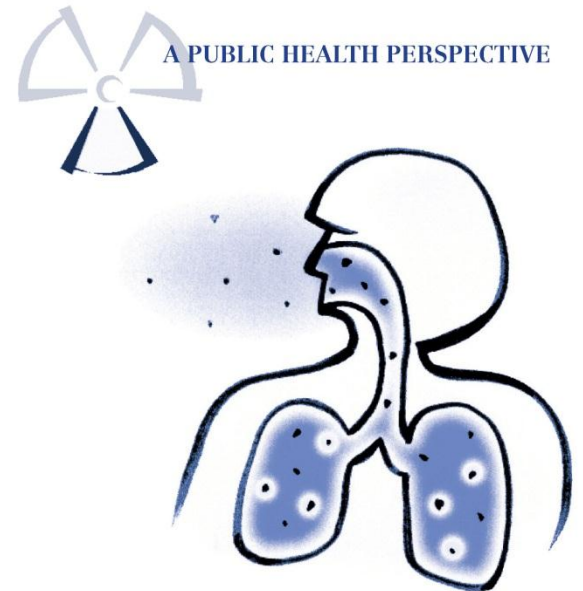
Membership is open to any WHO member state government, i. e. department of health, or representatives of other national institutions concerned with radiation research and protection.

A global project to

The screenshot shows the WHO website interface. At the top, there are navigation links: 'Zurück', 'Vor', and 'Neu laden'. Below these are 'Startseite' and 'Lesezeichen'. The main header features the WHO logo and the text 'World Health Organization'. A sidebar on the left contains a menu with links: 'Home', 'About WHO', 'Countries', 'Health topics', 'Publications', 'Research tools', 'WHO sites', 'Ionizing radiation', 'Chernobyl', 'Radiation accidents and emergencies', 'Environmental radiation', 'Research', 'About ionizing radiation', 'Publications and information resources', and 'Calendar of events'. The main content area displays the title 'INTERNATIONAL RADON PROJECT' and a brief description of the project's goals and activities.

WHO HANDBOOK ON INDOOR RADON

A PUBLIC HEALTH PERSPECTIVE

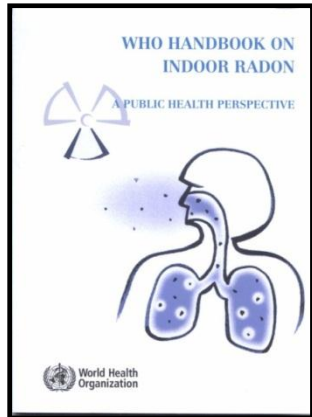


The International Radon Project (IRP) is a WHO initiative to develop sound public health policy. The public needs to be aware of radon risks and the means to reduce and prevent these. Exposure to radon is one of the most important environmental health risks. Radon is a naturally occurring radioactive gas that is colorless, odorless, and tasteless. It is produced from the natural decay of uranium and thorium in the earth's crust. Radon enters homes and buildings through cracks and other openings in the foundation. It can accumulate to dangerous levels, especially in basements and lower floors. Radon exposure is a leading cause of lung cancer, second only to smoking. The public needs to be aware of radon risks and the means to reduce and prevent these.

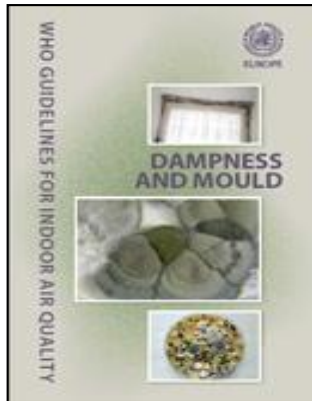
In 1996 WHO published a [report](#) containing several conclusions and recommendations covering the scientific understanding of radon risk and the need for countries to take action in the areas of risk management and risk communication.

