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Národný akčný
radónový plán

**National Action Radon Plan
of the Slovak republic
2022 - 2026**

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Introduction

To address the radon issue in the Slovak Republic (hereinafter "SR"), an Interdepartmental Commission for Radon Protection was established in 1991 at the Ministry of the Environment of the Slovak Republic (hereinafter "MoE SR"), covering all activities

in this area. The Commission has adopted comprehensive organizational measures enshrined in Government Resolution no. 726/1991. The Institute of Preventive and Clinical Medicine in Bratislava took part in the implementation (currently the Slovak Medical University), which cooperated with state health institutes (currently the Public Health Office of the Slovak Republic and regional public health offices). Radon volume activities and the associated radiation exposure were determined in residential areas, school facilities, preschool facilities, publicly accessible buildings, spas, caves and mines.

The first all-Slovak radon survey was conducted in the Slovak Republic at the beginning of 1991 in 4,000 selected households, in 1,000 selected schools and kindergartens and 12 selected spas. Questionnaires were distributed along with the detectors in order to obtain detailed information on each selected area [1].

The arithmetic mean of the equivalent volume activity of radon per year was 86 Bq/m³. In 88.6% of selected areas, the average equivalent volume activity of radon per year was below 200 Bq/m³ [2].

As a result of the changing lifestyle of the population in recent decades and following energy saving measures in buildings, it is necessary to examine the dose burden of the population due to radon exposure and, if necessary, to propose preventive measures, as well as corrective action.

Based on valid legal regulations in the field of radiation protection, the Public Health Office of the Slovak Republic (hereinafter "ÚVZ SR") and the relevant regional public health office (hereinafter "RÚVZ") are obliged to participate in the regulation and control of radon radiation. For the purpose of fulfilling this obligation, the ÚVZ SR was in accordance with the requirements of Act no. 87/2018 Coll. on Radiation Protection and on Amendments to Certain Acts (hereinafter referred to as "Act No. 87/2018 Coll. on Radiation Protection") in cooperation with RÚVZ with its registered office in Banská Bystrica (hereinafter referred to as "RÚVZ BB"), with RÚVZ with its registered office in Nitra (hereinafter referred to as "RÚVZ NR"), with RÚVZ Bratislava hl. City with its registered office in Bratislava (hereinafter referred to as "RÚVZ BA") and RÚVZ with its registered office in Košice (hereinafter referred to as "RÚVZ KE") established a working group dedicated to the implementation of prepared strategies of the National Radon Action Plan of the Slovak Republic (hereinafter "NARP").

The established working group shall comply with the standards of the International Atomic Energy Agency based in Vienna, the recommendations of the World Health Organization and other relevant international documents, standards and recommendations.

The primary step and long-term goal is to ensure public administration awareness, public involvement, information and education in the given issue, optimization of methods of acquaintance and representative research.

The Government of the Slovak Republic approves and supports the implementation of the NARP for the years 2022 to 2026. The proposal to update the NARP for the years 2027 - 2031 in accordance with §§ 6 par. 2 letter j) and 135 par. 5 of Act no. 87/2018 Coll. on radiation protection will be prepared by ÚVZ SR in cooperation with MZ SR, Ministry of Transport and Construction of the Slovak Republic, MoE SR, Ministry of Agriculture and

Rural Development of the Slovak Republic, Ministry of Economy of the Slovak Republic and Ministry of Education, Science, Research and Sports of the Slovak Republic and will be submitted for discussion of the Government of the Slovak Republic by 31 December 2026.

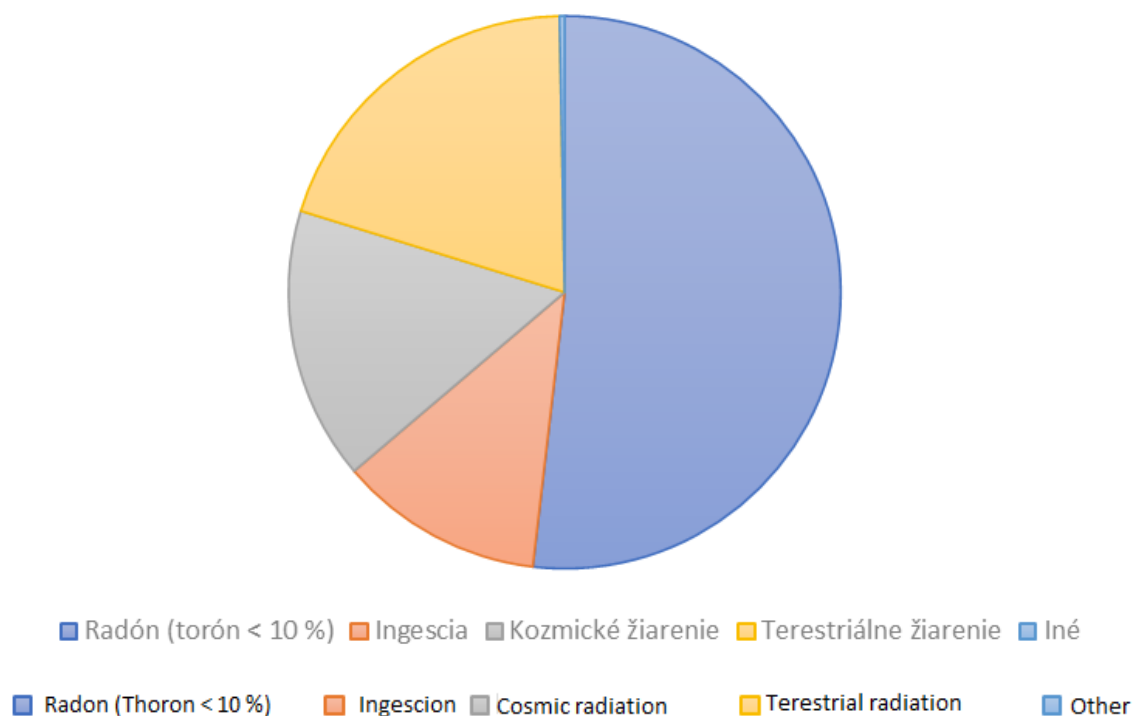
The report on the implementation of the NARP will be a part of the annual reports of the ÚVZ SR and the relevant RÚVZ and published no later than 15 July of each calendar year on the website of ÚVZ SR and sent to interested parties, which will be identified after the end of the 2nd phase of NARP. ÚVZ SR will annually organize a meeting of stakeholders for the purpose of mutual information on the fulfilment of set goals and tasks, which will result from the conclusions of the completed Phase 2 of the NARP.

