Slovak Republic

IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Country Programme Framework

2022–2027

This Country Programme Framework for the Slovak Republic (2022– 2027) has been signed on behalf of the Government of the Slovak Republic and the International Atomic Energy Agency

On behalf of the Government	**On behalf of the International Atomic Energy Agency**
_____	_____
Ms Marta Žiaková Chairperson Nuclear Regulatory Authority of the Slovak Republic	Mr Hua Liu Deputy Director General Head of the Department of Technical Cooperation
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Date	**Date**

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LIST OF ABBREVIATIONS

CPF	**Country Programme Framework**
IAEA	**International Atomic Energy Agency**
NPCs	**National Participation Costs**
TC	**Technical Cooperation**
TCF	**Technical Cooperation Fund**
TCP	**Technical Cooperation Programme**
IAEA	**International Atomic Energy Agency**
UJD	**Regulatory Authority of the Slovak Republic**
NPP	**Nuclear Power Plant**
RAW	**Radioactive Waste**
SNF	**Spent Nuclear Fuel**
ISNFSF	**Interim Spent Nuclear Fuel Storage Facility**
SAS	**Slovak Academy of Sciences**
NuPECC	**Nuclear Physics European Collaboration Committee**
PACT	**Programme of Action for Cancer Therapy**
STU	**Slovak University of Technology**
RASIMS	**Radiation Safety Information Management System**
TSA	**Thematic Safety Areas**
IRRS	**Integrated Regulatory Review Service**
AMS	**Accelerator mass spectrometry**
CENTA	**Centre for nuclear and accelerator technologies**
EU	**European Union**
OECD	**Organisation for Economic Cooperation and Development**
NEA	**Nuclear Energy Agency**
WHO	**World Health Organization**
CERN	**European Organization for Nuclear Research**

EXECUTIVE SUMMARY

This Country Programme Framework (CPF) is an update of the latest version of the CPF signed in 2014 and provides an overview of what Slovakia aims to achieve within the framework of the International Atomic Energy Agency's (IAEA) Technical Cooperation Programme (TCP) during the period 2022-2027. The programme is centred on major socioeconomic orientations of the country and focuses on fields in which the IAEA can make significant contributions. The CPF enjoys strong government commitment and outlines a six-year strategy for targeted IAEA support in the following priority fields, with indication of expected outcomes:

i) Nuclear and Radiation Safety and Security
Outcome: strengthened nuclear and radiation safety and security; reduced amount of radioactive waste and risk of exposure for the protection of people and environment; enhanced protection for personnel with occupational radiation exposure; reduced exposure to radon.

ii) Human Health
Outcome: increased access to improved mammography services for women and enhanced radiotherapy services.

iii) Nuclear Knowledge Development and Innovation
Outcome: strengthened capacity and established international cooperation for nuclear knowledge development for industrial and environmental applications in Slovakia.

Within the field of Nuclear and Radiation Safety and Security, priorities are given to the topics including strengthening of human resources in the relevant regulatory bodies, preparation for a deep geological repository for radioactive waste disposal, construction of the dry interim storage facility for spent nuclear fuel at the Jaslovske Bohunice site, development of the facility for melting metal radioactive waste management in Jaslovske Bohunice, decommissioning of A1 and V1 NPP in Jaslovske Bohunice, and implementation of the activities of the National Radon Action Plan.

Within the field of Human Health, topics to be covered include quality enhancement of mammography service within the national breast cancer screening programme and knowledge transfer from high level medical institutions in the world to research and clinical sphere in Slovakia.

Within the field of Nuclear Knowledge Development and Innovation, enhancement of capacity and establishment of international cooperation in the following areas are expected: nuclear structure and neutron-cross section measurements for non-destructive analysis application; environmental radionuclides monitoring; detection techniques using gamma-spectrometry; capacity building on assessment of radiation exposure; development of fiber-reinforced self-compacting heavyweight concrete for geological disposal.

Review of progress will be carried out before the end of each TCP cycle throughout the timeframe of this CPF and will serve for better preparation of new project proposals for the following TCP cycle. The mid-term review of this CPF will be conducted in 2024 and the final review will be carried out latest in 2026, one year prior to the expiration of this CPF and when the preparation of the next CPF will start.

1. INTRODUCTION

The Country Programme Framework contained in this document serves as the frame of reference for technical cooperation between the Slovak Republic and the IAEA during the period 2022-2027. The CPF reflects an agreement between Slovakia and the IAEA on national priorities and goals to which nuclear science and technology can contribute directly and cost-effectively. The CPF has been developed based on a thorough analysis of the following national strategic documents:

- *National Action Plan of the Slovak Republic (update every two years; new version will be released in December 2021)*
- *National Report of the Slovak Republic,* prepared in terms of *the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*
- *Energy Security Strategy of the Slovak Republic*
- *Policy, Principles and Strategy for Further Development of Nuclear Safety*
- *Strategy of a Back-end of Nuclear Energy in the Slovak Republic*
- *National Programmes of Research and Development for Years 2019-2023 with a View to 2028*
- *Road Map of Research Infrastructures - SK VI Roadmap 2020 – 2030*
- *Research and innovation strategy for intelligent specialization of the Slovak Republic*
- *Act No. 87/2018 Coll. on radiation protection*
- *Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation*
- *Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation*
- *Europe's Beating Cancer Plan* and *Agenda 2030*

The formulated national needs and priorities are in line with *the Act no. 541/2004 on the Peaceful use of nuclear energy (Atomic Act) and on amendment and alterations of several acts as amended* and *Decree No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities.*

The key objectives expected to be achieved under the framework of this CPF are to:

- improve nuclear and radiation safety and security;
- enhance the management of decommissioning activities and reduce radioactive wastes;
- promote radiation safety and protect the public and the environment from the harmful effects of ionizing radiation;
- improve human health care service with the aim of reduced exposure to radiation for patients;
- strengthen nuclear knowledge development and establish international cooperation.

The preparation of this CPF document has been coordinated by the Nuclear Regulatory Authority of the Slovak Republic (UJD), in cooperation with key stakeholders including Public Health Authority of the Slovak Republic, Ministry of Economy of the Slovak Republic, Ministry of Health of the Slovak republic, SLovenske Elektrarne, JAVYS, Slovak Academy of Sciences (SAS), Slovak University of Technology, and Comenius University.

Gender mainstreaming has been applied throughout the development process of this CPF and Slovakia ensures equal access to resources and opportunities of TC projects regardless of gender. *The National Gender Equality Strategy* was applied. Women are an important part in the development of the national TC projects and have significantly contributed to the completion of the CPF. They will also be involved in the implementation and evaluation of the projects and achieving the national goals. The gender ratio was balanced. Approximately 45% of female and 55% of male participated in the development process of the CPF.

2. SITUATION ANALYSIS

Country Overview

Slovakia is located in central Europe and has a population of about 5.4 million of inhabitants. It was established on 1 January 1993 following the break-up of the former Czechoslovakia. It borders with 5 countries: Poland, Austria, Hungary, Czech Republic, and Ukraine. Slovakia has become a member of the IAEA since 27 September 1993, and is a member of the European Union (since 1 May 2004), the United Nations (since 19 January 1993), the International Monetary Fund (since 1 January 1993), the World Trade Organisation (since 1 January 1993), the Organisation for Economic Cooperation and Development (since 14 December 2000), Interpol (since 3 October 1993), NATO (since 29 March 2004), and other important economic, social, and human-right international organizations. Slovakia is part of the Eurozone since the 1 January 2009 and is part of the Schengen area.

The main energy source in Slovakia is nuclear power, followed by fossil fuels and hydroelectric power. Updated in February 2021, Slovakia has four nuclear reactors operating at Jaslovske Bohunice and Mochovce, which generate half the electricity in the country. Slovakia focuses on the sustainable use of natural resources and actively adapts to climate change with particular focuses on flood control, promotion of risk management in climate change, and provision of support to energy-efficient solutions in all sectors. Although Slovakia is a small country, its varied topography supports a wide variety of vegetation. Agriculture and timber cutting have diminished the republic's original forest cover, but approximately 40% of its area is still forested.

By the early 21st century, the prosperous manufacturing industries had contributed a substantial proportion of Slovakia's GDP, and manufacturing workers had constituted a significant portion of the labour force. Important industries include automotive, machinery, steel production, ceramics, chemicals, textiles, food and beverage processing, production of electrotechnical devices, and furniture manufacturing. The service industries, an increasingly important part of Slovakia's economy, account for more than two-thirds of the GDP.

Cooperation with the IAEA

Slovakia became a Member State of the IAEA on 27 September 1993, and is a party to many multilateral and safeguards agreements, such as *Revised Supplementary Agreements Concerning the Provision of Technical Assistance by the IAEA, Application of Safeguards in Connection with the Treaty on Non-Proliferation of Nuclear Weapons, Vienna Convention on Civil Liability for Nuclear Damage, Convention on the Physical Protection of Nuclear Material, Amendment to the Convention on the Physical Protection of Nuclear Material, Convention on Early Notification of a Nuclear Accident, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, Convention on Nuclear Safety,* and *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.*

Slovakia has benefited from the assistance provided by the TCP focussing on the strengthening of regulatory and radiation protection infrastructure, the improvement of management of decommissioning activities and radioactive waste, the quality enhancement of radiotherapy services, and the development of nuclear knowledge. In addition to national TC projects, Slovakia also actively participates in the regional and interregional projects that are relevant to its national priorities, and may also consider thematic areas include food and agriculture, nutrition, etc. Since 2013, Slovakia has benefited from assistance in the area of nuclear security from the IAEA through national training course and workshops in the area of nuclear security culture, security in transport of nuclear material,

and computer security for nuclear security. Slovakia also attended numerous nuclear security related regional and international training courses, workshops, exercises, conferences, and technical and consultancy meetings. Integrated Nuclear Security Support Plan (INSSP) is a useful tool for reviewing nuclear security regimes and identifying areas where the security needs to be strengthened. Slovakia actively cooperates with IAEA in this field and the support of INSSP is discussed.

