



Guide for Readers

National Policy for nuclear safety
and radiation protection 2018



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Disclaimer: in case of interpretation differences, the Dutch version of this document is leading

Foreword

The Netherlands has a diverse nuclear landscape. Just think of the applications in the energy supply, healthcare, industrial and scientific sectors. All these diverse applications have a common theme: 'Safety comes first'. This applies to nuclear power generation, the application of ionizing radiation, shipments of radioactive materials and radioactive waste processing; all of these activities must be guaranteed 100% safe. The government plays an important and active role by setting, supervising, and enforcing the rules for using nuclear applications.

Additionally, it is essential for the government to inform the Dutch public quickly, clearly and accurately about all potential risks involving radiation and the consequences thereof. This also means the government will need to cooperate with licensees to provide the public with timely and accurate information in case of an incident, a nuclear crisis, or a radiation accident.

Together with all the parties involved, I am committed to prioritizing safety for people and the environment and ensuring that all nuclear activities permanently comply with the latest international insights and rules.

This Guide provides a clear overview of current policy on nuclear safety and radiation protection. And of how the various applications are related to the involvement of different government organizations. The Guide was drawn up by the Authority for Nuclear Safety and Radiation Protection, in close cooperation with the other departments involved. Together with them, I commit myself every day to a nuclear safe Netherlands.

I wish you much reading pleasure.

State Secretary For Infrastructure And Water Management,
Stientje van Veldhoven

1 Introduction



The 2018 Guide to Dutch policy for nuclear safety and radiation protection sets out current policy regarding nuclear safety and radiation protection. The Guide also outlines the way in which the Netherlands handles the organization and implementation of this policy. This overarching document is intended for professionals working in the field. These are e.g. businesses, institutions, government bodies, and non-governmental organizations that deal with nuclear processes and radiation. The document presents a detailed overview of the current situation in the Netherlands, but contains no policy proposals.

Responsibility for this policy rests with several ministries. The Guide outlines the tasks and responsibilities of the various ministries involved in Dutch policy in the field of nuclear safety and radiation protection. The Guide was prepared using input from – and in consultation with – all of the ministries involved. Given the descriptive nature of this document, some topics are discussed in more detail than others.

This Guide replaces the policy document entitled “National policy on radiation protection and nuclear safety 2014”. There have been numerous developments since the publication of that memorandum. For example, several decrees and regulations have entered into force whilst others have been updated. These include the updated Safety of Nuclear Facilities Regulations, as well as the Decree on Basic Safety Standards for Radiation Protection and its associated regulations. Various crisis management and emergency response documents have been updated, and the national programme for the management of radioactive waste and spent fissionable materials has been established. The reports of several investigations have also been published, such as the report into the final disposal of radioactive waste (OPERA). In organizational terms, the Authority for Nuclear Safety and Radiation Protection (ANVS) started operation as a single integrated organization. With effect from 1 August 2017, it acquired the status of an independent administrative body.

Finally this document serves as an implementation of ‘recommendation 1’, as formulated by the international mission conducted by the International Atomic Energy Agency mission in 2014¹.

¹ “The government should provide a consolidated, overarching national policy and strategy for safety, including radioactive waste management and disposal, and including human and financial resources, as well as a framework for research and development.”

2.1 Outline of the policy

The basis for the Dutch policy and the legislation for nuclear safety and radiation protection was established in the 1960s. The profitable application of ionizing radiation was introduced on a larger scale in the Netherlands. Since then, policy and legislation have been further developed. Standards have been modified in accordance with evolving insights, recommendations, and regulations (at both national and international level). Dutch policy is based on the frameworks for nuclear safety and radiation protection used in Europe and elsewhere.

Dutch policy on nuclear safety and radiation protection focuses on the following aspects:

- The protection of people and the environment against risks resulting from practices or activities involving fissionable materials, ores, radioactive materials and devices (safety).
- Providing protection against risks resulting from deliberate interference, including terrorism and cybercrime, with these practices or activities (security).

The policy is captured in legislation and regulations. The statutory basis for the protection of the public, employees, and patients against the adverse effects of ionizing radiation is anchored in the Nuclear Energy Act and the legislation based on it. The government informs parliament about this policy and its implementation.

The IAEA's Fundamental Safety Principles

Dutch policy and legislation implement the International Atomic Energy Agency's (IAEA) ten 'Fundamental Safety Principles'. These internationally accepted principles underpin several international conventions, directives, regulations, and Euratom directives. The IAEA has further refined these principles in its Safety Requirements and Safety Guides. Details of the ten IAEA Fundamental Safety Principles are given in Appendix 1. In each case, a concise description is given of how the substance of the principle in question has been translated into the Dutch context.

The IAEA's Nuclear Security Fundamentals

The IAEA's Nuclear Security Fundamentals apply to the area of nuclear security². These set out the essential elements of a country's nuclear safety regime. The Netherlands has converted the Nuclear Security Fundamentals' 12 key principles into its legislation. These include the responsibility of the state, the required legislative and regulatory framework (including confidentiality and secrecy), responsibilities during international transport, a system of sanctions, international cooperation, identification and assessment of nuclear security threats, and preparation for – plus measures to be implemented in the event of – a nuclear security incident.

² IAEA Nuclear Security Series No. 20, (IAEA, Wenen 2013)

2.2 Key principles of national policy

National policy for nuclear safety and radiation protection is based on the following six policy principles:

Safety comes first

Dutch policy gives priority to the protection of people, animals, plants, and goods against the adverse effects of ionizing radiation. This is reflected in various ways, such as the safeguarding of nuclear safety, the security of facilities, radioactive substances, devices and transports that emit ionizing radiation, and prevention of the improper proliferation of knowledge and radioactive materials (non-proliferation).

Personal responsibility and the polluter pays

The party utilizing ionizing radiation has primary responsibility for radiation protection and for safeguarding nuclear safety. The licensees of nuclear facilities must have sufficient resources available (including staffing, financial and technical resources) to meet the requirements of nuclear safety and radiation protection. The licensee's staff must have the necessary qualifications and skills. This requirement also applies to third parties, such as contractors working under the responsibility of the licensee who perform practices that may impact the nuclear safety of the nuclear facility, and radiation protection. The regulators will monitor the licensee's compliance with these requirements. With regard to meeting the social and other costs involved, the same principle applies – “the polluter pays”. This means that the costs of shutdown, decommissioning of nuclear facilities, and termination of practices involving sources are borne by those responsible (licensees) for these operations. The same applies to the disposal and management of radioactive waste.

Continuous improvement

One principle anchored in the legislation is that all parties involved in nuclear safety and radiation protection must make every effort to achieve continuous improvement. The aim is to ensure the safety and protection of people and the environment as effectively and efficiently as possible, while conforming to the state-of-the-art. To this end, policymakers have closely examined similar situations in other countries. This requires that both the government and the companies involved use management systems that are capable of continuous testing and evaluation. The government imposes national and international testing and evaluation requirements on the sector.

Examples of the testing and evaluation requirements that are imposed on the sector:

- Requirement (Ministry of Social Affairs and Employment) imposed on the sector to carry out risk assessments and evaluations aimed at worker protection.
- Requirement (Ministry of Health, Welfare and Sport) imposed on the sector to evaluate medical radiological procedures concerning patient doses and the amounts administered.
- Requirement (Ministry of Infrastructure and Water Management) imposed on the licensee of a nuclear facility to ensure that the facility's nuclear safety is investigated in a systematic and verifiable manner, evaluated, and – where necessary – improved.
- Requirement imposed on the licensee to monitor the effective dose received by members of the public outside a site as a result of the organization's licensed practices involving sources of ionizing radiation (several different ministries).

If investigations or evaluations give cause to do so, then all such measures must be taken – provided that they are reasonably achievable. This applies to both the sector and the government.

Operating in a risk-focused way (graded approach)

The Netherlands adopts a graded approach to the development, design and implementation of policy and legislation on nuclear safety and radiation protection. This means that the risk of exposure and the potential effects involved, as well as the controllability (in the event of a serious accident) and the complexity of the practices in question are taken into consideration. The Netherlands operates in a risk-focused way. Detailed policy and implementation decisions are based on sound analysis of the risks involved. The greater the risk, the stricter the regime. Depending on the risk in question, the legislation's graded approach takes the form of exemptions, registration requirements, licensing requirements and supervision and enforcement.

Goal-oriented or means-based requirements

Depending on the results of the assessment of a licence application, in terms of justification, optimization, dose limits and suitability, demands are imposed on the organization in the form of requirements. This applies to the construction, operation and decommissioning of nuclear facilities. In the Netherlands, preference is given to goal-oriented requirements rather than means-based requirements, where possible. This gives both the organization and the competent authority sufficient leeway to create made-to-measure solutions. These solutions ensure that safety is safeguarded as effectively and efficiently as possible, and that it can be continuously improved. The regulator monitors how, and by which selected means and measures, the organization meets the goal-oriented requirements.

