Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

Second report on the implementation of Directive 2011/70/Euratom

(Member State Report)

(Report under Article 14(1) of 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)

August 2018

In the event of discrepancies between this translation and the original German version, the latter shall prevail.

CONTENTS

Preface

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 obliges the Member States of the European Union (EU) to submit a report on the implementation of this Directive (Member State Report), for the first time by 23 August 2015, and to update it every three years. The second Member State Report must be submitted by 23 August 2018.

This report was prepared under the leadership of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Federal Environment Ministry – BMU), taking into account the "Guidelines for Member States reporting on Article 14.1 of Council Directive 2011/70/Euratom" of the European Nuclear Safety Regulators Group (ENSREG).

A. Overview

A.1 Generation and inventory of different types of radioactive waste

In the Federal Republic of Germany, distinction is made between two types of radioactive waste, taking into account aspects that are relevant for disposal:

- spent fuel and waste from reprocessing, and
- radioactive waste with negligible heat generation.

Spent fuel has been generated and is being generated from the operation of installations for the fission of nuclear fuel for the commercial generation of electricity (hereinafter referred to as nuclear power plants) and from the operation of installations for fission of nuclear fuel not used for the commercial generation of electricity (hereinafter referred to as nuclear non-power reactors).

In Germany, seven nuclear power plants are currently in operation. With the entry into force of the Thirteenth Act Amending the Atomic Energy Act (AtG) on 6 August 2011 as a result of the events in Japan, fixed shutdown dates were introduced for all German nuclear power plants. For the seven nuclear power plants still in operation, the authorisation for power operation will expire successively between the end of 2019 and the end of 2022. Three reactors are in the post-operational phase. Another 23 reactors (including experimental and demonstration reactors) are in the process of being decommissioned and for three reactors decommissioning has been completed. In addition, three research reactors, three reactors for training purposes and one reactor for educational purposes are currently in operation in Germany. Seven research reactors are in decommissioning and three research reactors were permanently shut down. For 28 research reactors, decommissioning has been completed.

Furthermore, a uranium enrichment plant and a fuel fabrication plant are in operation in Germany.

The delivery of spent fuel from nuclear power plants to reprocessing plants is no longer valid since 1 July 2005. The waste from reprocessing of spent fuel in other European countries is going to be returned to the Federal Republic of Germany and stored until its disposal.

Radioactive waste with negligible heat generation is mainly generated during the operation and during the dismantling of nuclear power plants. To a lesser extent, this type of radioactive waste is also generated by the application of ionising radiation in industrial, research and medical applications.

Between 1967 and the end of 1978, around 47,000 m³ of low and intermediate level radioactive waste had been emplaced in the Asse II mine. Since 1988, there has been a continuous inflow of groundwater from the overburden into the mine. At the same time, the stability of the old mine started to deteriorate successively due to the degree of excavation. According to § 57b AtG, the Asse II mine must be closed immediately. Closure is to take place after retrieval of the radioactive waste. The concept of retrieval provides for recovering and conditioning of the radioactive waste and to store it until disposal. According to current estimates, there will be a volume of conditioned waste of approx. 175,000 to 220,000 m³ for later disposal.

In the period from 1971 to 1998, a total of approx. 37,000 m³ of solid and solidified waste and approx. 6,600 radiation sources with a total activity of around 10^{14} Bq had been disposed of in the Morsleben repository for radioactive waste (ERAM). Emplacement of low-level and intermediate-level radioactive waste in the Morsleben repository for radioactive waste has been concluded. This disposal facility is to be closed and sealed for the long term.

The inventory of spent fuel and radioactive waste, as well as a prediction of the amounts generated in the future are shown in Chapter C and can be found in detail in the *Inventory of Radioactive Waste (Current inventory and prediction)*. At the reference date of 31 December 2017, there were 19.504 Mg of raw and pretreated waste, and 121.980[1] m³ of treated and conditioned radioactive waste stored in the Federal Republic of Germany.

A.2 Organisational framework in the field of spent fuel and radioactive waste management

In the Federal Republic of Germany as a federal state, the “regulatory body” consists of authorities of the Federation and the *Länder* (see Figure A-1). By organisational decree, the Federal Government specifies the federal ministry competent for nuclear safety and

[1] Corrected value 2019

radiation protection, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

The basic provisions on the determination of official responsibilities are set out in §§ 22 to 24 AtG and in the “Act on the Search for and Selection of a Site for a Repository for High-Level Radioactive Waste” (Repository Site Selection Act – StandAG), where the regulatory bodies are listed that are responsible for the implementation of and compliance with the provisions of this Act and statutory ordinances issued hereunder. These include the Federal Office for the Safety of Nuclear Waste Management (BfE), the Federal Office for Radiation Protection (BfS) and other federal authorities with their fields of competence as shown in Figure A-1. The BfE was established on 1 September 2014 as the new licensing and supervisory authority for radioactive waste management and also monitors the implementation of the site selection procedure according to the Repository Site Selection Act.

Furthermore, administrative tasks are carried out by the *Länder* on behalf of the Federation. The respective *Land* government determines the competent supreme *Land* authorities. In individual cases, subordinate authorities may also be tasked with licensing and supervisory functions.

In July 2016, the Bundesgesellschaft für Endlagerung mbH (BGE) was founded as the project implementer for planning, construction, operation and closure of repositories, which is organised under private law but remains the sole ownership of the Federation. On 25 April 2017 the operator tasks were transferred to the BGE.

The spent fuel and radioactive waste from the operators named in the Act on the Reorganisation of Responsibility in Nuclear Waste Management will in future be stored by a separate company organised under private law. For this purpose, the BGZ Gesellschaft für Zwischenlagerung mbH (BGZ) was founded. Since August 2017, the BGZ has been operating the central storage facilities in Ahaus and Gorleben. With effect from 1 January 2019, the twelve decentralised storage facilities at the sites of the German nuclear power plants will be transferred to the BGZ. On 1 January 2020, the twelve on-site storage facilities for low- and intermediate-level radioactive waste specified in the Act will follow.