During the period of 2009-2020, 391 persons (125 women) from Slovakia were trained, 364 persons (82 women) attended specialist meetings, and 99 international experts were provided to Slovakia under the TC programmes. The gained knowledge and experience have brought along positive impacts and have allowed Slovakia to make significant progress in the relevant fields.

Meanwhile, Slovakia has been a regular contributor to the *Working Capital Fund, the Regular Budget* and *the Technical Cooperation Fund* of the IAEA, and is the host country to many IAEA training events, fellowships, and scientific visits, receiving participants from all over the world, in particular those from developing countries. Participants are trained in different institutes and organizations of Slovakia depending on their expertise and needs.

National Priorities and Goals

National strategies and policies integrate the 17 Sustainable Development Goals along with country-specific objectives. National priorities, which Slovakia would like to achieve during the timeframe of this CPF, are the followings: strengthening nuclear and radiation safety and security, reducing amount of radioactive waste and risk of exposure to protect people and the environment from the adverse effects of ionizing radiation, enhancing human health care services with reduced exposure to radiation for patients, and strengthened capacity and established international cooperation for nuclear knowledge development for industrial and environmental applications in Slovakia. These priorities are linked with SDG 3 – Good Health and Well-Being, SDG 6 – Clean Water and Sanitation, SDG 8 – Decent Work and Economic Growth, SDG 9 – Industry, Innovation and Infrastructure, SDG 12 – Responsible Consumption and Production, SDG 14 – Life Below Water and SDG 15 – Life on Land, and were identified based on strategic documents, such as *National Action Plan of the Slovak Republic, National Report of the Slovak Republic prepared in terms of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Energy security strategy of the Slovak Republic, Policy, Principles and Strategy for Further Development of Nuclear Safety, Strategy of a Back-end of Nuclear Energy in the Slovak Republic, National programmes of Research and Development for years 2019-2023 with a View to 2028, Road map of research infrastructures - SK VI Roadmap 2020 – 2030, Research and innovation strategy for intelligent specialization of the Slovak Republic, Act No. 87/2018 Coll. on radiation protection, Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation, Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation, Europe's Beating Cancer Plan* and *Agenda 2030*. The formulated national needs are fully in line with the *Act no. 541/2004 on the Peaceful use of nuclear energy (Atomic Act) and on amendment and alterations of several acts as amended* and *Decree No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities*.

Risk Analysis

In general terms, challenges for the implementation of TC projects could be posed by lack of suitable host organizations or experts, budget limitation, loss of trained staff, insufficient governmental and legislative support, inefficient coordination among related parties, and cancellation or change of events due to unforeseen reasons. However, based on previous experience, likelihood for these potential risks to happen is rather low.

2.1 NUCLEAR AND RADIATION SAFETY AND SECURITY

In Slovakia there are four unit nuclear reactors of WWER-440/213 type in operation. Two at Jaslovske Bohunice site (NPP V2) and two at the Mochovce site (NPP Mochovce 1, 2). Three units are currently under decommissioning: two units of WWER-440/230 type (NPP V1) and one unit of HWGCR – 150 MWe type (NPP A1). Spent nuclear fuel from V1 NPP units was transported to the Interim Spent Fuel Storage and that from A1 NPP was repatriated to the Russian Federation. Transport of spent fuel was completed in 1999. Both Jaslovske Bohunice site and Mochovce site have the technology designed for treatment of radioactive waste, called Technology for Treatment and Conditioning of Radioactive Waste and Facility for Treatment and Conditioning of Liquid Radioactive Waste respectively. National repository of low level waste at the Mochovce site has been in operation since 1999, and Interim Spent Fuel Storage Facility at Bohunice site, where a project to increase safety and storage capacity was implemented, has been in operation since 1987. Radioactive waste (RAW) that does not meet the waste acceptance criteria for disposal in national repository of low level waste, will be finally disposed in a deep geological repository in compliance with the waste acceptance criteria for disposal.

2.1.1 Legal Framework

The basic law on the peaceful use of nuclear energy is Act No. 541/2004 Coll. (Atomic Act). In 2011, the operation of all nuclear facilities was permitted for an indefinite period with an amendment to *Act no. 541/2004 on the Peaceful use of nuclear energy (Atomic Act) and on amendment and alterations of several acts as amended*.

By resolution No. 256/2014, the Government adopted the document *Policy, Principles and Strategy for Further Development of Nuclear Safety*. The aim of the document is to summarize and strengthen the principles to protect the public and the environment from harmful effects of ionizing radiation associated with peaceful uses of nuclear energy. It is linked with other strategic documents including *Programme Declaration of the Government for the period 2020 – 2024*, *Energy Security Strategy of the Slovak Republic*, and *National Policy and National Programme for the Management of Spent Nuclear Fuel and Radioactive Waste in the Slovak Republic.*

State regulation over nuclear safety and management of radioactive waste and spent nuclear fuel lies with the Nuclear Regulatory Authority of the Slovak Republic. It also carries out supervision over nuclear installations under the *Act No. 50/1976 Coll. on Spatial Planning and Construction (Building Act)* as a special building authority with the competence to issue permits for sites of nuclear installation.

The Ministry of Economy of the Slovak Republic is responsible for power engineering including nuclear fuel management, radioactive waste storage, and exploration and mining of radioactive raw materials. By the Government Resolution No. 402/2018, section B.3, dated 5 September 2018, the Ministry of Economy of the Slovak Republic was instructed to draw up a phased schedule for the preparation of the deep geological repository.

Protection of people from harmful effects of exposure to ionizing radiation is fulfilled by the Ministry of Health of the Slovak Republic and is determined and carried out based on *Act No. 87/2018 Coll. on radiation protection* together with *Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation* and *Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation*. Directive 2013/59/EURATOM of 5 December 2013 is also referred. Directive 2013/59/EURATOM lays down basic safety standards for the protection against the

dangers arising from exposure to ionizing radiation and repeals Directives 89/618/Euratom, 90/641/EURATOM, 96/29/EURATOM, 97/43/EURATOM and 2003/122/EURATOM. Limitations of occupationally exposed radiation are stated in *Decree No. 98/2018 Coll. on the Limitation of Exposure of Workers and the General Public to Sources of Ionizing Radiation* and *Decree No. 99/2018 Coll. on Ensuring Radiation Protection*.

To ensure occupational health and safety at nuclear installations, labour inspection is performed by the Labour Inspectorate pursuant to Act No.125/2006 Coll. Verification of compliance with safety requirements of classified and common technical equipment is done by the authorized legal entities in accordance with the *Act No. 124/2006 Coll. on occupational health and safety*.

State supervision in the field of radiation protection during the shipments of radioactive and nuclear materials is, in accordance with Act No. 87/2018 Coll., carried out by the Ministry of Transport and Construction of the Slovak Republic.

Radiation monitoring is performed in line with Directive 2013/51/EURATOM of 22 October 2013 which lays down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption, *Decree No. 96/2018 Coll. laying down details on the activities of the radiation monitoring network*, and *Decree No. 100/2018 Coll. on the Limitation of the Exposure of the Population from Drinking Water*, Natural Mineral Water and Spring Water.

Environmental impact assessment of nuclear installation is under the purview of the Ministry of Environment of the Slovak Republic and is conducted in compliance with the *Act No. 24/2006 Coll. on Environmental Impact Assessment*.

2.1.2 Technical Cooperation in Past and Current Cycles and Main Outcomes

Highlights of assistance provided in the past national TC projects in the national regulatory field include licensing of new units of NPP Mochovce 3 and 4, decommissioning of V1 and A1 NPP Jaslovske Bohunice, capacity building in the development and applications of nuclear technology, and strengthening of the overall national regulatory capabilities. These TC projects contributed to the development of a higher-level regulatory infrastructure by supporting activities in the fields of nuclear and radiation safety and security, radioactive waste management, emergency preparedness, control systems and components, media and public communication, nuclear energy, nuclear materials, and licensing of new nuclear sources. Particular attention was given to the improvement of radiation protection legislation. Both junior and senior staff were involved in the capacity building activities under TC projects.

In the field of decommissioning and radioactive waste management, past projects have supported the improvement of medium level waste management for the A1 NPP decommissioning project, development of methodologies for application of revised clearance criteria and for recycling of radioactive waste, and management of transuranic waste. Within these projects, a number of specialists were trained in the potential hazards while handling and dismantling large components of primary circuits of NPPs, the specificities in decontamination and demolition of large civil structures for their free release, and the safe operation of melting facility. State-of-the-art operational and safety procedures (manuals) for conventional and radiological safe operation of RAW melting facility were prepared and adopted. Applicable methodologies for characterization, treatment, and conditioning of RAW contaminated with transuranic radionuclides were proposed and optimized. Capabilities and standards for the safe implementation of unique decommissioning activities and RAW management in Slovakia were improved. Primary circuits and civil structures were decommissioned, RAWs were treated, and radioactive safety was improved in accordance with the best practices worldwide.

Methodology for clearance criteria derivation for decommissioned materials and general methodology for recycling and conditional release of materials were elaborated. Conceptual proposals of procedures for treatment, conditioning, and disposal of transuranic RAW were put forward and applied in the follow-up decommissioning stages of the A1 NPP decommissioning project. The Guide for Standard Format and Content for Safety Related Decommissioning Licensing Documents was adopted. Increased stakeholder involvement, such as cooperation establishment with the local non-governmental organisations, might be beneficial for the future activities based on the needs of sociological development and for the achievement of project outcomes.