1. Risk assessment

The issue of radiation protection of the population against the adverse effects of radon and its daughter products, which penetrate into the air of living spaces and workplaces from the subsoil of buildings, building materials and water, is currently receiving considerable attention in all countries of the world.

Radon, as a product of the radioactive conversion of radium, is usually found in soil air. Radionuclide Rn-222 as a radioactive inert gas easily penetrates through various environments, due to temperature and pressure differences inside buildings and outside them is sucked from the subsoil and can cause increased volume activity of radon in the air of residential areas and workplaces.

Worldwide, exposure from natural sources of ionizing radiation is estimated at 2.4 mSv per year. Radon exposure is estimated to account for 52% of this annual effective dose of the population (Picture No. 1).



Picture no. 1 Contributions of natural sources of ionizing radiation to the exposure of the population [3]

The World Health Organization has addressed aspects of radon exposure in residential areas and workplaces, reflecting epidemiological evidence, and concluded that there is a presumption that long-term exposure to radon may increase the risk of lung cancer.

Thus, anyone who is exposed to increased levels of radon volume activities in residential areas for a long time is also exposed to an increased risk of developing lung cancer. This risk increases linearly with increasing radon concentration in the space.

1.1. Epidemiological findings

Risk of lung cancer due to exposure to radon in the air in residential areas, was originally estimated only by extrapolating the results obtained by studying the health of miners. These studies included a set of individual data on the effective doses received by miners as a result of radon exposure in the workplace [4].

This data contains restrictions, namely:

- absence of data on individual effective doses for women and children,
- absence of data on smokers in most studies,
- uncertainty of the health effects of ionizing radiation (short-term exposure to high doses versus long-term exposure to low doses),
- inadequate control of other contributing factors (gamma radiation, uranium dust, other pollutants such as arsenic, diesel fumes, etc.).

Epidemiological studies in this area had to be performed to quantify the risk of lung cancer in the population. Since the 1990s, a number of analyses have been carried out to assess the risk of lung cancer due to exposure to radon in the air of residential areas [5].

Unlike studies carried out on miners, these case-control studies make it possible to take into account both active and passive causes that may affect outcomes, such as smoking, as well as risk assessments for women and children. The results of these studies can be considered as identical.

A reference publication consisting of 13 European projects [6] forms the best basis in the international field for estimating the level of risk associated with the development of lung cancer in connection with the long-term exposure to radon.

Based on the results of this reference publication, conclusions can be drawn as follows:

- the risk of developing lung cancer is proportional to the level of radon volume activity in residential areas and workplaces,
- the risk of developing lung cancer is multiplicative of the individual likelihood in smokers,
- the average volume activity of radon in residential areas at the level of 100 Bq/m³ corresponds to a possible individual increase in the risk of lung cancer by 16 %.

These findings have been confirmed by similar studies conducted in North America and China [4].

1.2. International recommendations for the effects of radon on health

In light of new epidemiological findings, the World Health Organization has prepared an international project on radon. This project resulted in the publication of the WHO Handbook on Indoor Radon [5]. The handbook provides an updated overview of the main aspects of radon and its impact on health, detailed recommendations for reducing health risks due to radon exposure and options to prevent and reduce radon exposure. It emphasizes issues of planning, implementation and evaluation of national radon programs. The message from the World Health Organization is clear. He argues that while radon is dangerous to all, once measurements and measurements of radon volume activities in residential areas and workplaces have been made, radon exposure can be reduced by taking preventive or corrective measures [5].

To minimize the health risks associated with radon exposure, the World Health Organization proposes setting a reference level of radon volume activity for residential areas of 100 Bq/m³,

but adds that in cases where this value cannot be achieved due to individual and country-specific geological conditions, the selected reference level of radon volume activity should not exceed 300 Bq/m³ [5].