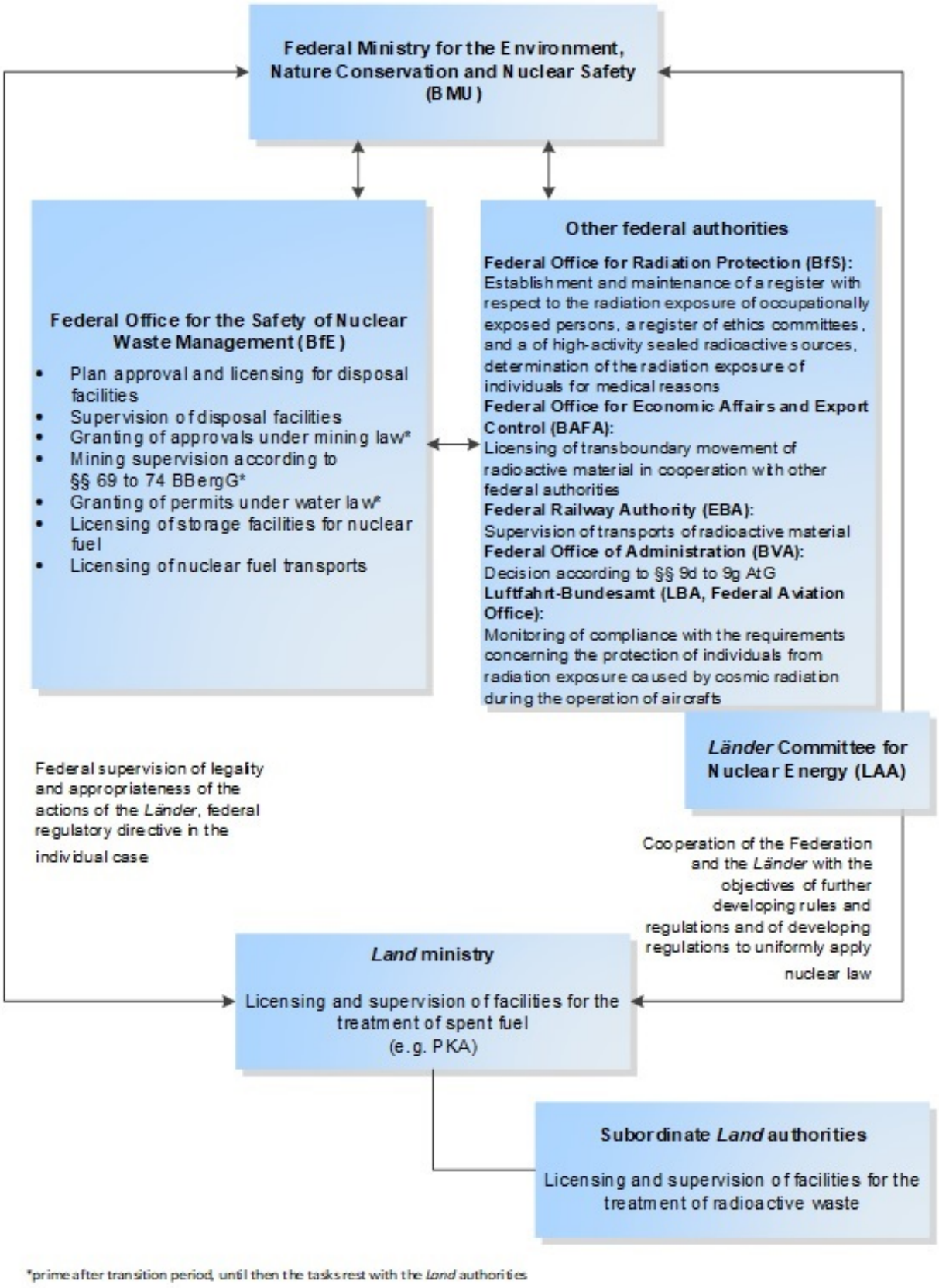

Figure A-1: Organisational framework in the field of spent fuel and radioactive waste management in the Federal Republic of Germany

A.3 National radioactive waste management policy fundamentals

The national radioactive waste management policy is based on the following decisions:

- The utilisation of nuclear fission for the commercial generation of electricity in the Federal Republic of Germany will be terminated in the year 2022 at the latest.
- The delivery of spent fuel from installations for the commercial generation of electricity to reprocessing plants has become unlawful as of 1 July 2005. The current waste management objective provides for its direct disposal.
- According to the AtG, providing facilities for the safekeeping and disposal of radioactive waste is a federal task.
- The Federal Government plans to emplace all types of radioactive waste in deep geological disposal facilities. For radioactive waste with negligible heat generation, the Konrad mine in Salzgitter is currently being converted into a repository. The repository site for high-level radioactive waste will be determined by a selection procedure established in accordance with the StandAG and has officially been started in 2017 with the objective to determine the repository site by 2031.

The strategy for the management of all spent fuel and radioactive waste that has been and will be generated is outlined in the *Programme for the responsible and safe management of spent fuel and radioactive waste (National Programme)*.

A.4 Periodic self-assessment and peer review

With regard to an international peer review that meets the requirements of Directive 2011/70/Euratom, an IRRS (Integrated Regulatory Review Service) mission and an ARTEMIS (IAEA Radioactive Waste Management Integrated Review Service) mission will be conducted in the Federal Republic of Germany from 31 March to 13 April 2019 and at the end of 2019.

B. Summary and developments since the first Member State Report

Further provisions of Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste were transposed into national law with the Fourteenth Act Amending the AtG of 20 November 2015.

Already on 27 July 2013, the Repository Site Selection Act entered into force. The Act regulates the selection procedure for the determination of a repository site for high-level radioactive waste. Based on the StandAG, the Commission on the Storage of High-Level Radioactive Waste examined and assessed the fundamental radioactive waste management issues of relevance for the selection procedure. In addition, the Commission has evaluated the StandAG and made proposals for its further development. The *Bundestag* and the *Bundesrat* have reviewed the recommendations of the Commission and implemented them in the Act on the Reorganisation of the Organisational Structure in the Field of Disposal as well as in an amendment of the Repository Site Selection Act. From the recommendations of the Commission, no circumstances have arisen which have led to changes in the National Programme.

On 30 July 2016, the Act on the Reorganisation of the Organisational Structure in the Field of Disposal entered into force. The Act reallocates the responsibilities in the field of disposal. As a new licensing and supervisory authority for spent fuel and radioactive waste management, the BfE was established on 1 September 2014 which also monitors the implementation of the site selection procedure. In July 2016, the BGE was founded as the project implementer for planning, construction, operation and closure of repositories, which is organised under private law but is the sole ownership of the Federation. On 25 April 2017, the aforementioned operator tasks were transferred to the BGE. Thus, the BGE has also become the project implementer of the site selection procedure.

On 16 May 2017, the Act amending the Repository Site Selection Act entered into force. The Act is based on the recommendation of the Commission on the Storage of High-Level Radioactive Waste. It essentially comprises regulations on a comprehensive and transparent participation procedure, specification of the site selection procedure, the regulation on legal protection before deciding on the repository site, and the introduction of a graded concept for earliest possible securing of the site.

On 16 June 2017, the Act on the Reorganisation of Responsibility in Nuclear Waste Management entered into force. The Act implements the recommendations of the Commission to Review the Financing for the Phase-out of Nuclear Energy (KFK) and brings together the responsibility for financing and action in all areas of nuclear waste management. The operators of the nuclear power plants will continue to be responsible for the entire management and financing of decommissioning, dismantling and proper packaging of the radioactive waste. The Federation will be responsible for the implementation and financing of storage and disposal of spent fuel and radioactive waste. The responsibility for disposal also lay with the Federation prior to the entry into force of this Act.

