

A small, light blue icon of a radon atom, showing a central nucleus with a diagonal line and three surrounding electron shells.

Radon National Action Plan (RANAP)

in practice

Synergy of Science, Legislation and Education in Radon Protection

16th INTERNATIONAL WORKSHOP GARRM

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@ Faculty of Nuclear Sciences and Physical Engineering

State Office for Nuclear Safety

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***"This country abounds in honey and radon"* - points to the Czech Republic's pragmatic approach to the radon issue, where a natural phenomenon has become a systematically managed public health protection program.**

The importance of radon issues in the Czech Republic

- The Czech Republic has specific geological conditions that contribute to higher radon exposure compared to other countries
- Radon is the second most common cause of lung cancer after smoking
- The heaviest load: regions Karlovy Vary, Liberec and Vysočina

Context of the amendment to the Atomic Act

- Implementation of new obligations from July 1, 2025
- Mandatory use of the National Radon Database (NRD)
- Update of the Radiation Protection Decree

Objective of the article and presentation

- Presentation of the results of the third decade of the Radon Program of the Czech Republic
- Demonstration of synergy between science, legislation and awareness activities
- Introducing new tools and their practical use - NRD



Radon, my lady...

Presentation Outline (slide bullets)

1. RANAP

Characteristics

Long-term goals

Partners

Results achieved in the middle of the 3rd decade

2. NRD

What is the NRD?

History and development

Function

Users, SÚJB inspectors and the public

Benefits

3. TACR Project - Key Results

Decrease in average OAR (volume radon activity) concentrations

Regional differences

The influence of building age on radon risk

Other survey findings

Cooperation between science legislation and education as a key factor

4. Focus on schools – special attention

Health aspects

Legislative requirements

Social impact

5. Information and awareness-raising activities of the SÚJB

Web portals

Webinars

Legislative framework

Subsidy system

Radon trails

6. Planned activities

Educational activities

Pilot projects

Technical activities

International activities



Characteristics of RANAP

- Valid from January 1, 2020, follows on from the radon programs 2000-2009 and 2010-2019
- Binding document of the SÚJB in accordance with European directives and the Atomic Act
- Revised as part of the regular five-year review in 2025

Three long-term goals of RANAP

1. **Informed and communicating state administration**, involved public and educated experts
2. **Effective prevention** during construction and renovations
3. **Effective control** of ongoing radon exposure

RANAP partners

- SÚJB (manager) - responsible for updating RANAP

Active partners

- Ministry of Environment
- Ministry of Regional Development
- Ministry of Finance
- Ministry of Industry and Trade
- Ministry of Agriculture
- Regional authorities
- SÚRO
- SÚJCHBO



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Results achieved in the middle of the third decade

- Systematic exposure monitoring using NRD
- TACR
- Focus on schools
- Use of radon maps in prevention legislation
- System of free measurements and state support



What is the NRD?

- **Central electronic system** for collecting and recording the results of radon and natural radionuclides measurements
- Assessment of human exposure due to radon and natural radiation sources
- Web application enabling data recording and evaluation

History and development of the NRD

- **2021:** needs analysis and documentation preparation
- **2022:** selection process and funding allocation
- **2022-2023:** implementation of the technical solution
- **2024:** official launch of the system
- **From July 1, 2025:** mandatory use according to the amendment to the Atomic Law

NRD function

- **Measurement records:** radon in buildings, radon index of land, natural radionuclides
- **Continuous update:** continuous addition of new data
- **Automatic processes:** evaluation, task tracking, workflow (*obliged entities see records kept by the office – public control takes place, which leads to the detection of irregularities and correction*)



NRD users

Obligatory entities

- They send data according to the Atomic law
- Measures RIP, OAR, radionuclides in water and building materials
- Registration secured by the citizen's bank identity

SÚJB inspectors and SÚRO specialists

- They evaluate measurements and check obligations
- Save time by eliminating manual work with data

Public

- Can request measurements (OAR, RIP)
- Communication with SÚJB via the system
 - *request an application for license and for special professional qualifications (in process)*

Benefits of NRD

1. **Centralization and standardization** of data flows
2. **Effective control and targeting of measures**
3. **Decision support** in the creation of RANAP
4. **Elimination of analog documentation**

NRD internal input - main screen

NRD

NÁRODNÍ
RADONOVÁ
DATABÁZE

Vyhledat subjekt, pracoviště/pr...