According to the World Health Organization, national radon programs should focus to identify the geographical areas where most people are exposed to radon. At the same time, they should focus on raising public awareness of the health risks associated with the presence of radon in residential air.

According to the World Health Organization, a successful national radon program is based also in cooperation with other health promotion programs and the training of construction professionals. The World Health Organization recommends developing communication strategies to inform the various target groups, together with a recommendation to take appropriate action if the situation so requires.

The International Atomic Energy Agency, based in Vienna, in its safety guide No. SSG-32 [7] has identified several criteria that should be part of national radon plans, namely:

- determination of an appropriate reference level for radon volume activity in residential areas,
- determination of an appropriate reference level for the volume activity of radon at workplaces,
- identification of types of residential areas where the public stays for a long time, e.g. schools, kindergartens, pre-schools, social service homes, hospitals, etc., to be included in the national radon program,
- conducting a radon volume activity survey,
- identify radon prone areas,
- take measures to reduce the level of radon volume activity in the identified areas as a matter of priority,
- implement measures to reduce the volume activity of radon in drinking water,
- implement measures to control the content of radio in building materials,
- include in building regulations and standards appropriate preventive and remedial measures such as the prevention of radon penetration and the implementation of other measures, if necessary,
- implement measures to control and reduce radon exposure, including setting out the circumstances / conditions under which these measures will be mandatory / optional,
- evaluate at regular intervals the success of the adopted national radon program.

2. Current situation in the Slovak Republic

Based on the results of a survey conducted in the 1990s in the Slovak Republic, the average annual effective dose per capita was estimated at 1.8 mSv and using a multiplicative model was estimated the number of additional deaths from lung cancer 14 per 100,000 inhabitants of the Slovak Republic in due to radon exposure in the indoor air of buildings. To compare the relationship between total lung cancer deaths and additional lung cancer deaths due to radon irradiation in the indoor air of buildings in individual regions of the Slovak Republic, a correlation coefficient $R = 0.84$ at a significance level $\alpha < 0.01$ was determined.

At the end of the 20th century, organizations within the competence of the Ministry of the Environment of the Slovak Republic began to investigate the presence of radon in soil air and to implement maps of derived radon risk in the territory of the Slovak Republic. Maps

are available on the website of the Dionýz Štúr State Geological Institute. Derived radon risk maps are currently used for land use planning.

Act no. 87/2018 Coll. on radiation protection was in § 123 par. 6 and § 130 par. 2 set reference level for radon volume activity at the workplace 300 Bq/m³ per calendar year and reference level for radon volume activity in living spaces as well 300 Bq/m³ per calendar year. Articles 54 and 74 of Council Directive 2013/59 / Euratom were the basis for setting those reference levels for radon volume activity of 5 December 2013 laying down basic safety standards for protection against the dangers arising from ionizing radiation and repealing Directives 89/618 / Euratom, 90/641 / Euratom, 96/29 / Euratom, 97/43 / Euratom and 2003/122 / Euratom and radon surveys conducted in the 1990s and 2012.

The NARP should, as far as possible, be integrated with other building strategies, such as indoor air quality or energy saving, in order to develop synergies and avoid contradictions. As synergies between smoking and long-term exposure to radon have also been demonstrated, which increase the likelihood of developing lung cancer, these combined risks need to be considered when providing radon information and coordinated with the National Tobacco Control Program.

One of the recognized anti-cancer programs is the European Code Against Cancer [8], which sets out 12 ways to reduce the risk of cancer. Point 9 of the Code reads: 'Find out if you are exposed to strong natural radon radiation at home. Make sure that excessive radiation values are reduced. "

Radon risk reduction programs do not have an immediate visible effect on the health of the population, as the main averted health risk is the risk of developing lung cancer with a latency of up to several decades. An estimate of the incidence of malignant tumours in men and women in the Slovak Republic can be found in Annexes no. 1 and no. 2.

In the long run, it will not be possible to directly observe life-saving, but the immediate risks will be reduced. For this reason, the success and risk reduction program of radon exposure will be estimated on the basis of the reduction of radon volume activity in living spaces, which may have additional benefits in terms of improving indoor air quality.

An indicator of the success of the adopted NARP strategies will be a reduction in the number or percentage of dwellings with radon volume activity above the reference level or a reduction in the average volume activity of radon in residential areas and in the workplace.

3. Strategies of the National Radon Action Plan of the Slovak Republic [9]

A. Identification of radon prone areas

A1) identification of types of residential areas where the public has been staying for a long time, e.g. pre-school facilities, school facilities, facilities for the provision of social services, facilities for the provision of health care, etc., which will be included in the national radon program,

A2) a representative survey of the indoor air of selected residential areas and workplaces,

A3) selection of a suitable statistical method for the identification of radon prone areas.

B. Raising public radon awareness through the use of information technology

B1) radon awareness raising,

B2) development of tools for gathering and making information available about radon and about radon irradiation.