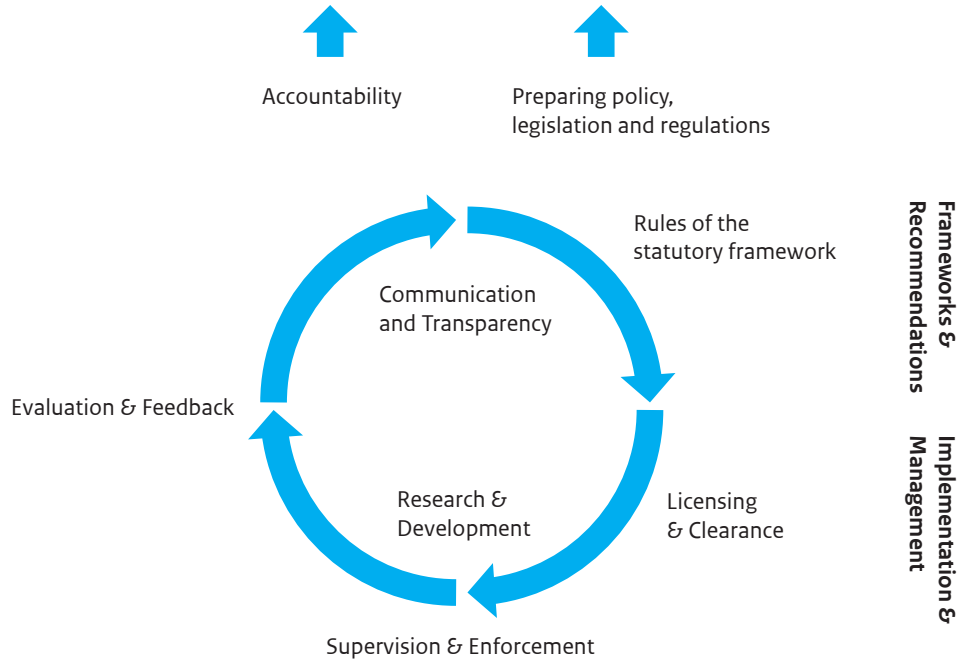
Transparency

The government makes every effort to ensure that it always operates transparently, based on effective communication. Based on this key principle, the government actively communicates details in areas such as policy and legislation, and their implementation. The aim is to inform society and stakeholders about developments, findings, potential risks (including health risks), etc. Similarly, communication is a vital instrument in the event of a radiation safety accident or radiological emergency. Informing people about the situation enables them to take action and limit their exposure to ionizing radiation as much as possible. Transparency is also a condition for the statutory options for public participation, e.g. when granting licences.

2.3 Policy cycle with regard to nuclear safety and radiation protection

In accordance with the policy cycle, the Netherlands focuses on evaluating and monitoring its policy. At national level, this includes investigations by the Netherlands Court of Audit, the Dutch Safety Board, and the annual environmental monitor of the National Institute for Public Health and the Environment. The purpose of the evaluation is also to determine whether the implementing organizations have sufficient resources (in terms of manpower, expertise, quality and funding) to effectively carry out their duties in the area of nuclear safety and radiation protection. The Netherlands complies with international requirements by participating in peer reviews (by organizations such as the IAEA) in the field of nuclear safety and security.

Council of Ministers and Parliament



3 Statutory framework



3.1 International rules and directives

Traditionally, many of the rules governing nuclear safety and radiation protection were derived from international legal rules to which the Netherlands had committed itself. The international harmonization of legislation and regulations is being augmented by increasing international cooperation. By this means, those involved are endeavouring to achieve both good quality, adequate legislation, and a level playing field. Wherever possible, the Netherlands seeks to follow internationally accepted principles, recommendations, practices, and agreements. These have been developed with input from – and in consultation with – the Netherlands, under the guidance of Euratom, IAEA, OECD/NEA, UN³, WHO, ILO, OSPAR, ENSRA, ESARDA, HERCA, EACA, ENSREG and the WENRA⁴. National circumstances – such as the specific Dutch context and the country's policy aspirations – sometimes lead to a specific interpretation.

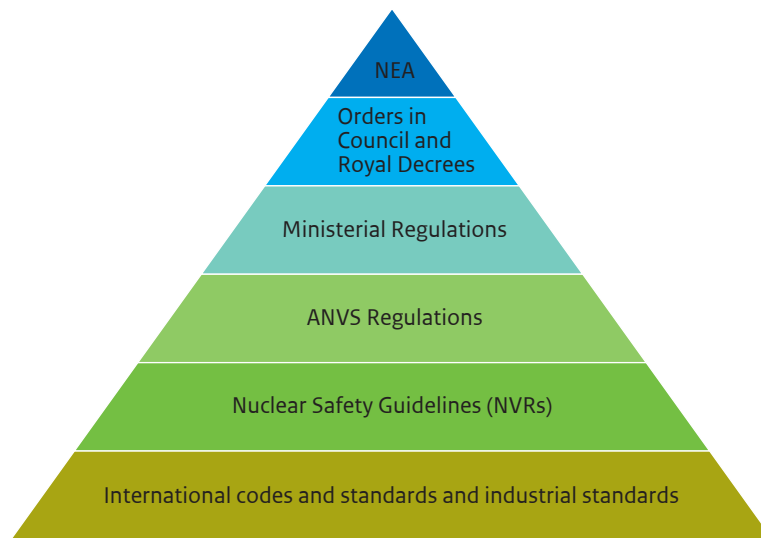
The Nuclear Energy Act provides a basis for the implementation of directives based on the [Euratom treaty](#) and on standards⁵ drawn up by the IAEA (which are often not directly binding). The Euratom directives are usually implemented in the context of a set of administrative orders and ministerial regulations, partly a regulation issued by the ANVS in 2018. The IAEA rules carry over into legislation and regulations, partly via Euratom directives and licences.

3.2 Nuclear Energy Act

Nuclear Energy Act

The Nuclear Energy Act and the legislation and licences based on it (including the associated requirements) form the legal guarantee for nuclear safety and radiation protection. Since its introduction in 1963, the Nuclear Energy Act has been amended more than 50 times, but it has not been fundamentally revised yet. There was also no immediate reason to do so, as the Act and its delegation provisions provide a broad basis for the implementation of European and international rules. Appendix 3 contains a summary of the legislation and regulations. The pyramid provides a schematic overview of the structure of the Dutch statutory framework.

The Nuclear Energy Act is a framework act comprising of approximately 80 sections. A remarkable feature of the Nuclear Energy Act is its comprehensive character: all uses of ionizing radiation and all of the requirements to protect against it are regulated exclusively by this Act and by legislation based on it.



³ These include Security Council resolution 1540

⁴ An explanation of the abbreviations used is given in Appendix 4

⁵ Such as the Safety Standards, the Security Series, and the Codes of Conduct

Associated legislation

An extensive body of legislation is based on the Nuclear Energy Act. This includes administrative orders, ministerial regulations, the regulations issued by the ANVS, and a number of general operating decisions (see Appendix 3 for a more extensive list). These include:

- **Nuclear Facilities, Fissionable Materials and Ores Decree (BKSE):** the licensing system for practices with fissionable materials and ores has been elaborated in the Nuclear Facilities, Fissionable Materials and Ores Decree.
- **Fissionable Materials, Ores and Radioactive Materials Transport Decree (BVSER):** The licensing system for the shipment of these materials has been elaborated in the Fissionable Materials, Ores and Radioactive Substances (Transport) Decree. There are four categories of transport licences: fissionable materials, fissionable materials with depleted uranium shielding, import or export of medicines or consumer items, and shipment in accordance with a special regulation.
- **Decree on Basic Safety Standards for Radiation Protection (Bbs):** the Decree on Basic Safety Standards for Radiation Protection has been in force since 6 February 2018. The goal of this Decree is to protect the public, the environment, employees and patients against the adverse effects of ionizing radiation. It replaces the Radiation Protection Decree. This complies with the 2013/59/Euratom directive – the Basic Safety Standards or BSS –, which in turn is an elaboration of the recommendations of the International Commission on Radiological Protection. The requirements set out in the Decree have been further elaborated, in the form of the associated regulations.
 - **Regulation on Radiation Protection for Occupational Exposure:** Responsibility for the protection of employees from occupational exposure to radiation rests with the Ministry of Social Affairs and Employment. Specific topics have been further elaborated in the Regulation on Radiation Protection for Occupational Exposure 2018. These include additions to risk assessment & evaluation, cooperation with radiation practitioners/ occupational health service, criteria for the registration (or re-registration) of radiation practitioners, warning signals, National Dose Registration and Information System, requirements concerning dosimetric services, and radon in the workplace.
 - **Regulation on Radiation Protection for Medical Exposure:** In the field of medicine, important technological and scientific developments have generally led to a marked increase in patients' exposure. The BSS emphasize that justification of medical exposure is required (in individual cases). These standards also impose strict requirements on information provided to patients, on the registration and reporting of doses used in medical procedures, on the use of diagnostic reference levels, and on the availability of instruments for measuring doses. This is laid down and regulated in the Decree on Basic Safety Standards for Radiation Protection (Chapter 8) and in the Regulation on Radiation Protection for Medical Exposure.
 - **Regulations on Basic Safety Standards for Radiation Protection:** The Regulation on Basic Safety Standards for Radiation Protection contains provisions for the elaboration of the Decree on Basic Safety Standards for Radiation Protection. These Regulations contain rules and appendices with technical and other requirements for implementation, such as administrative requirements, values for exemption and release from regulatory control, core competences and other qualifications for experts and the corresponding educational requirements, generic justification for practices and measures.
- **Nuclear Safety Regulation for Nuclear Facilities:** The regulations extend to implementation of the Euratom Directive for the nuclear safety of nuclear facilities (Directive 2009/71/Euratom, as amended by Directive 2014/87/Euratom). The regulations provide the necessary Community framework for maintaining the nuclear safety of nuclear facilities and for promoting continuous improvement.
- **Nuclear Facilities and Fissionable Materials (Security) Regulation:** This regulation includes the Dutch implementation of the amended Convention on the Physical Protection of Nuclear Material (CPPNM/a).