The financial resources for the financing of storage and disposal were made available to the Federation by the operators of the nuclear power plants. On 3 July 2017, the operators transferred a total of about 24.1 billion euros to the public-law foundation – *“Fonds*

zur Finanzierung der kerntechnischen Entsorgung (Entsorgungsfonds)“ (fund for the financing of nuclear waste management (waste management fund)) – which was established with the entry into force of the Act on the Establishment of a Fund for the Financing of Nuclear Waste Management (Waste Management Fund Act – EntsorgFondsG). The waste management fund reimburses the costs to the Federation incurred by the in connection with the tasks of storage and disposal and deposits the funds transferred by the nuclear power plant operators.

On 27 April 2017, the *Bundestag* passed the Act on the Reorganisation of the Law on the Protection against the Harmful Effects of Ionising Radiation (*Strahlenschutzgesetz* – StrlSchG); on 12 May 2017, the *Bundesrat* approved the Act. The provisions for emergency situations already came into force in 2017, three months after the promulgation of the StrlSchG. For the most part, new statutory ordinances will be drafted by the end of the year 2018, which will substantiate the legal provisions. This will reorganise the German radiation protection system according to the distinction between existing, planned and emergency exposure situations as defined by Council Directive 2013/59/EURATOM. At the same time, the amendment will, among other things, result in the adaptation of numerous specifications according to the state of the art in science and technology, thus improving, for example, radiation emergency preparedness of the Federation and the *Länder.*

C. Scope and inventory

Article 2 – Scope

Article 2.1

This Directive shall apply to all stages of:

a) spent fuel management when the spent fuel results from civilian activities;
b) radioactive waste management, from generation to disposal, when the radioactive waste results from civilian activities.

Article 2.2

This Directive shall not apply to:

a) waste from extractive industries which may be radioactive and which falls within the scope of Directive 2006/21/EC;
b) authorised releases.

Article 2.3

Article 4(4) shall not apply to:

a) repatriation of disused sealed sources to a supplier or manufacturer;
b) shipment of spent fuel of research reactors to a country where research reactor fuels are supplied or manufactured, taking into account applicable international agreements;
c) the waste and spent fuel of the existing Krško nuclear power plant, when it concerns shipments between Slovenia and Croatia.

Article 2.4

This Directive shall not affect the right of a Member State or an undertaking in that Member State to return radioactive waste after processing to its country of origin where:

a) the radioactive waste is to be shipped to that Member State or undertaking for processing; or
b) other material is to be shipped to that Member State or undertaking with the purpose of recovering the radioactive waste.

This Directive shall not affect the right of a Member State or an undertaking in that Member State to which spent fuel is to be shipped for treatment or reprocessing to return to its country of origin radioactive waste recovered from the treatment or reprocessing operation, or an agreed equivalent.

Article 12 – Contents of national programmes

Article 12.1

The national programmes shall set out how the Member States intend to implement their national policies referred to in Article 4 for the responsible and safe management of spent fuel and radioactive waste to secure the aims of this Directive, and shall include all of the following:

c) an inventory of all spent fuel and radioactive waste and estimates for future quantities, including those from decommissioning, clearly indicating the location and amount of the radioactive waste and spent fuel in accordance with appropriate classification of the radioactive waste;

Article 14 – Reporting

Article 14.2

On the basis of the Member States' reports, the Commission shall submit to the European Parliament and the Council the following:

b) an inventory of radioactive waste and spent fuel present in the Community's territory and the future prospects.

Residual radioactive material generated during the handling of radioactive material as well as disassembled or dismantled radioactive components must be utilised without detrimental effects or disposed of as radioactive waste in a controlled manner.

In the Federal Republic of Germany, radioactive waste is generated:

- in connection with the operation of nuclear power plants, experimental, demonstration and research reactors,
- in connection with the decommissioning of nuclear power plants and experimental and demonstration reactors, of research and training reactors, and of other nuclear facilities,
- in connection with uranium enrichment and the fabrication of fuel assemblies (nuclear industry),
- in connection with basic and applied research,
- in connection with the use of radioisotopes in other research institutions, universities, trade and industry companies, hospitals and medical practices,
- in connection with other waste originators, such as e.g. the military sector,
- in future in connection with the conditioning of spent fuel intended for direct disposal.

Detailed information on the inventory of spent fuel and radioactive waste can be found in the Inventory of Radioactive Waste, which covers spent fuel and radioactive waste from reprocessing in other European countries returned to Germany by 31 December 2017, as well as all types of radioactive waste intended for disposal in the Federal Republic of Germany.

The existing regulations distinguish between radioactive material from nuclear and other handling licensed according to radiation protection legislation on the one hand, and waste only containing naturally occurring radioactive material (NORM). For NORM, some of the applicable requirements (e.g. with regard to exemption provisions) are principally different from requirements applicable to radioactive material from nuclear facilities and other handling which is licensed according to nuclear or radiation protection legislation. NORM is not considered as radioactive waste and therefore not accounted for. For more detailed explanations regarding the distinction between NORM and radioactive waste, see Chapter C.2 of the *Report of the Federal Republic of Germany for the Sixth Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.

Radioactive waste from industrial, medical and research applications that has to be delivered to a *Land* collecting facility rather than directly to a federal disposal facility will only be taken into account once it has been delivered to a *Land* collecting facility.

At the reference date of 31 December 2017, about 8,800 Mg HM[2] had been generated from the operation of nuclear power plants in the Federal Republic of Germany in the form of spent fuel assemblies, which will have to be disposed of in Germany.

The radioactive waste returned from reprocessing in other European countries and the vitrified high-level radioactive waste generated in Germany is stored in the form of 3,164 canisters in 113 casks.

The amount of spent fuel from non-power reactors is significantly lower than the amount from nuclear power plants to be disposed of and is stored in the wet storage facilities of the research reactors in Berlin, Garching and Mainz as well as in 479 casks (dry storage) in the storage facilities in Ahaus, Jülich and Rubenow.

As at 31 December 2017, there were 19.504 Mg of raw and pretreated waste, and 121.980[3] m³ of treated and conditioned radioactive waste stored in the Federal Republic of Germany.

Based on the intention to dispose of all types of radioactive waste in deep geological formations and taking into account disposal-relevant aspects, a basic subdivision was chosen in the Federal Republic of Germany which meets the requirements for the registration and classification of radioactive waste from the point of view of disposal. The basic subdivision into high-level radioactive waste and waste with negligible heat generation will also be made if the waste packages to be disposed of are kept in extended surface storage prior to their transportation to a repository.