C. Preventive and corrective measures to reduce the occurrence of radon in residential areas and workplaces

C1) elaboration of general information on preventive measures at workplaces and for building owners,

C2) development of general information on corrective measures at workplaces and for building owners,

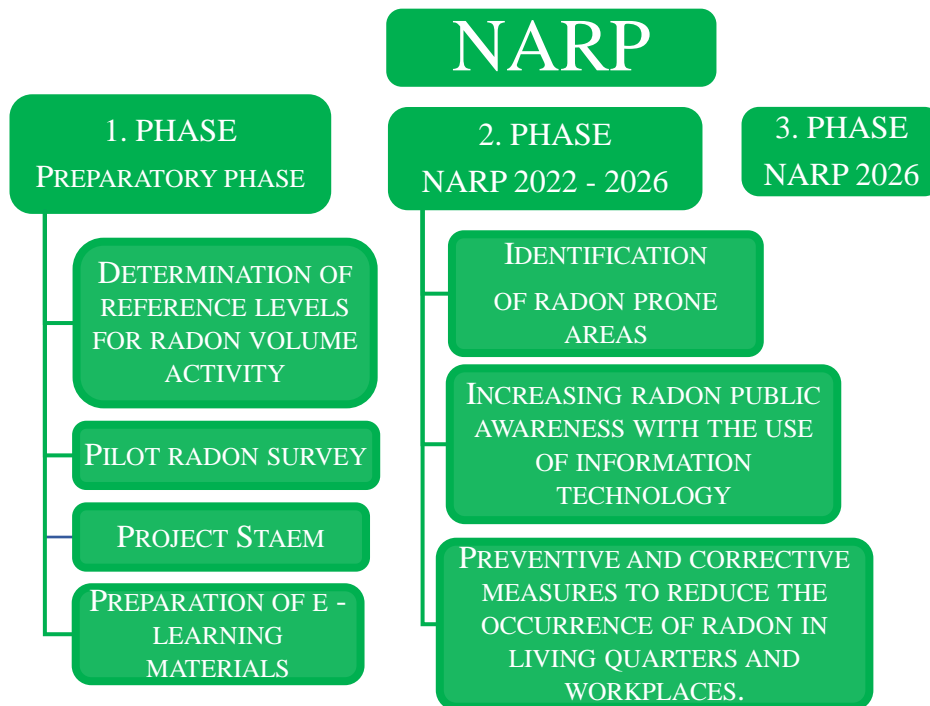
C3) providing financial support for the implementation of corrective measures,

C4) establishing cooperation with programs aimed at reducing the energy performance of buildings and improving indoor air quality in residential areas,

C5) coordination of cooperation with smoking prevention programs.

4. Preparatory phase of NARP

All the activities listed below can be included in the so-called preparatory phase of NARP (Picture 2). Picture no. 2 NARP implementation phases



Picture no. 2 NARP implementation phases

Determination of reference levels for radon volume activity

Part of the preparatory phase was the determination of reference levels for the volume activity of radon in residential areas and workplaces by Act no. 87/2018 Coll. on radiation protection. The list of legal regulations that have discussed the provision of radiation protection of the population and workers from natural sources of ionizing radiation since 1972 is given in Annex no. 3.

According to § 130 par. 2 of Act no. 87/2018 Coll. on radiation protection: „§ 130 A building with a possible increased occurrence of radon (2) *The reference level for the volume activity of radon in residential areas is 300 Bq.m-3 per calendar year.* ”

The basis for setting that reference level was Articles 54 and 74 of Council Directive 2013/59 / Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from ionizing radiation and repealing Directives 89/618 / Euratom, 90/641 / Euratom, 96/29 / Euratom, 97/43 / Euratom and 2003/122 / Euratom, as well as radon surveys carried out in the 1990s and in 2012.

According to § 123 par. 6 of Act no. 87/2018 Coll. on radiation protection:

"§ 123 Workplace with possible increased irradiation by natural ionizing radiation (6) The reference level for the volume activity of radon at the workplace is 300 Bq.m-3 per calendar year."

The basis for setting the above reference level was Articles 54 and 74 of Council Directive 2013/59 / Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from ionizing radiation and repealing Directives 89/618 / Euratom, 90/641 / Euratom, 96/29 / Euratom, 97/43 / Euratom and 2003/122 / Euratom, as well as radon surveys carried out in the 1990s and in 2012.

According to Act no. 87/2018 Coll. on radiation protection § 127 par. 2 and 3, § 129, § 131 and § 133 par. 1 shall enter into force on 1 January 2024.

The postponement of the effectiveness of the above paragraphs is directly related to the need to identify the radon prone areas, which will be carried out in the 2nd phase of NARP 2022 - 2026.

Pilot radon survey

ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE participated in the pilot radon survey in the years 2020 - 2021.

For the purpose of identifying radon prone areas using professionally and scientifically based criteria based on a survey of radon volume activity in residential areas and workplaces, ÚVZ SR and RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE in cooperation with the International Atomic Energy Agency based in Vienna (hereinafter "IAEA") within the project RER 9153 carried out in selected 18 districts of the Slovak Republic with a higher probability of radon - measurement of radon in the air of houses and gamma radiation from building materials. The measurement was focused on family houses, which are permanently inhabited by families with children under 18 years of age.

It was a pilot radon survey conducted by ÚVZ SR and RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE in the territory of the SR, which are locally competent public health authorities in localities that were selected on the basis of the results of the initial radon survey, which was carried out at the end of the last century (in the 90s).