ANVS-Regulations

The ANVS Regulation on Basic Safety Standards for Radiation Protection has been in force since 6 February 2018. These regulations contain further rules to protect people against the hazards of exposure to ionizing radiation. The ANVS-Regulation on Nuclear Safety and Security will enter into force in the spring of 2019.

Nuclear Safety Guidelines

The licences for nuclear facilities make use of the Nuclear Safety Guidelines (NVR's). These are IAEA Safety Requirements and Safety Guides that have been adapted to the Dutch situation. They are linked to a licence, depending on the nuclear facility in question. Through its affiliation with the Western European Nuclear Regulators Association (WENRA), the ANVS has committed itself to implement the reference levels. These are important for various reasons, such as promoting the national and international harmonization of legislation.

Guidances

Guidances are informative documents that indicate how specific topics in the legislation should be interpreted. Guidances are not binding. The Netherlands has a number of guidances in the field of nuclear safety and radiation protection. These include the [Guidance to the Safe Design and Operation of Nuclear Reactors](#) and [Guidance to licence applications for fissionable materials, radioactive materials and devices](#). Other ministries also issue guidances that are relevant to radiation protection, such as the Ministry of Social Affairs and Employment's [Guidance to risk analysis for radiation applications](#).

3.3 Other relevant legislation and regulations

In addition to the Nuclear Energy Act licence, other licences are often required before the proposed practice or activity can be allowed to proceed. For example, a licence for building work or for environmental aspects or a nature conservation act licence may be required.

4 Organization



4.1 National-level organization

At national level, several different ministers are responsible for the implementation of the Nuclear Energy Act and of the legislation based on it. The duties, powers and responsibilities of these parties have been laid down in various items of legislation. These include the Nuclear Energy Act, the Basic Safety Standards for Radiation Protection Decree and Regulations, the 2018 Radiation Protection (Occupational Exposure) Regulations, the Ionizing Radiation (Medical Exposure) Regulations, the Supervisors' Appointment and Performance Decree for the Nuclear Energy Act 2013, the Nuclear Facilities and Fissionable Materials (Protection) Regulation, and the National Defence (Exemption) Decree.

On 1 August 2017, by an amendment to the Nuclear Energy Act (ANVS Establishment Act), the ANVS was established as an independent administrative body (Authority). In this way, various duties in the field of nuclear safety and radiation protection have been comprehensively combined. Responsibility for the ANVS, as an independent administrative body, is the Ministry of Infrastructure and Water Management.

Other ministers have certain responsibilities, powers and duties. For instance, the Ministry of Social Affairs and Employment is responsible for worker protection, and the Ministry of Health, Welfare and Sport for patient protection.

Following the establishment of the ANVS, the responsibilities of each ministry are as summarized in the table below.

Ministry	Responsibility for
Infrastructure and Water Management	<ul style="list-style-type: none"> • Nuclear Energy Act and policy on nuclear safety and radiation protection and radioactive waste, the related emergency preparedness, security and safeguards, insofar as these relate to the environmental aspects of radiation protection • Interdepartmental coordination of preparations for – and the responses to – nuclear accidents involving category A facilities⁶, including radiation-related measures and crisis communication • Drinking water • Financial security of nuclear reactors, together with the Ministry of Finance • Politically responsible for the ANVS's performance
Social Affairs and Employment	<ul style="list-style-type: none"> • Policies, legislation, regulations and supervision regarding radiation protection for workers
Health, Welfare and Sport	<ul style="list-style-type: none"> • Policies, legislation, regulations and supervision regarding radiation protection for patients • Policies, legislation, regulations and supervision regarding the protection of public health against the undesirable effects of ionizing radiation on product and food safety • Policy regarding care for those who have been exposed to radioactivity • Emergency preparedness in the case of nuclear accidents in areas for which it is responsible, such as public health, care, and food safety

⁶ In the Netherlands, for emergency preparedness and response activities, a distinction is made between accidents involving category A facilities and those involving category B facilities. An accident involving a category A facility can have cross-regional effects that require administrative coordination by the government, in accordance with Art. 40 of the Nuclear Energy Act. These are accidents involving nuclear reactors, or ships and spacecraft that use nuclear energy, or nuclear defence equipment. This classification applies to such facilities in the Netherlands and elsewhere.

Ministry	Responsibility for
Economic Affairs and Climate Policy	<ul style="list-style-type: none"> • Energy policy, including nuclear energy policy • Emergency preparedness in the case of nuclear accidents in areas for which it is responsible, such as energy distribution and telecommunication (partly responsible) • State Supervision of Mines (SodM) in connection with supervision to monitor compliance with nuclear energy legislation for the mining industry • Support for applied nuclear energy research
Justice and Security	<ul style="list-style-type: none"> • Coordination of preparedness and response – national crisis control organization • Coordination of national security, including counterterrorism • Policy in the area of public order and security
Agriculture, Nature and Food Quality	<ul style="list-style-type: none"> • Policies, legislation, regulations and supervision regarding radiation protection in relation to food quality and animal welfare (including agricultural measures) • Netherlands Food and Consumer Product Safety Authority in connection with supervision to monitor compliance with nuclear energy legislation on product and food safety. Officials from the Netherlands Food and Consumer Product Safety Authority (NVWA) have been appointed by the Ministry of Health, Welfare and Sports to perform these duties.
Defence	<ul style="list-style-type: none"> • Fissionable materials, nuclear facilities and equipment, radioactive materials and devices emitting ionizing radiation that are intended for use by the armed forces and that are exempted from licence requirements under the Nuclear Energy Act.
Foreign Affairs	<ul style="list-style-type: none"> • Policies on non-proliferation and for the international coordination of nuclear safety and radiation protection, and the associated crisis control, security and safeguards
Education, Culture and Science	<ul style="list-style-type: none"> • Policy for education, science and vocational training • Academic system including Delft University of Technology (licensee under the Nuclear Energy Act). Delft University of Technology is responsible for the reactor. This also includes scientific research, unless it concerns research that the ANVS requires for the performance of its duties – in which case responsibility rests with the ANVS.
Finance	<ul style="list-style-type: none"> • Legislation concerning liability for any losses resulting from accidents at nuclear facilities. Concerns the implementation of the Nuclear Accidents (Liability) Act. • Financial security of nuclear reactors, together with the Ministry of Infrastructure and Water Management • Supervision carried out by the Customs, for compliance with the Nuclear Energy Act • Shareholder status of COVRA and URENCO
Interior and Kingdom Relations, together with the ANVS (responsible for coordinated preparation and execution)	<ul style="list-style-type: none"> • The Buildings Decree and its provisions concerning ionizing radiation • Availability of information (local and national) on exposure to radon in homes and other buildings and the associated health risks, the importance of radon measurements, and the available technical means to reduce existing radon concentrations.

Section 4.3 covers the tasks of the various ministries in relation to inspection.

4.2 Authority for Nuclear Safety and Radiation Protection

On 1 January 2015, the ANVS started operating as a single integrated organization. The merger involved various services in the field of nuclear safety and radiation protection at the former Ministries of Economic Affairs and of Infrastructure and the Environment (including the Department of Nuclear Safety, Security and Safeguards). The new body took the form of a single directorate at the Ministry of Infrastructure and the Environment. On 1 August 2017, the ANVS was established by law as an independent administrative body⁷. The organization is independent and competent. It continuously monitors and promotes nuclear safety, radiation protection, and security. The creation of the ANVS fulfils the aspiration to combine knowledge and expertise at government level, and to more effectively and clearly reflect the international regulations of IAEA and Euratom. This merging process does not interfere with the fact that various other ministries will retain certain duties, powers and responsibilities.

