Pursuant to Article 109 of the Rules of Procedure of the National Assembly (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 92/07 – official consolidated version, 105/10, 80/13, 38/17, 46/20, 105/21 – Constitutional Court Decision, 111/21 and 58/23), the National Assembly, at its session of 28 November 2023, adopted the following

**RESOLUTION**

**on Nuclear and Radiation Safety in the Republic of Slovenia for the 2024–2033 period (ReJSV24–33)**

**1. INTRODUCTION**

Radioactivity is a natural phenomenon, so we are constantly exposed to natural sources of radiation as they are a feature of the environment. The utility of using sources of ionising radiation and radioactive materials is undisputed in certain fields and is increasing year by year as society and science evolve, from energy production to medical, industrial and research applications. In the history of the development of the use of sources of ionising radiation and radioactive materials, as well as of nuclear technologies since the middle of the 20th century, awareness of the importance of systematically ensuring the safety of these technologies, particularly in the nuclear power industry, the safe use of all types of ionising radiation, has also increased year by year. The radiation risks to workers, the general public and the environment that may arise from their use need to be assessed and, where necessary, optimised and controlled.

The regulation of safety is the responsibility of the State. However, radiation risks may transcend national borders, and the purpose of international cooperation is to raise awareness of the need to ensure safety at a global level by sharing information, experiences and improving capacities to control hazards, to prevent accidents, to respond to emergencies and to mitigate the adverse consequences of accidents, should they occur.

In the Republic of Slovenia, as in all developed countries, legislation has been developed since the middle of the 20th century that takes into account the requirements of international standards in this area, in particular those of the International Atomic Energy Agency (hereinafter: the IAEA). Since the beginning of the 21st century, the commitment to ensuring nuclear and radiation safety has also been emphasised at the highest political level. This is enshrined in the IAEA's core standard GSR Part 1: Governmental Legal and Regulatory Framework for Safety, Revision 1, 2016. Although the provisions of the IAEA standards are not binding, they are, as a rule, followed by all countries that use nuclear energy. The Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the 2024–2033 Period (hereafter: the Resolution) is also based on the aforementioned standard. The Resolution represents a fundamental political orientation and commitment to nuclear and radiation safety as a priority alongside all other aspects of the use of nuclear technologies and ionising radiation. In the initial part, the Resolution highlights the ten basic safety principles that are taken into account by the legislation of the Republic of Slovenia in this field and then in the following sections describes the main nuclear and radiation practices in the country, the integration of Slovenian regulations into international alliances in this field, the legislation in force and the organisation of state authorities, and emphasises the need for adequate human resources to ensure nuclear and radiation safety. Research and development activities are also linked to this, and public participation and commitment to quality, excellence in leadership and management and a safety and security culture are of particular importance.

Three goals are pursued in ensuring nuclear and radiation safety: the safety of nuclear and radiation facilities, the safe management of radioactive waste and spent fuel, and radiation protection through the safe use of sources of ionising radiation.

In the past, new aspects of safety have been developed, such as the system of nuclear non-proliferation measures and policies (and related measures to ensure effective export controls on dual-use items), the physical protection of nuclear facilities and materials (nuclear security as a broader concept), the safe transport of radioactive and nuclear materials, the protection of patients from exposure in the health sector, protection against natural sources of radiation, in particular indoor exposure to radon, protection against outdoor exposure to radiation from construction materials, etc. That is why the phrase "nuclear and radiation safety" should be understood in its broadest sense and is used in the Resolution whenever the text allows or requires it.

The Ionising Radiation Protection and Nuclear Safety Act [1] (hereinafter: ZVISJV-1) defines nuclear safety as technical and organisational measures to ensure the safe operation of a nuclear facility, prevent emergencies or mitigate the consequences of emergencies, and contribute to the protection of exposed workers, the general public and the environment against ionising radiation. Radiation safety means measures to achieve the safe use of a radiation source or the safe operation of a facility, to prevent emergencies or to mitigate the consequences of such events and thereby contribute to the protection of the environment and protection against radiation. The third definition states that radiation protection means measures to ensure that people are protected from the effects of exposure to ionising radiation.

These definitions and the fundamental principles of nuclear and radiation safety set out in the following section provide the basis for recognition of the common and protection-oriented values of enabling the development, production and use of radiation sources and the conduct of radiation practices, while minimising, as far as possible, damage to human health and radioactive contamination of the living environment resulting from the use of sources of ionising radiation.

Since the Republic of Slovenia has one operating nuclear power plant, one operating research reactor and makes relatively wide use of ionising radiation sources in industry, research, education, and human and veterinary medicine (including the transport and also transit of these sources in the case of radioactive materials), ensuring and respecting the fundamental principles of nuclear and radiation safety is a permanent vital and strategic objective of its development.

The Resolution highlights the broader aspects of nuclear and radiation safety in the country. Radioactive waste and spent fuel management is also a very important part of comprehensively addressing radiation and nuclear safety and would fall within the scope of this document. However, this area is not addressed in detail in the Resolution, as it is dealt with in the Resolution on the National Programme for Radioactive Waste and Spent Fuel Management for the 2023–2032 Period [2], which is envisaged as an umbrella national document by Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste [3].

The contents of the Resolution also partly refer to the contents of the Integrated National Energy and Climate Plan of the Republic of Slovenia [4], the Resolution on the National Programme of Higher Education 2030 [5] and the Resolution on the Scientific Research and Innovation Strategy of Slovenia 2030 [6].

The largest and most important nuclear facility in the country is the Krško Nuclear Power Plant, which produces about 40% of the electricity generated in the Republic of Slovenia and covers about 20% of the electricity needs of the Republic of Slovenia and 16% of the electricity needs of Croatia. The nuclear and radiation safety strategy therefore depends on whether a country uses nuclear technology for electricity generation. This is also reflected in the form and contents of the Resolution.

**2. NUCLEAR AND RADIATION SAFETY PRINCIPLES**

For the purposes of this section, "safety" means the protection of people and the environment from the risks arising from potential exposure to ionising radiation, and the safety of facilities and activities that give rise to risks arising from potential or actual exposure to ionising radiation. In the Resolution, nuclear and radiation safety includes the nuclear and radiation safety of nuclear and radiation facilities, radiation protection in the conduct of other radiation practices, the safe management of radioactive waste and spent fuel, and the safe transport of radioactive materials by road, rail, sea and air, but does not include other aspects of safety.

Safety includes both the risks from exposure to ionising radiation under normal circumstances and the risks from exposure to ionising radiation due to various events. "Events" mean human errors or actions caused by incorrect written procedures or instructions, equipment failures, operating errors, a naturally occurring event or design inadequacy which may compromise radiation or nuclear safety.

The fundamental objective of nuclear and radiation safety (the fundamental safety objective) is to protect people and the environment from unnecessary harmful effects of ionising radiation now and in the future.

The fundamental safety objective, aimed at the individual and the collective protection of people and the environment, should be achieved by restricting, to the extent reasonably practicable, the operation of facilities or the pursuit of activities that give rise to risks from potential exposure to the harmful effects of ionising radiation, taking into account the principles of nuclear and radiation safety. The operation of facilities and the pursuit of activities should be carried out in such a way so as to meet the highest safety standards that can reasonably be achieved. This should be ensured by measures, namely:

(a) controlling human exposure to ionising radiation and discharges of radioactive materials into the environment;

(b) reducing the likelihood of events which may lead to a loss of control of a nuclear reactor core, a nuclear chain reaction, a radioactive source or any other source of radiation;

(c) mitigating the consequences of such events, should they occur.

The fundamental safety objective applies to all facilities and activities and to all phases throughout the lifetime of the facility or radiation source, including planning, siting, design, production, construction, commissioning, operation or use, and decommissioning and closure. The transport of radioactive materials, including their transit, and radioactive waste and spent fuel management should also be adequately covered.

Achieving the fundamental safety objective requires the joint efforts of all state authorities and other organisations listed in Sections 6 and 8 of the Resolution, because, although there is a clear division of responsibilities and powers between them, the individual segments cannot operate separately from and independently of the system as a whole.

The primary responsibility for the safe operation of a nuclear or radiation facility lies with its operator, while the primary responsibility for the safety of a radiation practice lies with the radiation practice operator. The State must ensure the general conditions for the safe operation of all nuclear facilities and the safe use of radiation sources, which includes, in particular, a comprehensive and effective system of laws and regulations, as well as regulatory control and inspection by state authorities (in particular the Slovenian Nuclear Safety Administration (hereinafter: the SNSA) or the Slovenian Radiation Protection Administration (hereinafter: the SRPA)) and ensuring the possibility of an expert assessment of technical questions on nuclear and radiation safety by independent approved experts (individuals and organisations). In a broader sense, the State is also responsible for maintaining and developing the general level of expertise in this field and for planning the use of nuclear energy, which includes, in particular, academic-level research and education.

In order to achieve this fundamental safety objective, the Republic of Slovenia has established a legal framework with the Ionising Radiation Protection and Nuclear Safety Act, which was adopted by the National Assembly of the Republic of Slovenia as the most important legal act regulating this area. The following ten principles of nuclear safety are included in the provisions of the ZVISJV-1 and in the provisions of all other regulations issued on its basis.

**Principle 1: Responsibility for safety**

**The primary responsibility for safety lies with the persons or organisations responsible for the facilities and activities that give rise to risks from exposure to ionising radiation.**

The primary responsibility for safety lies with the persons or organisations responsible for the facility and activity that give rise to risks from exposure to ionising radiation. This primary responsibility also applies to the implementation of the programme of measures to reduce radiation exposure.

A licence to operate a facility or carry out an activity may be granted to an organisation or individual – the licence holder.

The licence holder has primary responsibility for safety throughout the lifetime of the facility or activity and cannot transfer this responsibility. Other groups, such as design engineers, manufacturers, installers, repairers and maintainers, employers, subcontractors, as well as transport organisers and carriers, and consignors and consignees also have legal, professional and functional responsibility in relation to safety.

The licence holder is responsible for:

– establishing and maintaining the necessary competences;

– providing appropriate training and information;

– establishing the procedures and conditions to maintain safety under all expected conditions;

– verifying the adequacy of the design, performance and appropriate quality of the facilities and activities and of their associated equipment;

– ensuring the safe management of sources of ionising radiation that are produced, used, stored or transported;

– ensuring the safe management of radioactive waste and spent fuel.

The licence holder must fulfil these responsibilities in accordance with the safety objectives and requirements laid down in the law or in other regulations, i.e. government decrees, ministerial rules or other legally binding documents issued pursuant to the law. The management system of the organisation of the holder or operator must ensure that these responsibilities are fulfilled.

**Principle 2: The role of the state administration**

**A lasting and effective legal and regulatory framework for safety is in place, including an independent regulatory authority.**

The Republic of Slovenia has put in place a legal and regulatory framework for the clear definition of responsibilities and for the regulatory control of facilities and activities which give rise to risks from exposure to ionising radiation. On the basis of the legislation, it is effectively fulfilling its national responsibilities and international obligations.

The Republic of Slovenia has established as part of the public administration independent regulatory authorities, the SNSA and the SRPA, which have the appropriate powers, technical and managerial competences, and human and financial resources to fulfil their responsibilities. The two regulatory authorities are effectively independent from license holders or any other authority and therefore their decisions cannot be unduly influenced by interested stakeholders.

The legal system in place requires informing the public, other stakeholders and the media on the safety aspects (including health and environmental aspects) of facilities and activities that give rise to risks from radiation exposure. Similarly, the wider legal system requires consultation with the residents living in the affected area, the public and other stakeholders when key decisions are taken.

The legislative and regulatory framework must ensure the effective independence of the regulatory control and inspection of nuclear and radiation safety, even where the licence holder is a state authority or public institution, or where the licence holder is in any way linked to the ministries under whose jurisdiction the SNSA and the SRPA fall.

**Principle 3: Leadership and management for safety**

**Effective leadership and management for safety should be established and sustained in facilities and activities that give rise to radiation risks.**

The management of the investor or operator of a radiation or nuclear facility must establish, implement, maintain and continuously improve an effective and comprehensive management system. This should include safety, security and quality management, health and environmental protection, economic management and the consideration of human and organisational factors and social aspects in such a way that safety is not compromised by other requirements. The management system, which must be aligned with the safety objectives of the organisation to ensure radiation and nuclear safety, must be in place throughout all phases of the radiation or nuclear facility. In the organisation operating a nuclear or radiation facility or conducting a radiation practice, the management must demonstrate leadership for safety at all times.

The safety of a radiation or nuclear facility must be the most important part of the management system and override all other requirements. Safety aspects must be a priority in all decisions. The management system must also ensure the fostering of a strong safety culture, the regular assessment of safety performance and the application of lessons learned from experience.

Safety culture is the characteristics and behaviours in an organisation or in individuals that give safety the highest priority and attention warranted by their significance. In the radiation or nuclear field, safety culture refers to the personal commitment and responsibility of everyone involved in any activity that affects the functioning and safety of a radiation or nuclear facility. Individuals in the organisation of the investor or operator of a radiation or nuclear facility, from management downwards, should foster a strong safety culture.

The management system and leadership for safety must foster and sustain a strong safety culture. Safety culture and security culture must be included in the management system. This includes in particular:

– a common understanding of key aspects of safety and safety culture in the organisation;

– individual and collective commitment from the management and individuals at all levels of safety;

– acceptance by individuals of personal accountability for safety;

– measures to encourage questioning, critical thinking and continuous learning by employees at all levels of the organisation and to discourage complacency about safety;

– the reporting of problems relating to technical, human and organisational factors;

– conservative decision-making in the implementation of all safety-related activities;

– an awareness that safety threats are possible and that the consequences can be significant.

To prevent human and organisational errors, human factors must be taken into account, and the management system must also promote communication and the transmission of information both within the organisation and to the public, the introduction of good practices (using domestic and foreign experience) and the reporting of any deviations.

The safety of all facilities and activities should be assessed using a graded approach. The safety assessment involves a systematic analysis of normal operation and its effects that may lead to events and the consequences of these events. The safety assessment includes safety measures to control risks. The design and safety systems should also be assessed to demonstrate that they fulfil the required safety functions. Where control measures or operator measures are required to maintain safety, an initial safety assessment should also be carried out to demonstrate that the proposed solutions are correct and can be relied on. A facility may only be constructed and commissioned or an activity may only be commenced once the regulatory authority has confirmed that the proposed safety measures are adequate.

The process of safety assessment for facilities or activities is repeated in whole or in part as necessary later in the conduct of operations in order to take into account changed circumstances (such as the application of new standards or scientific and technological developments), the feedback of operating experience, modifications and the effects of ageing. For facilities in operation for long periods of time, safety assessments are periodically reviewed and, if necessary, repeated during the periodic safety review. After the periodic safety review, the regulatory authority allows the continued operation of the facility if it determines that the safety measures are still adequate.

The precursors to potential accidents and events must be identified and analysed. Measures must be taken to prevent the occurrence or recurrence of accidents. The feedback of operating experience from facilities and activities – and, where relevant, from elsewhere – is a key means of ensuring safety. Programmes and processes must be put in place for the collection and analysis of operating experience (domestic and foreign) and for event analysis, including the analysis of events, near misses, accidents and unauthorised acts. Lessons learned should be shared with all stakeholders and measures implemented to prevent recurrence.

**Principle 4: The justification of facilities and activities**

**Facilities and activities that give rise to radiation risks must yield benefits that outweigh the radiation risks to which they give rise.**

The legislation provides that facilities and activities are considered justified if the benefits they yield for the individual or society outweigh the harm to health that would result from the operation of the facilities and the conduct of activities. For the purposes of assessing the benefits and harm to health, all significant consequences of the operation of facilities and the conduct of activities, both now and in the future, must be taken into account.

Decisions on the justification of major infrastructure investments, such as nuclear power plants, which pose a risk of exposure to ionising radiation and radioactive contamination of the living environment, are taken with the broadest social consensus in the country's strategic documents.

For facilities and activities posing a lower risk of radiation exposure, the decision on justification may be taken by the competent regulatory authority (the SNSA or the SRPA).

The justification of the radiation exposure of patients in the health sector, both for diagnostic and therapeutic radiological procedures, should be considered primarily in relation to the intended procedure and the individual patient. Justification is based on clinical assessment of whether the diagnostic or therapeutic programme is beneficial. The clinical assessment is carried out by physicians who are appropriately trained in radiation protection.

In activities where it is possible to use techniques other than ionising radiation, the use of alternative methods that achieve the same purpose is encouraged. However, in the use of ionising radiation, the use of radiation sources which do not generate radioactive waste is encouraged.