http://www.who.int/ionizing_radiation/env/radon

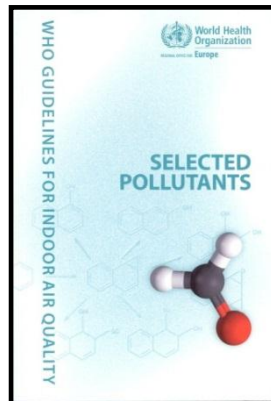
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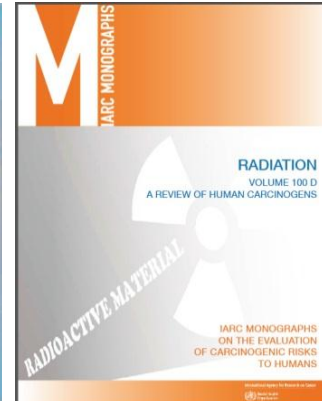
2009



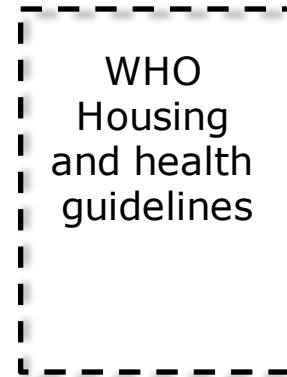
2010



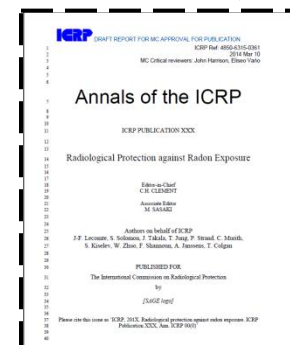
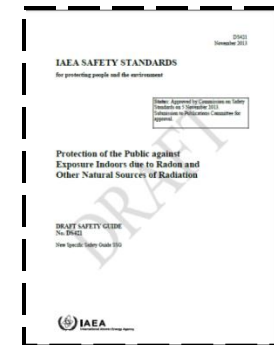
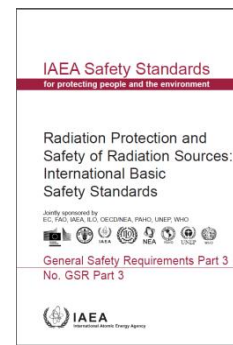
2011