4.3 Cooperation between stakeholders and partners within the Netherlands

Promoting safety requires effective cooperation between the various parties, each of which has their own tasks, powers and responsibilities within the area of specialization. This applies both to the partnership between the ANVS and the other ministries, State Inspectorates and National Institutes, and to the partnership between the ANVS and provincial authorities, local authorities, water boards, security regions, and municipal health services. It also applies to partnerships with the research consultancies, scientific institutes, industrial and professional associations, and not least the sector itself. Cooperation is also important in view of efficient use of the capacities, resources, and expertise of the parties involved.

The ANVS concluded the [2017 Cooperation Agreement for Radiation Protection](#) with the Ministries of Infrastructure and Water Management; Health, Welfare and Sport; Social Affairs and Employment; Defence; and Economic Affairs and Climate Policy, including the inspectorates that operate on behalf of – or within – these ministries. This agreement was intended to facilitate effective cooperation under normal circumstances (as opposed to crisis), as well as in the case of incidents. There are also cooperation agreements with the Ministry of Finance, regarding the use of Customs personnel to monitor compliance with the Nuclear Energy Act. This cooperation does not entail any change to ministerial responsibility or to the powers of the parties concerned.

4.4 International cooperation

At international level, the Netherlands participates in activities and initiatives aimed at improving radiation protection and nuclear safety worldwide. Within its means, the Netherlands takes its responsibility wherever possible. It makes an active contribution by putting all available knowledge and experience to practical use. Several ministries participate in international forums such as Euratom, the IAEA, and the OECD/NEA. Interdepartmental consultation, led by the Ministry of Foreign Affairs, exist to share and coordinate information about participation in these forums

In regular exchange with other countries, Dutch policy on nuclear safety and the management of radioactive waste and spent fuel is reviewed. This takes place within the frameworks of the Convention on Nuclear Safety and of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The legislation is subject to international reviews at regular intervals, such as the European Union's assessment of compliance with Art. 35 (environmental monitoring programme) of the Euratom treaty. All involved ministries and the regulatory body are also assessed by

⁷ The decree of 6 July 2017 determined the date at which two items of legislation entered into force. The first of these was the Act of 26 April 2016, amending the Nuclear Energy Act in connection with the establishment of the Authority for Nuclear Safety and Radiation Protection (Bulletin of Acts and Decrees 2016, 180). The second was the Amending Decree for the establishment of the Authority for Nuclear Safety and Radiation Protection (Bulletin of Acts and Decrees 2017, 233)

professional counterparts from the Integrated Regulatory Review Service (IRRS) and ARTEMIS (an integrated expert peer review service for radioactive waste and spent fuel management). Staff from Dutch nuclear facilities is regularly invited to participate in peer review missions run by the Operational Safety Review Team (OSART), by the International Probabilistic Safety Assessment Team (IPSART) and by the Safety Aspects of Long Term Operation (SALTO) mission.

International treaties and Euratom directives recommend that the various parties involved exchange information and details of their experiences, to enhance safety and improve the regulatory framework. This concerns the experiences of regulators (Regulatory Experience Feedback) as well as the experiences of those in industry (Operational Experience Feedback). To this end, the Netherlands uses the Incident Reporting System (IRS), the Incident Reporting System for Research Reactors (IRSRR), the Fuel Incident Notification and Analysis System (FINAS, for nuclear fuels), and the Incident and Trafficking Database (ITDB). The Netherlands participates in the European Clearing House on Operational Experience Feedback. This organization analyses information from the above-mentioned systems and databases. It also cooperates with the competent authorities of other countries that use Siemens/KWU nuclear reactors. The information on international experiences thus obtained is used by the licensees and the government to improve safety.

In recent years, international cooperation with the neighbouring countries has intensified. One example of this is the closer cooperation between ANVS and the Belgian Federal Agency for Nuclear Control (FANC), as captured in the FANC and ANVS Cooperation Protocol of 14 September 2017. The Netherlands has agreements with various countries, such as Belgium and Germany, concerning cooperation in the event of a nuclear crisis that has potential cross-border consequences. These agreements are implemented by the Ministry of Infrastructure and Water Management, the Ministry of Justice and Security, and the ANVS.

5 Licensing, supervision and enforcement



Under the Nuclear Energy Act, the implementation of licensing, supervision and enforcement is largely entrusted to the ANVS. In this role, the ANVS cooperates with various ministries and inspectorates that are responsible for carrying out specific tasks in the field of radiation protection (see section 4.1). The agreements reached with regard to such cooperation are captured in the 2017 Cooperation Agreement for Radiation Protection. As far as interventions under criminal law are concerned, the Public Prosecution Service operates autonomously.

5.1 Licensing policy

The ANVS grants all licences based on the Nuclear Energy Act and on the Decree on Basic Safety Standards for Radiation Protection. In doing so, it applies a number of guiding principles, as described in chapter 2. The approach used by the ANVS is described in a document entitled “[Vergunningenbeleid ANVS](#)” (ANVS’s licensing policy). This document, which was published in 2017, also gives a general description of the way in which facilities are terminated and decommissioned.

5.2 Supervision and enforcement

In the Netherlands, supervision and enforcement in the field of nuclear safety is conducted by the ANVS. Supervision and enforcement in the field of radiation protection is conducted by the ANVS and various Inspectorates, to the extent that this falls within their purview. The ANVS also cooperates with the Customs.

The various inspectorates monitor and promote nuclear safety, security as well as protection of workers, patients and members of the public against the adverse effects of exposure to ionizing radiation. For instance, the Social Affairs and Employment Inspectorate has a regulatory programme aimed at preventing employees from being exposed to excessive levels of ionizing radiation. The Health and Youth Care Inspectorate (IGJ), for example, monitors and promotes the safety and quality of healthcare. Supervision with regard to medical exposure are an integral part of the IGJ’s risk-driven regulatory and incident regulation work. In 2017 in its “[Toezicht- en interventiestrategie ANVS](#)” (ANVS inspection and enforcement strategy), ANVS provided a detailed account of its activities in the area of supervision and enforcement.

Legislation and regulations, together with the licence, create the framework for enforcement. The goal of enforcement includes compliance with statutory provisions, encouraging the adoption of an adequate safety and compliance culture, guaranteeing adequate security, and promoting – in a general sense – the protection of people and the environment.

The Public Prosecution Service’s National Public Prosecutor’s Office for Financial, Economic and Environmental Offences (OM) is the competent authority for applying criminal law, and is responsible for directing the criminal investigation. This creates a dual situation involving the State Inspectorates and the Public Prosecution Service. In the case of misdemeanours or minor or simple violations, designated State Inspectorates are entitled to impose an administrative penalty. The basis for this is anchored in the Public Prosecution Service (Settlement) Decree.

The following table shows details of the strategies followed by each individual inspectorate.

Inspectorate	Strategy
Social Affairs and Employment Inspectorate (ISZW)	Has a regulatory programme aimed at preventing employees from being unnecessarily exposed to ionizing radiation. The aim of the programme is to maintain or achieve the highest level of radiation safety for employees. This involves supervision with a greater focus on measures such as making it compulsory for organizations to use registered radiation protection experts. Similarly, it is also compulsory for organizations to perform a risk assessment & evaluation before undertaking any practices or activities.
Health and Youth Care Inspectorate (IGJ)	Monitors and promotes the safety and quality of healthcare. Supervision with regard to the use of radiation in patients are an integral part of the IGJ's risk-driven regulatory and incident regulation work. The IGJ's purview covers the assessment both of individual professional practice and of organizational preconditions that impact the safe use of radiation. The inspectorate works on the basis of a healthy trust in the provision of care. If it feels this is suboptimal, it takes action at its own discretion. In addition to the use of radiation, the IGJ is also responsible for regulating the quality of the medical devices and drugs used in such applications.
State Supervision of Mines (SodM)	Primarily secures the interests of safety and the environment for the personnel involved and for society at large, with regard to the extraction, storage and transport of minerals (oil, gas, salt and geothermal energy) and to offshore wind energy. SodM assesses the aspects of safety, radiation protection, environment, health and efficient (including technically efficient) extraction. The regulator thus ensures that the soil (and deep subsoil) in the Netherlands is used in an efficient and responsible manner, whereby (once again) the safety of people and the environment is guaranteed.
Military Healthcare Inspectorate (IMG)	Performs periodical inspections at health centres and dental centres run by the Ministry of Defence and at military institutions providing hospital care, rehabilitation care, nursing care, mental healthcare, as well as medical training and examination institutes, logistics companies, etc. The IMG can also perform thematic studies into specific aspects of care (such as patient safety and privacy) to determine whether they are being responsibly delivered or secured.
Netherlands Food and Consumer Product Safety Authority (NVWA)	Monitors the safety of food and consumer products, animal and plant health, and animal welfare. It also enforces nature legislation. This also includes exposure to ionizing radiation. The NVWA uses a risk-focused and knowledge-driven approach. Its operations are based on a justified trust in companies that demonstrably fulfil their responsibilities.