During the programme cycle 2020-2021, two projects focused on safety and security: SLR9016 *Enhancing Regulatory Activities and Strengthening Human Resources* and SLR9017 *Decommissioning of Highly Contaminated or Activated Components, Structures and Nuclear Power Plant Site Final Clean-up and Free Release*. TC project SLR9016 aims at strengthening human resources to enhance the national regulatory infrastructure towards new tasks in the field of nuclear safety, radioactive waste management, emergency preparedness, radiation safety, transport of radioactive material and decommissioning. Project objective of SLR9017 is to improve capabilities for safe, effective, and successful implementation of decommissioning projects in Slovakia. Under these two projects, participation to international conferences and training courses, national workshops, and provision of equipment are supported.

2.1.3 Technical Cooperation for Future Cycles Based on National Priorities

National priorities to be addressed under this CPF are the preparation for a deep geological repository for radioactive waste, construction of dry interim spent nuclear fuel storage facility, commissioning of the facility for melting metal radioactive waste management in Jaslovske Bohunice, decommissioning of the A1 NPP and V1 NPP in Jaslovske Bohunice, capacity building of the Nuclear Regulatory Authority and relevant regulatory bodies of the Slovak Republic, and implementation of the National Radon Action Plan.

Deep Geological Repository

Topic of a deep geological repository for permanent disposal of spent nuclear fuel (SNF) and high-level radioactive waste started to be managed in 1996. In the period from 1996 to 2001, the first two parts of the initial stage were completed, within which the following tasks were addressed:

- Conceptual design and implementation activities,
- Source term, interaction between near-field and far-field,
- Siting,
- Safety analyses,
- Public involvement.

During this period, five candidate sites were selected when basic field research was performed. In addition to that, reports were developed summarising international experience in the deep geological repository development, directions and plans were set in all areas, expert teams were formed for solution of individual problems, and cooperation was established with organizations dealing with deep geological disposal in Belgium, Czech Republic, Hungary and Switzerland. The project was then postponed until the turn of 2012-2013, when activities were initiated to continue the national programme on deep geological repository. In 2014, with reference to the Council Directive 2011/70/EURATOM *Establishing the Community Framework for the Responsible and Safe Management of Spent Nuclear Fuel and Radioactive Waste*, the *National Policy and the National Programme for the management of spent nuclear fuel and radioactive waste in the Slovak Republic*

dealing with direct disposal of SNF in a deep geological repository was developed, and was approved in 2015 by Government Resolution No. 387/2015. In 2016, the project *Deep geological repository – site selection, stage 1*, in which a proposal was included for further development of the deep geological repository in Slovakia, was completed, followed by the project *Deep geological repository – site selection, stage 2 – Part I* in the years 2017 and 2018. The deep geological repository is expected to be commissioned around 2085.

Under the timeframe of this CPF, attention would be given mainly to scientific research of the geology conditions in Slovakia, allowing the primary and secondary site selection for the Deep Geological Repository (considered depth up to 1200 m). Furthermore, specific construction methods and safe long-term passive shielding have to be designed and tested, and stakeholder communication and knowledge management have to be maintained to enable accessibility and readability of data and information in decades from now. Support of IAEA will be sought mainly to capacity building in this field.

Development of Dry Interim Spent Nuclear Fuel Storage Facility

As of 31 December 2019, 12 712 spent nuclear fuels were stored in Interim Spent Nuclear Fuel Storage Facility (ISNFSF), representing 90.08 % of its maximal designed capacity. Due to the insufficient filling capacity of the wet ISNFSF, an investment project *Increasing storage capacity for SNF at Jaslovske Bohunice site* was approved in 2013, in which an extension of total storage capacity by 18 600 SNF would be realized in two stages – 10 100 SNF with the first stage and 8 500 SNF with the second one. In 2016, the process of environmental impacts assessment under Act No. 24/2006 Coll. was completed with a recommendation of dry technology for SNF storage, placing a maximum of 85 SNF into reinforced concrete storage modules.

Construction of the dry ISNFSF is carried out by JAVYS, a.s. and external contractor, concluded in accordance with the Public Procurement Act. Design and construction layout for the expansion were completed in December 2019 and the expected date of operation is in 2022. Although the design has been proven and approved, gaining experiences on the safest possible means of operation of the dry ISNFSF and its safeguard will be essential in the following years as this form of storage represents a brand-new activity in Slovakia.

Construction of the Facility for Melting Metal Radioactive Waste Management

After preparations for the construction of the facility for melting metal radioactive waste management, within which documentation was prepared in accordance with the legislative requirements, a public assessment of environmental impacts of this activity according to the Act No. 24/2006 Coll. was performed. After obtaining a positive Final Statement of the Ministry of Environment on the proposed activity, No. 1775/2015-3.4/hp, and a building permit, construction works and installation of technological equipment were carried out. Preparations are currently underway for inactive testing of the facility, and commissioning is planned in 2021. Remelting of metallic RAW is a proven and long-term used technology for RAW reduction. However, this technology carries inherent risks associated with high temperatures, melted metals and high-pressure gasses. It is therefore of paramount importance to share information and experience among operators of melting facilities – either conventional or nuclear facilities. Constant training and education for operational personnel will be a key element in maintaining the highest level of safety.

Stage 2 Decommissioning of V1 NPP in Jaslovske Bohunice

In accordance with the Government Resolution No. 809/1998, operation of Unit 1 of V1 NPP was terminated on 31 December 2006 and Unit 2 of V1 NPP on 31 December 2008. The decommissioning of the V1 NPP is planned in two stages. Decommissioning of V1 NPP is implemented through a series of projects. Out of the total 74 projects, 61 projects are completed, 8 projects are currently being implemented, and the rest are in the preparatory stage. Stage 2 started in 2015 and will be finished in 2025. The activities of stage 2 focus on dismantling of facilities and structures of the primary circuit located in the controlled area, i.e. decommissioning of the nuclear island. Dismantling of external objects at the V1 NPP, including tanks, underground piping and cable channels, will also be performed. Site evaluation, and clearance and exemption activities to support waste minimisation and material reuse will be realized as well. After the site is restored to its original condition (or demolition), the site will be released from regulatory control according to the Atomic Act. It will be the first time that a large nuclear site to be decommissioned and released from regulatory control, representing a major technological endeavour associated with extreme volumes of contaminated or activated materials. Therefore, prudent verifications will have to be implemented, and knowledge and experience sharing with similar projects abroad from the perspective of both regulator and decommissioning license owner will be necessary.

After obtaining a permit for decommissioning, JAVYS, a.s. implements activities such as dismantling of large-scale components of the primary circuit and the most contaminated equipment (reactor pressure vessels of both units, steam generators, main circulating pumps, primary circuit piping and other technological components). Parallel with the dismantling activities, a continuous process of RAW management, their shipment and release of materials meeting the criteria for release into the environment, takes place. The key element is to ensure that no Ra-contaminated material will be free released from the regulatory control. However, due to the large masses the probability of failure gets higher. Support from the IAEA is therefore crucial to plan for and implement the decontamination works, verification of final status, and proper means of controlled demolition of the Nuclear Island buildings. Once decommission is finished, a thorough site verification will be required and proper methodology will have to be employed and carried out precisely. Experience of the IAEA and its Members States will be crucial at these final steps.

Stage 3 and 4 Decommissioning of A1 NPP in Jaslovske Bohunice

The operation of A1 NPP was terminated in 1979 and decommissioning activities commenced. The whole process has been divided into five subsequent stages, with stage 3 and 4 started from October 2016. Main units included in the decommissioning stage 3 and 4 are technological equipment of the primary circuit, oil management and accessories of turbo-compressors, CO_2 cooling systems, heavy water management, fuel cladding inspection system, steam generators including their accessories, and treatment of sludge from long-term storage. Remediation of contaminated soils and contaminated water will be carried out as well. Decommissioning of external objects of A1 NPP is also continued in this stage. Planned completion date of stage 3 and 4 is 2024 and of the entire decommissioning is 2033. Decommissioning of A1 NPP represents a world-wide unique technical challenge, as it is decommissioned after an INES 4 accident (1977). The difficulty for decommissioning and entailed health and radiation risks are thus raised exponentially, with lots of trans uranium alpha contaminants involved. International cooperation has been proven essential and effective from past TC projects, and will be even more important in the subsequent stages as the decommissioning project

reaches the highest activated/contaminated and largest technology parts of the NPP. Support and advice from experts will be sought after to carry out some specific tasks of A1 NPP's decommissioning.

Strengthening Regulatory Capacity through Human Resource Development

Human resource strengthening is an essential permanent task for the Nuclear Regulatory Authority of the Slovak Republic and other regulatory bodies, such as the Public Health Authority of the Slovak Republic and relevant ministries. Knowledge transfer via workshops, trainings, scientific visits, expert missions, and fellowships is an excellent way for capacity building. The turnover of employees and the increasing needs and requirements in the regulatory field lead to the necessity of continuous training of both junior and senior staff. Agency assistance is required to further improve the regulatory activities in Slovakia, including new activities in the field of deep geological disposal, dry storage of SNF, nuclear and radiation safety and security, radioactive waste management, decommissioning, emergency preparedness, as well as control systems and components.