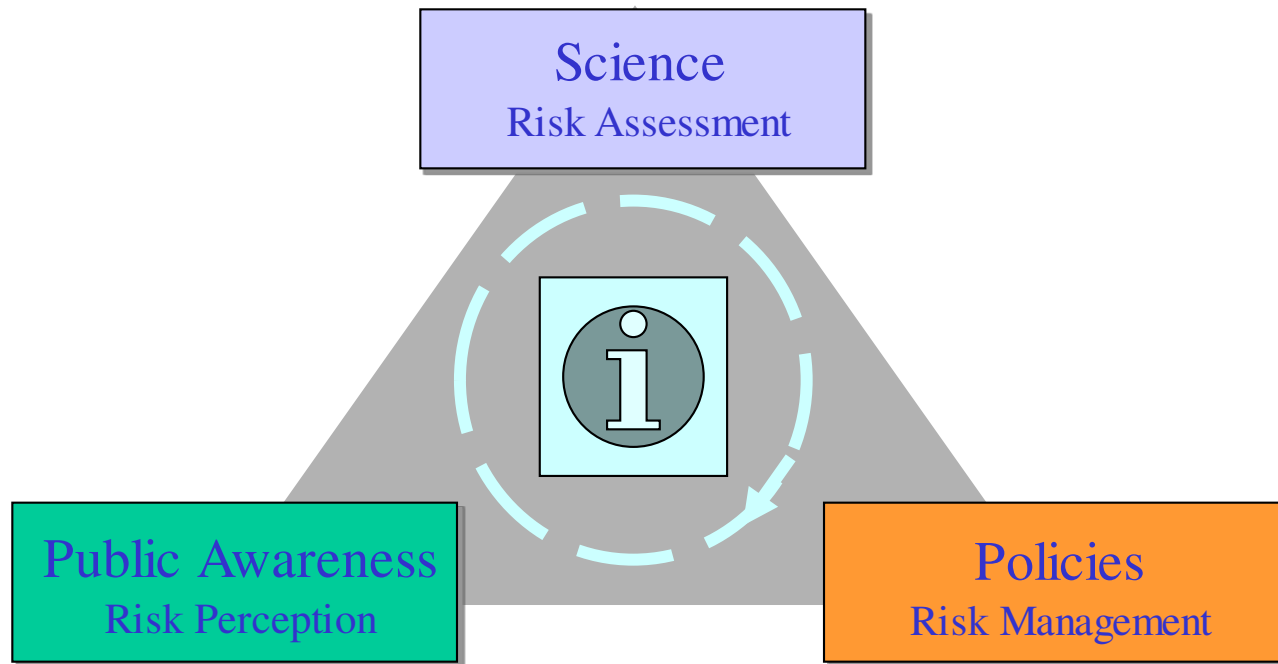
2012



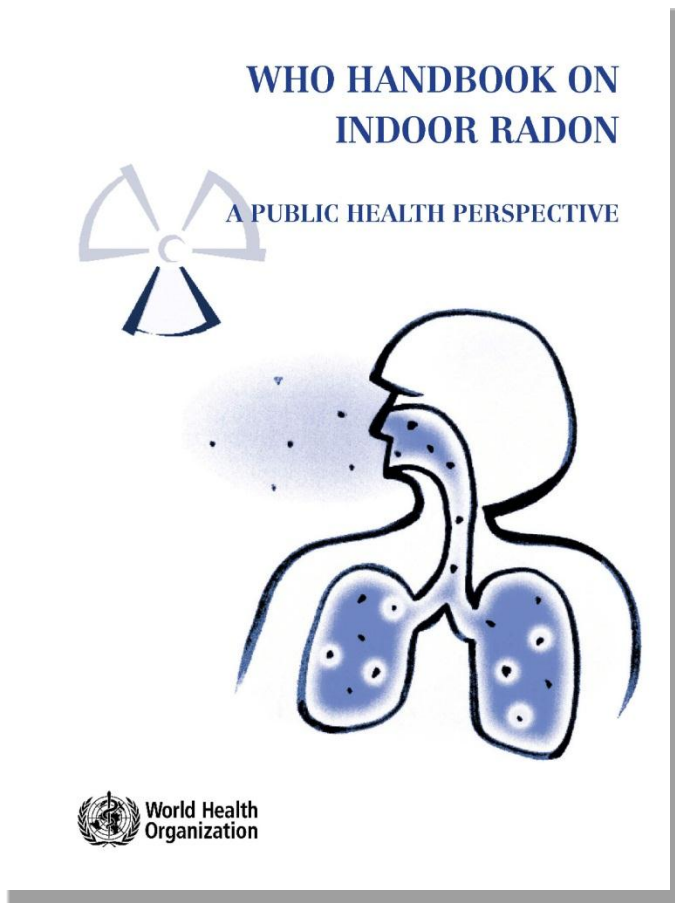
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Radon: an environmental health risk



WHO Handbook on Indoor Radon (2009)



Structure

Introduction

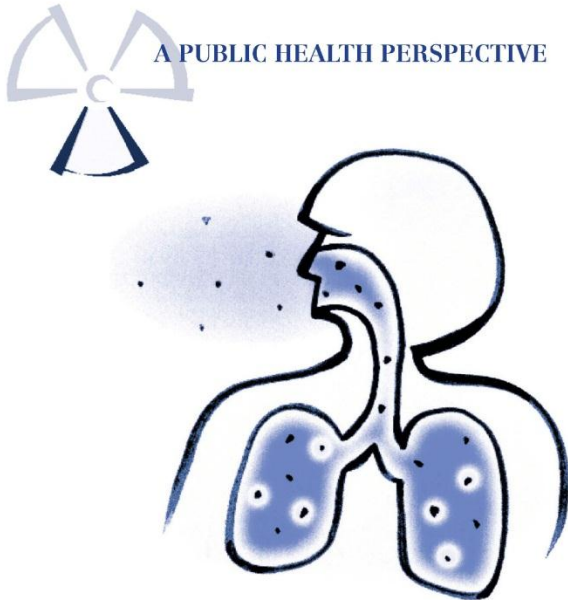
1. Health Effects of Radon
2. Radon Measurements
3. Prevention and Mitigation
4. Cost-Effectiveness
5. Radon Risk Communication
6. National Radon Programmes