**Principle 5: The optimisation of radiation protection**

**Radiation protection must be optimised to provide the highest level of safety that can reasonably be achieved.**

The legislation provides that safety measures applied to facilities and activities that give rise to radiation risks are considered optimised if they provide the highest level of safety that can reasonably be achieved throughout the lifetime of the facility, taking into account current technical knowledge and economic and social factors.

In order to determine whether risks from exposure to radiation are as low as can reasonably be achieved, all such risks, whether arising from normal or abnormal operation or from accident conditions, should be assessed before the start of the activity. Such an assessment should then be periodically updated throughout the lifetime of the facility or the conduct of the activity. In doing so, a graded approach should be used. The magnitude of the radiation risk and the exposure of workers and the population arising from the conduct of a radiation practice are assessed, and radiation protection measures and the method of optimising ionising radiation protection in the circumstances and working conditions relevant to radiation protection are identified. Consideration should also be given to possible interdependence between individual measures or associated risks (for example, for different stages of the lifetime of facilities and activities, for different groups or for different stages of radioactive waste and spent fuel management). Uncertainties in knowledge should also be taken into account.

The optimisation of radiation protection involves an assessment of the relative significance of various factors, including:

– the number of people (workers and the public) who may be exposed to radiation;

– the likelihood of them being exposed;

– the magnitude and distribution of radiation doses received;

– radiation risks arising from foreseeable events;

– economic, social and environmental factors.

The optimisation of radiation protection also means applying good practices and common sense to the measures taken to avoid radiation risks as much as possible during day-to-day activities.

The resources devoted to safety by licence holders have to be proportionate to the radiation risk and the possibility of controlling it. The scope and details of the legislation, its application and the control of licence holders are also adapted to these risks.

The extent of regulatory and inspection controls is proportionate to the level of risk from actual and potential exposure to ionising radiation.

**Principle 6: The limitation of radiation risks to individuals**

**The control of radiation risks arising from the exposure of workers and the general public to radiation must ensure that no individual is exposed to unacceptable risks to health from the effects of ionising radiation.**

The legislation provides for the control of exposure and risks to human health within the prescribed dose limits. Such dose limits represent a legally binding upper limit of acceptability and are not sufficient to ensure the best achievable protection under the circumstances. They are therefore complemented by the optimisation of protection against ionising radiation in all circumstances and working conditions.

In the medical use of ionising radiation, the reduction of patient exposure is only achieved through the consistent implementation of measures to justify and optimise radiological procedures, as dose limits are not applied. In addition to established approaches such as the monitoring of typical exposure in standard radiological procedures and the use of diagnostic reference levels, the use of referral criteria and the recording of personal doses would also contribute to the protection of patients.

**Principle 7: The protection of present and future generations**

**People and the environment must be protected from the radiation risks arising from exposure to ionising radiation in the present and in the future.**

Risks from exposure to ionising radiation may transcend national borders and may persist for long periods of time. In assessing the adequacy of measures to manage radiation risks, the possible consequences of these measures, now and in the future, have to be taken into account, in accordance with the legislation. In particular, it is important to assess whether:

– the legal safety requirements apply not only to local populations but also to populations distant from the facilities and activities;

– in areas where the effects could last for several generations, future generations are adequately protected without the need for them to take significant protective measures.

The safe and economic management of radioactive waste and spent fuel ensures that burdens that can and should be addressed today are not passed on to future generations. Radioactive waste and spent fuel must be managed in such a way so as to ensure that the predicted impacts on the health of future generations are not greater than the impacts that are acceptable today.

**Principle 8: The prevention of accidents**

**All reasonable measures must be taken to prevent nuclear and radiological accidents and mitigate their consequences.**

The legislation prescribes the following measures to reduce the likelihood of accidents occurring:

– to prevent the occurrence of failures or abnormal conditions (including breaches of physical security) that could lead to accidents;

– to prevent the escalation of any such failures or abnormal conditions if they occur;

– to prevent the loss of a source of radiation or the loss of control over a source of radiation.

The primary means of preventing and mitigating the consequences of accidents is "defence in depth". Defence in depth is implemented primarily through the combination of a number of consecutive and independent modes or levels of protection that would have to fail before adverse effects on human health or radioactive contamination of the environment could occur. If one level of protection or barrier fails, the next level or barrier is available. When properly implemented, defence in depth ensures that no single technical, human or organisational failure could lead to harmful effects, and that the combinations of failures that could give rise to significant harmful effects are of very low probability. The different ways in which each level of protection operates are a necessary part of defence in depth.

Defence in depth is provided by an appropriate combination of:

– an effective management system with a strong management commitment to safety and a strong safety culture;

– adequate site selection and the incorporation of good design and technical features to ensure safety margins, diversity and redundancy, mainly by the use of:

– design, technology and materials of high quality and reliability;

– control, protection and safety systems and systems to monitor proper operation;

– an appropriate combination of safety features based on natural characteristics and technical safety systems;

– comprehensive operational instructions and practices and accident management procedures;

– the establishment and implementation of an integrated management system.

Accident management procedures must be developed in advance. This provides the means for regaining control over a nuclear reactor, a nuclear chain reaction or some other source of radiation in the event of a loss of control and for mitigating any harmful consequences.

**Principle 9: Emergency preparedness and response**

**Arrangements must be made for emergency preparedness and the response to nuclear or radiological accidents.**

The legislation lays down the primary goals of preparedness and response to a nuclear or radiation emergency:

– to ensure that arrangements are in place for an effective response to a nuclear or radiation emergency at the scene and, as appropriate, at the local, regional, national and international levels;

– to ensure that the radiation risk arising from events that are expected to occur with a significant probability is minor;

– for any accidents that do occur, to take practical measures to mitigate any consequences for human life and health and the environment.

The licence holders, the SNSA, the SRPA and the Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (hereinafter: the URSZR), together with other relevant stakeholders (e.g. other ministries, ZVD Zavod za varstvo pri delu, d.o.o. (hereinafter: ZVD), the Slovenian Armed Forces and others) and in cooperation with other countries, the IAEA and the European Commission, have made prearrangements for preparedness and response in the event of a nuclear or radiological emergency at the local, regional and national levels with emergency plans in the event of a nuclear or radiological accident and with emergency response instructions.

The emergency plans in the event of a nuclear or radiological accident and emergency response instructions to ensure preparedness for and the response to emergencies take into account the following:

– the likelihood and the possible consequences of a nuclear or radiological accident;

– the characteristics of the radiation risks;

– the types and location of the facilities and activities; and

– the guidelines for taking protective measures set out in the Protection Strategy for a Nuclear or Radiological Accident.

The plan and instructions include:

– the statutory powers to take protective measures and to decide when to take protective measures and which protective measures to take;

– ensuring that protective measures are implemented in an organised and coordinated manner and that personnel at the scene and the public are informed in the event of an emergency.

All reasonably foreseeable cases are taken into account in the preparation of the emergency plans and instructions in the event of a nuclear or radiological accident. The preparedness of all organisations involved in the event of a nuclear or radiological accident is tested in exercises. When urgent protective measures need to be taken as a result of an emergency in order to save lives, in order to prevent serious health effects from radiation exposure and to prevent a catastrophic deterioration of the situation, it may be acceptable for emergency workers to receive, on the basis of informed consent, doses that exceed the occupational dose limits normally applied, but only up to a predetermined level.

**Principle 10: Protective measures to reduce existing and unregulated radiation risks**

**Protective measures to reduce existing and unregulated radiation risks must be justified and optimised.**

Radiation risks may arise in facilities and activities that are not under regulatory control. The legislation provides that, in situations where the risk of exposure to such radiation is relatively high, protective measures are established to reduce radiation exposure and to remediate the adverse situation.

Increased exposure of the population may also arise from radiation of natural origin, where remediation measures may be taken, in particular for exposure to radon gas in dwellings and workplaces. At the same time, the potential for exposure to radon is taken into account in the planning of energy, earthquake protection, fire protection measures and other remediation measures and interventions in existing facilities. Exposure to natural sources in industrial activities with materials containing naturally occurring radionuclides that cannot be ignored from the point of view of radiation protection, and the external exposure of workers or members of the public to radiation from building materials should also be identified and assessed.

Increased exposure of the general population may also occur as a result of human activities conducted in the past that were not subject to regulatory control or that were subject to a less rigorous regime of control.

**3. NUCLEAR AND RADIATION PRACTICES IN THE REPUBLIC OF SLOVENIA**

Radiation practices started on the territory of the Republic of Slovenia almost at the same time as elsewhere in the world. The oldest known source used at the Ljubljana hospital was purchased as early as 1902. Subsequently, the use of ionising radiation in various segments of society expanded in parallel with, and contributed significantly to, the development of society and the economy. Shortly after the Second World War, the Jožef Stefan Nuclear Institute was established in Ljubljana, where the knowledge needed to develop nuclear technologies was systematically developed. This put the country on a par with the most developed countries in the world at the time, with a clear desire to develop its nuclear programme. In the 1960s and 1970s, this development culminated in the decision to first build a research reactor and then a nuclear power plant.

The largest and most important nuclear facility in the country is the Krško Nuclear Power Plant (hereinafter: the Krško NPP). The construction of the plant, which was supplied by the US company Westinghouse, began in 1974, and the first fuel was loaded into the reactor in 1981, when the plant was also connected to the power grid. The plant began operating commercially in 1983.

In 2012, the SNSA issued a decision approving modifications of the Safety Analysis Report, allowing for the extension of the expected operational lifetime of the Krško NPP. In 2013, the Krško NPP started implementing a safety upgrade programme, which was completed in 2021, and in 2023 the dry spent fuel storage facility started operating.

The Krško NPP successfully completed the environmental impact assessment process and successfully obtained environmental approval for the extended operation of the Krško NPP in 2023. Subject to the successful completion of the periodic safety review in 2023 and 2033, the estimated operating lifetime of the Krško NPP until 2023 can be extended until 2043.

Strategic documents such as the Resolution on Slovenia's Long-Term Climate Strategy until 2050 (ReDPS50) [7] and the Integrated National Energy and Climate Plan (NEPN), which is an action plan for the implementation of the climate strategy, envisage the continued use of nuclear energy as a low-carbon energy source after the Krško NPP is no longer in operation, as well as the possibility of building a new nuclear power plant.

In 2021, the Ministry of Infrastructure issued an energy permit to the investor Gen energija, d.o.o., for the Krško Nuclear Power Plant 2 energy project. The siting process, including a comprehensive environmental impact assessment, is also planned to start in 2023.

The second nuclear facility in Slovenia is the TRIGA research reactor, which is operated by the Jožef Stefan Institute (hereinafter: the JSI). It was built in 1966. It was supplied by the US company General Atomics, while the reactor vessel, reactor body and buildings were built by domestic companies. In 1991, the facility was reconstructed, remediated and adapted for pulsed operation. It is used for research and education in reactor physics and engineering and for isotope production. In 1999, under a special programme for the return of spent fuel from research reactors, all previously stored spent fuel (219 spent fuel elements) was returned to the country of origin of the fuel, i.e. the USA. In December 2014, the JSI completed the first periodic safety review of the TRIGA research reactor, which is a precondition for the 10-year extension of its operation. A second periodic safety review is underway and will be completed by the end of 2024. In March 2015, the JSI issued a new second edition of the TRIGA Long-Term Operation Strategy, which envisages the possibility of the reactor continuing to operate at least until the end of the next periodic safety review, and it would be reasonable that it operates until the end of the lifetime of the Krško NPP, i.e. until 2043. By way of a decision of the SNSA and a decision of the Scientific Council of the JSI, the operation of the reactor was extended at least until the completion of the next periodic safety review, i.e. until the end of 2024. In February 2023, an update of the safety report for the new decommissioning programme was also approved.

The Central Radioactive Waste Storage Facility (hereinafter: the CRWSF), which is located in the immediate vicinity of the research reactor at Brinje near Ljubljana, is also a nuclear facility. The CRWSF is used for the storage of low- and intermediate-level solid radioactive waste not originating from power-generating nuclear facilities but from other activities. The operation of the CRWSF is part of the mandatory national service of general economic interest of radioactive waste management (hereinafter: the service of general economic interest of radioactive waste management), which is provided by the Agency for Radioactive Waste Management (hereinafter: the ARAO).

The Žirovski vrh Uranium Mine (hereinafter: the ŽVUM), established in 1976, started mining uranium ore in 1982, and the production of uranium concentrate, also known as "yellow cake", began in 1984. The production was stopped in June 1990 for economic and political reasons. The whole complex consisted of an underground mine with all external facilities, a processing plant and all other necessary facilities. All these facilities have been remediated and decommissioned. Two repositories of mining and hydrometallurgical tailings still remain on the site of the closed mine, the Jazbec repository and the Boršt repository. After the remediation was concluded, the Jazbec repository of mining tailings was closed in 2015 and transferred to the management of the ARAO, which carries out the long-term supervision and maintenance of the repository as part of the service of general economic interest of radioactive waste management. The Boršt hydrometallurgical tailings repository has the status of a radiological facility and is not yet closed. The closure of the repository has been delayed to ensure additional remediation measures for the long-term stability of the repository, as part of the repository is on a landslide. It is expected to be closed and transferred to the management of the ARAO in 2024.

A repository for low- and intermediate-level radioactive waste (hereinafter: LILRW) will be built in Vrbina, in the municipality of Krško, in the immediate vicinity of the Krško NPP, which is intended for the disposal of the Slovenian part of the radioactive waste from the operation and decommissioning of the Krško NPP, the waste stored in the CRWSF in Brinje and the waste generated during the decommissioning of the research reactor. The construction and operation of the repository is part of the service of general economic interest of radioactive waste management provided by the ARAO. The construction of the facility is scheduled to start in 2024 and to be completed in 2026. The repository schedule foresees the start of trial operation in the second half of 2026 and of regular operation in the second half of 2027.

In addition to the above nuclear and radiation facilities, other types of radiation sources are used in the Republic of Slovenia: sealed sources, unsealed sources, X-ray devices and accelerators. They are used in industry, research, human and veterinary medicine and other activities. Sealed and unsealed sources of radiation, which include radioactive materials, including nuclear or fissile materials, must be transported in accordance with the legislation (the ZVISJV-1 and the Transport of Dangerous Goods Act [8]), and the risks must be evaluated in the relevant documents produced by the SNSA. These also apply to specific cases (e.g. the evaluation of a fallen satellite with radioactive material, uncontrolled radiation sources, nuclear-powered vessels, etc.).

**4. INTERNATIONAL COOPERATION**

The international nuclear and radiation safety regime is based on multilateral and bilateral agreements and participation in international organisations and bodies. In all these activities, the open and unimpeded flow of information in the form of the exchange of knowledge and experiences (administrative, operational, scientific, technological), as well as the obligation to inform, assist and ensure nuclear safety, are of paramount importance.

Nuclear and radiation safety are, in accordance with the generally accepted principles and clear convention provisions [9], within the exclusive national competence of individual states. However, it is indisputable, and unfortunately has been demonstrated several times, that the risks and consequences of nuclear accidents (e.g. Chernobyl in 1986, Fukushima in 2011) do not know national borders or, even in the case of radiological accidents, i.e. accidents outside nuclear facilities, can have severe and significant cross-border consequences. After the well-known and high-profile nuclear accident at the Three Mile Island Nuclear Generating Station in the United States in 1979, and particularly after the Chernobyl nuclear accident, the international community's awareness of the need for cooperation in this field has been materialised in several international treaties, the main purpose of which is, above all, to establish an effective and simple means of providing information and assistance [10]. Subsequently, regulation by convention was extended to the alignment of the basic principles of nuclear safety and the safe management of spent fuel and radioactive waste [11]. The Fukushima accident contributed to the "stress tests" in the European Union (hereinafter: the EU), which were carried out in the same year as the accident, and to the extensive national action plans that are coming to an end at the beginning of the 2020s. The accident also led to changes in EU legislation, a major update of the IAEA standards, a number of initiatives such as the Vienna Declaration, and stress tests carried out or to be carried out as part of EU assistance to third countries (e.g. Belarus, Iran, Turkey).

**4.1 Multilateral agreements**

International cooperation in this area is not only necessary due to the potential risk of accidents in the peaceful use of nuclear energy. In addition to compliance with commitments under the treaties on the non-proliferation of nuclear weapons [12] and other related safeguards agreements or safeguards measures (safeguards agreements and additional protocols), the physical protection of nuclear facilities and nuclear material [13] or liability for nuclear damage [14], it is also important for the Republic of Slovenia, which has a small nuclear programme and a relatively small administrative and professional infrastructure, to be involved on a daily basis in the exchange of information, studies, expertise and research in this field, and in the technical assistance that it can provide on the basis of international cooperation.