Implementation of the National Radon Action Plan

The National Radon Action Plan of the Slovak Republic 2020 - 2024, and subsequent actions in the horizon until 2050, provides guidance on the implementation of countrywide radon surveys to determine the annual average volume of radon activities in buildings with accommodation spaces, to identify areas with increased indoor radon prevalence based on measurements of radon in residential premises, and to identify buildings with possible increased presence of indoor radon. The results of radon surveys will be available to the professionals and the lay public. An understandable and up-to-date system will be introduced to provide information to the professionals and the public regarding health risks resulting from radon exposure. The activities of the National Radon Action Plan will be implemented by creating a functional system, by developing methodologies, and by educating the professionals and the lay public on related subjects. The main and long-term strategy of the action plan is to promote healthy behavior and less harmful environment to reduce the risk of lung cancer due to increased exposure to indoor radon in the Slovak Republic.

2.1.4 Radiation Safety Information Management System (RASIMS)

Slovakia is devoted to follow the recommendations and requirements of the IAEA safety standards and is constantly working on the improvement of its infrastructures for radiation safety to best align with these standards. According to RASIMS, national radiation safety infrastructure of Slovakia can be summarized as very good compliance with IAEA safety standards regarding TSA 2 (Occupational radiation protection); average compliance regarding TSA 1 (Regulatory infrastructure), TSA 3 (Radiation protection in medical exposure) and TSA 4 (Public and environmental radiation protection); very low compliance/no info regarding TSA 6 (Education and training in radiation protection) and TSA 7 (Transport safety). For RASIMS 2, in November 2020, a new national focal point was nominated, and as of the end of August 2021, the vast majority of TSA 1 to TSA 6 has been completed and endorsed and TSA 7 is under development. The last Integrated Regulatory Review Service (IRRS) in Slovakia was carried out in 2012, followed by a Follow-Up mission in 2015. The Slovak Government invited IAEA to review the regulatory framework for radiation safety again, and the next IRRS mission is scheduled in 2022.

2.1.5 Main Counterparts in the Field of Nuclear and Radiation Safety and Security

Nuclear Regulatory Authority of the Slovak Republic
Public Health Authority of the Slovak Republic
Ministry of Economy of the Slovak Republic
Ministry of Health of the Slovak Republic

Slovenske Elektrarne
JAVYS
JESS
VUJE

2.1.6 Nuclear and Radiation Safety and Security Outcome

The expected outcome of the proposed technical cooperation programme in the thematic area of nuclear and radiation safety and security is:

Strengthened nuclear and radiation safety and security and reduced amount of radioactive waste and risk of exposure to protect people and the environment from the adverse effects of ionizing radiation.

The expected outcome will contribute to the attainment of SDG 8 – Decent Work and Economic Growth, SDG 12 – Responsible Consumption and Production and SDG 15 – Life on Land.

2.2 HUMAN HEALTH

2.2.1 Legal Framework

Human health care and health protection are supervised by the Ministry of Health of the Slovak Republic. Human health care is ensured in accordance with the provisions of *Act No. 576/2004 Coll. on the Provision of Health Care and Services Related to the Provision of Health Care, Act No. 577/2004 Coll. on the Scope of the Health Care Reimbursed on the Basis of the Public Health Insurance and on Reimbursements for Services Related to the Provision of Health Care*, and Annex No. 2 to *Act No 577/2004 Coll. Content of Preventive Inspections*.

The protection of human health from harmful effects of ionizing radiation is determined and carried out based on *Act No. 87/2018 Coll. on radiation protection* together with *Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation* and *Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation*.

In order to improve the health care services, the National Health Information Centre (NHIC) was established in 2011. It is a state-funded organization founded by the Ministry of Health of the Slovak Republic. NHIC performs tasks in informatization of health service, administration of the National Health Information System, standardization of health informatics, health statistics, and provision of library and information services in the field of medical sciences and health service. It administrates national health registries and national health administrative registries. At international level, NHIC collaborates with the World Health Organization (WHO), the Organization for Economic Cooperation and Development (OECD), the European Statistical Office (EUROSTAT), and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). The National Health Information System was developed in accordance with the provisions of *Act No. 153/2013 Coll. on the National Health Information System*.

Provision of health insurance and supervision of healthcare are in compliance with the provisions of *Act No. 581/2004 Coll. on Health Insurance Companies, Supervision of Health Care and on Amendment to Certain Acts*.

2.2.2 Technical Cooperation in Past and Current Cycles and Main Outcomes

The IAEA has helped Slovakia to improve its cancer services, particularly in radiotherapy. Previous TC projects aimed at the improvement of radiotherapy services, implementation of new treatment techniques, upgrade of tissue banking through radiation sterilization, and enhancement of radiochemical facilities to produce medical radionuclides. Improved treatment was realized for cancer patients through knowledge upgrading, protocols development, and introduction of advanced treatment techniques. Several medical personnel were trained in the application of advanced treatment techniques (3D-CRT, IMRT, SBRT and SRS). Harmonized new treatment protocols and QA/QC protocols were developed. Quality Assurance Team for Radiation Oncology (QUATRO) peer review mission and quality evaluation of radiation therapy practices at the National Cancer Institute's Department of Radiotherapy were provided under the TC projects. Overall, quality of radiotherapy service was enhanced and waiting time for patients was reduced in Slovakia.

There is one ongoing project related to human health for TC programme cycle 2020-2021, SLR6006 *Implementing Special Radiation Techniques*, aiming to improve radiotherapy services in Slovakia. Within the framework of this project, participation in training courses by the European Society for Radiotherapy and Oncology (ESTRO), national training courses, scientific visits, expert missions including Quality Assurance Team for Radiation Oncology (QUATRO), and provision of equipment are expected.

2.2.3 Technical Cooperation for Future Cycles Based on National Priorities

In the field of human health, main priorities are identified in the strategic documents *Act No. 87/2018 Coll. on radiation protection, Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation, Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation*, *Europe's Beating Cancer Plan* and *Agenda 2030*. The main priority is quality enhancement of the provided human health care with reduced exposure to radiation for patients, and support the monitoring and evaluation of cancer control strategies and programmes. Extremely important is the knowledge transfer from high level medical institutions in the world to research and clinical spheres in Slovakia through participation to conferences and trainings, fellowships, scientific visits, and expert missions.

Quality of health care needs to be improved constantly at all level, such as active prevention, early detection, accurate diagnosis, and treatment. Capacity building, knowledge transfer, implementation of new methods and techniques, as well as modernization of the medical technology are effective tools to achieve such improvement.

Quality Assurance of Mammography Services

Mammography is one of the basic practices for screening breast cancer. Safe and efficient implementation of screening for female breast malignancies in the 50-69 age group needs to be ensured by sufficient number of mammography screening sites and trained personnel, making quality review of existing screening sites and certification of new sites among the priorities. 16 screening mammography sites are available but have not been assessed by clinical audits yet. Clinical audits, such as QUATRO and QUANUM are to be carried out as part of the quality assurance in radio diagnostics, radiation oncology and nuclear medicine. Clinical audits are designed to evaluate quality management of all aspects of radiological examination, including clinical outputs, effectiveness, patients' well-being at examination, etc. Also, clinical audits serve to optimize the radiation load and to evaluate the dose and the quality of the digital image. It is essential to develop continuous training programmes for related health care professionals and to monitor proper use of healthcare facilities by introducing a quality programme in radiology. QUAADRIL is a suitable audit tool for Quality Management and comprehensive clinical audits of diagnostic radiology services. The aims will be to organize and review quality audits as a basis for reducing doses to patients and staff in the radiology department, to develop methodological practices, and to gain experts' guidance on quality evaluation and assurance in radiological workplaces.

2.2.4 Main Counterparts in the Field of Human Health

Ministry of Health of the Slovak Republic
National Cancer Institute
St. Elisabeth Cancer Institute
Eastern Slovak Cancer Institute
Slovak Medical University in Bratislava

2.2.5 Human Health Outcome

The planned outcome of the proposed technical cooperation programme in thematic area of human health is:

Increased access to improved mammography services for women and enhanced radiotherapy services.

The planned outcome will contribute to the attainment of SDG 3 – Good Health and Well-Being.

2.3 NUCLEAR KNOWLEDGE DEVELOPMENT AND INNOVATION

2.3.1 Legal Framework

Nuclear research and transfer of results to practical use are supervised by the Ministry of Education, Science, Research and Sport of the Slovak Republic. It coordinates the implementation, evaluation, and development of research infrastructures and their link to national science and technology policy priorities. The ministry closely collaborates with research institutes such as the Slovak Academy of Sciences, the Comenius University, and the Slovak University of Technology. Governmental support of research and technology transfer is linked with strategic documents *the National programmes of Research and Development for years 2019-2023 with a View to 2028* and *Research and innovation strategy for intelligent specialization of the Slovak Republic,* and is performed in accordance with the provisions of *Act no. 172/2005 Coll. on the Organization of State Support for Research and Development* and on the amendment of *Act no. 575/2001 Coll. on the Organization of Government Activities and the Organization of the Central State Administration*.

To support nuclear research for industrial, health, and environmental applications*, the Current Research Information System* (CRIS), which contains information on research projects and their results, was developed. CRIS also has a registry of research and development organizations, a database of researchers, and a statistical survey of the potential of research and development.

Slovakia is a party of several bilateral and multilateral scientific and technical agreements, actively promoting the involvement of research teams and national technology platforms to the European Research Area, a system of scientific research programmes integrating the scientific resources of the EU, and to the international research centers and research infrastructures.