The RER 9153 project involves measuring the volume activity of radon in homeowners in districts selected on the basis of pre-established criteria approved by the IAEA (e.g. houses built before 1992, houses built after 1992, basement houses, houses without cellars, houses after reconstruction on increase in energy efficiency, houses without reconstruction, houses with children under 18). The general professional and lay public was informed about the ongoing pilot radon survey and the planned implementation of the NARP, among other things, through a program on publicist-news television.

STEAM project

ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE participated in the years 2020 - 2021 in the information program on the risks associated with radon.

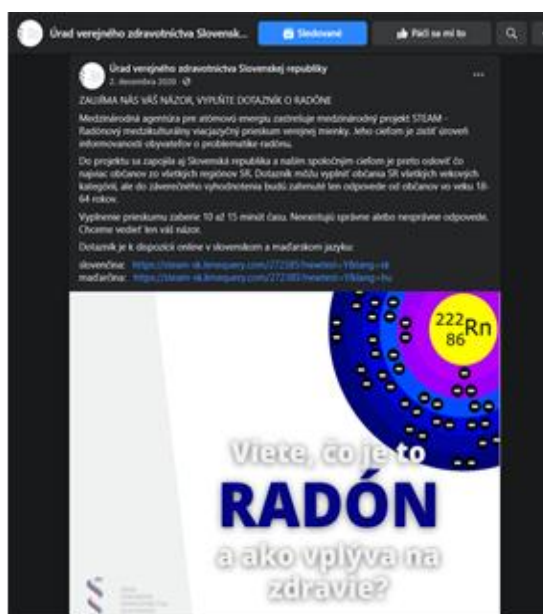
Through public health authorities, the Slovak Republic participated in the STEAM project - Radon Intercultural Multilingual Public Opinion Survey, which aimed to address and involve as many citizens from all regions of the Slovak Republic and obtain relevant data for the implementation of NARP (Picture 3). This project was managed by the IAEA in order to determine the level of awareness of the population about radon and subsequently optimize the ways of informing the population about the risks associated with radon. The survey was conducted in the form of a questionnaire prepared by IAEA staff. This questionnaire was distributed online simultaneously in about 20 countries in the IAEA European Region and will be evaluated according to IAEA guidelines. ÚVZ SR ensured its translation into Slovak and Hungarian and financially ensured its publication and making it available to the general public on the website. Citizens of the SR could participate in the survey by completing this online questionnaire. The questionnaire could be filled in by citizens of the Slovak Republic of all ages; only answers from citizens aged 18-64 will be included in the final evaluation.

The questionnaire is still available online in Slovak and Hungarian:

Slovak: <https://steam-sk.limequery.com/272385?newtest=Y&lang=sk>

Hungarian: <https://steam-sk.limequery.com/272385?newtest=Y&lang=hu>

Through public health authorities, the Slovak Republic uses not only information leaflets but also websites, as well as social networks, where it publishes information related to radon, related health risks, the importance of radon measurements and available technical means to reduce existing radon concentrations. with radon, preventive and corrective measures and evaluates the reactions of the population.



Picture no. 3 Radon intercultural multilingual public opinion polling - informing the public through social media

Preparation of e - learning materials

ÚVZ SR cooperated in the preparation of e-learning materials with the IAEA for the purpose of educating the professional public.

Prepared e-learning materials are available in English:

5. Phase 2 of NARP 2022 - 2026

At present, the staff of the ÚVZ SR and the relevant RÚVZ are starting the second phase of the NARP for the years 2022 - 2026. The submitted material of the NARP for the years 2022 - 2026 is the first comprehensive radon program in the SR. The main goal of this phase is to identify radon prone areas and ensure the availability of radon measurements for the population of the Slovak Republic through the following strategies:

A) Identification of radon prone areas

A1) Identification of types of residential areas where the public has been staying for a long time, e.g. pre-school facilities, school facilities, facilities for the provision of social services, facilities for the provision of health care, etc., which will be included in the national radon program

According to § 133 par. 4 of Act no. 87/2018 Coll. on radiation protection:

„§ 133 Radon irradiation in living areas

(4) The owner of a building that serves a preschool or school facility, for the provision of social services or health care, or for other commercial purposes during long-term stay of persons, is obliged to ensure measurements of radon volume activity in the building's indoor air. "

In the course of 2022, employees of territorially competent radiation protection authorities in cooperation with other public administration bodies will participate in the fulfilment of tasks under this strategy.