Ensuring nuclear and radiation safety is not something that is done once and for all, but is an activity that needs to be continuously reviewed and improved, and in the international arena there are several mechanisms to ensure continuous reviews, reporting and improvement. For example, a State Party to the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management is required to undergo a review process every three years, which includes preparing a report, reviewing the reports of the other Contracting Parties and asking questions of other Contracting Parties, responding to questions asked by other Contracting Parties, and participating in the review meeting and other activities organised in this regard within the IAEA. In accordance with Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom, and Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, the provisions on "arrange for periodic self-assessments of their national framework and competent regulatory authorities and invite an international peer review of relevant segments of their national framework and competent regulatory authorities" must be transposed in the national legislation.

National reports and international thematic and peer reviews are key to fulfilling the commitments under these Conventions and Directives and are a fundamental commitment of each country.

**4.2 Participation in European Union institutions**

Even before formally joining the EU, Slovenia, and in particular the SNSA, have been strongly involved in and connected to various EU bodies in the field of their competences and expertise. The nuclear and radiation safety situation was also assessed before and during the pre-accession negotiations of Slovenia. Before joining the EU, Slovenia concluded all negotiation chapters and demonstrated its ability to implement the provisions of the Euratom Treaty and the EU secondary legislation based on it.

Following Slovenia's accession to the EU, Slovenian representatives began to participate in bodies set up within the existing EU institutional framework on nuclear and radiation safety, in particular the 1957 Euratom Treaty, with the following main objectives: to promote research and disseminate technical information; to establish uniform safety standards for the protection of the public and of workers in the nuclear industry; to facilitate research; and to ensure that civil nuclear materials are not diverted to other uses, particularly military.

Several technical advisory committees operate under the Euratom Treaty. The Republic of Slovenia fulfils its obligations in three of them:

– the Committee under Article 31 of the Euratom Treaty, which makes recommendations to the European Commission for documents on radiation protection in relation to public health;

– the Committee under Article 35 of the Euratom Treaty, which monitors the effectiveness of the monitoring of radioactivity in the air, water and soil; and

– the Committee under Article 37 of the Euratom Treaty, the main purpose of which is Member States' reporting on planned major reconstructions of nuclear facilities or the construction of new nuclear facilities, on which the committee is required to deliver an opinion.

In addition to the advisory committees under the Euratom Treaty, there are several other committees in the EU that relate to areas covered by the Euratom Treaty. Slovenia has a representative in the Instrument for Nuclear Safety Cooperation (INSC), a body which advises the European Commission on the programme and implementation of assistance in the field of nuclear and radiation safety to third countries. Slovenian representatives also serve on the Euratom committee, which advises the European Commission on fission and fusion research and acts as a single committee, but with two committees, the Fission Committee and the Fusion Committee. Slovenia has representatives on both committees. Both committees are renewed (re-established) for each financial period; they have also been established for the 2021–2027 period. They operate as advisory committees, in accordance with the provisions of Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission’s exercise of implementing powers [15].

The policy and normative framework in the field of nuclear and radiation safety in the EU is mainly developed by the Atomic Questions Group (AQG) of the Council of the European Union, in which Slovenia actively participates.

Under the Euratom Treaty, the European Commission has special competence for the supervision of nuclear material, which is aligned with the IAEA's competence. European Commission inspectors can at any time check the status of nuclear material in our country. They usually work together with IAEA inspectors. On the other hand, under the Additional Protocol, the focus of international supervision is on preventing uncontrolled nuclear activities; inspections are conducted by the IAEA and Euratom may participate in them.

The European Nuclear Safety Regulators Group (ENSREG), an independent expert body established in 2007 by a decision of the European Commission, plays a specific role in the EU institutional framework for nuclear safety. The group is composed of the highest representatives of the regulatory authorities responsible for nuclear safety from all 27 EU Member States. Representatives of the European Commission also participate on an equal footing in the group.

ENSREG's role is to help create the conditions for continuous improvement and a common understanding in the field of nuclear safety and radioactive waste management. To date, ENSREG has played the most prominent and influential role in drafting the content of Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations and Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations (hereinafter: Council Directive 2009/71/Euratom) [16], and Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (hereinafter: Council Directive 2011/70/Euratom), and the preparation and implementation of the stress test programme for nuclear power plants in the EU in 2011 and 2012. ENSREG works within its three working groups in the areas of (i) nuclear safety, where it is involved in the preparation of thematic peer reviews, the implementation of stress tests in third countries and the monitoring of post-Fukushima action plans, (ii) radioactive waste and spent fuel safety, and (iii) openness and informing the public of ENSREG activities.

The operating experience of nuclear power plants is an important source of information for improving nuclear and radiation safety. The European network for collecting feedback on the operating experience of nuclear power plants, called the Clearinghouse, operates at the European Commission's Joint Research Centre (JRC) in Petten, the Netherlands. Its tasks are to improve nuclear safety through cooperation between nuclear power plant operators, regulatory authorities and technical expert organisations, to develop operational safety assessment methods (methods, computer tools) and to capture data from related databases such as the IRS, which is managed by the IAEA and the OECD/NEA.

The European Radiological Data Exchange Platform (hereinafter: the EURDEP) enables the monitoring of radiological data from most European countries, available in (near) real time. The Slovenian Early Warning Network, consisting of stationary radioactivity monitors throughout the country, continuously monitors the level of radioactivity on the territory of Slovenia, allowing for rapid alerting in the event of the unexpected arrival of a radioactive cloud. The Slovenian network sends data to the EURDEP system in real time. If there is an increase in radiation, the appropriate alarms are set off.

As an EU Member State, Slovenia is part of the system for the technical implementation of early notification and information exchange in the event of a radiological or nuclear emergency (hereinafter: ECURIE). Two types of messages are entered into the system by Member States: those intended for the immediate notification of Member States in the event of an actual or potential transboundary threat from a nuclear or radiological emergency, and those intended for the voluntary notification of minor events with only local consequences, which do not fall into the previous group. The system is designed in such a way that when the European Commission verifies a notification, it automatically notifies the other Member States.

The European Technical Safety Organisations Network (hereinafter: ETSON) is an association of European scientific and professional organisations that supports the decisions of nuclear regulatory authorities. The conditions for membership are a long-term research programme and financial independence from nuclear facility operators. The Slovenian member is the JSI.

The European Nuclear Education Network (hereinafter: ENEN) brings together more than 60 European providers and users of research-based nuclear engineering and safety education. One of the key objectives of the association is to promote and ensure quality studies. The Slovenian members are the JSI, the Faculty of Mathematics and Physics of the University of Ljubljana and the ARAO.

The Sustainable Nuclear Energy Technology Platform (hereinafter: SNE–TP) brings together more than 115 European nuclear stakeholders from industry, research, NGOs, and scientific and technical support to regulatory authorities. Within the platform, stakeholders have coordinated a research strategy for the field. The European Commission is co-funding the implementation of the SNE–TP research strategy under the Euratom Framework Programmes. The Slovenian members are the JSI and the Slovenian National Building and Civil Engineering Institute.

**4.3 Cooperation with the International Atomic Energy Agency (IAEA)**

The IAEA is a specialised international organisation of the United Nations system of organisations, established in 1957 by a decision of the United Nations General Assembly. At the end of April 2023, 176 countries were members of the IAEA. In accordance with its statutes, the IAEA's objectives are to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world, to encourage and assist research on atomic energy for peaceful uses throughout the world, and to foster the exchange of scientific and technical information. Its essential task is to improve and maintain the system of control of nuclear materials and related activities. An important activity of the IAEA is the provision of technical assistance and cooperation to promote nuclear technologies for the progress of Member States in need of such assistance. The IAEA also develops international safety standards relating to the use of nuclear energy, nuclear and radiation safety, radiation protection, radioactive waste and spent fuel management, and the transport of radioactive materials, and produces recommendations and guidelines on the protection of nuclear facilities and nuclear and radioactive materials.

Slovenia became a member of the IAEA in 1992; since 1957 it had been an active member of the IAEA within Yugoslavia.

Representatives of Slovenia regularly attend the annual General Conference, which is the supreme governing body of the IAEA. Slovenia also follows the work of the Board of Governors, which is the highest governing body between the two sessions of the General Conference. During Slovenia's cooperation with the IAEA as an independent country, Slovenia has been elected to the Board of Governors from its regional group on several occasions (most recently in 2021) and has also held the chairmanship of the Board of Governors.

Slovenia participates in several areas of activities of the IAEA, namely:

– the technical assistance and cooperation programme: By participating in the national and regional projects of this programme, Slovenia has acquired a large amount of technical equipment, trained many of its experts and, through various forms of scholarships and scientific visits, has enabled them to come to know the trends and scientific knowledge in other IAEA Member States. Slovenia and its experts are increasingly participating actively and constructively in these programmes, also as programme providers, and Slovenia also conducts and organises training (courses or workshops) for Slovenian experts or foreign participants;

– the co-financing of research projects;

– the participation of national experts in expert advisory missions to nuclear facilities around the world or to the regulatory authorities of other countries (the Operational Safety Review Team, the International Regulatory Review Service, the International Physical Protection Advisory Service, etc.);

– the participation of Slovenian experts in IAEA technical working groups and committees;

– visits by foreign expert advisory missions to Slovenian nuclear facilities and other institutions;

– drafting new standards and other technical documents in the IAEA's field of work;

– the use of various IAEA information systems, such as the International Nuclear Information System (INIS) library, the Nuclear Security Information Portal (NUSEC) and more than 130 databases (e.g. the database of emergencies in nuclear facilities, the Incident and Trafficking Database (ITDB), the Unified System for Information Exchange in Incidents and Emergencies (USIE) and the Response and Assistance Network (RANET));

– maintenance of the International Nuclear and Radiological Event Scale (INES).

On several occasions, Slovenia has undergone international inspections of its nuclear and radiation safety practices, such as those carried out by the IAEA. The modalities and conduct of IAEA missions are largely standardised. The IAEA forms a team of international experts who visit the host country, carry out a mission (not an inspection) and formally report the results to the country in a special report, which Slovenia usually makes public, unless it contains classified information. The host state is then expected to prepare an internal action plan for the implementation of the recommendations and suggestions for improvement on the basis of the report and, on this basis, to invite the IAEA to conduct follow-up review missions.

The following IAEA missions have been conducted in Slovenia:

– the Operational Safety Review Team (hereinafter: OSART) in 1984, 1993, 2003, 2017 and 2018 (a follow-up review mission);

– the Integrated Regulatory Review Service (hereinafter: IRRS) at the URSJV (hereinafter: the SNSA) in 1999, 2011, 2014 (a follow-up review mission);

– the IRRS at the SNSA and the SRPA in 2022;

– the International Physical Protection Advisory Service (hereinafter: IPPAS) – in 1996 and 2010;

– the Integrated Safety Assessment of Research Reactors (hereinafter: INSARR) – in 1976, 1985, 1992, 2012 and 2015;

– the Transport Safety Appraisal Service (hereinafter: TranSAS) in 1999;

– the Review of Accident Management Programmes (hereinafter: RAMP) in 2001;

– the Occupational Radiation Protection Appraisal Service (hereinafter: ORPAS) – in 2001;

– the Emergency Preparedness Review (hereinafter: EPREV) in 2017 and 2022 (a follow-up review mission):

– the Preliminary Mission for Safety Aspects of Long-Term Operation (hereinafter: Pre-SALTO) in 2021 and

– the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (hereinafter: ARTEMIS) – in 2022.

In addition, the IAEA has a specific role under the Treaty on the Non-Proliferation of Nuclear Weapons and related safeguards agreements and additional protocols. Its inspectors can enter the Republic of Slovenia at any time and independently verify the conduct of holders of nuclear materials. They cooperate with inspectors from the European Commission (Euratom). The purpose of these inspections is to prevent the proliferation of nuclear weapons.

**4.4 Cooperation with the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA)**

After acquiring observer status in 2001, Slovenia became a member of the Nuclear Energy Agency (hereinafter: NEA) in 2011. Our country’s representatives serve on the Steering Committee and all NEA standing committees:

- the Radioactive Waste Management Committee (RWMC);

- the Committee on Radiological Protection and Public Health (CRPPH);

- the Committee on the Safety of Nuclear Installations (CSNI);

- the Nuclear Science Committee (NSC);

- the Committee on Nuclear Regulatory Activities (CNRA);

- the Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle (NDC);

- the Nuclear Law Committee (NLC);

- the Committee on Decommissioning of Nuclear Installations and Legacy Management (CDLM) and the Management Board for the Development, Application and Validation of Nuclear Data and Codes (MBDAV).

Slovenia is also in the NEA Data Bank, i.e. a database of data required for nuclear research, and the Information System on Occupational Exposure (ISOE).

Work on these committees and numerous sub-committees requires a high level of expertise as they outline technical and organisational solutions that are developed and later used by the most developed countries in the world. The NEA also organises test research projects bringing together interested member countries, which share the project costs. Due to the lack of funding, Slovenian research organisations are generally not actively involved in these projects. The results are usually presented in work reports that are only available to member countries, while some of them are or become available to the public. These, however, are only summaries, far from covering all new findings. As the active involvement of Slovenian representatives in selected NEA test research projects is extremely important due to the possibility of contributing to technical solutions and having access to the latest findings in the field, funding must be secured from the government budget and other participating research organisations.

**4.5 Cooperation with other international organisations**

In the field of monitoring nuclear non-proliferation, Slovenia, like most developed countries, is a member of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (hereinafter: the CTBTO) as well as two groups, namely the Nuclear Suppliers Group (hereinafter: the NSG) and the Zangger Committee. Headquartered in Vienna, the CTBTO maintains a global network of monitoring stations that can detect a nuclear explosion anywhere in the world. The other two organisations coordinate international efforts to prevent exports of dual-use items, i.e. goods that are primarily used for peaceful purposes but can also be used for the development of nuclear weapons.

Slovenia also cooperates with the United Nations Scientific Committee on the Effects of Atomic Radiation (hereinafter: the UNSCEAR), which periodically reports on the exposure of the population, workers and patients for the purpose of UNSCEAR reports.

The description of cooperation with international organisations is not complete, as ministries, state authorities and other organisations active in the area of nuclear and radiation safety also participate, as a member or in some other capacity, in other independent international organisations.

**4.6 Participation in international associations**

In addition to formal international organisations and cooperation based on contractual obligations, ministries, state authorities and other organisations active in the area of radiation and nuclear safety from various countries also form other, less formal ties. As a rule, the aims of such associations are the improved mutual exchange of information and the joint development of a particular field.

Since 2004, the SNSA is a member of the Western European Nuclear Regulators Association (hereinafter: WENRA). The association brings together the representatives of all regulatory authorities for nuclear safety in Europe (including non-EU members). Its main purpose is the harmonisation of safety standards.

Following the example of the WENRE, the Heads of the European Radiological Protection Competent Authorities (hereinafter: the HERCA), consisting of representatives of the authorities responsible for monitoring radiation safety and radiation protection, was established. Its two Slovenian members are the SRPA and the SNSA (working groups).

In the area of nuclear security, the European Nuclear Security Regulators Association (hereinafter: the ENSRA) was established in 2004. Its two Slovenian members are the representatives of the SNSA and the Ministry of the Interior (hereinafter: the MNZ).

The International Nuclear Law Association (hereinafter: INLA) is an international association of legal and other experts on the peaceful use of nuclear energy, whose main aims are to support and expand knowledge and the development of law and related research, the exchange of findings between members and cooperation with similar associations and institutions.

The World Association of Nuclear Operators (WANO) is the leading international organisation for improving the level of nuclear safety, bringing together all nuclear power plant operators. Slovenia’s representative is the Krško NPP.

The International Framework for Nuclear Energy Cooperation (hereinafter: the IFNEC, formerly the GNEP) is an association established on the initiative of the United States and dedicated to the development of and research on advanced nuclear fuel cycle technologies and generation IV nuclear reactors and possibilities for the joint disposal of radioactive waste and spent fuel. Slovenia is a member and a party to the relevant agreement.

The Global Initiative to Combat Nuclear Terrorism (GICNT) is an international initiative, in which Slovenia has been involved since 2007. The initiative’s aim is to strengthen the countries’ capacities in combatting nuclear terrorism in accordance with the national legislation and the countries’ obligations under international legal frameworks. On behalf of Slovenia, the coordinator of the initiative is the Ministry of Foreign and European Affairs, working together with the SNSA and the Financial Administration of the Republic of Slovenia.

The Nuclear Security Contact Group (hereinafter: the NSCG) is an association formed following the fourth Nuclear Security Summit (in 2016). Slovenia joined the association in 2017, thus expanding the country’s activities in the area of nuclear security. Its representatives are the Ministry of Foreign and European Affairs and the SNSA.