Key messages for each chapter

WHO Handbook on Indoor Radon (2009)

WHO HANDBOOK ON INDOOR RADON

A PUBLIC HEALTH PERSPECTIVE

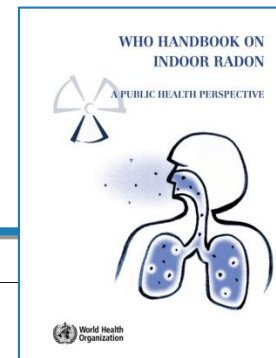


Structure

Introduction

1. Health Effects of Radon
2. Radon Measurements
3. Prevention and Mitigation
4. Cost-Effectiveness
5. Radon Risk Communication
6. National Radon Programmes

National radon programmes



Organize a national radon programme

Conduct radon surveys

Identify and remediate homes with high radon concentrations

Set national reference levels

Implement building regulations and building codes

Develop risk communication programmes



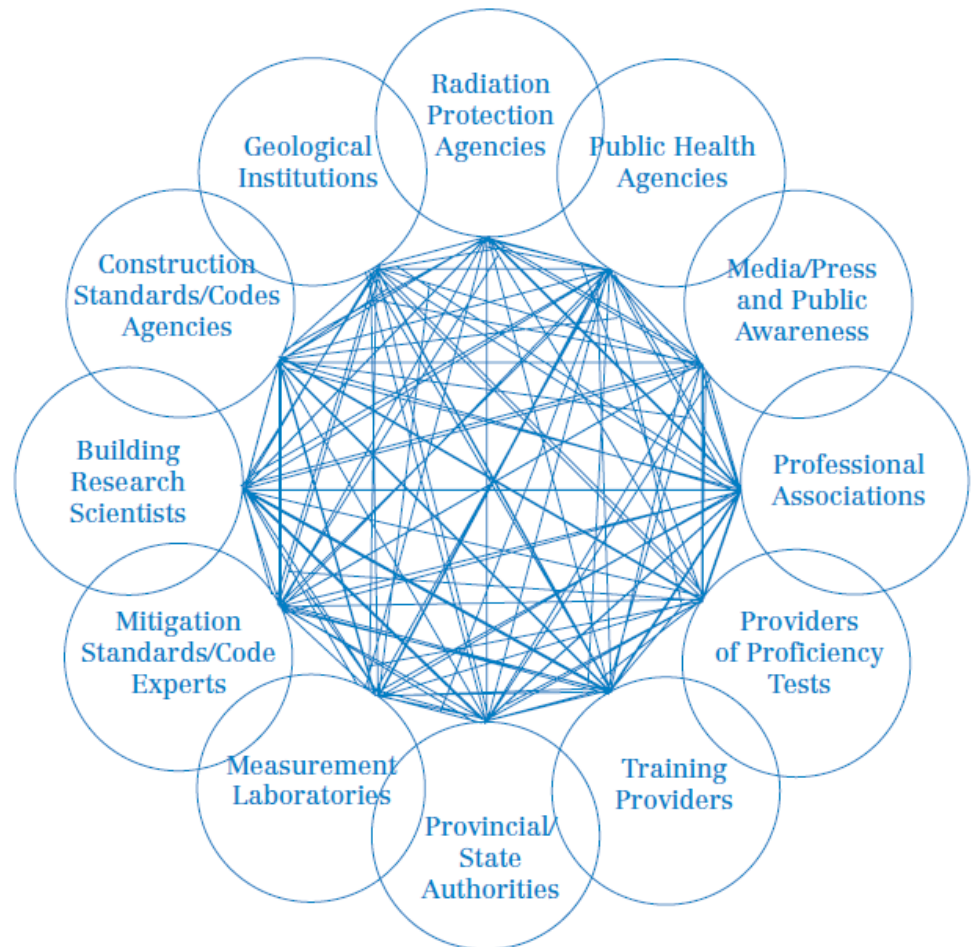
National radon programme

(1) Is it needed?

Initiate an assessment



Designate a national lead agency



National radon programme

(1) Is it needed?