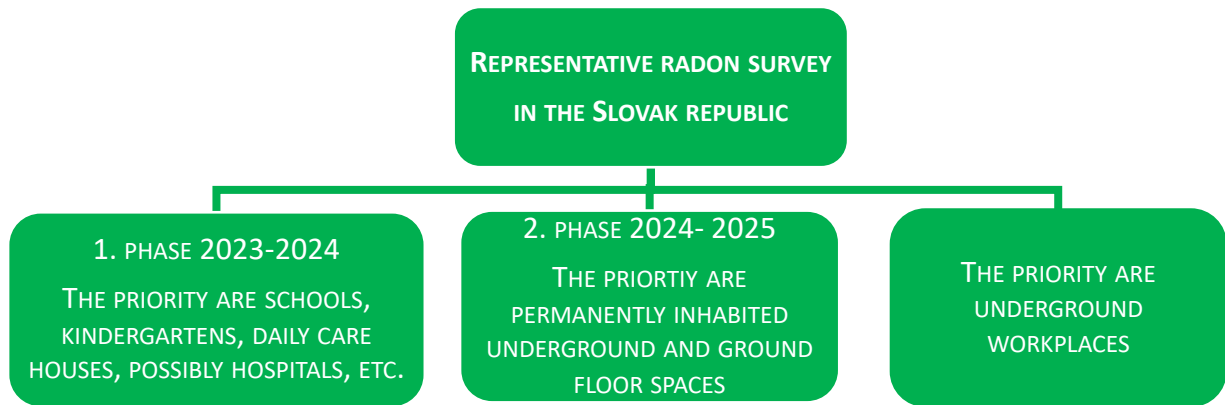
The types of residential areas and workplaces that will be included in the NARP are identified:

- a) underground,
- b) in the basement or first floor of a building.

A2) Representative survey of indoor air in selected residential areas and workplaces

The value of the volume activity of radon in the soil varies from region to region depending on the occurrence of uranium in the geological subsoil and in the soil and on the mode of gas movements between individual geological structures. At the same time, the value of the volume activity of radon in living spaces depends on the value of the volume activity of radon in the soil, from the permeability of the soil and from the way in which the building is constructed and used. Many studies have been performed to find the correlation between radon volume activity values in residential areas and radon volume activity values in soil. The results point to the fact that it is not possible to relevantly evaluate and identify potential radon prone areas in residential areas and workplaces only on the basis of information on the volume activity of radon in soil, due to the fact that many other factors are included in the calculation. However, radon maps can be used as input to perform radon surveys. In Annex no. 4 is a European map of measurements of the volume activity of radon in the indoor air of buildings from the data of a survey conducted in 2018.

With the submitted NARP material, we propose to carry out a representative radon survey in three stages defined in Picture no. 4.



Picture no. 4 Stages of representative radon survey in the Slovak Republic

A comprehensive representative radon survey will be performed by the staff of the ÚVZ SR and the relevant RÚVZ in residential areas and workplaces for the purpose of creating radon maps on the basis of these criteria:

- SR will be divided into 490 sampling points (10 km x 10 km grid),
- 15 buildings will be randomly selected at each sampling site, taking into account the priorities of each stage, i.e. a total of 7350 places,
- the measurement will be carried out in buildings on a permanently inhabited ground floor (or first floor) or underground,
- the measurements will be carried out using solid-phase trace detectors (hereinafter referred to as "detectors") in the non-heating season of 6 months starting in May and in the heating season of 6 months starting in November, as appropriate in two or more selected rooms,
- further criteria will be set by the staff of the territorially competent radiation protection authorities and will be annexed to the updated NARP (e.g. issuance of building permit before/after 1992, population density, area of the workplace underground or first above ground, number of classes underground / first above ground), uniformity of the distribution of measuring points in a given sampling point, etc.).

In the first half of 2023, active radon meters in the indoor air of buildings will be purchased for each territorially competent radiation protection authority, i.e. 5 equipment (ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE) and for laboratories for measuring natural radionuclides at ÚVZ SR and RÚVZ BB will be purchased equipment for measuring radon in the indoor air of buildings using detectors with a minimum capacity of 5,000 detectors per year. Workplaces equipped in this way will provide radon measurement services in the indoor air of buildings intended for the permanent residence of residents on the ground floor (or first floor) or in the underground free of charge.

Part of the considered strategies is to build a National Reference Centre for Radon in RÚVZ BB in order to ensure the quality of the methods used to solve the radon problem.

Procedures for measuring radon at workplaces will be developed by employees of territorially competent radiation protection authorities (ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE) during the years 2022 to 2026 according to current European and international recommendations.

A3) Selection of a suitable statistical method for the identification of radon prone areas

Potential radon prone areas in residential areas and workplaces will only be identified and determined on the basis of the conclusions of a comprehensive radon survey, which will be carried out in accordance with the strategy set out in point A2 above, from statistical methods as well as from the requirements of the European

Commission, which requires the division of the territory into areas in a grid (10 km x 10 km). Employees of territorially competent radiation protection authorities (ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE) will participate in the fulfilment of tasks arising from this strategy.

B) Increasing radon public awareness with the use of information technology

B1) Increasing radon awareness

This strategy focuses on the most important part of the NARP. Its basic participants are members of the state administration, natural persons - entrepreneurs, legal entities and experts, as well as the public. It is necessary to provide them with information, data and knowledge in the field of radon issues. The strategy includes the identification of preventive measures, methods for determining the radon index of land, tools for reducing radiation from natural sources of ionizing radiation and building materials assessed for gamma emission and identification of corrective measures, methods for determining radiation from natural sources of ionizing radiation in construction, tools for prevention of radon penetration into the building and building materials assessed in terms of gamma radiation emission.

Social networks are the fastest and most effective information channel. Through them, professional information and videos focusing on radon issues will be provided to members of the state administration, natural persons - entrepreneurs, legal entities and experts, as well as the public.