In 2018, Slovenia joined three international initiatives pertaining to various aspects of nuclear security, namely the INFCIRC/908 (mitigating insider threats), the INFCIRC/910 (the security of high activity sealed radioactive sources) and the INFCIRC/918 (countering nuclear smuggling). Slovenian stakeholders duly follow activities as part of these initiatives, work together and exchange information.

The European Association of Competent Authorities (hereinafter: EACA) is an association of regulatory authorities responsible for the transport of radioactive material. The main tasks of the association, which was established in 2008 by France and the United Kingdom, are the adoption of a joint approach, the interpretation of the relevant regulatory requirements and the exchange of good practices. The SNSA has been a member of the EACA since 2016.

For more than 15 years, Slovenia has been among the 20 European countries participating in the European ALARA Network (hereinafter: the EAN), which promotes the dissemination of good practices on radiation protection in industrial, research and health sectors across Europe. The EAN comprises several subnetworks, with the active involvement of the SRPA in the European Radioprotection Authorities Network (hereinafter: ERPAN), which is dedicated to the operational exchange of information on legislation and the monitoring of radiation protection measures.

**4.7 Bilateral agreements with other countries**

Slovenia’s most important and undoubtedly the first bilateral agreement concluded in this area was the Arrangement Between the SNSA and the United States Nuclear Regulatory Commission (US NRC) for the Exchange of Technical Information and Cooperation in Nuclear Safety Matters. This agreement provided Slovenian nuclear experts with access to the relevant information of the country, supplying equipment for the Krško NPP, which is also the world’s leading country in nuclear safety development. The US NRC has an extensive international cooperation programme, having concluded such bilateral agreements with nearly all nuclear countries as well as many others. As Slovenian (and EU) legislation does not cover all (technical) aspects of nuclear and radiation safety, US legislation is often used as a reference for the Krško NPP and also contains a number of regulatory guidelines that prove useful in inspections and assessments for most regulatory authorities in countries using US nuclear technology.

Slovenia has signed agreements on early notification in the event of a radiological emergency with all neighbouring countries. Such agreements were signed with the Republic of Hungary in 1995, the Republic of Austria in 1996 and the Republic of Croatia in 1998. The Arrangement between the SNSA and the Institute for Environmental Protection and Research (ISPRA) of the Republic of Italy for the early exchange of information in the event of a radiological emergency was signed in 2010. The regulatory authority that took over the ISPRA’s duties under the agreement is the ISIN (Ispettorato per la sicurezza nucleare e la radioprotezione). Early notification agreements mainly provide the legal basis for quick notification in the event of a radiological event that could endanger the residents of several countries. All such agreements also contain provisions on the exchange of information in relation to nuclear and radiation safety.

In addition to neighbouring countries, various initiatives and bilateral agreements have been made with other countries based on the circumstances and needs. Under similar agreements, the SNSA also maintains regular contact with its Slovakian and Canadian counterparts. The SNSA has concluded several memorandums of cooperation. Such memorandums cover similar topics as intergovernmental agreements but on a hierarchically much lower level and are therefore easier to conclude. Slovenia has so far concluded memorandums of cooperation with the regulatory authorities of the Czech Republic, Poland, the Republic of North Macedonia, Bosnia and Herzegovina, Albania, Morocco and Belarus.

It should also be noted that the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment in and Exploitation and Decommissioning of the Krško Nuclear Power Plant entered into force in 2003, regulating the countries’ mutual relations concerning the status, exploitation and decommissioning of the Krško NPP. Under this agreement, both contracting parties are responsible for ensuring the material conditions to maintain a high level of nuclear safety, while Slovenia is solely responsible for legislation and the supervision of nuclear safety.

**5. THE APPLICABLE LAW**

The Constitution of the Republic of Slovenia, Chapter III (Economic and Social Relations), provides that everyone has the right to a healthy living environment, which is to be ensured by the State. To this end, the conditions and manner in which economic and other activities are pursued must be established by law. These constitutional provisions form the regulatory basis for nuclear and radiation safety.

Slovenian legislation regulating nuclear safety and radiation protection is comprehensive and in line with the international standards. In terms of practical application, the area is governed by the Act regulating ionising radiation protection and nuclear safety, which dates back to the times of former Yugoslavia. After Slovenia gained independence, the Yugoslav Act remained in force until the adoption of the new Act in 2002. Up to 2015, the Act was amended four times (in 2003, 2004, 2011 and 2015). In 2017, a new Act on the relevant topic was adopted and has since been amended twice (in 2019 and 2021). Pursuant to this Act, ten decrees have been adopted by the Government, nine sets of rules by the minister responsible for the environment, 11 sets of rules by the minister responsible for health, two joint sets of rules by the two aforementioned ministers and three sets of rules by the minister responsible for internal affairs.

Slovenia has transposed the IAEA’s basic standards into its legislation. In the middle of the first decade of the 21st century, the SNSA representatives participated in the WENRA group (see the previous section), drafting the nuclear power plant reference levels. Reference levels are condensed and upgraded IAEA standards that the regulatory authorities of European nuclear countries have recognised as appropriate for all of Europe. In 2011, all these European reference levels were transposed into binding Slovenian sets of rules, thereby harmonising Slovenian regulations with the best European practices. Both the IAEA standards and the WENRA reference levels are constantly updated, as is the domestic legislation.

Furthermore, the broader area of nuclear and radiation safety is regulated by legislation on nuclear liability, the export of dual-use items (i.e. items that could be used to produce nuclear weapons), the transport of dangerous goods (including the transport of radioactive material, such as nuclear or fissile materials), regulations on the provision of the service of general economic interest of radioactive waste management, the Slovenian Fund for Financing the Decommissioning of the Krško NPP and the Disposal of Radioactive Waste and Spent Fuel, the permanent cessation of uranium ore exploitation and the prevention of the consequences of mining in the uranium mine at the ŽVUM, regulations on protection and rescue, etc.

Slovenia is a party to many agreements that, in accordance with the Constitution of the Republic of Slovenia, become directly applicable upon ratification and publication (see Section 4, International cooperation).

The systematic regulation of radiation protection started in the 1950s and 1960s. On the basis of the Act on inspections, a set of rules was adopted in 1947 relating to protection measures in working with X-ray equipment and radioactive material. The first Act governing ionising radiation protection was adopted in 1959 and provided the basis for three sets of rules adopted in 1962, defining the use of radioactive elements, operators’ training and qualifications, and medical examinations. In the following years, until the adoption of the Act regulating ionising radiation protection and nuclear safety in 2002, radiation protection legislation was developed, amended and supplemented in line with the findings of world experts, international standards and best global practices.

Despite a relatively extensive regulatory framework on radiation protection, Slovenia was obliged to align its legislation in the process of pre-accession negotiations with the EU radiation protection legislation, which comprises numerous regulations and directives. This was achieved with the adoption and entry into force of the Ionising Radiation Protection and Nuclear Safety Act (in 2002) and subsequent decrees and sets of rules in this area.

However, upon Slovenia’s accession to the EU in 2004, there was no need for significant amendments to the legislation governing nuclear safety, since there were no binding EU directives in this area at the time. In the years following Slovenia’s accession, the EU’s competence was also extended to include nuclear safety with the adoption of two directives on nuclear safety and radioactive waste management. Both were transposed into the Slovenian legal order, thus providing the basis for the modification of Slovenian legislation.

The European Commission adopted Commission Delegated Regulation (EU) 2022/1214 [17]. Among other things, it lays down the technical criteria concerning the economic activity of electricity generation from nuclear energy in existing installations and the construction and safe operation of new nuclear power plants for the generation of electricity or heat. These criteria are used to determine whether an economic activity contributes substantially to climate change mitigation and whether it causes significant harm to any other environmental objective.

The development of Slovenian nuclear and radiation safety has been significantly affected by the fact that the only nuclear power plant in Krško is of US origin. During its construction in the times of former Yugoslavia, the relevant regulations and standards were only beginning to develop. The power plant was therefore built in accordance with the regulations of the United States of America as the supplying country. US technical regulations and the US NRC regulatory guides are still used today as supporting and reference documentation in the regulatory control of the Krško NPP. For more, see Section 4.7 of the Resolution.

**5.1 Key solutions in the ZVISJV-1**

The ZVISJV-1 defines nuclear safety as technical and organisational measures to ensure the safe operation of a nuclear facility, prevent emergencies or mitigate the consequences of such events, and protect exposed workers, the population and the environment against ionising radiation. Radiation safety is defined as measures to achieve the safe use of a radiation source or the safe operation of a facility, to prevent emergencies or to mitigate the consequences of such events and thereby contribute to the protection of the environment and protection against radiation.

The principles of nuclear safety covered in Section 2 are included in Article 4 of the ZVISJV-1 (the principle of integrity; the principle of justification; the principle of radiation protection optimisation; the principle of dose limits; the principle of peaceful use; the principle of primary responsibility; the polluter pays principle; the principle of preparedness; the principle of subsidiary action; the principle of publicity; the principle of a graded approach and the principle of continuous improvement) or in other regulations. Ensuring nuclear and radiation safety starts in the phase of designing a nuclear or radiation facility, taking into account: the principle of defence in depth, the single failure criterion, the principle of independence, the principle of diversity, the redundancy principle, the fail-safe principle, the principle of verified components and the principle of a graded approach.

Designs of radiation or nuclear facilities must also:

- prioritise the use of passive safety features, thereby reducing dependence on active safety functions, control and human intervention to ensure safety;

- in all facility conditions and for project events, as well as for serious accidents in nuclear power plants, ensure the main safety functions to maintain sub-criticality, if necessary; heat removal, if necessary, and the containment of radioactive material in all facility conditions and for project events;

- take into consideration the characteristics of the location, including the impacts on the facility originating from the location’s area of influence;

- take into consideration the normal operation conditions, the anticipated initiating events, accidents and repositories, including the scenario of normal and changed development.

The design bases must include the envisaged primary internal and external events caused by human activity or natural causes, whose likelihood or potential consequences for the environment, the population or workers are not insignificant. The design bases for a radiation or nuclear facility must be verified by means of safety analyses. The design bases for a radiation or nuclear facility must be determined in a clear and systemic manner, documented and, if necessary, updated during construction, throughout the facility’s service life and during any inactivity and decommissioning. The operator of a radiation or nuclear facility must check the design bases regularly. The design bases must also be reviewed after operational occurrences affecting radiation or nuclear safety or due to important new information on radiation or nuclear safety.

According to general international standards and Slovenian legislation (the principle of primary responsibility referred to in Article 4 of the ZVISJV-1), nuclear and radiation safety is ensured by and falls under the responsibility of the operator. The operator must ensure that during the facility's service life:

- the facility operates or trial operates in accordance with the approved operating conditions and limits;

- the written procedures for the operation, trial operation, cessation of operation or decommissioning of the facility are used, which should cover every facility condition foreseen in the safety report;

- its own and foreign operational experiences are monitored and applied to plan and implement safety improvements;

- the operational indicators of the safety and operation of the facility are monitored and used to improve operational safety;

- the aging processes in equipment are monitored and measures taken to reduce or eliminate the effects of these processes;

- the facility's systems and components are maintained, inspected and tested, thus ensuring their availability, reliability and ability to fulfil their functions;

- the safety report is regularly updated so that it includes every modification of the facility;

- if the facility is a nuclear power plant, after the completion of any maintenance works with refuelling, an opinion of an approved radiation and nuclear safety expert is obtained regarding nuclear safety during and after these works;

- a plan for the optimisation of radiation protection is in place, and implemented, regularly reviewed and updated;

- equipment is brought or installed in the radiation or nuclear facility and equipment suppliers and contractors are controlled;

- safety analyses are used to verify the facility's safety;

- an emergency plan or instructions are in place and implemented when necessary, which are harmonised and implemented in cooperation with other authorities and organisations responsible for taking action in the event of a nuclear or radiological accident;

- training and upskilling are provided for employees and outside workers in the radiation or nuclear facility;

- radioactive waste is managed so as to generate as little radioactive waste and discharges thereof into the environment as possible in terms of activity and scope, and so that it is processed and stored in a way suitable for disposal and compliant with the national radioactive waste and spent fuel management programme;

- radioactivity monitoring is provided in the vicinity of the radiation or nuclear facility.

Facilities’ nuclear and radiation safety is also ensured with other institutes and measures (for instance, by means of periodic safety reviews, mandatory safety improvements, regular reporting, a management system, the involvement of approved experts, etc.), from a potential licence amendment or withdrawal to facility shutdown and sanctions for offences. Sanctions and license withdrawal are measures of last resort when all other forms of ensuring nuclear and radiation safety fail.

The ZVISJV-1 also regulates the performance of radiation practices and the use of radiation sources. Any practice for which a licence was not obtained in advance or any practice that was not notified is prohibited. As in the case of nuclear and radiation facilities, the radiation practice operator also bears primary responsibility for the safety of workers and the population. Before issuing a licence, the regulatory authority must check whether the operator has the necessary skills to perform practices and upgrades as appropriate, has the appropriate technical means and has conducted all the necessary preparations to take action in the event of emergencies and to hand over any radioactive waste at the end of the practice to the provider of the service of general economic interest of radioactive waste management. The regulatory authority must keep registers and records to monitor sources of ionising radiation, nuclear materials, radioactive waste and spent fuel "from cradle to grave".

The ZVISJV-1 also sets out measures for the physical protection of nuclear facilities and nuclear materials and measures for the protection of major radiation sources. Physical protection is the responsibility of facility operators, while the protection of radiation sources is the responsibility of their users. The supervision of the physical protection of facilities and nuclear materials is conducted by the MNZ in cooperation with the SNSA. The supervision of measures for the protection of radiation sources is conducted by the SRPA (in the field of human and veterinary medicine) and the SNSA (other activities).

**6. INSTITUTIONAL FRAMEWORK**

The use of nuclear energy and sources of ionising radiation developed alongside the institutional framework of state administration authorities and other associated institutions conducting their part of the activities required for the use of nuclear energy and ensuring nuclear and radiation safety. The framework is organised around three main sections or pillars covering the following areas:

1.      The development of a broader state energy policy with the leading role of the ministry responsible for energy and, for the purposes of scientific research, the ministry responsible for science.

2.      Independent regulatory control over nuclear and radiation safety with the leading role of the SNSA as part of the ministry responsible for natural resources and spatial planning, and the SRPA as part of the ministry responsible for health, as well as the URSZR as part of the ministry responsible for defence, the ministry responsible for internal affairs, and the Financial Administration of the Republic of Slovenia.

3.      The disposal of radioactive waste is ensured by the ARAO and overseen by the ministry responsible for waste.

International standards and foreign practices show that the strict separation of the authority overseeing nuclear and radiation safety from the authorities whose main task is the development of a broader state energy policy is of key importance in ensuring successful control over the peaceful use of nuclear energy and radiation sources. In Slovenia, this separation is ensured appropriately.

As a body within the ministry responsible for natural resources and spatial planning, the SNSA is separated from most nuclear facility operators. Furthermore, the SNSA is completely independent of the ministry in its regulatory and inspection decisions.

In human medicine (and veterinary medicine), separation is ensured by having the SRPA as an independent body within the ministry responsible for health. As the ministry responsible for health has a variety of powers in the field of health care, where service providers also carry out radiological activities and use radiation sources, the complete independence of the SRPA in regulatory and inspection decisions is just as important as in the case of the SNSA.

Standards also require that the competent ministries ensure sufficient financial and human resources for the performance of tasks by the relevant regulatory authorities.

Most professional, regulatory and inspection decisions on nuclear and radiation safety are entrusted to the SNSA and the SRPA. In this section, the concept of nuclear and radiation safety is to be interpreted and used in its broader sense, including physical protection (of nuclear facilities and nuclear materials), actions to be taken in the event of an emergency, the transportation of nuclear and radioactive materials (as class 7 dangerous goods), measures related to nuclear non-proliferation, etc.

The SNSA is responsible for the supervision of nuclear safety, nuclear and radiation facilities and sources of ionizing radiation in the country, with the exception of sources in human and veterinary medicine. The SNSA’s work also includes most international cooperation activities regarding nuclear and radiation safety, which are constantly expanding.

The SRPA is responsible for the supervision of all sources of ionising radiation in human and veterinary medicine, the protection of patients in radiological procedures, the supervision of radiation exposure due to radon and the protection of the population and individuals against radiation.

When necessary, both regulatory authorities cooperate efficiently in exercising their powers.

In addition to the SNSA and the SRPA, a limited scope of legislative requirements from the ZVISJV-1 is also covered by other authorities: The URSZR for emergency preparedness and the ministry responsible for internal affairs for the physical protection of facilities and nuclear materials.