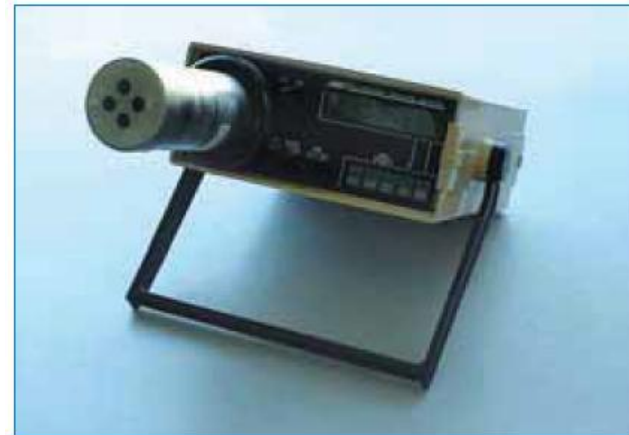
Initiate an assessment



Designate a national
lead agency

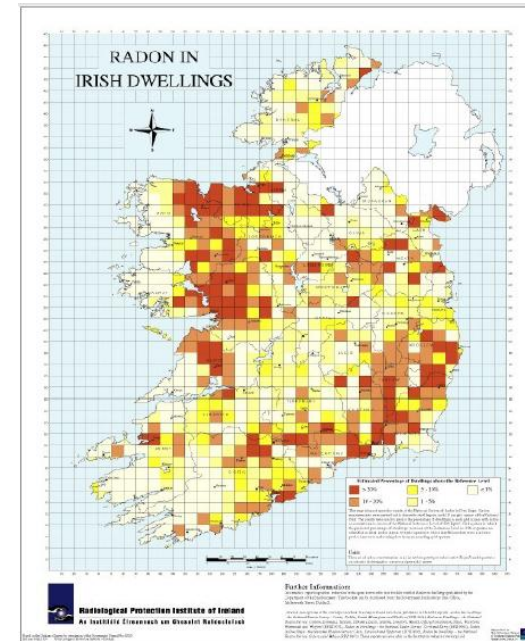
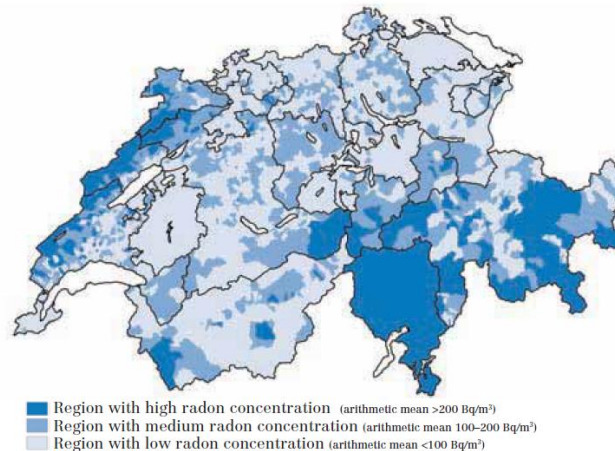
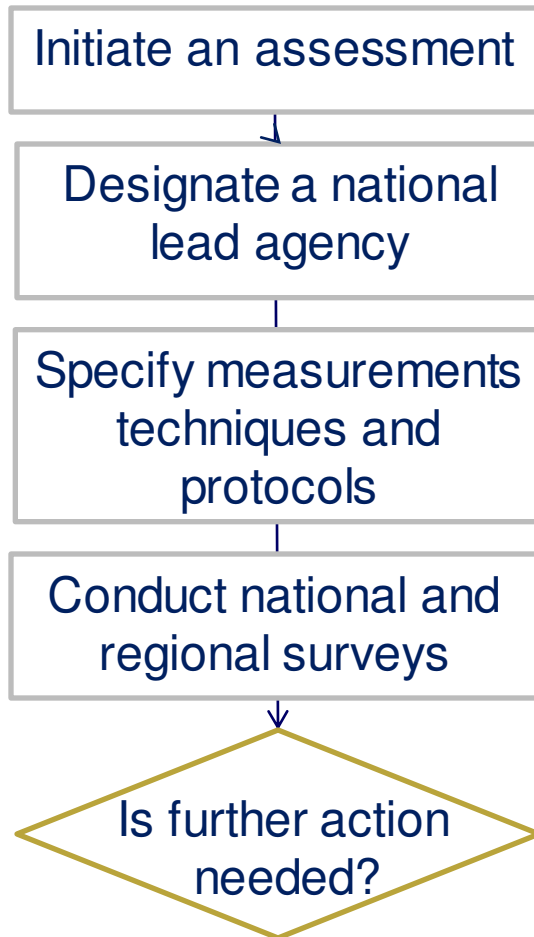


Specify measurements
techniques and
protocols



National radon programme

(1) Is it needed?