The websites used by ÚVZ SR and RÚVZ will concentrate and provide information and a comprehensive overview of radon issues. Visitors to the website will be able to ask questions to which the experts of ÚVZ SR, RÚVZ BA, RÚVZ BB, RÚVZ NR and RÚVZ KE will answer. On the websites of ÚVZ SR and RÚVZ it will be possible to find references to natural persons - entrepreneurs and legal entities who are registered for the determination of radon index of land and determination of radiation from natural sources of ionizing radiation in construction, as well as manuals for building owners and users implementation of preventive and corrective measures.

In the years 2022 - 2026, information videos on radon will be prepared and distributed for employers, employees and residents. Radon reports, information leaflets and materials, PowerPoint presentations will also be presented by personal employees of the territorially competent radiation protection authorities at personal meetings.

The website www.narp.sk will also be available, which will provide the general public and the professional public with comprehensive information on radon issues.

B2) Development of tools for collecting and making available information on radon and radon exposure

The Slovak Republic, through public health offices, is preparing a national radon database and information system as part of the state administration informatization

project, which will provide the opportunity to monitor and evaluate the development of radon exposure in residential areas and workplaces through collected data. In this way, it will be possible to ensure the availability of local and national information on the exposure of residents in residential areas and workplaces to the professional public and the general public.

The register of radon measurement results will be created not only in accordance with the valid legislation in the field of radiation protection in the Slovak Republic, but also in accordance with the requirements of the European Commission. The territory will be divided into areas in a grid (10 km x 10 km). Areas in the grid (10 km x 10 km) in which there will be no permanent residences will be considered irrelevant.

Access to the data registered in the information system will be graduated in accordance with the requirements of public administration entities, civic associations, professional associations and in accordance with the requirements of the GDPR.

C. Preventive and corrective measures to reduce the occurrence of radon in living quarters and workplaces

C1) Development of general information on preventive measures at workplaces and for building owners

Preventive measures are taken before the construction of residential buildings or workplaces. The aim of preventive measures is to prevent the penetration of radon into the indoor air using suitable building materials and insulation materials and by ensuring sufficient ventilation of the house or apartment.

Detailed information on preventive measures for the general public and the professional public will be published on the website www.narp.sk.

C2) Development of general information on corrective measures at workplaces and for building owners

Corrective measures to prevent the penetration of radon into the indoor air of residential areas or workplaces are carried out in the existing building. Corrective measures can be anti-radon barriers located in the foundations of the building, as well as ventilation systems from the subsoil.

Detailed information on corrective measures for the general public and the professional public will be published on the website www.narp.sk.

C3) Provision of financial support for the implementation of corrective measures

The provision of financial support for the implementation of corrective measures in buildings with residential areas with an increased incidence of radon will need to be regulated by legislative adoption of appropriate legislation to the competent authorities for the provision of subsidies from the state budget. The effects of such legislation on state-owned or non-residential residential buildings will need to be ensured within the approved limits of the entity concerned for the relevant financial years, without additional requirements for the state budget.

C4) Establishing cooperation with programs aimed at reducing the energy performance of buildings and improving indoor air quality in residential areas

In cooperation with the State Housing Development Fund, information on the risks arising from radon exposure will also be provided to the population in connection with

the allocation of funds for insulation or other technical modifications of buildings related to energy savings and indoor air quality. Coordination of the NARP with the Energy Efficiency Action Plan for 2020 is also planned.

C5) Coordination of cooperation with smoking prevention programs

Already in 2020, the staff of the Radiation Protection Department of the ÚVZ SR established cooperation with the Department of Health Support and Health Education of the ÚVZ SR in the matter of coordination in providing information on radon in connection with the national tobacco control program.

During the years 2022 - 2025, information leaflets, videos on radon and the effect of the synergistic effect between smoking and radon exposure will be prepared and distributed, which will be presented by employees of territorially competent radiation protection authorities at personal meetings and via social networks.

6. Other organizations involved in the implementation of NARP 2022-2026

Other organizations may participate in the fulfilment of the tasks of NARP 2022 - 2026 within their competence, depending on their own financial resources.

The Ministry of Transport and Construction of the Slovak Republic participates in informing and educating the public and experts involved in the construction of buildings, in the control of building materials and in the development of methods and technologies for reducing radon radiation.

The Ministry of Health of the Slovak Republic participates in informing experts in the field of building design and construction with residential areas, employees of building authorities and the public on the issue of health protection against radon radiation.

The Ministry of the Environment of the Slovak Republic participates in informing and educating the public in the field of radon radiation protection and in projects aimed at defining radon prone areas in residential areas.

The Ministry of Education, Science, Research and Sports of the Slovak Republic participates through universities and its directly managed organizations in informing and educating the public and experts in the field of radon radiation protection and in the development of methods and technologies for reducing this radiation.