Adamová Marcela

?

Obližené

Pracovní činnosti

Dokumenty ke zpracování

Radonový index pozemku

Měření Rn staveb

Školy a školská zařízení

Provozovatelé

Budovy

Měření dávek

Mapa

Statistiky

Měření v obytných budovách

Vodovody

Balená voda

Stavební materiály

Pracoviště RADON

Pracoviště NORM

Posádky letadel

Nástroje

Co je "Národní radonová databáze" a k čemu slouží?

Jak začít?

Aktuální stav implementačního projektu

Seznam změn

Radonový index pozemku

Držitelé oprávnění: [124](#).
Otevřené úkoly: [0](#).
Výsledky měření: [8937](#).
Problémy v evidenci: [0](#).

Rn stavby

Držitelé oprávnění: [124](#).
Otevřené úkoly: [152](#).
Výsledky měření: [5238](#).
Problémy v evidenci: [0](#).

Školy

Provozovatelé: [787](#).
Výsledky měření: [12864](#).
Problémy v evidenci: [221](#).

Obytné budovy

Výsledky měření: [505972](#).
Problémy v evidenci: [0](#).

Vodovody

Provozovatelé: [1464](#).
Vodovody: [5216 / 4110](#).
Problémy v evidenci: [876](#).

Balená voda

Výrobci / dovozci: [10](#).
Provozovny: [8 / 21](#).
ON: [14 / 24](#).
Problémy v evidenci: [30](#).

Stavební materiály

Výrobci / dovozci: [558](#).
Provozovny: [1022 / 2522](#).
ON: [3015 / 6173](#).
Problémy v evidenci: [4367](#).

Pracoviště RADON

Provozovatelé: [1384](#).
Pracoviště Radon: [956 / 2696](#).
Problémy v evidenci: [5525](#).

Pracoviště NORM

Provozovatelé: [191](#).
Pracoviště NORM: [588 / 587](#).
Problémy v evidenci: [1073](#).

Posádky letadel

Provozovatelé: [15](#).
Provozovny: [17 / 17](#).
Problémy v evidenci: [1](#).

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NRD 1.34 rev 1964 © AHASWARE s.r.o. 2022-2024



Key results of the representative survey

Decrease in average OAR concentrations

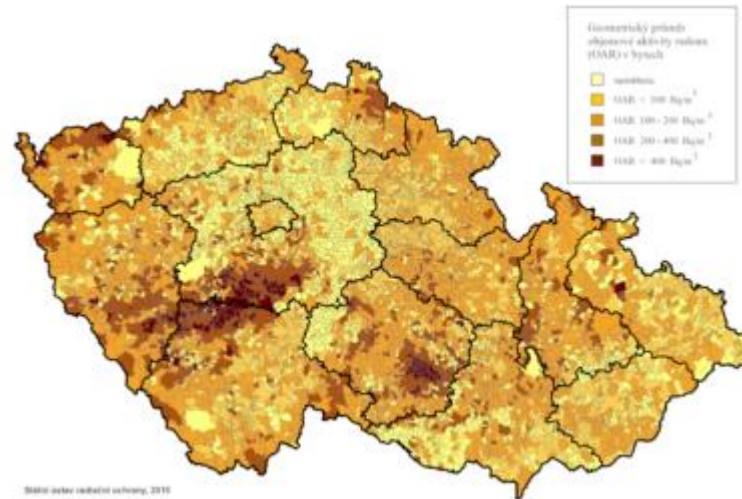
- **Newly found:** $89 \text{ Bq}\cdot\text{m}^{-3}$ (based on 2461 dwellings)
- **30 years ago:** $119 \text{ Bq}\cdot\text{m}^{-3}$
- **Reduction of approximately 25 %**