Professional, regulatory and inspection tasks in the diverse area of nuclear and radiation safety in the Slovenian state administration are performed by only 50 to 60 experts, some even on a part-time basis, which is insufficient for current tasks in a country with a nuclear programme. A shortage thereof would be acute if the Slovenian nuclear programme was to expand. In the event of a final decision to build a new nuclear power plant, the Government of the Republic of Slovenia will ensure additional personnel for the SNSA and other regulatory authorities in time. The IRRS mission also concluded that the SNSA and the SRPA lack the necessary qualified personnel for the appropriate performance of tasks, as such activities and the potential construction of a new nuclear power plant represent a big HR and financial challenge. Furthermore, the ARTEMIS mission proposed that the Government address the need for additional and properly qualified personnel for the SNSA and the ARAO to perform their responsibilities in ensuring safe radioactive waste management.

New challenges are also anticipated in the use of ionising radiation sources in health care. Slovenia is planning to introduce proton therapy for cancer treatment and to build a cyclotron for the production of radiopharmaceuticals, which will also require additional qualified personnel for both the operators as well as the SRPA and other regulatory authorities.

**6.1 Ministries and their bodies**

**The Ministry of Natural Resources and Spatial Planning**

**The Slovenian Nuclear Safety Administration**

The Ministry of the Environment and Spatial Planning is responsible for preparing and implementing nuclear and radiation safety legislation, with the exception of human and veterinary medicine. The regulatory authority responsible for "... matters of the safety of nuclear facilities and for the inspections of the implementation of the laws, regulations and general acts falling within the competence of the Republic and governing the safety of nuclear facilities" was established in 1987 with the adoption of amendments to the Act on the National Administration System and on the Executive Council of the Assembly of the Socialist Republic of Slovenia and on the Republic Administrative Authorities [18]. It began its operations on 1 January 1988 as the Republic Administration for Nuclear Safety.

With the adoption of the 1994 Organisation and Competence of Ministries Act [19], the SNSA became a body within the Ministry of the Environment and Spatial Planning. The Decree on bodies within ministries [20] provides that the SNSA "(1) performs tasks in the area of nuclear safety, (2) performs tasks in the areas of radiation safety, radiation practices and the use of radiation sources, with the exception of human and veterinary medicine, (3) monitors environmental radioactivity, the protection of the population and the environment against ionising radiation, the cybersecurity of nuclear facilities, the physical protection of nuclear materials and facilities and the protection of radioactive sources, nuclear non-proliferation and the protection of nuclear goods, and the transportation of nuclear and radioactive materials, (4) monitors the implementation of nuclear liability regulations, (5) performs tasks in the area of radioactive waste and spent fuel management, (6) performs tasks in the area of preparedness for nuclear and radiological accidents and tasks related to the protection of critical infrastructure (nuclear power plants), (7) performs the tasks of inspection control in the aforementioned areas and (8) contributes to the fulfilment of international obligations under international agreements on nuclear and radiation safety and performs the tasks of the international exchange of information."

In addition to the ZVISJV-1 and the implementing regulations issued on the basis thereof, the professional and administrative powers of the SNSA are contained in several other regulations.

**The Ministry of Natural Resources and Spatial Planning**

In addition to those of the SNSA, the competences of the Ministry of Natural Resources and Spatial Planning also extend to the "nuclear" aspects of the implementation of legislation on spatial planning and the construction of facilities. The ministry responsible for natural resources, in collaboration with the ministry responsible for energy, draws up the national programme for radioactive waste management and spent fuel, which is then adopted by the National Assembly of the Republic of Slovenia on the proposal of the Government of the Republic of Slovenia. The ministry also supervises the operations of the ŽVUM.

The Spatial Planning and Construction Directorate, in collaboration with the SRPA, performs tasks related to protection measures against radon in new builds, renovations of buildings with high levels of radon and works on existing buildings. The Inspectorate supervising constructions conducts supervision of the fulfilment of legislative requirements for new builds, renovations and works on existing buildings and of the installation of building materials from the list of materials that could exceed the relevant reference levels.

**The Ministry of Health**

**The Slovenian Radiation Protection Administration**

The SRPA operates as a body within the ministry responsible for health. It was established based on the 2002 Act regulating ionising radiation protection and nuclear safety. On 1 March 2003, it assumed the powers of the Health Inspectorate of the Republic of Slovenia relating to radiation protection and all related administrative tasks previously performed by the Ministry of Health.

The Decree on bodies within ministries provides that the SRPA "(1) carries out expert, administrative and development-related tasks in the implementation of activities and the use of sources of ionising radiation in human and veterinary medicine and the protection of human health against the harmful effects of ionising radiation; (2) performs tasks of the systematic screening of the working and living environment for human exposure to natural sources of ionising radiation; (3) monitors the radioactive contamination of food and drinking water; (4) approves radiation protection experts and assesses their competences; (5) carries out inspections in the areas referred to in points 1, 2, 3 and 4 of this paragraph and (6) performs the tasks of the restriction of, reduction in, and prevention of the harmful effects of ionising radiation."

**The Ministry of Climate and Energy**

**The Energy Directorate**

In accordance with the applicable regulations, Slovenia's energy principles, the National Energy and Climate Plan as well as adopted action plans and operational programmes, the Energy Directorate ensures the performance of administrative tasks and measures to ensure a reliable energy supply, increase energy efficiency and savings, and boost the use of energy from renewable sources. The Directorate’s tasks also include supervising the services of general economic interest and participating in the drafting of regulations, documents and measures for the planning of national energy supply and consumption and the sustainable development of energy systems. The Energy Directorate is therefore part of the state administration responsible for the development of nuclear energy use.

The Energy Directorate monitors the operations of the Slovenian Fund for Financing the Decommissioning of the Krško NPP and the Disposal of Radioactive Waste and Spent Fuel, and supports the competent Slovenian minister leading the intergovernmental commission established under the Agreement on the Krško NPP between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment, Exploitation and Decommissioning of the Krško NPP [21]. This commission was tasked with monitoring the implementation of the relevant agreement.

The ministry responsible for the environment, climate and energy also supervises the operations of the provider of the service of general economic interest of radioactive waste management (the ARAO).

**The Ministry of the Interior**

According to the legislation in force, the ministry responsible for internal affairs covers mostly the area of physical protection; the operator of a facility that contains nuclear or radioactive materials (category 1) and the carrier or transport organiser must provide a physical protection plan and ensure the implementation of measures for the physical protection of facilities or materials in accordance with the plan. Such a physical protection plan is approved by the ministry responsible for internal affairs with the Internal Affairs Inspectorate of the Republic of Slovenia as its body within the ministry responsible for inspections in this area. The ministry responsible for internal affairs also conducts the security vetting of foreign nationals in accordance with the ZVISJV-1. It also acts as a contact point for the Convention on the Physical Protection of Nuclear Material and its amendment (A/CPPNM).

The Police as a body within the ministry is responsible for drawing up risk assessments for nuclear facilities and transports of nuclear and radioactive materials.

**The Ministry of Finance**

**The Financial Administration of the Republic of Slovenia**

In accordance with the Decree on the checks of radioactivity of consignments that could contain orphan sources [22], the implementation of the decree in the area of radiation safety is monitored by the inspectors of the SNSA and, once the goods are released into free circulation, by the customs authority.

**The Ministry of Higher Education, Science and Innovation**

The ministry responsible for higher education, science and innovation ensures the financing of study programmes and research for the training of experts in technical and natural sciences relevant to nuclear safety.

The ministry is also responsible for maintaining the national research infrastructure, including the TRIGA research reactor. Funds for the reactor’s operation are provided in accordance with Article 18 of the Scientific Research and Innovation Activity Act [23].

**The Ministry of Defence**

**The Administration of the Republic of Slovenia for Civil Protection and Disaster Relief**

The URSZR performs administrative and expert tasks relating to protection, rescue and relief and other tasks regarding protection against natural and other disasters. It is also responsible for drawing up the National Emergency Plan in the Event of a Nuclear or Radiological Accident [24] and the National Emergency Plan in Case of the Use of Weapons of Mass Destruction for Terrorist Purposes or a Terrorist Attack with Conventional Means [25]. The URSZR also provides the conditions for the work of the commander and the Civil Protection Headquarters, overseeing in an operational and professional capacity the activities of civil protection and other protection, rescue and relief forces under national jurisdiction, directing and coordinating it based on the situation at hand.

**The Ministry of Agriculture, Forestry and Food**

The ministry responsible for agriculture performs special powers in the area of radiation safety for the implementation of Council and Commission regulations on the imports of food and feed originating in third countries following the accident at the Chernobyl nuclear power station (the "post-Chernobyl regulation") and on the maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency (the "dormant regulation").

**The Ministry of Labour, Family, Social Affairs and Equal Opportunities**

As part of its powers, the inspectorate responsible for labour checks if the risk of exposure to radon in basement and ground floor work areas is covered in the safety statement with a risk assessment and spreading awareness among employers of the health risks of radon exposure and the necessary measures to reduce exposure.

**6.2 The broader institutional framework**

**The ARAO — the Radioactive Waste Management Agency**

The ARAO was established based on an ordinance of the Executive Council of the Assembly of the Republic of Slovenia [26] at the beginning of 1991 to ensure the conditions for the permanent safe disposal of radioactive waste.

First organised as a public corporation, the ARAO was transformed into a public utility institute [27] in 1996, which it still remains after the adoption of the new Ordinance establishing the ARAO Public Utility Institute – the Radioactive Waste Management Agency [28].

The ZVISJV-1 provides that the service of general economic interest of radioactive waste management covers:

1. the acceptance, collection, transport, processing and storage prior to disposal, preparations for the construction of a repository, the construction of a repository and the disposal of radioactive waste not originating from power-generating nuclear facilities;

2. the processing of radioactive waste and spent fuel prior to disposal, preparations for the construction of a repository, the construction of a repository and the disposal of radioactive waste originating from power-generating nuclear facilities;

3. the operation of radioactive waste repositories;

4. the management, long-term monitoring and maintenance of closed radioactive waste repositories;

5. the management, long-term monitoring and maintenance of closed repositories for mining and hydrometallurgical tailings originating from the extraction and exploitation of nuclear minerals.

The Act further stipulates that the activities referred to in the preceding paragraph also include the development of expertise in radioactive waste and spent fuel management and the transfer of knowledge from the international environment to the Republic of Slovenia.

As a provider of the service of general economic interest of radioactive waste management, the ARAO is responsible for handling institutional radioactive waste generated in Slovenia and stored at the CRWSF, the long-term monitoring and maintenance of the closed repository of mining tailings originating from the extraction and exploitation of nuclear minerals and other tasks related to the service of general economic interest set out in the ZVISJV-1.

**The Public Fund of the Republic of Slovenia for the Financing of the Decommissioning of the Krško Nuclear Power Plant and for the Disposal of Radioactive Waste and Spent Fuel from the Krško Nuclear Power Plant**

The Krško NPP Public Fund was established in December 1994 and started its activities in 1995. That was the beginning of the systemic financing of the decommissioning of the Krško NPP and the permanent disposal of radioactive waste and spent fuel.

The Act Governing the Public Fund of the Republic of Slovenia for the Financing of the Decommissioning of the Krško NPP and for the Disposal of Radioactive Waste and Spent Fuel from the Krško NPP was adopted in September 2022 [29]. The fund is a legal entity under public law established by the Republic of Slovenia, and the founder’s rights and obligations are exercised by the Government of the Republic of Slovenia. The Act stipulates the eligible use of funds and the financing of the service of general economic interest of radioactive waste management from the state budget, the fund’s bodies, operations and asset management.

Monthly payments into the public fund were first ensured by the Krško NPP. In 2004, this obligation was assumed by ELES GEN (now GEN energija, d.o.o.), the legal successor of the Slovenian investors in the Krško NPP.

Under the Act’s provisions, a proportion of the price of a kilowatt-hour of energy generated at the Krško NPP and sold in Slovenia is paid into the Krško NPP Public Fund. These assets are enriched through investments, thereby guaranteeing the gradual accumulation of the funds necessary to achieve the set aims.

Another important milestone was the conclusion of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment, Exploitation and Decommissioning of the Krško NPP which, among other things, provides that each of the two countries must ensure one half of the funds for decommissioning and the disposal of radioactive waste and spent fuel by paying into a special fund. Croatia established its dedicated fund at the end of 2007 and thus started collecting the funds to this end.

**The GIZ pool for the insurance and reinsurance of nuclear risks**

The GIZ Nuclear Pool was established in 1994 as an economic interest grouping (GIZ) for the insurance and reinsurance of nuclear risks by Slovenian nuclear facility operators. It comprises five insurance companies and two reinsurance companies.

Insurance mostly covers nuclear liability. The GIZ Nuclear Pool assumes nuclear liability within its capacities, while the surplus is reinsured with several foreign pools, the leading shares of which are held by British, Japanese, German, French and Nordic (Swedish and Finnish) nuclear pools. Together with its Croatian counterpart as the co-insurer (the risks are shared in a 50:50 ratio), the GIZ Nuclear Pool insures the assets of the Krško NPP against nuclear, fire and other risks (the risks of terrorism and machinery malfunction). Both nuclear pools insure the risks in question within their capacities, while the surplus is again insured with several foreign nuclear pools.

**6.3 Expert councils and commissions**

**The Expert Council for Radiation and Nuclear Safety**

The Expert Council for Radiation and Nuclear Safety operates on the basis of the ZVISJV-1 and the Rules on the Expert Council for Radiation and Nuclear Safety [30]. Its tasks are to provide opinions and proposals regarding radiation and nuclear safety issues, the protection of nuclear goods, environmental radioactivity, the protection of the environment against ionising radiation, intervention measures, post-disaster recovery and the use of radiation sources, except for human and veterinary medicine; the Expert Council for Radiation and Nuclear Safety also provides opinions and proposals regarding draft regulations under the ZVISJV-1, gives its opinion on the annual report on ionising radiation protection and nuclear safety, on the annual work programme of regulatory authorities and inspectors responsible for matters under the ZVISJV-1, and opinions and proposals on other matters relating to areas under its remit requested by the competent ministry or the SNSA.

**The Expert Council for the Issues of Radiation Protection of People**

The Expert Council for the Issues of Radiation Protection of People operates on the basis of the ZVISJV-1 and the Rules on the operation of the Expert Council for the Issues of Radiation Protection of People [31]. Its tasks are to provide opinions and proposals regarding the radiation protection of people, radiological procedures and the use of radiation sources in human and veterinary medicine. Like the Expert Council for Radiation and Nuclear Safety, it provides opinions and proposals regarding draft regulations under the ZVISJV-1, gives its opinion on the annual report on ionising radiation protection and nuclear safety, on the annual work programme of regulatory authorities and inspectors responsible for matters under the ZVISJV-1, and opinions and proposals on other matters relating to areas under its remit requested by the ministry responsible for health or the SRPA.

**The Commission on the Physical Protection of Nuclear Facilities and Nuclear and Radioactive Materials**

At the end of March 2012, the Commission on the Physical Protection of Nuclear Facilities and Nuclear and Radioactive Materials was appointed by the Government based on the ZVISJV-1. The Commission’s main responsibilities are to give opinions and make proposals concerning the drafting of regulations on physical protection, to give opinions on risk assessment, to monitor and coordinate the implementation of physical protection measures and to make recommendations to improve physical protection measures. The commission consists of representatives of ministries, other state administration authorities and agencies involved in the physical protection of nuclear facilities and nuclear and radioactive materials due to their field of work, and the representatives of nuclear facility operators.

**The Commission for the Control of Exports of Dual-use Items**

This commission was also appointed by the Government [32] on the basis of the Act Regulating the Control of Exports of Dual-use Items [33], which stipulates its main field of work, i.e. the coordination and control of the export, transfer, shipping and transit of dual-use items and the provision of technical assistance. Its responsibilities are set out in detail in the Decree on the procedures for issuing authorisations and certificates and on the competence of the Commission for the Control of Exports of Dual-use Items [34], which governs the documentation and the procedures for issuing authorisations and certificates and the prohibition of transit, and defines the tasks and the operational methods of the Commission for the Control of Exports of Dual-use Items.

The Commission consists of the representatives of ministries and other state administration authorities involved in the control of exports of dual-use items in the context of their sphere of work. It provides annual reports on its work to the Government.

**The Permanent Coordination Group for Restrictive Measures**

At the beginning of 2008, the Permanent Coordination Group for Restrictive Measures was appointed by the Government based on the Act Regulating Restrictive Measures Introduced or Implemented by the Republic of Slovenia in Accordance with Legal Acts and Decisions Adopted by International Organisations [35] and the Legal Act Establishing the Permanent Coordination Group for Restrictive Measures [36]. The group’s main tasks are to monitor the implementation of restrictive measures in Slovenia, to ensure the compliance of opinions and measures relating to restrictive measures, to provide professional assistance in the implementation of restrictive measures and to engage in international cooperation in the implementation of restrictive measures.