Roadmap of research infrastructures - SK VI Roadmap 2020 - 2030 is a key document of the Slovak Republic for the field of research, including nuclear research. It monitors the development and the state of significant public and private research infrastructure in the Slovak Republic and its connection to the economy, domains of smart specialization, international cooperation in the context of *European Strategy Forum on Research Infrastructures* (ESFRI) and the framework programme of the European Union in the field of research and innovation for 2021-2027 *Horizon Europe*. At the same time, it focuses on transforming the results and outputs of the fundamental research into practice and specifies the conditions and processes for identifying, monitoring and supporting the development and gradual internationalization of research infrastructure of the Slovak Republic. It defines the systemic framework for policies and activities in the field of research infrastructures at national and international level. Slovakia implemented the ESFRI, which became operational in April 2002. The role of ESFRI is to promote a mutual approach to research infrastructure in Europe and to act as an incubator for international negotiations on specific initiatives.

As part of *the Joint Programming Initiative* (JPI), the Slovak Republic is also involved in the EU programme *Joint Programme in Neurodegenerative Disease Research* (JPND).

The European Union Strategy for the Danube Region is a macroregional strategy that represents a new form of regional cooperation within the EU. It was approved by the EU Council in June 2011. The main goal of the Danube Strategy is to strengthen the cooperation among the countries of the Danube region, to settle common issues, to make more efficient use of existing resources, and to increase participation in EU programmes within the framework of enhanced cooperation.

2.3.2 Technical Cooperation in Past Cycles and Main Outcomes

Nuclear knowledge development and innovation is a thematic area that has been developing rapidly, and the outcomes and findings are applied to various thematic areas, such as industrial, healthcare, and environmental applications and nuclear and radiation safety and security. Therefore, it is an area that cannot be omitted. Past projects have focused on capacity establishment in the protection of environment against radioactive contamination, development of nuclear analytical techniques, and assessment of impacts of nuclear and non-nuclear energy technologies on the environment through radionuclide monitoring. Through these projects, several laboratory staff were trained in sampling and radioanalytical techniques for monitoring of radionuclides in the environment; new sampling and radioanalytical protocols and sampling strategies were developed and implemented; radionuclide analysis of environmental samples were carried out; validation and harmonization of sampling protocols were developed and applied in the laboratory work, and contamination of air and biota by heavy metals was assessed. Procurement support from the IAEA was provided for the establishment of Centre of Nuclear and Accelerator Technologies at Comenius University in Bratislava, including the delivery of the PIXE (Particle Induced X ray Emission) and PIGE (Particle Induced Gamma rays Emission) beam line systems and a multi-analytical spectrometric system used for non-destructive testing, to investigate archaeological and culturally historical materials, and to support nuclear, material, environmental and biomedical research. Overall capacity for monitoring of radionuclides in the environment has been improved.

2.3.3 Technical Cooperation for Future Cycles Based on National Priorities

IAEA's assistance on capacity building, knowledge sharing, and establishment of international cooperation and partnership in the following areas are sought after: nuclear structure and neutron-cross section measurements for non-destructive analysis application; environmental radionuclides monitoring; detection techniques using gamma-spectrometry; capacity building on assessment of radiation exposure; development of fiber-reinforced self-compacting heavyweight concrete for geological disposal.

Nuclear Structure and Neutron-Cross Section Measurements for Non-Destructive Analysis Application

Neutrons will be used to study nuclear structure of stable isotopes, specifically with respect to nuclear deformation. In addition to that, studies of cross sections can be performed. Non-destructive analysis (NDA) is an important technique for ensuring the integrity of critical components. As part of the regulations, reactor systems which contain the primary reactor coolant are required to be checked when manufactured and be thoroughly inspected during shutdowns for damage of excessive wear. To reduce the time and cost associated with these tasks, technicians need to be able to quickly identify if and where a component has failed.

The printed circuit heat exchanger (PCHE) is one of the compact new class heat exchangers that can sustain high pressure difference. The PCHE is characterized by high surface area density, while having high effectiveness, and by general reduction in size. The design life is approx. 60 years which is comparable to nowadays life of the reactor. However, PCHE has limitations that are the same as those of plate-fin heat exchangers, with cleaning virtually impossible in the tiny fluid passages, and design-code issues, with no approved material certified to be used in nuclear available. Printed circuit heat exchangers have channels which are far too small to allow for visual inspection and are dense enough to severely limit ultrasonic imaging capability of the internal geometry. One of the evolving methods of NDA is neutron radiography, which uses fast neutrons produced by subcritical assemblies, nuclear reactors, or accelerators to penetrate dense objects. Neutron radiography has its own benefits. Neutrons easily pass through metals unlike x-rays which are scattered or absorbed by the electrons of

high-Z elements such as iron, nickel, and chromium. Moreover, various materials with high absorption cross sections can be used to backfill PCHE channels to ease the detection of possible damages and defects. Since PCHE is a promising technology for application in Generation IV nuclear systems, research on nuclear structure and neutron-cross section measurements for NDA application should be beneficial for the future of nuclear industry in the world facing the demand of a clean and efficient energy.

Improving Environmental Monitoring of Radionuclides and Heavy Metals

The assessment of impacts of the operation of nuclear power plants on terrestrial and aquatic environment requires further improvements on capabilities for monitoring of radionuclides in the environment in Slovakia. This is especially important during the next few years when the two new reactors in the Mochovce NPP will be put into operation. Decommissioning of the two NPPs in Jaslovske Bohunice also requires monitoring of radionuclides in the environment to assess radioactivity impact on humans and the environment, assuring the public that the operation of NPPs has hardly a measurable signature in the environment. The focus will be on long-lived radionuclides, which will be analysed by accelerator mass spectrometry (AMS) and by high-sensitive gamma-spectrometry. The AMS line, as part of the existing tandem acceleratory laboratory in the Centre for Nuclear and Accelerator Technologies (CENTA), will be installed and should be operational from 2022. The AMS technology will fill the gap of analysis of actinides (Pu and U isotopes, and others) in the environment in Slovakia. The CENTA, a modern research and educational centre of excellence, will bring new applications of AMS, ion beam analysis and ion beam modification of materials for radioecological, environmental, life and material sciences. The accelerator technologies will also be applied on the analyses of heavy metals in the air, biota, and water samples. The new analytical techniques should be sensitive enough for assessing operations under normal conditions. Meanwhile, they should be robust enough to be applied during possible nuclear accidents in Slovakia and Europe.

Capacity Building on Assessment of Radiation Exposure

Environmental and food chain radioactivity monitoring are implemented in accordance with the Slovak legislation. Radiation protection authorities in the field of health have the obligations to inform the impact of ionizing radiation on public health and to participate in emergency response preparedness. The problem identified is that obligations are hard to fully fulfilled due to the absence of data on effective dose calculations. It is therefore essential to develop a functional system through structural change, further capacity building, and introduction of standard methodologies for this purpose. Within this system, development of a strategy for expertise building in radiation monitoring is necessary. Therefore, uniform standard methodologies for calculating efficient dose will be developed and the introduction of an automated calculation system for the purpose of public health impact assessment will be ensured.

Development of Fiber-Reinforced Self-Compacting Heavyweight Concrete for Geological Disposal

Ordinary Portland cement has been considered for many years the benchmark structural material for durable buildings and specific infrastructures such as biological shielding in the nuclear power plant or nuclear waste disposal. The conditions in very deep boreholes with a depth of up to about 5000 meters may be similar to those found in a geothermal well: high temperature, high water pressure, and with the risk of concrete structure degradation due to the undesired transformation of primary hydration products CSH to α-C2SH and C6S2H3 (jaffeite) above 120 °C. To overcome these conditions, a specific class of fiber-reinforced heavyweight concrete based on Modified Oil-Well cement (with supplementary cementitious materials including bentonite) is highly required. This fiber-reinforced heavyweight concrete should be able to meet both the functional and structural demands of deep

geological disposal, with proven resistant to harsh hydrothermal conditions and with performed attenuation capacity.

Not only suitable for very deep boreholes, the fiber-reinforced heavyweight concrete is also for deep geological repository. The resistance of the material against radiation and environmental effects is extremely important. As the deep geological repository in Slovakia is planned to be built at the depth of 1200 m, where the geological conditions are more burdensome than in shallow depth, use of more resistant materials is considered. Also, it is necessary to take into account the possible change of chemical structure of the used material in such depth. Therefore, such resistant material is considered.

2.3.4 Nuclear Research

To facilitate and broaden nuclear applications, Slovakia is also interested in the following research topics, which may possibly be supported by the IAEA with research programme resources and other relevant or extrabudgetary funds, rather than the technical cooperation fund.

- **Nuclear Structure of Exotic Isotopes (Au and Bi)**

  This region of nuclear chart is known to exhibit coexistence of various nuclear shapes and is accessible with heavy-ion beams produced with cyclotrons. Several deformation parameters will be studied by means of in-beam gamma-ray spectroscopy and spectroscopy of isomeric transitions. Experimental part of the project will be performed in the Accelerator laboratory of University of Jyväskylä (Finland) using the MARA separator of products of nuclear reactions. Unique detection system, developed at the Institute of Physics, Slovak Academy of Sciences, will be employed at the focal plane of the separator. It will allow to increase the beam current by at least factor of 10, compared with existing data, and will undoubtedly bring a new insight into the structure of extremely neutron-deficient nuclei. Important data helping us to understand the mechanism of nuclear deformation, both axial and triaxial, will be collected. Although, these parameters significantly influence many properties of atomic nuclei, including nuclear decay and fission, we do not have their satisfactory model description.