Regional differences

- **The highest load of Rn:** regions Karlovy Vary, Liberec and Vysočina
- Geological subsoil = most reliable predictor of radiation risk of Rn
- Use for targeted interventions and updating radon maps

The influence of building age on radon risk

- **Old houses:** highest risk, sometimes higher than 30 years ago (effect of insulation, window replacement)
- **New buildings (after 2010):** 1.5 % above the reference level of $300 \text{ Bq}\cdot\text{m}^{-3}$
- Confirmed effectiveness of preventive measures during construction





Other survey findings

- **Ventilation:** average $0.3 \text{ l} \cdot \text{h}^{-1}$ (recommended minimum)
- **BUT** a number of apartments with very low air exchange
- **PPDE:** average dose equivalent rate $0.138 \text{ microSv} \cdot \text{h}^{-1}$
- **International significance:** the study is one of the largest of its kind in Europe

Cooperation between science, legislation and education as a key factor

- Data usable for practice, regulation and updating of RANAP
- Basis for updating radon maps and NRD
- New 14 listed municipalities (approx. 600)



Web portals

radonovyprogram.cz

- Central information portal on radon measurement
- Possibility to request a free measurement
- Practical advice and guidance
- Forms and documents

radonovastezka.eu

- Portal dedicated to the radon trail in Jáchymov
- **Virtual tour** of the nature trail
- Educational materials and interactive content



radonovyprogram.cz



radonovastezka.eu



Webinars

- Regular educational webinars (YouTube)
- New obligations according to the amendment to the Atomic Act, registration in the National Registry of Deeds, work with the iReg portal
- Targeting license holders, designers, builders and the public

https://www.youtube.com/watch?v=9SIYt_u2bB8



Educational video TZB

<https://www.youtube.com/watch?v=4DpWmSkeh60>



Radon v budovách: Neviditelné nebezpečí



Legislative framework

Atomic Act and related regulations

- **Amendment to the Atomic Act:** new obligations from July 1, 2025 (NRD)
- **Radiation Protection Decree:** expected to be valid from January 1, 2026
 - RPA enumeration extension
- **All Recommendation's updates**

Technical standards

- **ČSN 73 0601:** Protection of buildings against radon from the subsoil
 - From July 1, 2025 it is binding for designers and civil engineers
- **ČSN 73 0602:** Protection of buildings against radon from building materials
- Key standards for technical anti-radon measures (free of charge since July 1, 2024)



Subsidy system

Current subsidy conditions

- **Family houses:** subsidy up to EUR 6,000 (same amount for 20 years)
 - negotiations with the Ministry of Finance on increasing subsidies for anti-radon remedial measures
- **Schools:** subsidies of up to EUR 60,000
- **Conditions:** OAR below 300 Bq·m⁻³, confirmed effectiveness of measures

Subsidy statistics (2017-2024)

- **Total expenses 2024:** EUR 29,000
- **Family houses:** approx. 10 buildings per year
- **Schools:** approx. 5 buildings per year
- **Waterworks:** anti-radon remedial measures resolved

Free measurements

- **Offer for:** family homes, schools, workplaces
- **Online ordering of** trace detectors
- **Professional advice** and evaluation

Radon trails

Jáchymov - the first radon trail in the world

- **Length:** approx. 3 km
- **Route:** from the museum through historical sites to the spa area
- **Content:** information board about radon, health, history, measurement, protective measures
- educational brochure in info centers
- **For previews of information boards, see** radonovastezka.eu

Expanding the concept

- Second radon trail planned in Harrachov
- Creating educational videos





Reasons for focusing on schools

Health aspects

1. **Increased sensitivity of children** - developing respiratory system
2. **Long-term stay** - a significant part of the day in a school environment