Further information on the categorisation of radioactive waste can also be found in the *Report for the Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. To allow for classification according to the system of the IAEA, a transfer table has been developed (see Table C-1). It is, however, important to note that the data shown are estimates that are subject to uncertainties.

[2] Megagram of heavy metal (Mg HM) is the unit of the mass of heavy metal and hence a measure for the fuel content (uranium, plutonium and thorium) of a fuel assembly.

[3] Corrected value 2019

Table C-1: Table for transfer into the IAEA classification

Waste class*	Distribution (%)				Waste management route
	VLLW	LLW	ILW	HLW	Disposal
NHGW**	-	90	10	-	in deep geological formations
HGW (m^3)***	-	-	2	98	in deep geological formations
HGW (MgHM)****	-	-		100	in deep geological formations

* NHGW: waste with negligible heat generation; HGW: heat-generating waste

** The percentages are based upon waste characteristics including radionuclide inventory and estimated annual arisings provided by the waste generators (Internal BfS-report ET-IB-52). The characteristics were compared with the limits for long-lived nuclides and heat generation specified for the IAEA's waste classification scheme.

*** The percentages are based on the current amount of waste from reprocessing returned to Germany and other radioactive waste. The ratio will change in the future.

**** Spent fuel is HLW (High-Level Waste).
Note: If spent fuel assemblies will be conditioned (depending on the disposal concept) then it could generate intermediate-level waste (ILW) (e.g. structural parts). In conclusion, spent fuel assemblies consist of high-level waste (HLW) (spent fuel) and ILW (structural parts). The ratio refers only to spent fuel (“MgHM”).

D. Article 4 – General principles

Article 4.1
Member States shall establish and maintain national policies on spent fuel and radioactive waste management. Without prejudice to Article 2(3), each Member State shall have ultimate responsibility for management of the spent fuel and radioactive waste generated in it.

Article 4.2
Where radioactive waste or spent fuel is shipped for processing or reprocessing to a Member State or a third country, the ultimate responsibility for the safe and responsible disposal of those materials, including any waste as a by-product, shall remain with the Member State or third country from which the radioactive material was shipped.

Article 4.3
National policies shall be based on all of the following principles:

a) the generation of radioactive waste shall be kept to the minimum which is reasonably practicable, both in terms of activity and volume, by means of appropriate design measures and of operating and decommissioning practices, including the recycling and reuse of materials;
b) the interdependencies between all steps in spent fuel and radioactive waste generation and management shall be taken into account;
c) spent fuel and radioactive waste shall be safely managed, including in the long term with passive safety features;
d) implementation of measures shall follow a graded approach;
e) the costs for the management of spent fuel and radioactive waste shall be borne by those who generated those materials;
f) an evidence-based and documented decision-making process shall be applied with regard to all stages of the management of spent fuel and radioactive waste.

Article 4.4
Radioactive waste shall be disposed of in the Member State in which it was generated, unless at the time of shipment an agreement, taking into account the criteria established by the Commission in accordance with Article 16(2) of Directive 2006/117/Euratom, has entered into force between the Member State concerned and another Member State or a third country to use a disposal facility in one of them.
Prior to a shipment to a third country, the exporting Member State shall inform the Commission of the content of any such agreement and take reasonable measures to be assured that:

g) the country of destination has concluded an agreement with the Community covering spent fuel and radioactive waste management or is a party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management ('the Joint Convention');
h) the country of destination has radioactive waste management and disposal programmes with objectives representing a high level of safety equivalent to those established by this Directive; and
i) the disposal facility in the country of destination is authorised for the radioactive waste to be shipped, is operating prior to the shipment, and is managed in accordance with the requirements set down in the radioactive waste management and disposal programme of that country of destination.

The ultimate responsibility for the management of spent fuel and radioactive waste lies with the Federal Republic of Germany.

Regarding the responsible and safe management of spent fuel and radioactive waste, the National Programme includes, among other things, the following aspects:

- The management of radioactive waste shall, as a rule, be carried out within German national responsibility. Disposal is to be on German national territory. All types of radioactive waste are to be disposed of in deep geological formations.

- A licence for the export of spent fuel from installations for the fission of nuclear fuel for research purposes may only be granted for serious reasons of non-proliferation of nuclear fuel or for reasons of a sufficient supply of fuel elements for medical and other top level research purposes. An exception to this is the shipment of fuel assemblies pursuant to sentence 1 with the aim of producing waste packages that are suitable for disposal and that are to be disposed of in Germany. Notwithstanding sentence 1, a licence for the export of spent fuel assemblies pursuant to sentence 1 shall not be granted if the spent fuel is stored in Germany on the basis of a licence pursuant to § 6 AtG.

- The vitrified waste from reprocessing of spent fuel in other European countries is going to be returned to Germany and stored until its disposal. The delivery of spent fuel from nuclear power plants to reprocessing plants has become unlawful as of 1 July 2005. The waste management objective is its direct disposal.

- For the processing of radioactive waste, installations in other European countries are utilised in addition to German installations. Until its disposal, radioactive waste from the operation and decommissioning of nuclear facilities and installations is treated and stored in decentralised or central facilities.

- Radioactive waste from research, medicine and industry must first be delivered to the collecting facility of the respective *Land* (*Land* collecting facility) and stored there. The *Land* collecting facilities deliver the radioactive waste stored in them to a disposal facility.

For the responsible and safe disposal of spent fuel and radioactive waste, the following main principles are taken into account in Germany:

Minimisation principle

According to § 6, para. 1 and 2 of the Radiation Protection Ordinance (StrlSchV), any unnecessary radiation exposure or contamination of man and the environment shall be avoided, and any radiation exposure or contamination shall be minimised, even if below the respective limit, by taking into consideration the state of the art in science and technology. Accordingly, radioactive waste generation shall be kept to the minimum which is reasonably practicable both in terms of its activity and volume of the radioactive waste. This is achieved by appropriate operating and decommissioning practices, including the recycling and reuse of materials. So, for example, the operators must consider the requirements relating to the proposed decontamination methods in the decommissioning concept. To achieve a condition adequate for the performance of decommissioning and dismantling work, attention must be paid not only to minimising individual and collective doses, but also to reducing the volume and recovery of residues as harmlessly as possible, while also taking into account secondary waste volumes. To reduce the need for storage and disposal volumes, special treatment methods for volume reduction are used

for some waste types, such as compaction, melting or incineration, for which existing external facilities are used. After successful treatment, the resulting residues are returned to the site.