The group consists of the representatives of ministries and other state administration authorities and organisations involved in restrictive measures in the context of their sphere of work.

**6.4 Approved experts**

As Slovenia is too small to be able to ensure all the necessary professional support as part of state authorities or the public sector, the majority of legislation is based on the expert opinions of approved experts. The legislation stipulates that, in a special administrative procedure, a regulatory authority recognises a particular legal entity as duly qualified to draft expert opinions, granting it the official status of an approved expert. The legislation also provides when an applicant must submit an opinion of an approved expert with its application to be granted nuclear or radiation safety rights. The party is free to choose its approved expert with whom it concludes a business agreement to obtain an independent opinion on the subject of its application.

While this regime relieves the State of the burden of financing and procedures to obtain expert opinions, it can also create doubts in the actual independence of such opinions. The legislation in force addresses these doubts by referring to the non-affiliation of the administrative officer considering a case, the opinion and assessment of an approved expert and the possibility to request a second expert opinion.

Solutions in other countries vary. In some countries, the regulatory authorities’ organisational structure also includes units responsible for expert analyses and research as a basis for concrete regulatory decisions (e.g. the Finnish regulatory authority) or have an external professional organisation (expert) providing its services exclusively (or mostly) for the regulatory authority (and not on the market), such as the French Radioprotection and Nuclear Safety Institute. Other countries have state research or professional institutes that draft expert opinions for the regulatory authority or a regulatory authority that contracts for each expert opinion with external organisations.

The ZVISJV-1 and the implementing regulations adopted pursuant thereto provide for several types of approved experts or service providers, each with their own special responsibilities in carrying out the measures and tasks under the legislation in question, namely:

- approved radiation and nuclear safety experts, who give opinions on concrete and related technical questions;

- approved radiation protection experts who advise on radiation protection measures, inspect working and radiation conditions in supervised and monitored areas, inspect radiation sources and personal protective equipment and provide training in radiation protection;

- approved dosimetry service providers who assess personal doses, including calibrating, reading and interpreting readings from the instruments for measuring personal doses and for measuring radioactivity in the human body or biological samples;

- approved medical physics experts who optimise radiological procedures, measure and assess patients' exposure, ensure and verify the quality of radiological procedures, and provide advice on medical physics to assist in radiological procedures in human medicine and non-medical procedures using medical equipment;

- approved occupational medicine providers who provide health surveillance over exposed workers;

- approved radiation protection training providers;

- approved radon measurement providers who measure and determine radon exposure;

- approved radioactivity monitoring providers who ensure the monitoring of environmental radioactivity;

- approved shipment radioactivity measurement providers who monitor the radioactivity of shipments and imports of goods that could be radioactively contaminated.

**6.5 Prevention activities and emergency preparedness**

In addition to their advantages, the use of nuclear energy and the performance of radiation practices also pose certain risks. Although providers do their best to avoid unnecessary threats to people and the environment, the system as a whole must be prepared for the worst possible events. The memory of the 1986 Chernobyl accident is still fresh, as is the 2011 nuclear accident at the Japanese Fukushima power plant which, even though the cause of the accident was uncommon, a tsunami, and even though it happened relatively far away, attracted global attention and raised numerous questions related to nuclear and radiation safety, including in Europe. The use of ionising radiation sources outside the energy sector, for instance in medicine, science and agriculture, can also cause an accident, as evidenced by past events, i.e. the 1987 accident caused by an abandoned radiation therapy source in Goiânia, Brazil, or the 1999 uranium criticality accident in a fuel reprocessing facility in Tokaimura, Japan.

All entities engaged in the performance of nuclear and radiation practices, including the competent state authorities, are also involved in prevention and preparedness for emergencies, namely a nuclear or radiological accident that could have a harmful effect on people and the environment. In July 2021, the Government adopted the Protection Strategy for a Nuclear and Radiological Accident, which provides the core government guidelines for taking protective actions in the event of a nuclear or radiological accident in accordance with international requirements in this area. The central planning document on the national level is the National Emergency Plan in the Event of a Nuclear or Radiological Accident, with which the relevant emergency and activity plans on all other levels, namely regional, local and facility levels, must comply. In addition to the Krško NPP, the National Emergency Plan also covers accidents at other nuclear and radiation facilities in Slovenia, nuclear and radiological accidents abroad with a potential impact on Slovenia and other radiological accidents with ionising radiation sources.

Ensuring a high level of preparedness and response to emergencies and compliance with international standards in this area also require constant coordination with international inspections, for instance EPREV missions.

In addition to the general requirements of emergency planning in the event of natural and other disasters, the peaceful exploitation of nuclear energy and use of radiation sources requires devoting sufficient attention to aspects related to commitments from international conventions [37] on nuclear liability and the Nuclear Damage Liability Act [38], namely the functioning of the damage assessment system, ensuring funds from the nuclear facility operator and the State and the compensation of injured parties as a result of a nuclear accident.

**7.**  **THE PROFESSIONAL COMPETENCES OF ALL STAKEHOLDERS IN THE FIELD OF NUCLEAR AND RADIATION SAFETY**

The main prerequisite for a high degree of nuclear and radiation safety in the country is qualified people responsible for ensuring this safety. The relevant international standards (mainly the IAEA standards) recognise that ensuring high-quality professional support should not be left entirely to the laws of the market but that such support should be provided by each country in an adequate and long-term stable manner.

Any country with a nuclear programme must also maintain sufficient expertise to be able to ensure the highest level of nuclear and radiation safety for its population and the populations of neighbouring countries at all times and in all conditions. Highly-educated, trained and motivated professionals, researchers and scientists and the continuous development of new skills are key to maintaining and continuously improving a high level of nuclear safety. Both can now be achieved only with a highly developed and international linked system of research and education. Ensuring research and education is part of Slovenia’s international commitments (the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the Euratom Treaty, Council Directive 2009/71/Euratom and Council Directive 2011/70/Euratom). Article 7 of EU Council Directive 2009/71/Euratom stipulates:

"Member States shall ensure that the national framework in place requires arrangements for education and training to be made by all parties for their staff having responsibilities relating to the nuclear safety of nuclear installations in order to maintain and to further develop expertise and skills in nuclear safety."

This Directive provision is reflected in several provisions of the ZVISJV-1 which require that all stakeholders have in place training for their staff.

The ZVISJV-1 requires that nuclear and radiation facility operators ensure a sufficient number of workers with appropriate knowledge and skills who are qualified and additionally trained to carry out all activities related to radiation and nuclear safety, with implementing regulations laying down the necessary worker qualifications in greater detail. The ZVISJV-1 provides that radiation practice operators must have the mandatory training and minimum qualifications for specific posts.

For approved experts, the ZVISJV-1 lays down the necessary qualifications and the approval process aimed at verifying experts’ qualifications.

As regards approved organisations, the ZVISJV-1 stipulates that the State must ensure the funding to train approved radiation protection experts, approved medical physics experts and approved radiation and nuclear safety experts, and the funding to finance development studies and independent professional examinations and international professional cooperation in radiation protection and nuclear safety.

The ZVISJV-1 also sets out the State’s obligation to finance the training of the state authorities responsible for nuclear and radiation safety.

This provision is implemented almost exclusively with funding from the SNSA and SRSA budgets, which are far from sufficient to cover the full and systematic financing for ensuring and maintaining the professional competence of all nuclear and radiation safety stakeholders in the country, as the budgetary resources are extremely scarce.

Research projects and programmes relating to nuclear energy are also co-financed by the Slovenian Research and Innovation Agency (hereinafter: ARIS) from the research funding of the ministry responsible for higher education, science and innovation in the form of targeted research projects.

In addition to direct funding, resources for professional support and development can also be provided by means of a public-private partnership, which represents private investments in public projects and/or the public financing of private projects in the public interest, which has so far not been implemented.

Qualified personnel are needed by nuclear and radiation facility operators and ionising radiation source users, by relevant state authorities and institutions as well as independent organisations and approved experts. The basis for ensuring adequate professional support are the systems of education and research and development.

In Slovenian organisations working in the area of radiation and nuclear safety (and broader technologies), the following challenges have been identified in recent years:

1.      At the national level, Slovenia is missing an analysis of the current situation and strategy regarding qualified personnel, including the envisaged needs and mechanisms for ensuring them, which would also address the shortage of qualified natural science and technical experts and the general lack of interest in natural and technical sciences in our society.

2.      Personnel aging in professional organisations outside the Krško NPP, with an insufficient number of young experts in the field in the last two decades, mostly due to the uncertain future of the nuclear power sector and the lack of popularity of natural and technical sciences among the general public. The situation is improving very slowly. Despite a slightly positive trend, there is a generational gap, as most previously active leading experts are either retired or will retire soon, there is a shortage of middle-aged experts and a high number of young experts are leaving the nuclear sector.

3.      The organisation of the relevant major research and approved organisations is relatively rigid and does not encourage the creation of high-tech business hubs that could be competitive on the national and global markets. Conversely, small and dynamic companies wishing to advance and expand fail to achieve the critical mass of experts in relevant fields that could represent a sufficient core for ensuring comprehensive and high-quality professional support for broader and more demanding segments of nuclear and radiation safety.

4.      Research and development programmes require a sufficient (critical) number of researchers. If existing research and development groups are not properly engaged in research and development in the area of nuclear and radiation safety, they will have to focus on other areas or the researchers will have to find employment abroad with more favourable working conditions. Untargeted and insufficient funding and the free market may completely change the orientation of research and development groups.

5.      If new nuclear facilities (a nuclear power plant or a research reactor) are built, the timely education, training and employment of new experts will be essential, as existing personnel will be completely unable to ensure the high-quality and timely performance of tasks during the siting and construction of a new nuclear facility. Sufficient and qualified personnel will also be key to the construction and operation of new nuclear facilities for the investor/future operator. The employment and development of qualified personnel in Slovenia must therefore receive maximum attention and adequate financing.

6.      The potential construction of a cyclotron centre for the purposes of nuclear medicine or a proton therapy centre would also require a sufficient number of qualified experts, both for the operator and the SRPA.

Research, education and professional activities in the area of nuclear and radiation safety and technology in Slovenia will have to be maintained for several decades, including outside of the Krško NPP, or much longer if a new nuclear power plant is built. It is therefore important that the State has set long-term strategic objectives in the area of nuclear and radiation safety as well as appropriate mechanisms in place to achieve them. A long-term strategy for ensuring qualified personnel is also essential to other areas of radiation protection.

**7.1 Research**

Any country with a nuclear and radiation programme must develop and maintain sufficient expertise to be able to ensure the highest level of safety at all times and under all conditions. Adequately educated, trained and motivated professionals and researchers and the continuous development of new skills are key to maintaining and continuously improving a high level of nuclear and radiation safety.

The key research areas for nuclear and radiation safety are:

- nuclear safety, with an emphasis on:

- the operational safety and monitoring of nuclear facilities (the development and application of tools, procedures and measures for the timely detection of the key parameters indicating a threat to a nuclear facility);

- safety analysis and facility design (the use of computer tools to analyse and verify design margins when designing or modifying a nuclear facility, the analysis of accident scenarios and external events);

- analysis of the system, structure and component connections (physical ageing effects, the vulnerability of systems and structures, seismic loads);

- the control of the ageing of systems, structures and components and the extension of the operating lifetime of nuclear facilities (methods and tools for the inspection of load-bearing structures, checking the condition of built-in reserve margins against material fracture, material wear);

- the management of radioactive waste and spent fuel and the decommissioning of nuclear facilities, with an emphasis on:

- the storage, processing and disposal of low- and intermediate-level radioactive waste;

- the storage, processing and disposal of high-level radioactive waste and spent fuel;

- an integrated approach to the decommissioning of nuclear facilities;

- radiation safety and monitoring, with an emphasis on:

- the safe and justified use of resources in industry;

- the safe, justified and optimised use of resources in medicine;

- the development of new diagnostic and therapeutic methods using ionising radiation in medicine;

- the monitoring of nuclear and radiation facilities and closed facilities subject to long-term surveillance and maintenance;

- the monitoring of radioactivity in the environment and emergency monitoring;

- emergency preparedness, which must ensure expertise in the national coordination of emergency preparedness, support systems and decision-making tools for implementing protective measures, as well as the capabilities of emergency responders and the preparedness of users of hazardous radiation sources, with an emphasis on:

- the assessment of the situation during an emergency (core condition assessment, radionuclide dispersion modelling, analysis of cyber-attacks on nuclear facilities);

- the assessment of doses in an emergency (the measurement of radionuclide concentrations, the assessment of doses for all exposure pathways – radiation exposure, inhalation, ingestion);

- the preparation of protective measures and their impact on the protection strategy (evacuation times, transport infrastructure, the effectiveness of sheltering, the challenges of resettlement, the decontamination of large areas);

- the effectiveness of emergency response organisations (the reliability of communications, organisation, working methods, digitalisation);

- new nuclear technologies and fusion, with an emphasis on:

- new nuclear reactor projects and new areas of research and development;

- the development of fusion reactors;

- nuclear security, with an emphasis on:

- research and development in nuclear security and related technologies, including nuclear forensics;

- research in social sciences related to nuclear and radiation facilities, with an emphasis on:

- the social acceptability of activities affecting the environment;

- public communication.

In the area of the safe use of nuclear energy and other ionising radiation sources, Slovenia has done most of its research on the use of nuclear energy; it also finances international fusion research, where it has an above-average success rate in Euratom projects. However, research is still lacking in some areas of nuclear safety, such as probabilistic safety and risk assessment and the ageing of nuclear facilities. Insufficient research and disregarding areas of research can have a significant impact on the provision of nuclear and radiation safety in the country.

There is also a lack of research and development in the field of medical radiation protection, particularly in the use of accelerators for proton beam therapy and accelerators for the production of radioactive material for the needs in nuclear medicine.

Research in nuclear safety for new nuclear power plants is still in its early stage of development. There is currently very little research in the field of nuclear security and a similar lack of research exists in the social sciences related to nuclear energy and ionising radiation. Research in nuclear security is essential for ensuring nuclear and radiation safety, while social science research focuses primarily on assessing societal acceptance of the safe use of nuclear energy.

In Slovenia, the management of radioactive waste and spent fuel is based on the so-called "polluter pays principle”, which must also be applied to research and development in this field, with the ultimate goal of the safe management and disposal of radioactive waste and spent fuel. Three main sources of funding are provided for this purpose: (1) funds paid by GEN energija d.o.o., as the Slovenian owner of the Krško NPP, pursuant to the programmes for the decommissioning and disposal of radioactive waste and spent fuel and the provisions of the Act Governing the Public Fund of the Republic of Slovenia for the Financing of the Decommissioning of the Krško Nuclear Power Plant and for the Disposal of Radioactive Waste and Spent Fuel from the Krško Nuclear Power Plant, (2) payments from users of the service of general economic interest of radioactive waste management other than waste from power-generating nuclear facilities, and (3) funds from the state budget. Research and development activities in this field are also defined in the Resolution on the National Programme for Managing Radioactive Waste and Spent Fuel.

It is also important to ensure full co-funding of participation in international research and industrial projects. Increasing globalisation requires the strengthening of excellence in science and technology. Without enhanced scientific and technological cooperation at the European and global level, the scientific challenges related to the safe use of nuclear energy and other sources of ionising radiation cannot be effectively addressed. For small countries, like Slovenia, and for their research programmes, international networking is particularly important, enabling responses to challenges and focusing on internationally relevant research with access to major research infrastructures. Participation in Euratom research projects, in the Horizon Europe Pillar 1 – Excellent Science and in other organisations, such as the OECD/NEA, is essential for building expertise in this area.

Science and research activities are financed from the public funds of the Ministry responsible for higher education, science and innovation in accordance with the new Scientific Research and Innovation Activity Act, mainly in the form of research projects and research programmes for which ARIS issues calls for proposals. Research projects are of shorter duration and have more specific objectives, while research programmes allow for the long-term funding of activities.

As a general rule, funding is awarded to project and programme proposals that the evaluation system identifies as strongest in terms of scientific excellence, social and economic impact, and implementation quality and efficiency. Projects across the entire energy sector compete within this framework. Consequently, research projects on nuclear power, including nuclear and radiation safety, may face temporary or even permanent funding cuts at any time. While this approach promotes scientific excellence and encourages nuclear safety research groups within its framework, it does not guarantee the long-term continuity and development of research areas crucial for supporting national policies on the safe use of nuclear energy and other ionising radiation sources.