6 Emergency preparedness and response



6.1 Personal responsibility of the licensee

Any risk of a radiation accident is curtailed, as far as possible, by imposing requirements in the licence and by means of diligent supervision monitoring compliance with these requirements. Responsibility for safety and security rests with the organizations themselves.

6.2 Strategy in the event of a radiation accident

Even with extensive safety systems, expert staff, strict requirements, and rigorous controls, the risk of radiation safety incidents, radiation accidents, or a nuclear accident can never be entirely ruled out. The International Nuclear and Radiological Event Scale (INES) is used to classify any events involving sources of ionizing radiation that impact (or could potentially impact) the safety of people and the environment. The severity of an accident or incident involving ionizing radiation is reflected by the corresponding number on the International Nuclear and INES scale.

In the case of radiation accidents, the Dutch approach is to assess the level of the potential effective dose received by an individual resulting from the incident, as well as the associated risks. The details of a crisis control procedure specifically for radiation accidents are set out in the National Emergency Plan for Radiation Incidents (NCS) and in the associated plans.

6.3 National Emergency Plan for Radiation Incidents

The Netherlands is prepared for radiation accidents, be it on a small or large scale. The NCS sets out key principles for crisis control in the event of radiation accidents. It also gives details of the main organizational structure for crisis control with regard to radiation accidents or nuclear accidents. This takes place within the framework of the generic crisis control system described in the National Handbook on Decision-Making in Crisis Situations. The NCS forms the basis for practical plans and handbooks, such as the NCS Response Plan and the regional emergency response plans. The NCS Response Plan lists the measures that could be taken in the event of an incident. Key operational and technical principles for the control of radiation accidents are detailed in a report entitled 'Technische basisinformatie stralings-ongevallenbestrijding' (Basic Technical Information on Radiation Accident Control) and in an expert report entitled 'Stralingsincidenten veiligheidsregio's' (Radiation Safety Accidents in Security Regions). The communicative aspects are set out in detail in the 'Crisis Communication for radiation incidents' sub-plan. Plans and response plans have been drawn up at national and regional level. These are regularly updated. The staff of emergency response organizations follow relevant educational programmes and training courses. They also take part in regular practice drills for accidents that could involve the release of ionizing radiation.

6.4 Organisation of emergency responses in the event of radiation accidents

National

In the Netherlands, the Ministry of Justice and Security has general responsibility for coordinating crisis control. The Ministry of Infrastructure and Water Management coordinates preparations for – and the control of – accidents at category A facilities, as far as the radiation-related effects are concerned. The latter Ministry is also responsible (if necessary, together with other government ministers) for the appropriate provision of information to the Dutch public and those involved in accident response. The Ministerial Crisis Coordination Centre (DCC) at the Ministry of Infrastructure and Water Management is responsible for coordinating the response to accidents at category A facilities. The DCC also works closely with that Ministry's Crisis Communication Directorate, which is responsible for crisis communication. The ANVS is responsible for coordinating the national expertise and consultation structure for radiation safety accidents, in the context of the Crisis Expert Team – Radiation and Nuclear (CETsn). If the National

Emergency Response Organisation is activated, all coordination and decision-making takes place in accordance with the National Emergency Plan for Radiation Incidents and the National Manual on Decision-Making in Crisis Situations.

Regional

Effective crisis control during regional and national emergencies requires organizations of a suitable size. Accordingly, each Dutch local authority is assigned to one of 25 security regions. The Security Regions Act provides the underlying regulatory framework. Each security region has its own regional emergency response organisation, based on a regional crisis plan. This plan defines the emergency response organisation and its duties, responsibilities, and powers in the context of emergency response and crisis control. In the case of nuclear accidents, Ministries have the power to direct local authorities (in functional terms), via the security region chair. The ANVS maintains contacts with the security regions, providing details about radiation sources in their area posing the greatest level of risk. In addition, it is the ANVS's job to provide security regions with advice and support in the event of a nuclear accident, radiation accident, or radiation safety incident. In the autumn of 2017, iodine pills were distributed throughout the country, under the direction⁸ of the Ministry of Health, Welfare and Sport, in coordination with the security regions.

Exchanging information with neighbouring countries

Radiation accidents could have cross-border impacts. It has been agreed (in the European Union and in the IAEA context) that, in cases like this, the countries involved will alert each other as soon as possible, inform one another, and exchange measurement data. In 2014, the key principles for crisis control and crisis response in the event of a radiation safety incident or accident were harmonized – as far as possible – with our two neighbouring countries, Belgium and Germany. The Netherlands has set out these key principles in the NCS, the NCS Response Plan, and the 'Crisis Communication for radiation incidents' sub-plan based on the latter.

Dutch Safety Board

The Dutch Safety Board (OVV) investigated cooperative activities involving the Netherlands, Belgium and Germany, with regard to nuclear power plants in the border areas. Various recommendations were made in the ensuing report, entitled "Samenwerken aan nucleaire veiligheid" (Cooperating on nuclear safety), which was published on 31 January 2018. The Dutch authorities involved use the results of this investigation to fine-tune various cooperation's with neighbouring countries.

⁸ Predistribution by the ministry itself.

7 Security and safeguards



7.1. Security of nuclear facilities, radioactive materials and fissionable materials

The Netherlands strives to secure its nuclear facilities, radioactive materials, fissionable materials and nuclear information or expertise against unauthorized influence, wherever possible by means of goal-oriented requirements. In 2012, the Netherlands ratified the amended Convention on the Physical Protection of Nuclear Material (CPPNM/a). The CPPNM/a is internationally binding. It defines various key principles in the area of security that must be implemented at national level. In the Netherlands, these internationally applicable principles are enshrined in the Nuclear Energy Act; the Nuclear Facilities, Fissionable Materials and Ores Decree; the Nuclear Energy Act -Confidentiality Decree; and the Nuclear Facilities and Fissionable Materials (Security) Regulation.

The Ministry of Infrastructure and Water Management can, if required, identify specific Design Basis Threats. These reference scenarios define the most severe and conceivable threats. These Design Basis Threats apply both to physical security infrastructure and to cybersecurity. They define the scenarios against which nuclear facilities must protect themselves. The licensees of nuclear facilities then select the most effective and efficient security measures for their own organization. They submit the proposed measures to the ANVS for approval. Transports of fissionable and radioactive materials are also covered by security regulations.

International consultation in the area of security takes place in various contexts, such as the European Nuclear Security Regulators Association (ENSRA). The Netherlands actively participates in the International Physical Protection Advisory Service (IPPAS). These IPPAS missions are staged by the IAEA, at the request of member states. The purpose of these missions is to assess the design, content and fine-tuning of nuclear security policy by the relevant government (or government body) and the nuclear sector. These assessment missions (together with various recommendations) are carried out by a group of experts from other countries, under the supervision of the IAEA. From 2008-2012, an IPPAS mission was conducted in the Netherlands⁹.

7.2 Safeguards

Safeguards is a system for verifying that countries are meeting their international obligations to use nuclear materials, such as plutonium, uranium and thorium, exclusively for peaceful purposes. The production of nuclear explosives or nuclear weapons is forbidden. Since 1970, worldwide recognition of the necessity of this verification is reflected in the requirements of the Treaty on the Non-Proliferation of Nuclear Weapons for the application of safeguards by the IAEA. The 1957 Treaty for the establishment of the European Atomic Energy Community (Euratom Treaty) also contains binding requirements for the application of safeguards by the European Commission. These supranational requirements constitute primary law and often have immediate effect, both on the treaty states and on companies (in the nuclear industry).

The Ministry of Foreign Affairs has primary responsibility for non-proliferation and safeguards. Under the Nuclear Energy Act, the ANVS is responsible for a number of executive tasks with regard to safeguards. These include granting access to international inspectors from Euratom and IAEA, and accompanying them as they perform their duties. Since 1 August 2017, the ANVS has also been responsible for the management and administration of the national register for fissionable materials and ores and for the provision of information on this matter.

⁹ Parliamentary papers II 32645 no. 41.

8 Radioactive waste policy



8.1 National Radioactive Waste Programme

In 2016, details of the radioactive waste policy were set out in the [Nationaal programma voor het beheer van radioactief afval en verbruikte splijtstoffen](#) (National programme for the management of radioactive waste and spent fissionable materials), in accordance with [Council Directive 2011/70/Euratom](#).