Interdependencies between all steps in spent fuel and radioactive waste generation and management

Product control of radioactive waste exists as a part of general quality assurance. Its task is to ensure compliance with waste acceptance requirements of the repositories. These are the result of the site-specific safety analysis for the repositories. The corresponding evidence requires the existence of organisational and administrative regulations defining the spheres of responsibility, tasks and activities of the parties involved. Within the scope of its responsibility for the operation of a repository, the BGE ensures that the waste acceptance requirements are met by examining waste packages and by qualification and accompanying control of conditioning measures. This is a sovereign task.

Product control comprises regulations on quality assurance in the registration and conditioning of radioactive waste and in the production of waste containers, including the registration and documentation of the characteristics of the waste packages relevant for disposal.

Organisational and administrative regulations governing the spheres of responsibility, tasks and activities of the parties involved are laid down in the guideline relating to the control of radioactive residues and radioactive waste of 19 November 2008. The supervisory authorities of the *Länder*, the BGE, the commissioned experts, the waste producers and the service companies acting on their behalf, as well as the operators of the storage facilities and *Land* collecting facilities are all involved in product control. The nature and extent of product control measures are determined depending on the conditioning technique, waste characteristics and requirements of the repository. The measures required to guarantee the safety of a repository for radioactive waste are laid down in the respective plant licence (plan approval notice).

Figure D-1 shows how it is ensured by a flow chart, approved by the BGE, in collaboration with the supervisory authorities of the *Länder* that storage takes place in a way that already corresponds to conditioning to meet the disposal requirements or allows later conditioning to meet the disposal requirements.

For the spent fuel and radioactive waste intended for emplacement in the disposal facility according to the Repository Site Selection Act, waste acceptance requirements have not been defined yet since the disposal concept depends on the site which is to be determined by law not before termination of the selection procedure according to the Repository Site Selection Act. Here, storage must take place in such a way that later conditioning to meet the waste acceptance requirements is possible.

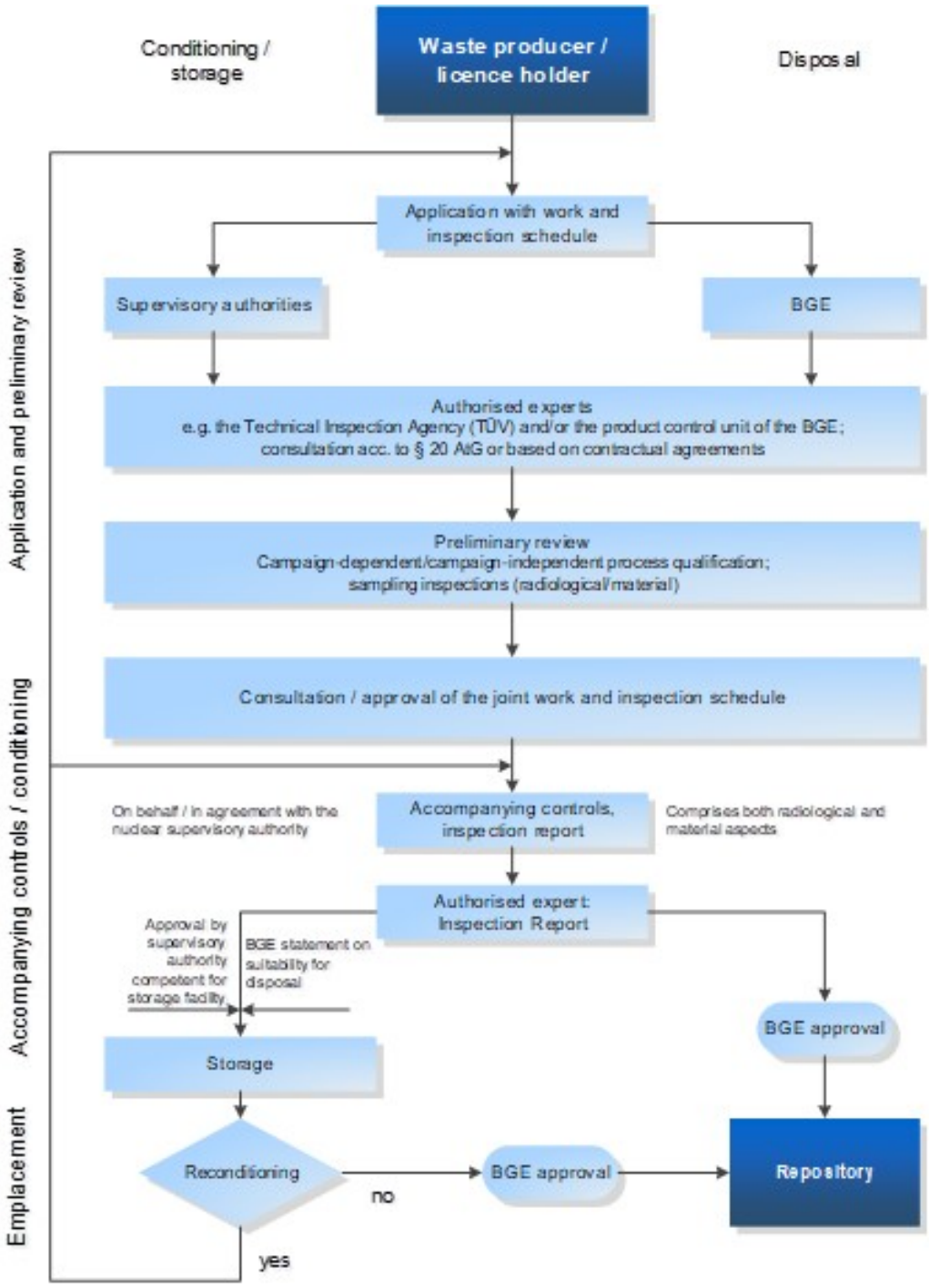

Figure D-1: Product control flow chart for waste packages regarding their conditioning, storage and disposal

The waste producers have to submit a waste management concept for all radioactive waste generated to the competent *Land* authority containing details on the technical and organisational provisions for collection and registration as well as on the whereabouts. In addition, proof of precautionary waste management according to § 9a AtG must be provided annually regarding the non-detrimental utilisation and controlled disposal of spent fuel.

Aspects of passive safety

As a matter of principle, passive safety features must be given priority in Germany in the disposal of spent fuel and radioactive waste with regard to long-term safety according to § 2d AtG.

The requirements for the storage of spent fuel and radioactive waste are summarised specifically in the guidelines of the Nuclear Waste Management Commission (ESK). They describe i.a. the preference of passive to active safety systems. The storage facilities are cooled by passive air convection which removes the heat from the casks independently of any active technical systems.

In the case of spent fuel, the main passive safety features are ensured with regard to the main safety functions

- safe enclosure of the radioactive inventory,
- adequate shielding of radioactive radiation,
- ensured maintenance of subcriticality, and
- safe removal of the decay heat

by the casks that are made of cast iron or forged steel with a double-lid closure system. Compliance with the resulting requirements is to be demonstrated at least for the licensed operating period.