One of the funding mechanisms is the target research programmes (TRP), for which ARIS issues calls for proposals in cooperation with ministries and other state authorities. The programmes are administered by ARIS on the basis of the Scientific Research and Innovation Activity Act, but as a rule, half of the funding must be provided by state authorities on the basis of sectoral laws governing the public funding of research.

A small part of Slovenian research in this area consists of applied research, primarily focused on providing direct support to industry and, to a lesser extent, to state authorities. To this end, the SNSA usually finances, on an annual basis, so-called project tasks in the field of nuclear and radiation safety in accordance with its internal research and development strategy. In recent years, the SRPA has particularly financed studies on patient protection and the reduction of radon exposure.

For the granting of licences in the field of nuclear and radiation safety, binding expert opinions from authorised professional organisations, as required by law, are of essential importance. The research and development required for the preparation of expert opinions by authorised expert organisations is paid for directly by the industry.

It is strategically important to secure long-term stable and supportive dedicated funding for the necessary national research in nuclear technology. This includes research that supports national policies for the safe use of nuclear energy and other sources of ionising radiation, as well as international cooperation. In addition to the funding provided by the Ministry responsible for higher education, science and innovation, there is an urgent need for additional resources due to a recent shortfall in research directly supporting decision-making by regulatory authorities in the field of nuclear and radiation safety in Slovenia, primarily caused by insufficient financial resources.

The Government of the Republic of Slovenia will develop a national strategy for research and development in the safe use of nuclear energy and other sources of ionising radiation. This strategy aims to strengthen the system of research and development in this area, as well as to regulate the funding mechanisms and to define more precisely the priority tasks and research programmes in this domain. The adoption of the national strategy is necessary to ensure the safe operation of nuclear and radiation facilities in view of the challenges posed by the ageing of nuclear and radiation facilities in Slovenia, the management of radioactive waste and the development of new technologies using radiation sources in medicine, industry and research, including the construction of modern nuclear power plants.

Slovenia generates about 20% of its electricity from its nuclear power plant, so whatever the future options, it is necessary to ensure sufficient domestic expert support for its operation and to put in place appropriate systemic solutions to improve the status and functioning of the profession to meet these needs. This is, of course, all the more important in the light of the decision on the possible construction of a second nuclear power plant at Krško, which would significantly increase the need for additional technical staff. If there is already a noticeable shortage of technical staff in the public sector, the additional needs will also affect all other stakeholders.

For the sustainable development of nuclear and radiation safety research, it is important to ensure stable funding for full-time researchers. Even without the planned second nuclear power plant, Slovenia currently estimates that it would require at least the following number of researchers in key areas of nuclear and radiation safety research:

- 30 for nuclear safety,

- 20 for radiation safety and monitoring,

- 20 for new technologies using ionising radiation in medicine,

- 15 for new nuclear technologies and fusion,

- 15 for the management of radioactive waste and spent fuel and the decommissioning of nuclear facilities,

- 10 for emergency preparedness,

- 5 for nuclear security,

- 5 for research in social sciences related to nuclear and radiation facilities.

Ensuring the necessary number of researchers in key research areas is a shared responsibility of several ministries and associated research organisations due to the sectoral commitments of individual ministries. If a final decision is taken to build a new nuclear facility or to introduce other new activities and technologies (e.g. proton therapy in medicine and the construction of a cyclotron for the production of radiopharmaceuticals), the above figures should be increased accordingly in due course. Projections of the situation and an analysis of the needs for qualified staff for all stakeholders (industry, regulatory authorities, professional organisations) will have to be made, taking into account the various possible scenarios for the development of the nuclear sector in the country, such as the construction of a new nuclear power plant, the extension of the operation of the Krško NPP and the construction of a new research reactor.

**7.2 Education**

In Slovenia, the first Bologna cycle does not include a diploma graduate programme in nuclear engineering or nuclear safety. Some related electives can be taken at higher levels at the Faculty of Electrical Engineering, the Faculty of Mechanical Engineering, and the Faculty of Mathematics and Physics of the University of Ljubljana, the Faculty of Energy Technology at the University of Maribor with its seat in Krško and the Faculty of Civil Engineering at the University of Maribor.

The second level master's programme in ‘Nuclear Engineering’ takes place at the Faculty of Mathematics and Physics at the University of Ljubljana. The programme is suitable for graduates of technical and scientific faculties of the first Bologna cycle. It consists mainly of courses in reactor engineering and nuclear and reactor physics, including a course in nuclear safety. Some of the courses are common to other programmes at the Faculty of Mathematics and Physics, but it is also possible to choose courses from other faculties at the University of Ljubljana. The Faculty of Mathematics and Physics' second-level master's programmes also include the ‘Medical Physics’ programme, which provides a relatively wide range of courses on radiation and radiation safety. The main areas of activity are radiotherapy (radiation oncology), diagnostic imaging with X-rays, ultrasound, magnetic resonance imaging (diagnostic radiology), diagnostic imaging with radioisotopes (nuclear medicine) and the study of the health effects of radiation and radiation protection (health physics).

Both studies are closely linked to the research activities of the Jožef Štefan Institute (JSI). Studies at the Faculty of Mathematics and Physics at the University of Ljubljana fully meet the quality standards of the European Nuclear Education Network (ENEN) and are distinguished by regular exchanges of students and professors with ENEN members.

The Faculty of Energy Engineering at the University of Maribor offers study programmes in energy engineering (Bologna first, second and third cycles). Within these programmes, students have the option to focus their studies on nuclear power engineering.

**7.3 Training**

Continuous and systematic training is essential for maintaining professional competence in any organisation. As the leading employer in the nuclear power sector in Slovenia, the Krško NPP trains its staff for work in a nuclear facility through a comprehensive in-house training system. This system includes a knowledge management programme supported by established procedures and a dedicated training unit. Through this system, the Krško NPP ensures that it maintains the knowledge necessary for the smooth and safe operation of the plant at all times.

Personnel employed in the nuclear power sector are trained by the Milan Čopič Nuclear Technology Training Centre at the JSI (hereinafter: the ICJT). The ICJT provides all initial theoretical training for future operators and engineers of the Krško NPP, as well as training for local operators, the personnel of professional organisations and state authorities.

The company GEN Energija, d.o.o., also has an established internal training system and has been conducting introductory training for all new employees for several years. This training includes both theoretical and practical components, providing participants with a comprehensive introduction to the operation of nuclear power plants and to the broader field of nuclear and radiation safety.

The training systems of the Krško NPP and ICJT are coordinated and complementary. Training at the ICJT, Krško NPP and GEN energija, d.o.o., is important, as an adequate number of trainees supports high-quality training, which features regular lectures, up-to-date training materials in Slovenian and an effective quality assurance system. The ICJT training materials are also used for emergency response training.

The ICJT training system thus established also allows other stakeholders to be involved in a high-quality training programme in different areas of nuclear safety and radiation protection.

The skills required in the nuclear field are very specific, so international networking and the provision of training at an international level are also of key importance. International training is provided by the IAEA, and Slovenia actively participates as both a recipient and provider of this training. IAEA training is particularly important for state authorities responsible for overseeing nuclear safety and radiation protection. Some essential skills can only be acquired at international events, where various regulatory authorities come together to share their experiences and ensure the continuous development of the profession in this field.

The SNSA, as Slovenia’s regulatory authority for nuclear and radiation safety, has its own competence assurance programme called SAT-URSJV. This programme outlines the professional competences required for specific positions, the methods for maintaining these competences, the training required and approaches to employee development.

Training systems vary from one institution to another, depending on the size of the institutions and the work they do. The general knowledge required in the field of nuclear and radiation safety is partly provided domestically by the ICJT and the ZVD, and internationally by the IAEA. The specific expertise provided by these institutions for other stakeholders is developed and maintained through their own processes, as they primarily operate as educational institutions or various institutes.

Slovenia has a long-standing tradition of providing radiation protection training for workers exposed to radiation. As early as 1981, a regulation was enacted requiring workers who work with ionising radiation sources or provide radiation protection services to undergo further training and training with authorised training providers. Subsequent legislation on radiation protection has continued to mandate the compulsory training of exposed workers by authorised organisations in accordance with approved training programmes.

The current legislation provides for compulsory radiation protection training for all individuals involved in radiation protection activities. This requirement extends to those who may not be directly exposed to ionising radiation at work but whose actions could affect the exposure of others or the safety of the facility or sources. In 2017, a package of specific radiation protection training was introduced for providers of radiological procedures in healthcare, with a focus on patient protection.

The scope and indicative programme of training is set out in the legislation. The scope of training depends on the risk involved in the activity and ranges from four hours for simpler activities, such as guiding in karst caves, to 200 hours for the most complex responsibilities, such as implementing radiation protection in a nuclear power plant. Radiation protection training in Slovenia is provided by two authorised organisations, the ZVD and the JSI. Training is carried out in accordance with a programme drawn up by the training provider and compliance is ensured by the SRPA, which approves alignment with the framework set out in the legislation. For radiation protection training within nuclear facilities, the training provider must collaborate with the facility operator; however, training for workers under direct supervision may be conducted independently by the facility operator. Each training programme concludes with an examination, after which trainees must demonstrate ongoing knowledge of radiation protection through re-testing every five years. Annually, between 1,000 and 4,000 people, including those due for a five-year re-test, complete the radiation protection examination. This type of training contributes to the high level of radiation protection in Slovenia. The cooperation of all stakeholders, i.e. radiation practice operators, authorised training providers and regulatory authorities, is crucial for the successful implementation of training.

**8. OBJECTIVES AND MEASURES FOR ACHIEVING THEM**

**8.1 The fundamental objectives of nuclear and radiation safety**

The primary objective of nuclear and radiation safety is to protect people and the environment from unnecessary harmful effects of ionising radiation.

All other objectives and measures are subordinate to the primary objective and serve as a means to achieve it. For each measure, also the responsible authorities, the financing and the implementation schedule are defined.

**8.2 The objectives of nuclear and radiation practices**

**Objective 1:**

Nuclear and radiation facilities, radiation practice operators, organisations involved in the transport of radioactive and nuclear materials and all organisations whose activities are related to nuclear security comply with the legal requirements, ensure the continuous improvement of nuclear and radiation safety and take account of international developments.

Measures to achieve the objective:

-        U1/1 Operators of nuclear and radiation facilities and radiation practice operators maintain a high level of nuclear and radiation safety and, in particular, a culture of safety and security – on an ongoing basis.

-      U1/2 State authorities, each within their respective spheres of competence, monitor and, where appropriate, encourage measures proposed by operators of nuclear and radiation facilities and radiation practice operators and other organisations to improve nuclear and radiation safety. All parties also actively support the appropriate exchange of information between Slovenian stakeholders – on an ongoing basis.

-        U1/3 Operators of nuclear and radiation facilities, radiation practice operators, other organisations as well as state authorities monitor the development of the profession worldwide and incorporate the findings into measures to improve nuclear and radiation safety in Slovenia – on an ongoing basis.

Each of the above-mentioned competent authorities – state authorities (the relevant line ministries, the SNSA and the SRPA), operators of nuclear and radiation facilities, radiation practice operators, organisations involved in the transport of radioactive and nuclear materials, and all organisations engaged in activities related to nuclear security – is responsible for funding compliance with the legal requirements, ensuring the continuous improvement of nuclear and radiation safety, and monitoring global developments in this field.

**8.3 The objectives of international cooperation**

**Objective 2:**

Slovenia or its state authorities and other organisations involved in nuclear and radiation safety conclude or accede to international conventions, agreements and treaties or other forms of cooperation that facilitate the rapid and equal exchange of information and mutual assistance. This cooperation aims to enhance nuclear and radiation safety, while reducing risks to people and the environment, both within Slovenia and beyond.

Slovenian state authorities and other organisations in the field of nuclear and radiation safety join international associations according to their needs and the benefits they can gain from such membership. Membership in such associations contributes to the maintenance of nuclear and radiation safety in Slovenia at a comparable international level.

International cooperation should be promoted and maintained in all areas of nuclear and radiation safety including science and education.

Measures to achieve the objective:

-        U2/1 Slovenian state authorities and other organisations involved in nuclear and radiation safety actively monitor and, where appropriate, join international associations and other forms of international cooperation – on an ongoing basis.

-        U2/2 The competent organisations regularly implement and report on their obligations under international agreements, treaties or other forms of cooperation – on an ongoing basis, annually in a report on ionising radiation protection and nuclear safety in the Republic of Slovenia.

-        U2/3 The Ministry of Foreign and European Affairs (hereinafter: MZEZ), the SNSA, the SRPA and other state authorities monitor developments at the international level and, if necessary, initiate procedures for the accession of Slovenia to any new or amended international agreements or for the conclusion of bilateral agreements in the field of nuclear and radiation safety – on an ongoing basis.

Each organisation allocates its own financial resources for international cooperation within its area of activity. The funding for state authorities is provided through the budget of the Republic of Slovenia.

**Objective 3:**

Slovenia will continue to actively participate in all nuclear and radiation safety activities within the competence of the EU, where its presence is mandatory and where its specific long-term interests can be pursued.

Measures to achieve the objective:

-        U3/1 Representatives of Slovenia (the Permanent Representation in Brussels, the SNSA, the SRPA) actively participate in the meetings of the EU working bodies – on an ongoing basis.

-        U3/2 Slovenian research organisations actively participate in the EURATOM Research Programme, being supported by the Ministry of Higher Education, Science and Innovation, the SNSA and other state authorities with an interest in such research and development activities – on an ongoing basis.

Funding for active participation in all nuclear and radiation safety activities within the competence of the EU is provided through public funds (EU funds and the budget of the Republic of Slovenia).

**Objective 4:**

Slovenia is an active member of the IAEA. As a member of this Agency, it contributes a compulsory membership fee as well as additional personnel and financial resources, based on its capacities, particularly in areas where it expects to advance its interests directly or indirectly.

In the field of technical cooperation, Slovenia supports projects with great development potential, especially in countries that are geographically close, in countries with similar programmes or technology, and especially in areas where Slovenian experts can provide assistance.

Slovenia will receive technical assistance mainly in areas where there is a lack of qualified domestic experts, in order to achieve specific objectives in the field of nuclear and radiation safety.

Slovenia will continue to encourage its experts to work professionally in other countries within the IAEA and will invite international groups of experts to conduct regular advisory inspections of its facilities and institutions to independently verify its capabilities. Specifically, Slovenia will invite groups with which it has established commitments.

Measures to achieve the objective:

-        U4/1 Slovenia pays annual IAEA membership fees and a voluntary contribution for technical assistance, the amount of which is proposed each year by the IAEA Secretariat – both of which are continuously financed from the SNSA budget.

-        U4/2 Slovenian state authorities (the SNSA and the SRPA) and other organisations bid for technical assistance programmes in third countries where Slovenian experience can support development efforts – on an ongoing basis.

-        U4/3 Slovenian experts participate as reviewers in international expert advisory missions to other countries, in advisory groups and standardisation committees and in other forms of the exchange of experiences (technical meetings, consultations, etc.) – on an ongoing basis.

-        U4/4 Slovenian state authorities (the SNSA and the SRPA) and other organisations (the ARAO, the Krško NPP) regularly update and report data to IAEA databases and participate in activities (emergency preparedness exercises, comparative measurements and similar) – on an ongoing basis.

-        U4/5 Slovenia is actively engaged in IAEA technical cooperation, where:

- it organises events with international participation, including working meetings, workshops, courses, seminars and similar, through the SNSA, the SRPA, the JSI and other organisations – on an ongoing basis;

-    it hosts candidates from other countries for scientific visits and training, and supports technical cooperation projects by deploying its experts to third countries. This commitment involves the SNSA, the SRPA, the JSI, the Ljubljana University Medical Centre, the Institute of Oncology and other organisations – on an ongoing basis;

-   where Slovenian state authorities (the SNSA, the SRPA, the Ministry of the Environment, Climate and Energy and others) and other organisations (including the ARAO, the Geological Survey of Slovenia, the JSI, the Ljubljana University Medical Centre, the Institute of Oncology, the Veterinary Faculty, the Agricultural Institute of Slovenia and others) participate in regional projects and apply for projects in areas where they do not have fully developed capacities – on an ongoing basis.

-        U4/6 In accordance with the Resolution and other programme documents, Slovenia assesses the effectiveness of the involvement of IAEA advisory and assessment missions (service missions) and invites them either once or at specified intervals. The missions to be invited every ten years, include IRRS and ARTEMIS, whose interval is prescribed by law. Other missions to be decided during the Resolution’s term are OSART, IPPAS, EPREV, INSARR, as well as other less frequent missions (such as SALTO, ORPAS, and others) – on an ongoing basis.

The financial resources for the active participation of Slovenia in the IAEA are provided from the budget of the Republic of Slovenia and from other organisations participating in IAEA activities.