- **Spectroscopy of Low-Energy Conversion Electrons for the Development of Targeted Auger Therapy**

  Conversion electrons with low energies are very powerful tool to study nuclear structure as they carry information about the multipolarity of transitions. Methods developed to detect them may also have an enormous impact on fundamental physics and on nuclear medicine. The nuclear structure of neutron-deficient odd-Au isotopes will be studied, and results of study will support the development of the technique of targeted Auger Therapy. There are two main aspects associated with the development of efficient radiopharmaceuticals based on Auger Emitters: a) the availability of suitable Auger-emitting radionuclides for therapy and b) the design of targeting vectors which can deliver Auger emitters into/close to the nucleus. The first aspect is addressed under present review. Targeted Auger Therapy represents great potential for the therapy of diseases which require a high degree of selectivity on the cellular level (e.g. for therapy of metastatic cancers).

- **Resistance Improvement of Reactor Vessels Against Ionizing Radiation**

  Development of new steel materials for reactor vessels with improved resistance is among the key topics in the field of Nuclear and Radiation Safety and Security. It will help to prolong the lifetime of vessels and their reliability in critical situations. In addition, there will not be a need for early exchange of vessels, therefore this solution is more economical. Usage of a material with improved resistance leads to significant improvement of secure operation of

reactor vessels and decreases the negative effects on the environment, especially in case of possible risks. At the same time, a unique database of construction materials used in V1 NPP during its operation will be created.

- **Radiation Shielding Performance of Fiber-Reinforced Heavyweight Concrete Exposed to Long-Term Irradiation**

  Resistant shielding materials play a crucial role in the field of Nuclear and Radiation Safety and Security. Therefore, development of such materials is important. For minerals that constitute concrete aggregate, irradiation can cause volumetric and mechanical changes. Extension of the experimental database from XRF (or Neutron) Tomography image before and after irradiation by gamma-rays, its comprehensive processing of image and description of irradiation implications to strategic concrete structures is then needed. A set of commonly used heavyweight aggregate and newly proposed minerals for heavyweight concrete as well as multicomponent cement will be assembled.

- **New Types of Fuel Elements in Reactors**

  Investigation on usage of reprocessed SNF will be carried out to reduce the economic and environmental impact of SNF disposal and the volume of stored radioactive waste. Meanwhile, research on new types of fuel elements for usage in reactors will be conducted. The new type of fuel will have a higher density of uranium, which increases the efficiency of its use. The design of fuel assemblies will be optimized such a way, that the thermal output of the reactor active zone could remain the same even with a reduced level of uranium 235 enrichment. The investigation will promote technological progress in the application of modern fuel elements and effective usage of nuclear fuel in nuclear power engineering.

2.3.5 Main Counterparts in the Field of Nuclear Knowledge Development and Innovation:

Ministry of Education, Science, Research and Sport of the Slovak Republic
Ministry of Health of the Slovak Republic
The Public Health Authority of the Slovak Republic
Slovak Academy of Sciences
Institute of Physics of the Slovak Academy of Sciences
Institute of Construction and Architecture of the Slovak Academy of Sciences
Comenius University

2.3.6 Nuclear Knowledge Development and Innovation Outcome

The planned outcome of the proposed technical cooperation programme in the thematic area of nuclear knowledge development and innovation is:

Strengthened capacity and established international cooperation for nuclear knowledge development for industrial and environmental applications in Slovakia.

The planned outcome will contribute to SDG 6 – Clean Water and Sanitation, SDG 8 – Decent Work and Economic Growth, SDG 9 – Industry, Innovation and Infrastructure, SDG 12 – Responsible Consumption and Production and SDG 14 – Life Below Water.

3. RESULTS MATRIX

Nuclear and Radiation Safety and Security

Nuclear and Radiation Safety and Security Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Strengthened nuclear and radiation safety and security and reduced amount of radioactive waste and risk of exposure to protect people and the environment from the adverse effects of ionizing radiation.	*Shortage of specialised staff*	*Number of experts trained and actively using newly acquired skills in desired fields by 2027*	*Training certificates/reports*	*Assumptions:* *1. Continuous Government support;* *2. Trained staff remain on board and apply gained knowledge and experience to future work;* *3. Timely approval of all necessary documentation/certification;* *4. Successful testing of acceptance/operation;* *5. Successful implementation of activities and termination of stages as planned.* *Risks:* *1. Unavailability of suitable hosts/experts;* *2. Lack of technology, methodologies and competent staff;* *3. Delay in progress during implementation of activities;* *4. Negative results of the Geological Survey;*
	No Deep Geological Repository and construction methods	*Site selected by 2025, construction methods elaborated*	*project reports/documents, national reports/documents*	
	Lack of free storage capacity, 90.08 % of maximal designed capacity already used	*New Storage Facility operational by 2025 with staff trained and actively using their newly acquired skills*	*Training certificates/reports, project reports/documents, national reports/documents*	
	No facility for melting metal radioactive waste	*New Facility for Melting Metal Radioactive Waste established by 2025 with staff trained and actively using their newly acquired skills*	*Training certificates/reports, project reports/documents, national reports/documents*	
	Decommissioning of V1 NPP at stage 2 and decommissioning of A1 NPP at stage 3 and 4	*Final stage (stage 2) decommissioning of V1 NPP finished by 2025; stage 3 and 4 decommissioning of A1 NPP completed by 2024 and final stage (stage 5) started*	*project reports/documents, national reports/documents, guides*	
	Missing radon level monitoring	*Activities related to radon monitoring and exposure reduction implemented in accordance with the National Radon Action Plan by 2027*	*project reports/documents, national reports/documents, recommendations developed for reduced radon exposure in residence areas*	

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
Institutional capacities of Nuclear Regulatory Authority and Public Health Authority improved to fulfil their mandates in line with international safety standards	*2022-2023, 2024-2025, 2026-2027*	*Nuclear Regulatory Authority, Public Health Authority*	*€140,000*		*€140,000*
Storage capacity for permanent disposal of spent nuclear fuel enhanced	*2024-2025, 2026-2027*	*JAVYS, Ministry of Economy*	*€300,000*		*€300,000*

Operational personnel of the facility trained and educated for melting metal radioactive waste management	*2024-2025, 2026-2027*	*JAVYS, JESS*	*€170,000*	*€20,000*	*€150,000*
Radioactive waste management improved	*2024-2025, 2026-2027*	*JAVYS, JESS, SE*	*€100,000*		*€100,000*
Decommissioning management improved	*2022-2023, 2024-2025, 2026-2027*	*JAVYS, VUJE, SE*	*€300,000*		*€300,000*
Institutional capacities for environmental radon monitoring improved	*2024-2025, 2026-2027*	*Ministry of Health* *Relevant national professional institutions*	*€130,000*	*€16,000*	*€114,000*

Nuclear and Radiation Safety and Security Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€1,140,000	*€36,000*	*€1,104,000*

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Human Health

Human Health Outcome[s]	Baseline	Indicator	Means of Verification	Assumptions/risks
Increased access to improved mammography services for women and enhanced radiotherapy services.	*Lack of quality assurance personnel*	*Number of skilled quality assurance staff in operation by 2027*	*Website of Ministry of Health, national expert statistics, training certificates and reports*	*Assumptions:* *1.Adequate resources are allocated in a timely manner;* *2. Continuous Government support;* *3. Trained staff remain on board and apply knowledge and experience gained to work.* *Risks:* *1.Budget limitation;* *2. Delay in progress during implementation of activities;* *3. Employee turnover.*
	16 screening mammography sites are available but have not been assessed by clinical audits	*Number of clinical audits implemented by 2027*	*National statistics of mammography, website of Ministry of Health, project reports and documents*	
	Lack of periodical assessment on cancer control capacities and needs	*At least one imPACT Review conducted by 2027*	*imPACT Report and MoH action plan to implement the imPACT recommandations*	

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B=C)
Screening mammography safety standards developed *Audit Teams on Quality on Radiology are established at a national level*	*2024-2025, 2026-2027*	*Ministry of Health* *Relevant national professional institutions*	*€68,000*	*€13,000*	*€55,000*

Human Health Subtotals

Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
€68,000	*€13,000*	*€55,000*

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Nuclear Knowledge Development and Innovation

Nuclear Knowledge Development and Innovation Outcome[s]	Baseline	Indicator	Means of Verification	Assumptions/risks
Strengthened capacity and established international cooperation for nuclear knowledge development for industrial and environmental applications in Slovakia.	*Insufficient knowledge on new non-destructive analysis application*	*Number of persons trained and using their newly acquired skills in related fields by 2027*	*Training certificates and reports*	*Assumptions:* *1.Research required technology available;* *2.Timely and sufficient training of related personnel;* *3. Continuous Government support.* *Risks:* *1.Unavaiblity of required resources, such as equipment, technology, suitable host institutes and experts;* *2. Budget limitation;* *3. Delay and cancellation of planned activities.*
	Lack of equipment and knowledge to analyse actinides in the environment	*Number of persons trained and using their newly acquired knowledge in related fields and number of established cooperation partnerships by 2027*	*Training certificates and reports, partnership/cooperation framework*	
	Unavailable of resistant material for the deep geological repository	*Progress made in the development of the new material by 2027*	*Scientific reports and publications, project/research/national documents/reports*	
	Absence of data on effective dose calculations	*Number of persons trained and using their newly acquired knowledge in related fields and progress made in the development of a functional system and uniform methodologies for calculating efficient dose by 2027*	*Training certificates and reports project/research/national documents/reports*	

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B=C)
Human resource capacities in neutron-cross section measurements enhanced *New method for non-destructive analysis developed*	*2024-2025*	*Institute of Physics, Slovak Academy of Sciences*	*€250,000*		*€250,000*
Human Resource Capacity in radioanalytical techniques developed	*2024-2025*	*Comenius University*	*€1,408,000*	*€1,340,000*	*€68,000*
More resistant material developed for geological disposal	*2024-2025, 2026-2027*	*Slovak Academy of Sciences, Institute of Construction and Architecture*	*€30,000*	*€15,000*	*€15,000*
Human resource capacities in the assessment of radiation exposure developed	*2024-2025*	*Ministry of Health* *Relevant national professional institutions*	*€110,000*	*€41,000*	*€69,000*