The Federal Government plans to emplace all types of radioactive waste in deep geological disposal facilities with the aim to guarantee isolation from the biosphere in the long term, thus ensuring the safety of man and the environment without any need for maintenance and control.

Graded approach and evidence-based and documented decision-making process

Facilities for waste processing, storage and disposal are subject to licensing under the Atomic Energy Act and the Radiation Protection Act. The approval requirements are based on the present hazard potential, which is determined, in particular, by the type of installation or facility and the existing or planned type, quantity and radioactivity of the radioactive material in them. This applies e.g. to the protection against safety-relevant events, to the limitation of radiation exposure resulting from incidents, or to ensuring protection against disruptive action or other interference by third parties.

The licensing procedure ensures that up to granting of the licence, all decisions are evidence-based and documented. More information on the course of the individual licensing procedures can be found in the *Report for the Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.

Management of all types of spent fuel and radioactive waste

For radioactive waste with negligible heat generation, including waste from the operation and dismantling of nuclear power plants, but also waste from industry, research and medicine, the Konrad mine in Salzgitter is currently being converted into a repository.

The site for a high-level radioactive waste repository will be determined by a selection procedure. This selection procedure is to be concluded by 2031. The plannings for this disposal facility consider next to the spent fuel and waste from reprocessing, the radioactive waste with negligible heat generation that may not be suitable for emplacement in the Konrad repository. This concerns radioactive waste that owing to its nuclide inventory and/or its chemical composition or the time of its generation is not suitable for emplacement in the Konrad repository. The emplacement of this radioactive waste is only permissible if the same best possible safety of the site is ensured as for the disposal of only high-level radioactive waste.

Furthermore, it is intended to also consider the radioactive waste to be retrieved from the Asse II mine in the site selection for this disposal facility. The same applies to the depleted uranium that has been generated and will be generated from uranium enrichment if it should not be reutilised. A final decision on the site for the disposal facility for this waste – also considering all technical, economic and political aspects – cannot be made until the criteria for emplacement in the disposal facility have been established in accordance with the Site Selection Act and until there will be sufficient information as regards quantity and nature of the waste to be retrieved from the Asse II mine and the date when it will be retrieved.

Disused radioactive sources are returned by the operator to the manufacturer for further utilisation or delivered to a *Land* collecting facility as radioactive waste. In the *Land* collecting facilities, disused sources are usually conditioned together with other radioactive waste, documented and stored until disposal.

Emplacement of low-level and intermediate-level radioactive waste in the Morsleben repository for radioactive waste has been concluded. This repository is to be closed and safely sealed for the long term.

E. Article 5 – National framework

Article 5.1
Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:

a) a national programme for the implementation of spent fuel and radioactive waste management policy;
b) national arrangements for the safety of spent fuel and radioactive waste management. The determination of how those arrangements are to be adopted and through which instrument they are to be applied rests within the competence of the Member States;
c) a system of licensing of spent fuel and radioactive waste management activities, facilities or both, including the prohibition of spent fuel or radioactive waste management activities, of the operation of a spent fuel or radioactive waste management facility without a licence or both and, if appropriate, prescribing conditions for further management of the activity, facility or both;
d) a system of appropriate control, a management system, regulatory inspections, documentation and reporting obligations for radioactive waste and spent fuel management activities, facilities or both, including appropriate measures for the post-closure periods of disposal facilities;
e) enforcement actions, including the suspension of activities and the modification, expiration or revocation of a licence together with requirements, if appropriate, for alternative solutions that lead to improved safety;
f) the allocation of responsibility to the bodies involved in the different steps of spent fuel and radioactive waste management; in particular, the national framework shall give primary responsibility for the spent fuel and radioactive waste to their generators or, under specific circumstances, to a licence holder to whom this responsibility has been entrusted by competent bodies;
g) national requirements for public information and participation;

the financing scheme(s) for spent fuel and radioactive waste management in accordance with Article 9.

Article 5.2
Member States shall ensure that the national framework is improved where appropriate, taking into account operating experience, insights gained from the decision-making process referred to in Article 4(3)(f), and the development of relevant technology and research.

E.1 General overview

The Basic Law (GG) defines legislative and administrative powers of the Federation and the *Länder* regarding the use of nuclear energy. Accordingly, the Federation has legislative power, while the execution of nuclear and radiation protection law is performed by the authorities of the Federation and the *Länder*.

Figure E-1 shows the hierarchical structure of the national regulations, the authority or institution adopting the regulation as well as its legal effect. The AtG contains the general national provisions for protective and precautionary measures and the management of spent fuel and radioactive waste. Most of the provisions laid down in the AtG are formally and materially concretised by further laws, ordinances as well as by the non-mandatory guidance instruments. The non-mandatory guidance instruments have regulatory relevance by virtue of the legal requirement that necessary precautions have to be taken in the light of the state of the art in science and technology.

The strategy for a responsible and safe management of spent fuel and radioactive waste is outlined in the National Programme. This is to be considered in all radioactive waste management planning and administrative procedures by the actors in the field of nuclear waste management.

The legal framework for nuclear waste management in Germany is described in detail in Chapter E.2.2 of the *Report for the Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.

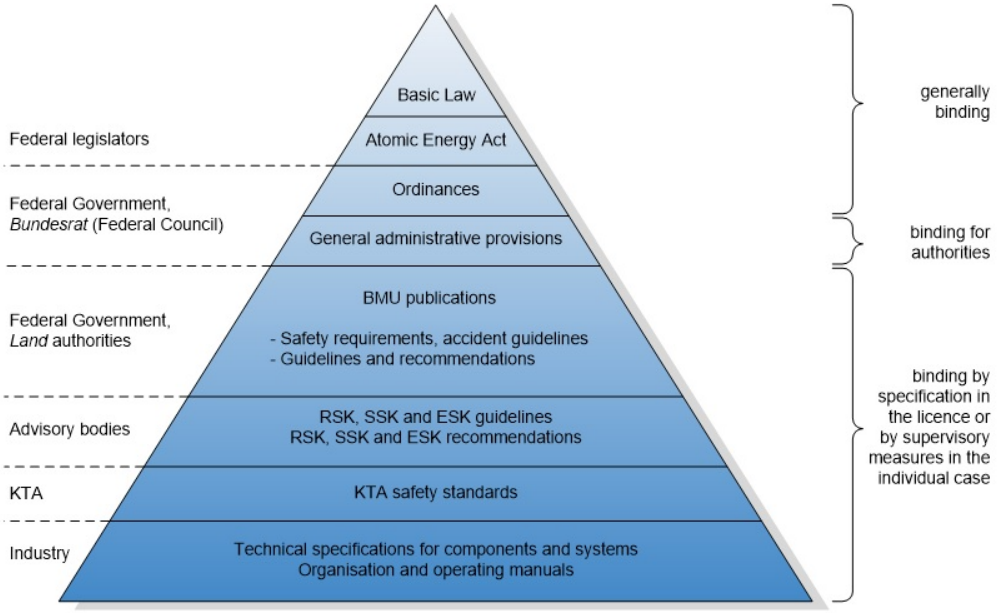

Figure E-1: Regulatory pyramid (hierarchy of the national regulations, the authority or institution adopting the regulation as well as its legal effect)

Regarding legislation and administrative actions in Germany, the international treaties concluded by the Federal Republic of Germany in accordance with Article 59(2), sentence 1 GG are on the same level as formal federal law. As a matter of principle, rights and obligations under the treaty only apply to the Federal Republic of Germany as contracting party. In the Federal Republic of Germany, international treaties in the fields of nuclear waste management, nuclear safety, radiation protection, liability and national implementing provisions have been ratified or are in the process of ratification. A list of all conventions can be found in Annex P.1.