- Population-weighted survey
- Geographically-based survey

National radon programme

(2) What is needed?

Is further action
needed?

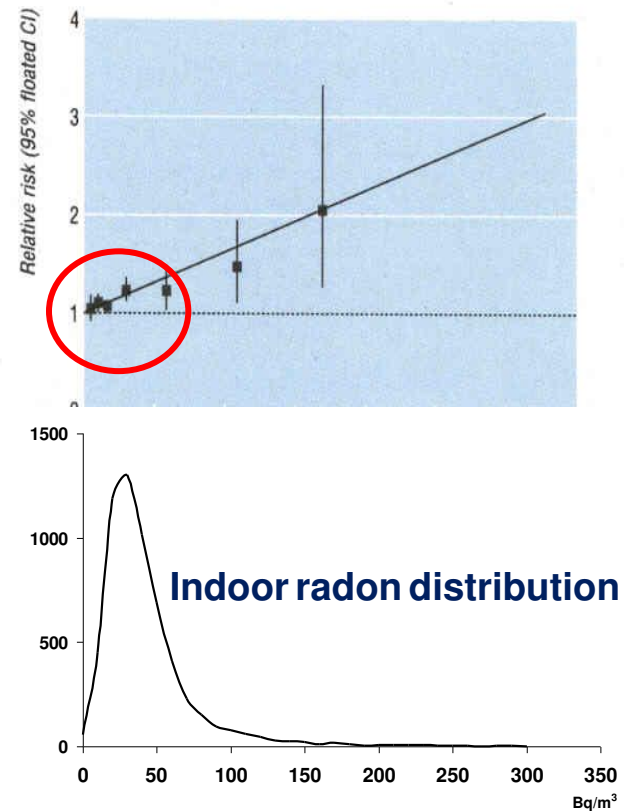
↓ yes



- Set national reference levels (RL) for dwellings
 - A RL reflects the maximum accepted average annual radon concentrations in a dwelling
 - It should be established at national level
 - When RLs are exceeded, action should be taken to reduce radon concentration
 - Compulsory vs. voluntary levels
 - Existing homes vs. new buildings

WHO Reference Levels

- A reference level of **100 Bq/m³** is justified from a public health viewpoint based on the current scientific evidence
 - Epidemiological studies do not support the evidence of a "safe" threshold level
 - Most lung cancer deaths are associated with low / moderate concentrations and not with the high levels
 - WHO recommends a reference level as low as reasonably achievable



WHO Reference Levels (cont'd)

- A reference level of **100 Bq/m³** is justified from a public health viewpoint based on the newest scientific evidence
- However, if this level cannot be implemented because of country-specific factors, the reference level should not exceed **300 Bq/m³**
- The decision to set a national reference level needs to take into account the prevailing economical and societal circumstances as well as various national factors such as:
 - Distribution of radon
 - Number of existing homes with high radon concentrations
 - Prevalence of smoking