**Objective 5:**

Slovenia is an active member of the OECD/NEA and contributes a calculated membership fee to support its activities. It actively participates in the work of its committees, the NEA database and the subcommittees relevant to ensuring a high level of nuclear and radiation safety, in accordance with its human and financial resources.

Measures to achieve the objective:

-        U5/1 Slovenia regularly pays its annual membership fees for the NEA and the NEA database from the SNSA budget – on an ongoing basis.

-        U5/2 Slovenian representatives (the SNSA, the SRPA, GEN energija, d.o.o, the ARAO) actively participate in the OECD/NEA committee and working group meetings and consistently propose improvements for the country based on the conclusions reached in these meetings – on an ongoing basis.

-        U5/3 Krško NPP and the SNSA exchange information on radiation protection in nuclear power plants through the ISOE system – on an ongoing basis.

-        U5/4 Slovenian research organisations participate in NEA research projects – on an ongoing basis.

Slovenia’s active participation in the OECD/NEA is financed from the budget of the Republic of Slovenia and from the funds of other organisations participating in NEA activities.

**Objective 6:**

Slovenia remains firmly committed to the Treaty on the Non-Proliferation of Nuclear Weapons and to the Safeguards Agreement, including the Additional Protocol, and ensures that nuclear safeguards inspections are conducted smoothly and promptly, when required.

Slovenia remains firmly committed to compliance with other nuclear non-proliferation and safeguards treaties (the Comprehensive Nuclear-Test-Ban Treaty – CTBT, the Convention on the Physical Protection of Nuclear Materials – A/CPPNM, the International Convention for the Suppression of Acts of Nuclear Terrorism – ICSANT).

Slovenia participates to the best of its ability in international organisations, associations and initiatives related to nuclear non-proliferation and nuclear security, and in particular fulfils its commitments regarding reporting, the exchange of best practices and joint efforts to improve measures in specific sub-areas.

Measures to achieve the objective:

-        U6/1 All organisations in Slovenia ensure full and timely cooperation and support for the work of international safeguards inspectors – on an ongoing basis.

-        U6/2 Slovenian representatives from the SNSA, the MZEZ, the MNZ and others continuously monitor the work of international organisations, associations and initiatives related to nuclear non-proliferation and nuclear security, and participate in meetings according to their human and financial resources and priority topics – on an ongoing basis.

The commitment to the Treaty on the Non-Proliferation of Nuclear Weapons, the Safeguards Agreement and other treaties on nuclear non-proliferation and nuclear security is financed from the budget of the Republic of Slovenia. Organisations bound by international safeguards agreements are responsible for covering their own costs related to these measures.

**8.4 THE OBJECTIVES OF LEGISLATION**

**Objective 7:**

Slovenia aligns its nuclear safety and radiation protection legislation with international best practices.

Measures to achieve the objective:

-        U7/1 State authorities (the SNSA, the SRPA and others) regularly monitor international developments in the field of nuclear and radiation safety, compare them with national legislation and propose amendments to the latter where necessary – on an ongoing basis.

-        U7/2 When a new directive in the field of nuclear safety and radiation protection is adopted, the state authorities (the SNSA, the SRPA and others) ensure the timely transposition of the EU directives on nuclear safety and radiation protection into the national legal order and address any identified breaches in the transposition of these directives within the established deadlines.

Financial resources for maintaining the nuclear safety and radiation protection legislation in line with the best international practice are provided in the budget of the Republic of Slovenia.

**8.5 THE OBJECTIVES OF THE INSTITUTIONAL FRAMEWORK**

**Objective 8:**

Slovenia ensures the proper separation and independence of the regulatory authorities responsible for the control of nuclear and radiation safety from entities primarily responsible for developing the country’s broader energy policy or the strategy for the use of ionising radiation sources. The supervisory bodies have sufficient financial resources and qualified staff to carry out their tasks effectively.

Measures to achieve the objective:

-        U8/1 The Government of the Republic of Slovenia, along with the line ministries, the SNSA and the SRPA, ensures the separation and independence of the supervisory bodies from the entities primarily responsible for developing the country’s broader energy policy or the strategy for the use of ionising radiation sources. This separation and independence must also be maintained in the event of organisational changes within government bodies – on an ongoing basis.

-        U8/2 The Government of the Republic of Slovenia ensures that the supervisory bodies (the SNSA and the SRPA) are provided with sufficient financial resources and a sufficient number of qualified staff to carry out their tasks – on an ongoing basis.

-        U8/3 In the event of a decision to construct new nuclear facilities or to introduce new complex technologies (e.g. proton therapy, the construction of a cyclotron), the supervisory bodies will be provided in a timely manner with sufficient additional financial resources and a sufficient number of additional qualified staff to perform their tasks. Given the complexity and length of the licensing process for new nuclear facilities and other complex technologies, sufficient staff should be in place at least five years before the formal procedures are initiated.

The resources necessary for the effective functioning of the regulatory authorities are foreseen in the budget of the Republic of Slovenia.

**Objective 9:**

The system of approved experts ensures the highest level of expertise in the decision-making processes of regulatory authorities regarding radiation and nuclear safety.

Measures to achieve the objective:

-        U9/1 Ensuring comprehensive coverage of all areas of nuclear and radiation safety by approved experts from Slovenia. This will be accomplished by promoting and funding targeted development tasks – implemented on an ongoing basis through measure U12/2.

-        U9/2 Enhancing the protection of patients from ionising radiation by promoting the recruitment of medical physics experts in major healthcare institutions, supported by the Ministry of Health and the SRPA – on an ongoing basis.

Targeted development tasks to ensure the nuclear and radiation safety coverage by approved experts are financed from the budget of the Republic of Slovenia and from the funds of the investors or operators of nuclear facilities. In addition, the budget of the Republic of Slovenia provides financial support for the recruitment of medical physics experts.

**Objective 10:**

In Slovenia, emergency preparedness for the use of nuclear energy and the implementation of radiation practices is adequately insured to minimise potential impacts on people and the environment.

Measures to achieve the objective:

-        U10/1 During the preparedness phase, in Slovenia a mechanism is established to ensure the coherence and reliability of documents related to emergency planning for nuclear and radiological accidents. This mechanism defines the authorities responsible for planning, along with the content, criteria and methodology for preparing these documents. It also includes coordination among planners and other stakeholders, as well as public participation in the planning process. During the response phase, the State appoints appropriate management authorities who, along with the protection and rescue forces, coordinate all activities to ensure the effective implementation of documents related to emergency planning for nuclear and radiological accidents at all planning levels, i.e. national, regional and local.

-        U10/2 The adequacy of the response system should be regularly verified through exercises designed to test the nuclear and radiological accident response plans and associated procedures, the competence of personnel, and the premises and equipment, including means of communication. Additionally, the ability of the State to fulfil its obligations within international organisations and under international treaties in this field should also be assessed. When planning exercises, planners must take into account the training, exercise and drill programmes that are part of the emergency plan. Unless otherwise specified in the plan, small-scale exercises are normally conducted every two years, while major accident exercises take place every five years.

Emergency preparedness is financed from the budget of the Republic of Slovenia, local community budgets and the funds of organisations responsible for implementing tasks outlined in the emergency plans for nuclear and radiological accidents.

**8.6 THE OBJECTIVES TO ENSURE THE PROFESSIONAL COMPETENCE OF ALL STAKEHOLDERS IN THE FIELD OF NUCLEAR AND RADIATION SAFETY**

**Objective 11:**

Slovenian educational institutions offer study programmes that prepare graduates to take on important roles in organisations where, following appropriate additional training, they can actively ensure nuclear and radiation safety.

Measures to achieve the objective:

-        U11/1 Higher education institutions ensure the long-term stable development of internationally comparable and recognised study programmes in nuclear and radiation technologies. They provide high-quality and comprehensive coverage of this field of study – on an ongoing basis.

-        U11/2 Study options in nuclear and radiation technologies should be adapted in a timely manner to align with the projected demand and developmental needs of Slovenia, supported by investments in the necessary capacities of higher education institutions made in due time – on an ongoing basis.

-        U11/3 All stakeholders need to improve career opportunities through gender mainstreaming in support of national development policies in areas related to nuclear and radiation safety, and through increased targeted investment in research and development in this field – on an ongoing basis.

-        U11/4 Operators of radiation and nuclear facilities, radiation practice operators and state authorities (the SNSA, the SRPA and others) support and participate in nuclear and radiation technology education programmes by providing scholarships and other appropriate forms of support – on an ongoing basis.

-        U11/5 Slovenia is raising awareness among professionals, employers and the public about the health risks posed by radon exposure, the importance of radon measurement and measures to reduce exposure. For this purpose, the SRPA, in accordance with the national radon programme, promotes ongoing cooperation among all radon stakeholders (such as the state authorities in radiation protection, construction, child-care, cultural, health and educational programmes, radon remediation contractors, health professionals, construction experts, local communities, the interested public and others) and coordinates their activities – on an ongoing basis.

-        U11/6 The SNSA implements a public awareness programme focusing on the use of building materials that cannot be disregarded from a radiation protection point of view – on an ongoing basis.

The long-term stable development of internationally comparable and recognised study programmes at higher education institutions in the field of nuclear and radiation technologies is financed from public funds. Funds for raising awareness of radon exposure and the use of construction materials are allocated from the budget of the Republic of Slovenia.

**Objective 12:**

Slovenia has established stable conditions for the funding and implementation of research and education activities in the field of nuclear and radiation safety, providing the necessary number of experts to competently address all key aspects of the safe use of nuclear energy and ionising radiation sources.

Measures to achieve the objective:

-        U12/1 The Government of the Republic of Slovenia, on the proposal of the Ministry of Natural Resources and Spatial Planning, will adopt a national strategy for research and development for the safe use of nuclear energy and ionising radiation sources by the end of 2024.

-        U12/2 Following the adoption of the national strategy for research and development for the safe use of nuclear energy and other ionising radiation sources, the Government of the Republic of Slovenia will approve a periodic research and development programme for all key research areas for the safe use of nuclear energy and ionising radiation sources – on an ongoing basis.

-        U12/3 The State actively supports and co-finances the participation of Slovenian scientists/experts in targeted and well-established international associations, organisations and research projects on the safe use of nuclear energy and ionising radiation sources – on an ongoing basis.

-        U12/4 The State encourages economic operators and others to research, develop and apply the results of research and development, leading to an increase in the number of researchers and developers in industry and health organisations – on an ongoing basis.

-        U12/5 When deciding on the construction of new nuclear facilities or the introduction of new complex technologies, the State ensures that all necessary applied research and development tasks are carried out in good time for new projects under measure U12/2.

Research and educational activities in the field of nuclear and radiation safety are financed from the budget of the Republic of Slovenia, as well as from contributions of investors and operators of nuclear facilities.

**Objective 13:**

Slovenia ensures conditions for the continuous and systematic training of experts in nuclear and radiation safety.

Measures to achieve the objective:

-        U13/1 Operators of radiation and nuclear facilities, radiation practice operators, state authorities (the SNSA, the SRPA, the MNZ, the URSZR and others) and professional organisations have internal mechanisms for the continuous and systematic training of their personnel to ensure that the professional competence of the organisation is maintained – on an ongoing basis.

-        U13/2 Nuclear and radiation safety training providers (the ICJT, ZVD and others) in Slovenia have established training programmes in various areas of nuclear and radiation safety and radiation protection, which are available to all stakeholders – on an ongoing basis.

-        U13/3 The State promotes international networking and the provision of training in the international arena, in particular within the IAEA – on an ongoing basis.

-        U13/4 Operators of nuclear and radiation facilities and radiation practice operators provide regular training in nuclear safety and radiation protection in accordance with the applicable legislation – on an ongoing basis.

-        U13/5 The SRPA assesses the adequacy of the radiation protection training framework programmes required by legislation and updates them as necessary – on an ongoing basis.

-        U13/6 The SNSA verifies training programmes in nuclear facilities and issues licences to personnel performing safety-relevant work – on an ongoing basis.

Operators of radiation and nuclear facilities, radiation practice operators, state authorities and professional organisations each provide their own funding for the continuous and systematic training of experts in nuclear and radiation safety.

**9. MONITORING AND REPORTING ON THE PROGRESS OF RESOLUTION IMPLEMENTATION**

The Resolution is implemented by all state authorities and other organisations referred to in Sections 6 and 8 of the Resolution. Once a year, the SNSA collects information on individual areas covered by the Resolution and includes it in its regular annual report on protection against ionising radiation and nuclear safety, which the Government of the Republic of Slovenia submits to the National Assembly of the Republic of Slovenia. The report must highlight the progress made in achieving the objectives and indicate possible improvements for the next resolutions.

**10.**  **ACRONYMS**

ARAO – The Radioactive Waste Management Agency

ARIS – The Slovenian Research and Innovation Agency

ARTEMIS – The Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation

AQG – The Atomic Questions Group

CDLM – The Committee on Decommissioning of Nuclear Installations and Legacy Management

CNRA – The Committee on Nuclear Regulatory Activities

CPPNM – The Convention on the Physical Protection of Nuclear Materials

CRPPH – The Committee on Radiation Protection and Public Health

CSNI – The Committee on the Safety of Nuclear Installations

CRWSF – The Central Radioactive Waste Storage Facility

CTBT – The Comprehensive Nuclear-Test-Ban Treaty

CTBTO – The Comprehensive Nuclear-Test-Ban Treaty Organisation

EACA – The European Association of Competent Authorities for the Safe Transport of Radioactive Material

EAN – The European ALARA Network

ENEN – The European Nuclear Education Network

ENSRA – The European Nuclear Security Regulators Association

ENSREG – The European Nuclear Safety Regulators Group

EPREV – Emergency Preparedness Review

ERPAN – The European Radioprotection Authorities Network

ETSON – The European Technical Safety Organisations Network

EU – The European Union

EURATOM – The European Atomic Energy Community

EURDEP – The European Radiological Data Exchange Platform

GICNT – The Global Initiative to Combat Nuclear Terrorism

HERCA – The Heads of European Radiological Protection Competent Authorities

ICJT – The Milan Čopič Nuclear Technology Training Centre at the Jožef Stefan Institute

ICSANT – The International Convention for the Suppression of Acts of Nuclear Terrorism

IFNEC – The International Framework for Nuclear Energy Cooperation

JSI – The Jožef Stefan Institute

INES – The International Nuclear and Radiological Event Scale

INIS – The International Nuclear Information System

INLA – The International Nuclear Law Association

INSARR – The Integrated Safety Review of Research Reactors

INSC – The Instrument for Nuclear Safety Cooperation

IPPAS – The International Physical Protection Advisory Service

IRS – The International Reporting System for Operating Experience

IRRS – The Integrated Regulatory Review Service

ISIN – Ispettorato per la sicurezza nucleare e la radioprotezione

ISOE – The System on Occupational Exposure

ISPRA – Istituto Superiore per la Protezione e la Ricerca Ambientale (the Italian Institute for Environmental Protection and Research)

ITDB – The Incident and Trafficking Database

IAEA – The International Atomic Energy Agency

MBDAV – The Management Board for the Development, Application and Validation of Nuclear Data and Codes

MNZ – The Ministry of the Interior

MZEZ – The Ministry of Foreign and European Affairs

NDC – The Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle

NEA – The Nuclear Energy Agency

Krško NPP – The Krško Nuclear Power Plant

NLC – The Nuclear Law Committee

NSC – The Nuclear Science Committee

NSCG – The Nuclear Security Contact Group

NSG – The Nuclear Suppliers Group

LILW – Low and Intermediate-Level Waste Repository

NUSEC – The Nuclear Security Information Portal

OECD – The Organization for Economic Cooperation and Development

ORPAS – The Occupational Radiation Protection Appraisal Service

OSART – The Operational Safety Review Team

Pre-SALTO – The Preliminary Mission for Safety Aspects of Long-Term Operation

RAMP – The Review of Accident Management Programmes

RANET – The Response and Assistance Network

ŽVUM – The Žirovski Vrh Uranium Mine

RWMC – The Radioactive Waste Management Committee

SALTO – Safety Aspects of Long-Term Operation

TranSAS – The Transport Safety Appraisal Service

SNSA – The Slovenian Nuclear Safety Administration

SRPA – The Slovenian Radiation Protection Administration

URSZR – The Administration of the Republic of Slovenia for Civil Protection and Disaster Relief

USIE – The Unified System for Information Exchange in Incidents and Emergencies

US NRC – The United States Nuclear Regulatory Commission

ZVISJV-1 – The Ionising Radiation Protection and Nuclear Safety Act

WANO – The World Association of Nuclear Operators

WENRA – The Western European Nuclear Regulators' Association

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National Assembly
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