E.2 Regulatory body

In the Federal Republic of Germany as a federal state, the “regulatory body” in terms of Article 20 consists of authorities of the Federation and the *Länder* (see Figure A-1).

By organisational decree, the Federal Government specifies the federal ministry competent for nuclear safety and radiation protection. In 1986, this competence was assigned to the then newly founded Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

The basic regulations on the determination of official responsibilities are contained in §§ 22 to 24 AtG, where the regulatory bodies are listed that are responsible for the implementation of and compliance with the provisions of this Act and statutory ordinances issued hereunder.

Coordination of the regulatory body

The BfE is responsible for the licensing of disposal and storage facilities pursuant to § 6 AtG. Bundling into one authority ensures the congruent interpretation of the regulations.

The nuclear authorities of the *Länder* are responsible for the licensing of conditioning and storage facilities pursuant to § 7 StrlSchV. The *Länder* Committee for Nuclear Energy (LAA) is a permanent Federation-*Länder* Committee composed of representatives of the supreme nuclear authorities of the *Länder* and the BMU. It serves the purpose of preparatory coordination of the activities of federal and *Land* authorities in connection with the enforcement of the nuclear law as well as the preparation of amendments and the further development of legal and administrative provisions as well as of the non-mandatory guidance instruments.

In the interest of nuclear law enforcement as uniform as possible throughout Germany, the competent nuclear approval and supervisory authorities of the *Länder* and the BMU develop technical rules and procedures for the uniform application of nuclear law by consensus wherever possible, which are then prepared as regulations and promulgated by the BMU. The BMU chairs the LAA and also manages its affairs. The Committee's decisions are usually made by mutual consent.

For preparing decisions to be taken by the General Committee, the LAA avails itself of several Technical Committees on the issues of “Legal Affairs”, “Nuclear Safety”, “Radiation Protection” and “Nuclear Fuel Cycle”, as well as of the Working Groups assigned to these Technical Committees for special permanent tasks (see Figure E-2). If need be, the Technical Committees may set up ad hoc working groups for special and above all urgent individual issues. The Technical Committees and the permanent Working Groups convene at least twice a year and more frequently if necessary. The General Committee convenes at least once a year.

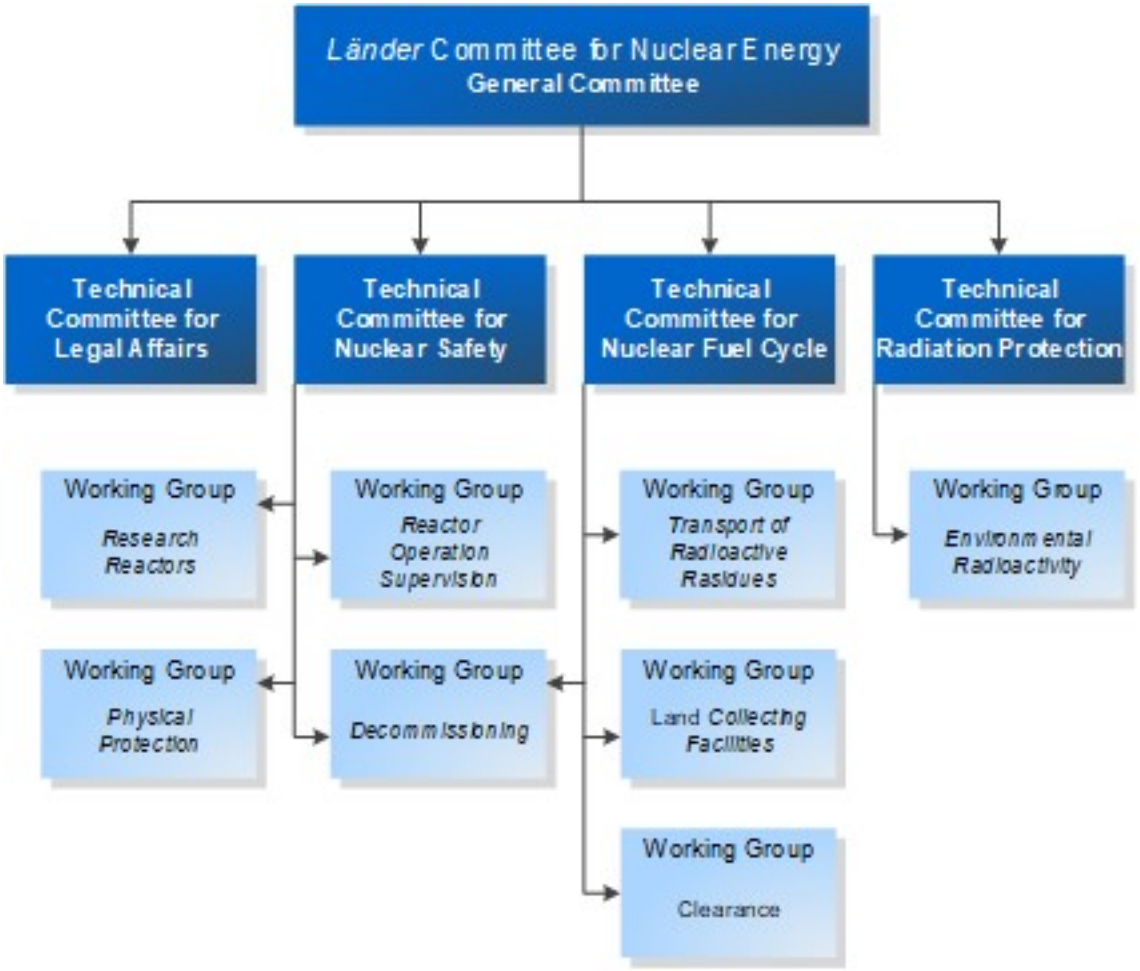

Figure E-2: *Länder* Committee for Nuclear Energy

In the area of legislation, the LAA is an important instrument of early and comprehensive involvement of the *Länder* which supplements the formal right of participation of the *Länder* in the legislative procedure of the *Bundesrat*.