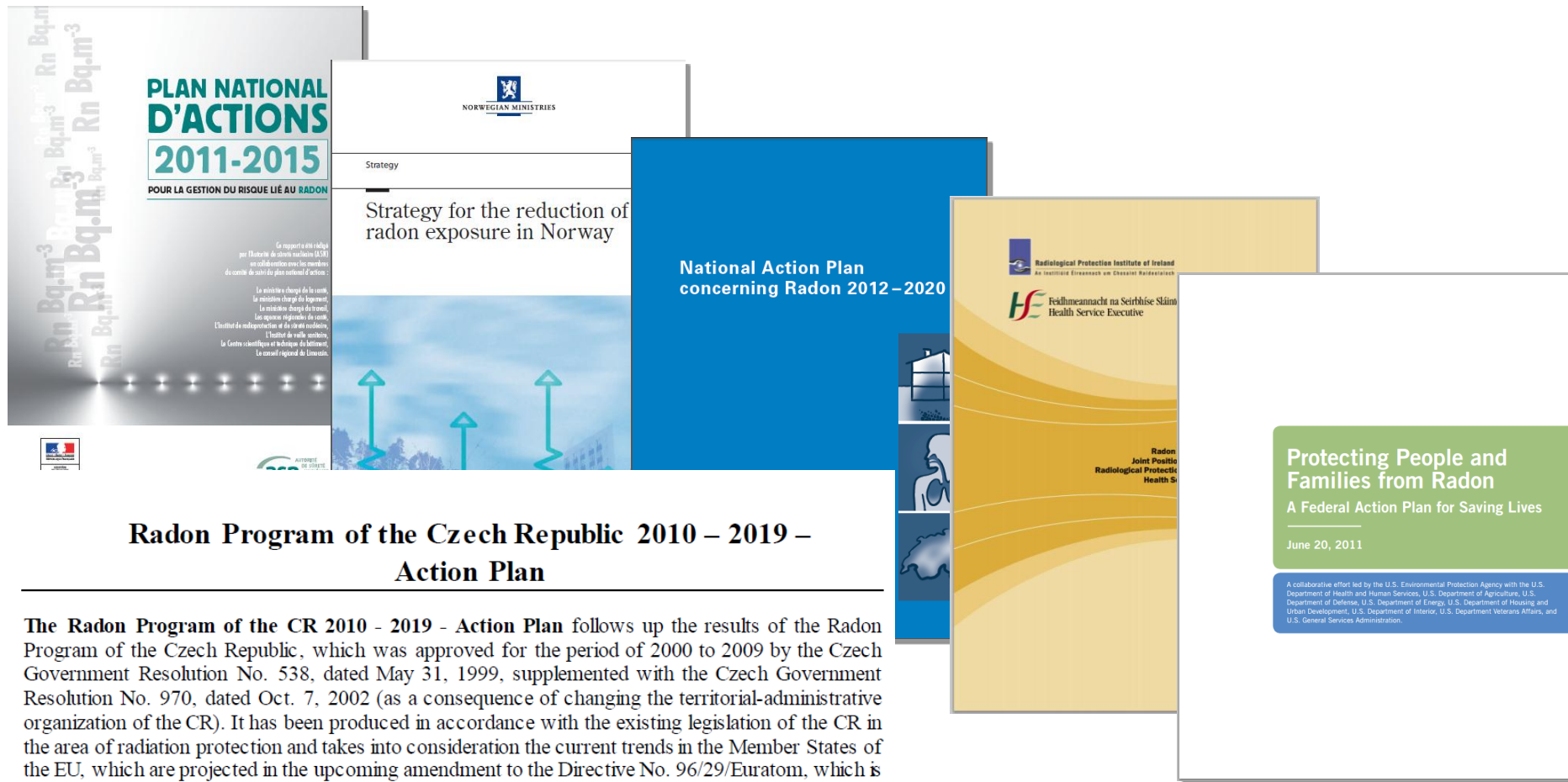
National radon programme

(2) What is needed?



- **Set** national reference levels (RL) for dwellings
- **Develop and implement** building regulations/building codes for new buildings
- **Identify and remediate** existing buildings that exceed RLs
- **Provide** training for building professionals
- **Develop** programs of information/awareness for stakeholders
- **Establish** a national database on radon levels
- **Impose** radon measurements as part of property transactions

Some recent National Action Plans



Radon Program of the Czech Republic 2010 – 2019 – Action Plan

The Radon Program of the CR 2010 - 2019 - Action Plan follows up the results of the Radon Program of the Czech Republic, which was approved for the period of 2000 to 2009 by the Czech Government Resolution No. 538, dated May 31, 1999, supplemented with the Czech Government Resolution No. 970, dated Oct. 7, 2002 (as a consequence of changing the territorial-administrative organization of the CR). It has been produced in accordance with the existing legislation of the CR in the area of radiation protection and takes into consideration the current trends in the Member States of the EU, which are projected in the upcoming amendment to the Directive No. 96/29/Euratom, which is being discussed in the EC working group.