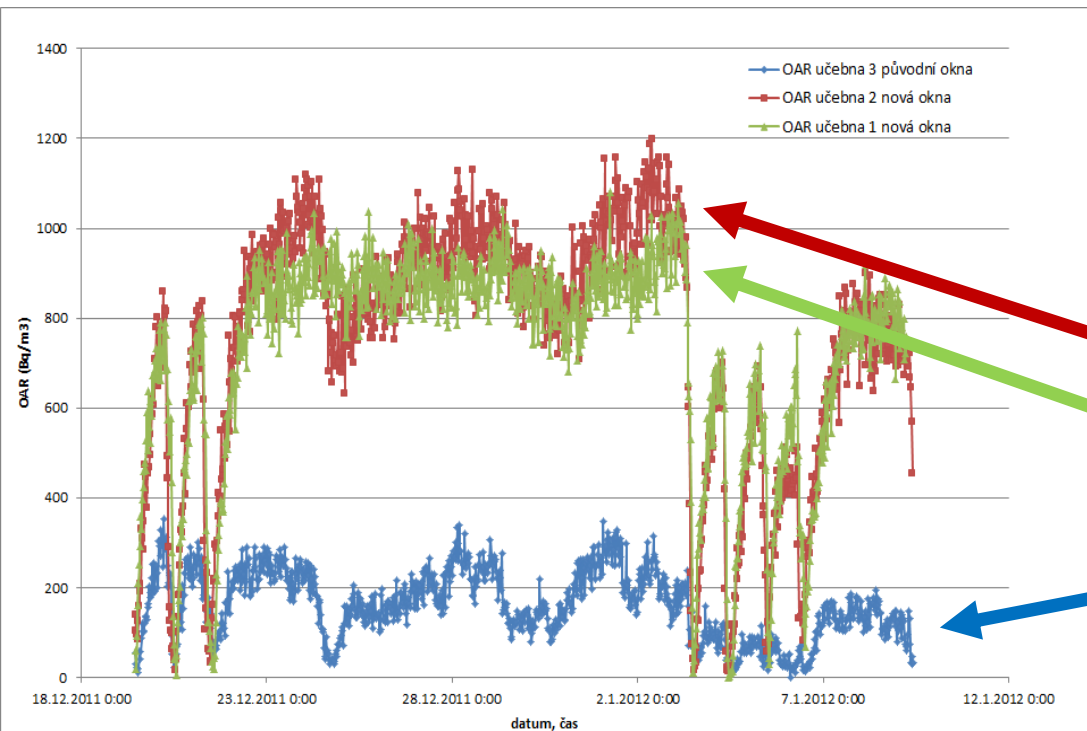
Legislative requirements

1. **Mandatory measurements** in the listed areas
2. **Measurements after modifications** affecting ventilation (insulation, window replacement)

Social impact

1. **Educational value** - inclusion in teaching, education
2. **Promoting a healthy lifestyle** - setting an example for the community

How new windows can negatively affect radon level





Educational activities

- **Revival of seminars** for designers and builders
- **Education of residents** and employees of municipal and building authorities
- **Education of school operation authorities** - low awareness of radon and NRD

Pilot projects

- Review of the construction prevention system (cooperation with the Ministry of Regional Development)
- **Analysis of construction errors** - objects with OAR higher than $300 \text{ Bq}\cdot\text{m}^{-3}$
- **Development of a new measurement model** - replacement of old trace detectors



Technical activities

- **Development of NRD** - expanding and streamlining the use of digital tools, their interconnection and process automation
 - **Uniform protocol forms**
 - **Bulk sending of data** and measurement results

International activities

- **Participation in international activities** to evaluate RANAP implementation
- **Optimization calculation** according to international standards
- **Sharing experiences** with other countries



RADONOVÝ PROGRAM
ČESKÉ REPUBLIKY

Thank you for your attention

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Special thanks to Hynek Novak



Forefather Czech said:
"This is the Promised Land, flowing with honey and radon..."