The Directive sets out a Community framework for the responsible and safe management of spent fuel and radioactive waste. This Directive states that member states must have national programmes, that they must evaluate these programmes every ten years and that they must report to the EU every three years regarding progress in implementing the Directive.

The policy has four key principles. The minimum possible amount of waste must be produced, through measures such as preventing the generation of waste and reusing materials as much as possible (minimization). If radioactive waste is generated, the producer bears primary responsibility for ensuring that the waste is managed safely, both now and in the future. The policy is also intended to ensure that unreasonable burdens are not placed on future generations. That is why those who create such waste in the first place are required to meet the costs of its safe management. The National Programme includes various action items and indicators, to ensure that radioactive waste policy is quantifiable.

Under the provisions of the Joint Convention with the IAEA, progress on policy concerning radioactive waste and spent fuel is reported and discussed (by peer review) every three years. This involves various checks to confirm that the Netherlands is in compliance with the key principles and guidelines formulated by the IAEA.

8.2 Temporary above-ground storage, geological disposal

Some licensees are generating radioactive waste, others will do so eventually. Waste generation is not restricted to nuclear facilities alone, it also occurs during industrial practices, medical tests, and the treatment of patients with radioisotopes. This concerns spent fuel or radioactive waste. All such waste must be shipped to the Central Organisation for Radioactive Waste (COVRA) and safely stored there temporarily (at a fixed rate for storage and geological disposal) until it can be stored in the final repository.

In the Research Programme for the Geological Disposal of Radioactive Waste (OPERA), a safety case was used to assess the safety of the long-term final disposal of radioactive waste in the Netherlands. The practical issues involved in establishing a focus group were explored. A focus group, to be set up from 2018 to 2019, will examine various options concerning the process of selecting a site for geological disposal. The national programme states that a definitive decision on the final repository will be taken in ca. 2100. From 2130 onwards, all radioactive waste that had previously been safely stored in special buildings at COVRA will be transferred to the final repository. The possibility of international cooperation with regard to a multinational final repository will not be excluded.

8.3 Special situations

An amount of historic radioactive waste is still being stored at the Petten research centre. Its gradual removal to the COVRA has already commenced. In the spring of 2018, agreements were reached with parties such as the Ministry of Economic Affairs and Climate Policy, the Ministry of Infrastructure and Water Management and the Ministry of Finance to ensure that this process runs smoothly and satisfactorily. The waste is being sorted, packaged and shipped under the conditions of a Nuclear Energy Act licence. As is the case with other installations and facilities, this process is being supervised by the ANVS.

The ANVS will ensure that there is an adequate response to any reports of orphan sources or radioactive materials being found in situations that do not correspond to any known licenses or notifications. Where necessary, other State Inspectorates will be involved, where this falls within their purview.

9 Safety culture



9.1 Safety culture in the field

Within the field itself, the spotlight is on developing, maintaining and strengthening a culture that focuses on operational safety in the organization. In this context ‘continuous improvement’ means working continuously on this safety culture. This is one of the priority areas for policy on nuclear safety and radiation protection.

Since the entry into force of the Nuclear Safety Regulation for Nuclear Facilities in 2017, the promotion of an effective safety culture has been the general rule for all nuclear facilities. This regulation imposes requirements on licensees in areas such as the management system, informing employees, evaluating the safety culture, and providing educational programmes and training courses.

In the nuclear sector, the existence of a safety culture is one of the areas regulated by the ANVS. The approach adopted here was the same as that used by the IAEA, as set out in standards such as the Safety Standard Leadership and Management for Safety (GSR Part 2). In the regulatory control system based on the Decree on Basic Safety Standards for Radiation Protection, safety culture also plays a part in the approach (or graded approach) to regulatory activities. The intensity of these regulatory activities depends partly on the safety culture that is in place.

The government continuously focuses on the safety culture in the field. Safety culture in the Netherlands is regularly spotlighted by various IAEA missions. At the request of the Netherlands, the IAEA carried out a more in-depth IAEA Independent Safety Culture Assessment mission at the premises of two licensees – the Nuclear Research and Consultancy Group (NRG) and the Electricity Production Company South-Netherlands (EPZ).

9.2 Safety culture – the competent authority

The 2017 Regulation on Nuclear Safety for Nuclear Facilities explicitly states that the ANVS works on its own safety culture. The importance of this work is underlined in the [ANVS Vision Document](#). This states that the internal safety culture is being increasingly placed in the spotlight, and that work in this area is being further intensified.

10 Communication



The Dutch government considers the proactive provision of accurate information to society and stakeholders as a key principle in its communications policy on nuclear safety and radiation protection. The ANVS has the statutory task of informing the public about such matters. The Ministry of Social Affairs and Employment and the Ministry of Health, Welfare and Sport, as well as organizations such as the Netherlands Food and Consumer Product Safety Authority (NVWA) and the National Institute for Public Health and the Environment (RIVM) have their own tasks and responsibilities in terms of public communication (see Table par. 4.1).

Not only the government, but licensees too, have duties with regard to communication (including public communication). For example, the Nuclear Safety Regulation for nuclear Facilities prescribes that the licensee must inform members of the public, local authorities and any interested parties in the vicinity of the nuclear facility about the facility's safety, both under normal operating conditions and during abnormal events.

As part of its official duties, the ANVS manages the coordination of risk communication about radiation accidents during the emergency preparedness phase. The ANVS, in consultation with the security regions, is responsible for all risk communication about nuclear accidents and radiation accidents. In the event of an actual crisis, the Ministry of Infrastructure and Water Management is responsible for crisis communication. The ANVS has an advisory role, based on its position within the Crisis Expert Team – Radiation and Nuclear (CETsn) and in the National Core Team for Crisis Communication.

The ANVS's website includes a portal that gives members of the public and any interested party access to all relevant governmental information on nuclear safety and radiation protection. The information at the website is closely related to the publicly available information at the Security Regions' websites. In 2017, the ANVS conducted an audience research study with the aim of better aligning information provision with public perceptions. The website also includes an entrance named 'Nuclear crisis or radiation accident' that can be accessed via a link at www.infonucleairrisico.nl. This entrance offers visitors access to information about nuclear safety inland and abroad, plus references to various domestic and foreign emergency plans.

In the [National Nuclear and Radiation Communications Consultation](#), the ministries involved – together with RIVM and the Security Regions – coordinate all communication issues relating to nuclear safety and radiation protection. The goal is to inform the public as effectively as possible, and to enhance people's knowledge of these topics.

The ANVS has initiated an international communication meeting. The Belgian Federal Agency for Nuclear Control (FANC) and the Belgian Crisis Centre are now in the process of joining this meeting.

11 Knowledge development



11.1 Research

Research and development contribute to innovation and advance our understanding, while helping to maintain existing levels of knowledge and expertise. These activities also deliver input for the continuous improvement of safety. In the Netherlands, the research field spans technical-scientific research, participation in international organizations, all manner of materials science research, research into new molecular imaging tracers, and applications intended for diagnostic and therapeutic purposes. The Ministry of Education, Culture and Science and the Ministry of Economic Affairs and Climate Policy play a leading role in these areas, including funding.

The CONFIDENCE project started in the spring of 2017. It is part of the European Joint Programme for the Integration of Radiation Protection Research (CONCERT). RIVM, KNMI and RIKILT are the Dutch participants in CONFIDENCE. The project focuses on uncertainties related to weather conditions and radiological dispersal models, and their effect on systems for supporting decisions in the event of accidents and disasters.

Various policy-supporting studies have also been carried out, in connection with the implementation of Directive 2013/59/Euratom Basic Safety Standards. These studies are used for policy development in the field of radiation protection.

At international level, the Netherlands is also contributing (to a limited extent) to three Research & Development studies that the OECD/NEA is conducting in the field of nuclear safety. Those programmes in which the country is currently involved are analyses of the underlying causes of incidents.

Based on the nature of the research in question, the following Dutch research bodies are important:

- Fundamental research/education by Delft University of Technology and the Reactor Institute Delft, including the Higher Education Reactor (HOR).
- Applied research by NRG, involving the High Flux Reactor and various other facilities. The Ministry of Economic Affairs and Climate Policy is funding a research programme into the nuclear safety of current and future reactors and into radiation protection, which will be carried out by NRG.
- Applied research by URENCO into the production of isotopes.
- Applied research by various university medical centres, in the context of nuclear medicine and radiotherapy.
- Research for policy support and purely scientific research in all policy areas, conducted by RIVM.
- Fundamental particle physics, including research into thermonuclear fusion, by the Netherlands Organisation for Scientific Research (NWO).