Nuclear Knowledge Development and Innovation Subtotals

Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
€1,798,000	*€1,396,000*	*€402,000*

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

3.1. RESOURCES SUMMARY TABLE

Thematic Area	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)	
Nuclear and Radiation Safety and Security	*€1,140,000*	*€36,000*	*€1,104,000*	*(+)*
Human Health	*€68,000*	*€13,000*	*€55,000*	
Nuclear Knowledge Development and Innovation	*€1,798,000*	*€1,396,000*	*€402,000*	
	Total estimated overall cost for CPF	**Total estimated resources* available for CPF**	**Total resources to be identified/mobilised**	
	€3,006,000	*€1,445,000*	*€1,561,000*	*(=)*
	<u>Estimated government cost sharing</u> (included in the above total of resources* available -B)		*€1,394,000*	
	<u>Other estimated extrabudgetary contributions</u> from donors/partners who have expressed interest (included in the above total of resources* available - B)		*€0*	
	<u>Estimated in-kind contributions</u> from the Government and other partners/donors that have expressed interest (included in the above total of resources available - B)**		*€51,000*	

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the Country Programme Framework.
(**)-This estimate should reflect the total estimated value (in Euros) of in-kind contributions provided by the Member State to carry out the planned programme (in-kind examples: time of staff, infrastructure, materials, equipment, repairs, construction work, sampling costs, shipment costs, etc.)

4. PROGRAMME IMPLEMENTATION AND SUPPORT

4.1 CPF COORDINATION

The preparation of this CPF was coordinated and monitored by the Nuclear Regulatory Authority of the Slovak Republic as the institution hosting the NLO office, and the Programme Management Officer (PMO) at the Division of Europe of the IAEA Department of Technical Cooperation. The PMO coordinated the relevant inputs from the IAEA Technical Departments, as well as the IAEA's Programme of Action for Cancer Therapy (PACT) and the Division for Programme Support and Planning at the IAEA's Department of Technical Cooperation. The CPF is the result of close engagement of relevant stakeholders such as line ministries and potential counterpart institutes that will be implementing the proposed programme. The National CPF Coordinator identified and coordinated the activities with the Ministry of Economy, Ministry of Health, Ministry of Education, Science, Research and Sport, and National institutes and Authorities listed in the Results Matrix to participate in the preparation process. In addition, the National CPF Coordinator provided consultations to Ministry of Health of the Slovak Republic and several research institutes, such as Slovak Academy of Science and Universities, in order to identify their needs based on thematic areas, that can be implemented as future TC projects. The mutual cooperation helped to prepare the document effectively and according to national priorities. All stakeholders involved in the development of the CPF were kept informed to ensure ownership. The key stakeholders involved in the development of this CPF include:

Stakeholder(s)	Role in CPF development
The Nuclear Regulatory Authority of the Slovak Republic	Coordinator of the development of the CPF at national level
Public Health Authority of the Slovak Republic Ministry of Economy of the Slovak Republic Ministry of Health of the Slovak Republic Ministry of Education, Science, Research and Sport of the Slovak Republic Slovak Academy of Sciences Comenius University JAVYS JESS Slovenske Elektrarne VUJE	Key stakeholders/Potential counterparts of TCP proposed under the framework of this CPF; Provide information on assistance required in different thematic areas to address national development priorities.

4.2 Future Review of CPF

Future reviews of progress under this CPF will be ongoing throughout the lifetime of this CPF and will be carried out before the end of each TC programme cycle. The knowledge gained from the review of the CPF will serve to better prepare new project proposals for the following TC programme cycle. The results of closed projects will be evaluated based on national priorities and discussed in future CPF as part of review process. The review will consider achieved progress in national priorities and level of their fulfilment, including the consideration of any significant changes (positive or negative) that have affected realization of TC programme and implementation of TC projects. The future review of CPF will be carried out based on valid strategic national documents and laws and will incorporate all national priorities, especially in the field of Nuclear and Radiation Safety and Security. The review will be led by the PMO at the Division of Europe of the IAEA's Department of Technical Cooperation and the NLO at the Nuclear Regulatory Authority of the Slovak Republic. The mid-term review will be carried out in 2024 and the final review and update towards the following CPF will be made latest in 2026, one year prior to the expiration of this CPF.

4.3 Partner Coordination

Slovakia became member of the United Nations on 19 January 1993 as one of the successor states after the division of the former Czech and Slovak Federal Republic. Slovakia, as part of former Czechoslovakia was one of the founding members of the UN in 1945. As a member of the United Nations, Slovakia adopted the *Agenda 2030* for Sustainable Development Goals at its core. National priorities integrate the 17 SDGs along with country-specific objectives. These priorities focus on strengthening nuclear and radiation safety and security, ensuring the peaceful use of nuclear techniques and technology, reducing radioactive waste to protect people and the environment from the adverse effects of ionizing radiation, enhancing human health care services with reduced exposure to radiation for patients, and establishing research capacity and international cooperation for nuclear research for industrial, health, and environmental applications.

Slovakia has been a member of the European Union since 1 May 2004. The membership has opened up new economic opportunities for the country whilst bringing free movement of goods, services, capital and people. In 2007 Slovakia joined the Schengen Area. Thanks to EU membership, Slovakia participates in the Common Foreign and Security Policy, which strengthens the country's position on the international political landscape. Being an EU member also brings the right to be fully engaged in the Union's decision-making, particularly via the Council of the EU. In return, Slovakia has transferred some of its powers to the EU institutions. For instance, it has ceded some powers in trade and agricultural policies, as well as in environmental and technical standards. Slovakia adopted all EU directives, recommendations, regulations and other strategic documents, such as the *Europe's Beating Cancer Plan, which is* considered during the formulation of national priorities.

The national coordinator of the development of this CPF and the implementation of future TCP is the Nuclear Regulatory Authority of the Slovak Republic. For the implementation of the proposed programme under this CPF, the following have been identified as key partners:

National

The Public Health Authority of the Slovak Republic
Ministry of Economy of the Slovak Republic
Ministry of Health of the Slovak Republic
Ministry of Education, Science, Research and Sport of the Slovak Republic
Slovak Academy of Sciences
Comenius University
National Cancer Institute
St. Elisabeth Cancer Institute
Eastern Slovak Cancer Institute
Slovak Medical University in Bratislava
Slovenske Elektrarne
JAVYS
VUJE
JESS

International

EU
OECD/NEA
WHO
CERN
University of Jyväskylä

ANNEX 1: PARTNERSHIP MATRIX

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Relevant Partners
Nuclear and Radiation Safety and Security	National Action Plan of the Slovak Republic National Report of the Slovak Republic prepared in terms of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management The Energy security strategy of the Slovak Republic Policy, Principles and Strategy for Further Development of Nuclear Safety Strategy of a Back-end of Nuclear Energy in the Slovak Republic National Policy and National Programme for the Management of Spent Nuclear Fuel and Radioactive Waste in the Slovak Republic Act no. 541/2004 on the Peaceful use of nuclear energy (Atomic Act) and on amendment and alterations of several acts as amended Decree No. 430/2011 Coll., on details on nuclear safety requirements for nuclear facilities Agenda 2030 *Goal 1. Continuous Increasing of Nuclear Safety and Security in Slovakia* *Goal 2. Strengthening of Principles for Protection of the Population and Environment Against Ionizing Radiation* *Goal 3. Systematic Improving of Decommissioning Management, SNF Management and RAW Management*	*Strengthened nuclear and radiation safety and security and reduced radioactive waste to protect people and the environment from the adverse effects of ionizing radiation.*	*SDG 12 – Responsible Consumption and Production* *SDG 15 – Life on Land* *SDG 8 – Decent Work and Economic Growth*	*National:* *VUJE* *JAVYS* *JESS* *Slovenske Elektrarne* *Nuclear Regulatory Authority* *Public Health Authority* *Ministry of Economy* *International:* *EIB* *EU* *OECD/NEA*

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Relevant Partners
Human Health	Strategic framework of health care for the years 2014 - 2030 Act No. 87/2018 Coll. on radiation protection Decree No. 101/2018 Coll. laying down details on ensuring radiation protection during medical irradiation Measure No. 102/2018 Coll. establishing diagnostic reference levels of medical irradiation Europe's Beating Cancer Plan Act No. 576/2004 Coll. on the Provision of Health Care and Services Related to the Provision of Health Care Act No. 577/2004 Coll. on the Scope of the Health Care Reimbursed on the Basis of the Public Health Insurance and on Reimbursements for Services Related to the Provision of Health Care Agenda 203é *Goal 1. Increasing of Radiation Safety and Security of Human Health in Slovakia* *Goal 2. Increasing of the Quality of Provided Health Care*	*Increased access to improved mammography services for women and enhanced radiotherapy services.*	*SDG 3 – Good Health and Well-Being*	<u>*National:*</u> *Ministry of Health* *National Cancer Institute* *St. Elisabeth Cancer Institute* *Eastern Slovak Cancer Institute* *Slovak Medical University in Bratislava* <u>*International:*</u> *WHO*/Europe IARC Breast Health Global Initiative (BHGI) EIB
Nuclear Knowledge Development and Innovation	Road map of research infrastructures - SK VI Roadmap 2020 – 2030 National programmes of Research and Development for years 2019-2023 with a View to 2028 Research and innovation strategy for intelligent specialization of the Slovak Republic The European Strategy Forum on Research Infrastructures Act no. 172/2005 Coll. on the organization of state support for research and development and on the amendment of Act no. 575/2001 Coll. on the organization of	*Strengthened capacity and established international cooperation for nuclear knowledge development for industrial and environmental applications in Slovakia.*	*SDG 6 – Clean Water and Sanitation* *SDG 8 – Decent Work and Economic Growth* *SDG 9 – Industry, Innovation and Infrastructure* *SDG 12 – Responsible Consumption and Production* *SDG 14 – Life Below Water*	<u>*National:*</u> *Ministry of Education, Science, Research and Sport* *Ministry of Health* *The Public Health Authority* *Slovak Academy of Sciences* *Institute of Physics of the Slovak Academy of Sciences* *Institute of Construction and Architecture of the Slovak Academy of Sciences* *Comenius University* *SLovenske Elektrarne*

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Relevant Partners
	government activities and the organization of the central state administration Agenda 2030 *Goal 1. Support of Nuclear Research in Slovakia* *Goal 2. Strengthening of the transfer of new nuclear methods and technology from research to industry* *Goal 3. Support and speed up the innovation process*			*International:* *EIB* *CERN*

ANNEX 2: LIST OF PARTICIPATING INSTITUTIONS

The Nuclear Regulatory Authority of the Slovak Republic
Main coordinator of TCP and responsible for state supervision over nuclear safety and security in Slovakia.