Conclusion

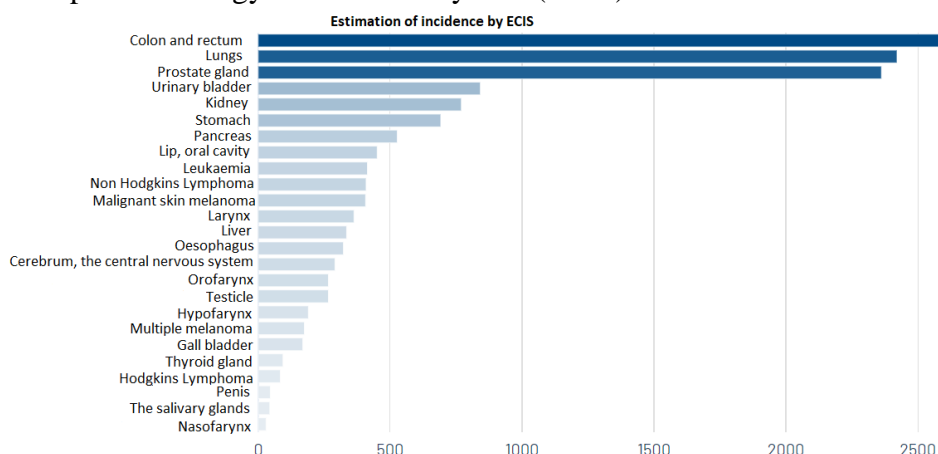
All activities of the 2nd phase of NARP 2022 - 2026 follow the preparatory phase and are necessary for the implementation of the strategies of the draft NARP, which is submitted as a non-legislative material for the Government of the Slovak Republic. The evaluation of the first stage of the second phase with a description of the next second stage of the NARP will be submitted by the ÚVZ SR in 2024 in accordance with the valid legislation of the SR. Proposal for updating the NARP for the years 2027 - 2031 in accordance with § 135 par. 5 of Act no. 87/2018 Coll. on Radiation Protection will be prepared by the ÚVZ SR in cooperation with the Ministry of Health of the Slovak Republic, the Ministry of Transport and Construction of the Slovak Republic, the Ministry of the Environment and the Ministry of Education, Science, Research and Sports of the Slovak Republic.

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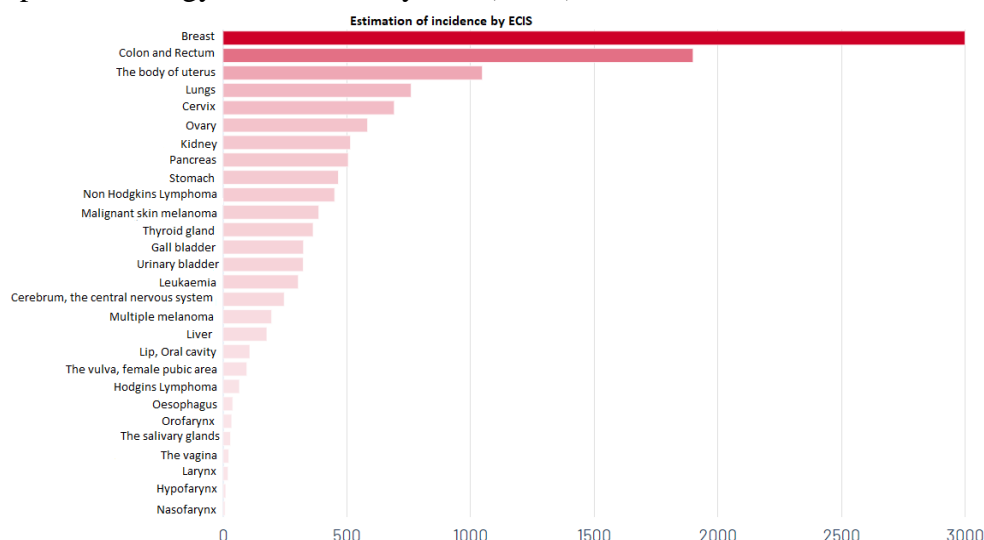
Annex no. 1

Estimation of the incidence of malignant tumours in men in the Slovak Republic in 2020 according to the European Oncology Information System (ECIS)



Annex no. 2

Estimation of the incidence of malignancies in women in the Slovak Republic in 2020 according to the European Oncology Information System (ECIS)



Annex no. 3

List of legal regulations concerning ensuring radiation protection of the population and workers from natural sources of ionizing radiation

[1] Decree of the Ministry of Health of the Czechoslovak Socialist Republic no. 65/72 Coll. on the protection of health against ionizing radiation.

[2] Decree of the Ministry of Health no. 406/1992 Coll. on requirements to limit exposure to radon and other natural radionuclides.

[3] Act no. 87/2018 Coll. on Radiation Protection and on Amendments to Certain Acts.

[4] Regulation of the Government of the Slovak Republic no. 350/2006 Coll., Which lays down details on the requirements for limiting exposure from natural radiation.

[5] Decree of the Ministry of Health of the Slovak Republic no. 528/2007 Coll., Which details of the requirements for limiting exposure to natural radiation are laid down.

[6] Decree of the Ministry of Health of the Slovak Republic no. 98/2018 Coll., Which lays down the details of limiting the exposure of workers and residents from natural sources of ionizing radiation.

[7] Decree of the Ministry of Health of the Slovak Republic no. 100/2018 Coll. on limiting the exposure of the population from drinking water, natural mineral water and spring water.

Annex no. 4

European map of measurements of radon volume activity in the indoor air of buildings