11.2 Education

The Ministry of Education, Culture and Science has primary responsibility for the quality of education in the Netherlands. Various universities and other organizations in the Netherlands offer educational programmes in the field of radiation protection, nuclear safety and nuclear technology.

The Technical University of Delft's (TU(D)) Faculty of Applied Sciences offers a programme in nuclear technology. The research focuses on energy and public health. To keep up with international developments, there is a need for a competence centre with its own radiation source and associated instrumentation. For this reason, the government has co-funded the TU(D)'s OYSTER project¹⁰. Institutes such as TU(D), Boerhaave (Leiden University Medical Center; LUMC) and NRG provide educational programmes and training courses in nuclear technology and radiation protection to individuals from the public and private sectors. In addition, other universities, such as Wageningen University, and institutions for higher professional education, such as the HZ University of Applied Sciences (Hogeschool Zeeland), also provide vocational education in the field of nuclear safety and radiation protection.

11.3 Expertise

The continuous promotion of expertise in the field of nuclear safety and radiation protection is anchored in legislation. Licence applications are assessed on this basis.

Radiation protection experts

The Decree on Basic Safety Standards for Radiation Protection draws a clear distinction between the different roles and responsibilities of the various services and experts. When performing practices that involve sources of ionizing radiation, the organization must consult a radiation protection expert – an accredited and registered consultant in the field of radiation protection. This consultant must have completed an educational programme at a state-accredited training institute. The accreditations and registrations are subject to formal requirements, both for the training institute and for the programme itself. The same applies to experts continuously updating their knowledge and acquiring the relevant work experience.

Trade and professional associations

The Netherlands has professional trade associations that are active in the area of nuclear safety and radiation protection. These associations share knowledge and develop expertise. They include:

- the [Dutch Society for Radiation Protection](#).
- the [Royal Netherlands Society of Engineers](#).
- the [Netherlands Commission on Radiation Dosimetry](#).
- the [Dutch Society for Clinical Physics](#).
- the [Dutch Society for Quality Surveillance, Inspection and Non-Destructive Testing](#).
- various associations for medical professionals, including laboratory staff, radiologists, and those working in nuclear medicine, radiotherapy and veterinary medicine.

¹⁰ OYSTER stands for: Optimised Yield - for Science, Technology and Education - of Radiation. It includes expanding the research potential of the TU(D)'s research reactor.

12 Financial resources sector and government



12.1 Financial requirements for the sector

The Netherlands imposes financial requirements on the sector, based on the principle of personal responsibility (the polluter pays). The licensees of nuclear facilities must have sufficient human and financial resources to ensure nuclear safety, based on the Nuclear Safety Regulation for Nuclear Facilities. In addition, specific requirements are imposed on the provision of financial security for:

- **Shutdown, decommissioning and termination:** the Nuclear Energy Act and the legislation based on it impose requirements to guarantee the financially responsible shutdown and decommissioning of nuclear facilities and the termination of practices involving radioactive materials and devices. This is reflected, among other things, by the requirement to provide financial provisions for the costs of the safe shutdown and decommissioning of nuclear facilities with nuclear reactors. The Ministry of Infrastructure and Water Management and the Ministry of Finance take the view that such financial provisions must provide sufficient assurance that these costs have been covered. It is stipulated that some companies and institutions (in which the costs of business termination are deemed to be relatively high) are required to draw up a termination plan. This plan gives details of the termination measures implemented by the licensee, including financial provisions.
- **Nuclear accidents:** the liability of the operators of nuclear facilities for nuclear accidents is governed by the Paris Convention, the Brussels Convention and a national scheme, in the form of a state guarantee. The details of this scheme are set out in the Nuclear Accidents (Liability) Act, which falls under the responsibility of the Ministry of Finance.
- **Waste:** financial provision is mandatory for the safe disposal of used high-activity sources (also known as HASS sources) and for the disposal of radioactive scrap.

12.2 Resources for the performance of the government's duties

The State Budget allocates funds for implementing the duties, responsibilities and powers associated with nuclear safety and radiation protection. These resources are also intended to facilitate permanent compliance with quality and expertise requirements in the area of nuclear safety and radiation protection.

Specifically for the ANVS, the Nuclear Energy Act stipulates that the Ministry of Infrastructure and Water Management will allocate sufficient financial resources for the ANVS to carry out its duties (official support and operations). These funds should be included in the Ministry's budget as separate budgetary items, with accompanying explanatory notes. By virtue of the law, sufficient numbers of qualified personnel must also be recruited for the performance of the ANVS's duties. Based on the 2013 Nuclear Energy Act - Fees Decree, certain costs for purposes such as licensing and supervision are passed on to the nuclear sector.

Appendix 1:

Ten fundamental IAEA principles in the policy and strategy of the Netherlands

The fundamental safety principles of the IAEA are outlined below. In each case there is a brief description of the principle and of how that principle was developed in the Dutch context, in terms of policy and strategy for nuclear safety and radiation protection..

No.	Principle	Contents
1	Responsibility for safety	<p>The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks.</p> <ul style="list-style-type: none"> → Licensing system linked to a specific individual → Personal responsibility and a justified confidence (that can be substantiated) with regard to operations (including safety culture, expertise), technology (including safety reports), and financial means (providing security) → A system of licences and registrations, and the associated supervision and enforcement
2	Role of government	<p>An effective legal and governmental framework for safety, including an independent administrative body, must be established and sustained.</p> <ul style="list-style-type: none"> → Nuclear Energy Act as an integral legal framework → ANVS as an independent administrative body
3	Leadership and management for safety	<p>Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks.</p> <ul style="list-style-type: none"> → Guarantees through regulation based on general rules, licensing, and supervision
4	Justification of facilities and practices	<p>Practices that involve exposure to ionizing radiation are only permitted if the economic, social and other advantages of the practices in question outweigh the health detriment they can cause.</p> <ul style="list-style-type: none"> → Assessment of generic and specific justification is anchored in legislation and licensing
5	Optimization of protection	<p>Protection must be optimized to provide the highest level of safety that can reasonably be achieved.</p> <ul style="list-style-type: none"> → Optimization principle and/or ALARA principle → Continuous improvement
6	Limitation of risks to individuals	<p>Measures for controlling radiation risks must ensure that no individual bears an unacceptable risk of harm.</p> <ul style="list-style-type: none"> → Dose limitation in legislation and licences
7	Protection of present and future generations	<p>People and the environment must be protected against radiation risks, now and in the future.</p> <ul style="list-style-type: none"> → Central goal of the Nuclear Energy Act and the legislation based on it → Licences and requirements for termination and decommissioning → Radioactive waste policy (including geological disposal) → Financial provisions

No.	Principle	Contents
8	Prevention of accidents	All practical efforts must be made to prevent and mitigate nuclear or radiation accidents. → Strict general rules and the associated licensing policy → Preventive assessment of applicants (in terms of expertise, reliability and solvency) → Regulatory and intervention policy; compliance with requirements
9	Emergency preparedness and response	Arrangements must be made for emergency preparedness and response for nuclear or radiation incidents. → Crisis policy and emergency response organisation → Licensee requirements (including company contingency plan and expertise requirements) → Coordination with neighbouring countries → Information provision and communication
10	Protective actions to reduce existing or unregulated radiation risks	Protective actions to reduce existing or unregulated radiation risks must be justified and optimized. → Legislation concerning natural sources and orphan sources → Detecting unregulated sources → Information provision → List of existing situations → Radon action plan

Appendix 2:

International agreements and consultations

With regard to the nuclear safety and radiation protection policy described in this document, the Dutch Government has ratified the following international agreements and, where necessary, implemented them in legislation:

- Euratom Treaty and the implemented directives and regulations based thereon
- Convention on Nuclear Safety
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- Convention on Early Notification of a Nuclear accident
- Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency
- Treaty on the Non-Proliferation of Nuclear Weapons
- Convention on Physical Protection of Nuclear Material
- Paris Convention on Third Party Liability in the Field of Nuclear Energy
- Brussels Convention Supplementary to the Paris Convention
- Convention for the Protection of the Marine Environment of the North-East Atlantic (“OSPAR”)
- European Union’s CBRN Action Plan
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (“Aarhus Convention”)

International agreements on the transport of radioactive and fissionable materials and ores are set down in:

- International Civil Aviation Organization (ICAO-TI)
- International Maritime Dangerous Goods Code (IMDG).
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
- Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)

In addition, the recommendations in the following non-binding IAEA Codes of Conduct have been applied in the development of legislation:

- Code of Conduct on the Safety and Security of Radioactive Sources
- Code of Conduct on the Safety of Research Reactors

Representatives of the Dutch Government actively participate in various formal and informal international partnerships, including:

- European Nuclear Safety Regulators Group (ENSREG): A consultation between the heads of the competent authorities for nuclear safety and/or radiation protection of EU member states.
- European Nuclear Security Regulators Association (ENSRA): A consultation between the heads of the competent authorities for the security of radioactive materials, fissionable materials and facilities of EU Member States and Switzerland
- Heads of the European Radiological Protection Competent Authorities (HERCA): A consultation between the heads of the competent authorities for radiation protection of the EU member states
- Western European Nuclear Regulators' Association (WENRA): A consultation between the heads of the competent authorities for nuclear safety of EU member states with a nuclear energy programme
- European Safeguards Research and Development Association (ESARDA). ESARDA is active in areas such as the promotion of research and development in the field of safeguards
- European Association of Competent Authorities for the Safe Transport of Radioactive Material (EACA)
- OSPAR Commission: Commission for the Convention for the Protection of the Marine Environment of the North-East Atlantic (or the 'OSPAR Convention')
- German-Dutch commission (NDKK-AG1/AG2): cooperation with Germany
- Nuclear Energy Agency (NEA), an agency of the Organisation for Economic Co-operation and Development (OECD), and participation in various Committees and underlying working parties
- World Institute for Nuclear Security (WINS)
- Various IAEA consultations on nuclear security, such as the Nuclear Security Guidance Committee, as well as expert meetings in the field of radiation protection, shipment, radioactive waste, security, emergency preparedness, etc.
- Participation in various IAEA Safety Standards Committees (NUSSC, RASSC, TRANSSC, WASSC)
- Committee on the Safety of Nuclear Installations (CSNI)
- Committee on Nuclear Regulatory Activities (CNRA)
- KWU regulators group: a partnership of governments whose countries use the same type of nuclear power plants as the one at Borssele

In 2017, cooperation agreements were concluded with:

- The United States Nuclear Regulatory Commission (UNSRC)
- The Belgian Federal Agency for Nuclear Control (FANC)

Appendix 3:

Relevant Dutch legislation and regulations

Legislation

Legislation relating specifically to nuclear safety and radiation protection

- Nuclear Energy Act
- Nuclear Accidents (Liability) Act

Other legislation of relevance to nuclear safety and radiation protection

General

- General Administrative Law Act
- Recognition of EU Vocational Qualifications Act
- Services Act
- Penal code
- Economic Offences Act
- Government Information (Public Access) Act
- Security Regions Act

Working conditions

- Working Conditions Act

Healthcare

- Medicines Act
- Special Medical Procedures Act
- Individual Health Care Professions Act
- Population Screening Act

Surroundings/Environment

- Environmental Permitting (General Provisions) Act
- Environmental Management Act
- Nature Conservation Act

Administrative orders and other royal decrees

Decrees relating specifically to nuclear safety and radiation protection

- Designation of Plants Decree Section 22 (4) and 33 (4) of the Nuclear Energy Act
- Basic Safety Standards for Radiation Protection Decree
- Radioactively Contaminated Scrap Metal (Detection) Decree
- Radioactive Waste and Spent Fuel (Import, Export and Transit) Decree
- Nuclear Facilities, Fissionable Materials and Ores Decree
- Fissionable Materials and Ores (Recording) Decree
- The Nuclear Energy Act Fees (Remunerations) Decree
- Fissionable Materials, Ores and Radioactive Materials (Transport) Decree
- Nuclear Energy Act (Confidentiality) Decree
- National Defence (Exemption) Decree

Other decrees of relevance to nuclear safety and radiation protection

General

- Cybersecurity Notification Obligation Decree
- Public Prosecution Service (Settlement) Decree

Healthcare (humans and animals)

- Decree on entitlements in occupational diseases of insured persons not pursuant to the Dutch Occupational Disability Insurance Act (WAO) or the Work and Income (Capacity for Work) Act (WIA)
- Veterinarians Decree
- Decree on Veterinary Medicinal Products
- Decree governing dietitians, occupational therapists, speech therapists, oral hygienists, remedial therapists, orthoptists and podiatrists
- Decree governing the educational requirements and area of expertise of physiotherapists
- Decree governing the educational requirements and area of expertise of clinical physicists
- Decree governing the educational requirements and area of expertise of radiodiagnostic laboratory staff and radiotherapeutic laboratory staff
- Decree governing the training requirements for dentists
- Medical Device Sterilization Companies Decree
- Temporary decree governing the independent competence of clinical technologists
- Commodities Act Decree on Fairground and playground equipment
- Commodities Act Decree on the Preparation and treatment of foodstuffs
- Commodities Act Decree on Irradiated goods
- Commodities Act Decree on Information on Foodstuffs
- Commodities Act Decree on Packaged Waters

Surroundings/Environment

- Environmental Impact Assessment Decree
- Major Accidents (Risks) Decree 2015
- Waste (landfill ban) Decree
- Buildings Decree 2012
- Drinking Water Decree

Ministerial regulations

Regulations relating specifically to nuclear safety and radiation protection

- Decree on the appointment and performance of regulators, Nuclear Energy Act 2013
- Recognition of the Energy research Centre of the Netherlands (ECN) as an institution authorised to provide personal monitoring devices
- Basic Safety Standards for Radiation Protection Regulations
- Nuclear Facilities and Fissionable Materials (Security) Regulation
- Regulation for the shutdown and decommissioning of nuclear facilities
- Radioactively Contaminated Scrap Metal (Detection) Regulation
- Nuclear Pressure Equipment Regulation
- Nuclear Safety of Nuclear Facilities Regulations 2017
- Radiation Protection (Occupational Exposure) Regulations 2018
- Ionizing Radiation (Medical Exposure) Regulations
- Application of the Nuclear Energy Act (Confidentiality) Decree (centrifuge technology) (not available in electronic format)
- Application of the Nuclear Energy Act (Confidentiality) Decree (laser technology)

Other regulations of relevance to nuclear safety and radiation protection

Working conditions

- Working Conditions Regulation

Healthcare

- Medicines Act Regulation

Shipment and transport

- Regulations on the Carriage of Dangerous Goods by Road
- Regulations on the Carriage of Dangerous Goods by Rail
- Regulations on the Carriage of Dangerous Goods by Inland Waterways

Surroundings/Environment

- Drinking Water Regulation

ANVS Regulations

- ANVS's Basic Safety Standards for Radiation Protection Regulations
- ANVS's Nuclear Safety and Security Regulations (in force in 2019)

Appendix 4:

Abbreviations

ARTEMIS:	Integrated Review Service for Radioactive Waste and Spent Fuel Management Decommissioning and Remediation
Bbs:	Decree on Basic Safety Standards for Radiation Protection
CBRN:	Chemical, Biological, Radiological and Nuclear
CETsn:	Crisis Expert Team – Radiation and Nuclear
CPPNM/a:	Convention on the Physical Protection of Nuclear Material
DCC:	Ministerial Crisis Coordination Centre
EACA:	European Association of Communications Agencies
ENSREG:	European Nuclear Safety Regulators Group
ENSRA:	European Nuclear Security Regulators' Association
ESARDA:	European Safeguards Research and Development Association
Euratom:	European Atomic Agency
FANC:	Federal Agency for Nuclear Control (Belgium)
GRS:	Gesellschaft für Anlagen- und ReaktorSicherheit
HASS	High-activity Sealed Radioactive Sources and Orphan Sources
HERCA:	Heads of the European Radiological Protection Competent Authorities
HFR:	High Flux Reactor at Petten
HOR:	Higher Education Reactor at Delft University of Technology
IAEA:	International Atomic Energy Agency
ICAO:	International Civil Aviation Organization
ICRP:	International Commission on Radiological Protection
ILO:	International Labour Organization
INSARR:	Integrated Safety Assessment of Research Reactors
IPPAS:	International Physical Protection Advisory Service
IPSART:	International Probabilistic Safety Assessment Review Team
IRRS:	Integrated Regulatory Review Service
ISCA:	Independent Safety Culture Assessment
KWU:	Kraftwerk Union
LUMC:	Leiden University Medical Center
MER:	Environmental Impact Assessment
MOX:	Mixed OXides
mSv:	milliSievert
NCS:	National Emergency Plan for Radiation Incidents
NEA:	Nuclear Energy Agency, part of OECD
NPV:	Non-proliferation treaty
NRG:	Nuclear Research and consultancy Group
OECD:	Organisation for Economic Co-operation and Development
OPERA:	Research Programme for the Geological Disposal of Radioactive Waste
OSART:	Operational Safety Review Team
OSPAR:	Convention for the Protection of the Marine Environment of the North-East Atlantic
OYSTER:	Optimised Yield - for Science, Technology and Education - of Radiation
RIKILT:	Dutch Institute for Food Safety, part of Wageningen University
RGEN:	Radiological and Health Expertise Network
TU(D):	Delft University of Technology

Wako: Nuclear Accidents (Liability) Act
WENRA: Western European Nuclear Regulators Association
WHO: World Health Organization

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