Public Health Authority of the Slovak Republic
Counterpart and responsible for the state health policy in the field of public health and of development trends in the sphere of public health in the Slovak Republic.

Ministry of Economy of the Slovak Republic
Counterpart and responsible for power engineering including nuclear fuel management and radioactive waste storage, as well as exploration and mining of radioactive raw materials.

Ministry of Health of the Slovak Republic
Counterpart and coordinator of TC projects in the field of Human Health for Oncology institutes and hospitals, and responsible for health care, health protection, health insurance and control of the ban on biological weapons.

Ministry of Education, Science, Research and Sport of the Slovak Republic
Counterpart and responsible for elementary, secondary and higher education, educational facilities, lifelong learning, science and for the state's support for sports and youth.

Slovak Academy of Sciences
Counterpart and responsible for realization of fundamental and applied research in a wide range of technical, natural, humanistic and social sciences, including nuclear research.

Comenius University
Counterpart and responsible for the advancement and dissemination of knowledge and its understanding, preparation of study programmes and realization of research in almost all scientific disciplines.

JAVYS
Counterpart and responsible for ensuring operation, maintenance and decommissioning of nuclear facilities, SNF management and SNF transportation as well as RAW management and RAW transportation.

JESS
Counterpart and responsible for building of a state-of-art nuclear power plant with an objective to generate electricity safely and effectively.

Slovenske Elektrarne
Counterpart and responsible for supply of the electricity and providing of ancillary services in Slovakia.

VUJE
Counterpart and responsible for providing services to support and operate the transmission and distribution systems in the field of nuclear power engineering.

ANNEX 3: LEGAL FRAMEWORK

IAEA-Relevant Treaties (Updated in August 2021)

Agreements

- Agreement on the Privileges and Immunities of the IAEA
- Vienna Convention on Civil Liability for Nuclear Damage
- Convention on the Physical Protection of Nuclear Material
- Amendment to the Convention on the Physical Protection of Nuclear Material
- Convention on Early Notification of a Nuclear Accident
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency
- Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention
- Convention on Nuclear Safety
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Technical Cooperation Agreement

- Revised Supplementary Agreements Concerning the Provision of Technical Assistance by the IAEA (RSA)

Safeguards Agreements

- Application of safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons
- Application of safeguards in implementation of Article III (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (with Protocol)
- Prot.Add. to Agreement between the Rep. Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Rep. of Finland, the Federal Rep. of Germany, the Hellenic Rep., Ireland, the Italian Rep., the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Rep., the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the IAEA in Implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons

CPF-Relevant Acts of Slovakia

- Act No. 50/1976 Coll. on Spatial Planning and Building Regulation (Building Act) as amended by later acts
- Act no. 541/2004 Coll. on the Peaceful use of nuclear energy (Atomic Act) and on amendment and alterations of several acts as amended
- Act No. 576/2004 Coll. on the Provision of Health Care and Services Related to the Provision of Health Care
- Act No. 577/2004 Coll. on the Scope of the Health Care Reimbursed on the Basis of the Public Health Insurance and on Reimbursements for Services Related to the Provision of Health Care
- Act No. 581/2004 Coll. On Health Insurance Companies, Supervision of Health Care and on Amendment to Certain Acts
- Act no. 172/2005 Coll. on the organization of state support for research and development and on the amendment of Act no. 575/2001 Coll. on the organization of government activities and the organization of the central state administration

- Act No. 24/2006 Coll. on the environmental impact assessment and on the amendments and supplements to some acts as amended by later acts and on the amendments and supplements to some acts
- Act No. 124/2006 Coll. on occupational health and safety
- Act No.125/2006 Coll. on labour inspection
- Act No. 238/2006 Coll. on the National Nuclear Fund for decommissioning of nuclear installations and for management of spent fuel and radioactive waste (the Nuclear Fund Act) and on the amendments and supplements to some acts
- Act No. 21/2007 Coll. on dual-use goods and technologies and amending and supplementing some acts
- Act No. 153/2013 Coll. on the National Health Information System
- Act no. 54/2015 Coll. on civil liability for nuclear damage and its financial coverage and on amendments to some acts
- Act No. 18/2018 Coll. on Personal Data Protection and amending and supplementing certain acts
- Act No. 87/2018 Coll. on Radiation Protection and on the amendments and supplements to some acts

CPF-Relevant Decrees of Slovakia

- Decree No. 54/2006 Coll. on accountancy for and control of nuclear material as well as notification of selected activities
- Decree No. 55/2006 Coll. on details concerning emergency planning in case of nuclear incident or accident
- Decree No. 57/2006 Coll. on details concerning the requirements for shipment of radioactive material
- Decree No. 430/2011 Coll., on details on nuclear safety requirements for nuclear facilities
- Decree No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
- Decree No. 33/2012 Coll., on the regular, comprehensive and systematic evaluation of the nuclear safety of nuclear equipment
- Decree No. 170/2015 of the Nuclear Regulatory Authority of the Slovak Republic of 6 July 2015 Establishing a List of Radioactive Materials, Their Quantities and Their Physical and Chemical Parameters Justifying the Low Risk of Nuclear Damage
- Decree No. 96/2018 Coll. which Lays down Details on the Activities of the Radiation Monitoring Network
- Decree No. 98/2018 Coll. on the Limitation of Exposure of Workers and the General Public to Sources of Ionizing Radiation
- Decree No. 99/2018 Coll. on Ensuring Radiation Protection
- Decree No. 100/2018 Coll. on the Limitation of the Exposure of the Population from Drinking Water, Natural Mineral Water and Spring Water
- Decree No. 112/2020 laying down the special materials and equipment falling under the supervision of the Nuclear Regulatory Authority of the Slovak Republic

ANNEX 4: DETAILS OF PAST TC PROGRAMME ACHIEVEMENTS

- Slovak Republic joined the IAEA TC programme in 1993.
- Since 1993, 41 national TC projects have been completed under the auspices of the TC programme by the time of the preparation of this CPF. In addition, Slovakia have participated in 12 interregional and 179 regional technical cooperation projects that have been completed by the time of the preparation of this CPF.
- Key areas and major impact include:
    - Nuclear and Radiation Safety and Security
    - Human Health
    - Nuclear Knowledge Development and Innovation

Thematic area	Results of past technical cooperation	Key counterpart institutes and partners
Nuclear and Radiation Safety and Security	*Improved management of decommissioning activities, treatment of RAW, and subsequent free release of non-contaminated material* *Strengthened human resources of Slovak Regulatory Authorities and enhanced regulatory activities in the fields of nuclear and radiation safety and security, radioactive waste management, emergency preparedness, control systems and components, media and public communication, nuclear energy, nuclear materials, and licensing of new nuclear sources*	*Nuclear Regulatory Authority* *Public Health Authority* *Ministry of Environment of the Slovak* *Ministry of Health of the Slovak Republic* *JAVYS* *VUJE*
Human Health	*Trained medical staff in the application of advanced treatment techniques (3D-CRT, IMRT, SBRT, SRS)* *Developed harmonized new treatment protocols and QA/QC protocols* *Conducted Quality Assurance Team for Radiation Oncology (QUATRO) peer review mission* *Performed quality evaluation of radiation therapy practices at the National Cancer Institute's Department of Radiotherapy* *Increased capabilities (skills and standardization) of 3D radiotherapy planning*	*St. Elisabeth Cancer Institute* *National Cancer Institute* *Eastern Slovak Cancer Institute* *Ministry of Health of the Slovak Republic* *Slovak Medical University in Bratislava Hospitals*
Nuclear Knowledge Development and Innovation	*Improved sampling and analytical capabilities for monitoring of radionuclides in the environment* *Developed and implemented new sampling and radioanalytical protocols and sampling strategies* *Validation and harmonization of sampling protocols were developed and applied in the laboratory work*	*Comenius University* *Slovak Academy of Sciences* *Slovak University of Technology* *Research Institutes*

	Assessed heavy metal contamination of air and biota *Supported procurement for the establishment of Centre of Nuclear and Accelerator Technologies at Comenius University in Bratislava, including the delivery of the PIXE (Particle Induced X ray Emission) and PIGE (Particle Induced Gamma rays Emission) beam line systems and a multi-analytical spectrometric system used for non-destructive testing, to investigate archaeological and culturally historical materials, and to support nuclear, material, environmental and biomedical research*