International Standards



WHO and PAHO are
working to support
implementation of the
International BSS

International BSS (2014)

Requirement 50: Public exposure due to radon indoors

The government shall provide information on levels of radon indoors and the associated health risks and, if appropriate, shall establish and implement an action plan for controlling public exposure due to radon indoors.

Requirement 52: Exposure in workplaces

The regulatory body shall establish and enforce requirements for the protection of workers in existing exposure situations.

International Standards



Published
January 2014

Radon Regulations

Drinking-water

- WHO Guidelines on Drinking-water Quality (2011)



Chapter 9 – Radiological aspects

9.7.3 Guidance on radon in drinking-water supplies

As the dose from radon present in drinking-water is normally received from inhalation rather than ingestion, it is more appropriate to measure the radon concentration in air than in drinking-water.

The World Health Organization reference level for radon concentration in indoor air is 100 Bq/m³ in dwellings. If this level cannot be reached under prevailing country-specific conditions, the level should not exceed 300 Bq/m³, corresponding to an annual dose of approximately 10 mSv (WHO, 2009). This recommendation is consistent with the International Basic Safety Standards¹ and with the most recent recommendations of the ICRP (2009b).

Screening levels for radon in water should be set on the basis of the national reference level for radon in air and the distribution of radon in the national housing stock. Where high radon concentrations are identified in indoor air, this is nearly always due to ingress of radon from the soil rather than degassing from the drinking-water supply. Nevertheless, in circumstances where high radon concentrations might be expected in drinking-water, it is prudent to measure for radon and, if high concentrations are identified, consider whether measures to reduce the concentrations present are justified.

The concentration of radon in groundwater supplies can vary considerably. Consequently, in situations where high radon concentrations have been identified or are suspected, the frequency of gross alpha and gross beta measurements may need to be increased so that the presence of radon progeny (in particular polonium-210), which can be major contributors to dose, can be assessed and monitored on an ongoing basis.

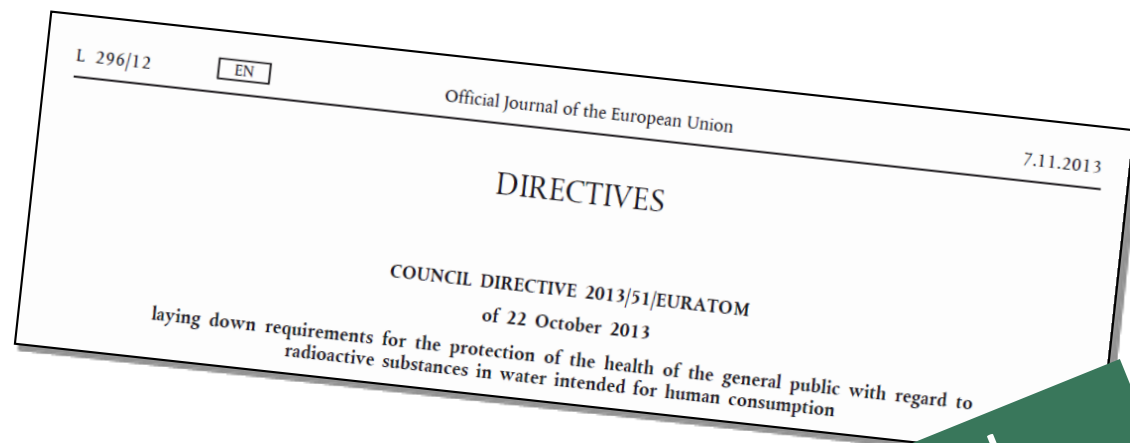
Radon Regulations

Drinking-water

- WHO Guidelines on Drinking-water Quality (2011)



- Council Directive 2013/51/EURATOM (2013)



Published
Nov. 2013



Key points for discussion

- Awareness and interest of politicians and authorities
- Indicators to measure the effectiveness of interventions
- Pros/cons of mandatory vs. voluntary measures
- Financial considerations