Advisory commissions

The Reactor Safety Commission (RSK) was founded in 1958 and advises the BMU on issues relating to nuclear safety and physical protection of nuclear facilities. In addition, it substantially contributes to the advancement of the safety level in nuclear facilities.

The Commission on Radiological Protection (SSK), founded in 1974, gives recommendations to the BMU on all issues related to the protection of the population as well as employees in medical facilities, research, industry and nuclear facilities against ionising and non-ionising radiation.

In 2008, the Nuclear Waste Management Commission (ESK) was founded due to the increasing importance of issues related to nuclear waste management. It has taken over the tasks until then performed by the RSK Committee on Fuel Supply and Waste Management. With the ESK, an advisory body has been established which, with its way of working, takes into account the increasing importance of nuclear waste management

issues and brings together a broad spectrum of technical expertise. International experiences and approaches are to be included in the Commission's work, a reason why besides experts from Germany, experts from France and Switzerland are also members of the Commission. The experts advise the BMU in all matters of nuclear waste management. This comprises the aspects of conditioning, storage and transport of radioactive materials and waste, further the decommissioning and dismantling of nuclear facilities as well as disposal in deep geological formations. As a result of its consultations, the Commission reaches resolutions on scientific and technical recommendations or statements directed to the BMU which are published on the website of the Commission (www.entsorgungskommission.de/en).

For dealing with various focal points in greater depth, the commissions set up committees and working groups, where additional experts may also be involved.

The members of the commissions represent a broad spectrum of positions taken and views held according to the state of the art in science and technology. They are independent and not bound by any directives. The BMU appoints the members of the Commission for a period of up to three calendar years. In general, reappointments in direct succession are possible but should be limited to total tenures of office of no more than six years.

Bundesgesellschaft für Endlagerung mbH (BGE)

With the entry into force of the Act on the Reorganisation of the Organisational Structure in the Field of Disposal, the separation between operators and the administrative aides ended and the operational management tasks are merged into a federally-owned company in private legal form, the BGE.

All tasks related to the planning, construction, operation and closure of disposal facilities as well as of the Asse mine, previously carried out by the BfS as the operator and Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH (DBE) and the Asse-GmbH as administrative aides, are carried out by the BGE. The transfer of the tasks to the BGE took place with effect from 25 April 2017. On 15 May 2017, DBE was sold to the Federation and merged with the BGE on 20 December 2017. The BGE also assumes the tasks of the project implementer according to the Repository Site Selection Act. To a certain extent, the BGE is given jurisdictional powers if required pursuant to § 9a, para. 3 AtG, third sentence, by way of entrustment of sovereign tasks, which concerns in particular the product control of radioactive waste.

Effective independence of the regulatory functions

The economic use of nuclear energy lies in private hands and not in the public sector, whereas nuclear licensing and supervision are functions of the State. Thus, there is a separation of spheres of interest.

State-organisational separation is ensured by the competence of the BMU for all decisions relating to nuclear safety and radiation protection and the competence for energy

industry policy lying with the Federal Ministry for Economic Affairs and Energy (BMWi). Licensing and supervision of nuclear installations and facilities generally lies within the responsibility of the *Länder*; legality and appropriateness supervision is performed by the BMU. In the areas of economic interests of the nuclear energy industry in Germany as well as project funding of reactor safety research and application-oriented, site-independent basic research on radioactive waste management, the Federation only take actions through the BMWi.

According to § 9a, para 3 AtG, the organisation of the planning, construction, operation and closure of facilities for the disposal of radioactive waste is a federal task. The Federation has assigned these tasks to the federally-owned private-law company BGE. The BGE is subject to nuclear supervision by the BfE.

The BfE also supervises the implementation of the site selection procedure for a repository according to § 19, para. 1 to 4 AtG. The procedure for the approval of a facility for the disposal of radioactive waste is carried out as a plan approval procedure.

In the cases where the site is determined by federal law, a licence shall substitute the plan approval. The BfE is also responsible for plan approval and licensing of disposal facilities. In this case, the BGE will be acting as the applicant.

Monitoring of compliance with the requirements under nuclear and radiation protection law and the stipulations in the approvals takes place within the BfE.

The BMU is responsible for supervising the execution of tasks by the BfE in terms of legality and appropriateness.

E.3 Special aspects

E.3.1 Approval process

With respect to the protection against the dangers arising from radioactive substances and the control of their utilisation, the nuclear and radiation protection law requires subjecting the construction, operation and decommissioning of nuclear facilities as well as other facts or circumstances, such as the handling of radioactive substances, to regulatory approval (i.e. licensing or plan approval decision) The approval requirement is laid down in various provisions, depending on the type of facility and activities involved.

Responsibilities relating to the approval of nuclear waste management facilities are summarised in Table E-1. It shows that for approval and supervision of the different facility types and activities, in some cases different authorities are responsible. Uniform application of the legal requirements and a harmonised licensing practice is ensured by the BMU’s supervision of legality and appropriateness.

Table E-1: Responsibilities relating to the approval and supervision in the area of spent fuel and radioactive waste management under the provisions of nuclear and radiation protection law in the Federal Republic of Germany

Material	Activity	Legal basis	Licensing	Supervision
Nuclear fuel and waste containing fissile material	Construction and operation	§ 7 AtG	*Land* authority	*Land* authority
	Treatment, use	§ 9 AtG	*Land* authority	*Land* authority
	Storage	§ 6 AtG	BfE	*Land* authority
	Import and export	§ 3 AtG	BAFA	Federation
Other radioactive substances acc. to § 2, para 1 AtG, nuclear fuel acc. to § 2, para. 3 AtG (e.g. waste with low fissile material content)	Handling, e.g. storage	§ 7 StrlSchV[1] (in future § 12 StrlSchG)	*Land* authority	*Land* authority
Radioactive waste with negligible heat generation	Disposal	§ 9b AtG	BfE[2]	BfE
Heat-generating radioactive waste	Disposal	§ 9b, para. 1a AtG	BfE	BfE

[1] Unless there is a licence according to §§ 6, 7, 9 or 9b AtG already extending to the activity

[2] Transitional provisions apply to existing repository projects. In the case of the Konrad repository, the tasks are transferred from the *Land* of Lower Saxony to the Federation after approval of commissioning of the repository. In the case of the Morsleben repository, the tasks are transferred from the *Land* of Saxony-Anhalt to the Federation after the plan approval decision will have become enforceable. Responsibilities relating to the Asse mine remain with the *Land* of Lower Saxony.

Approval of facilities for nuclear waste management is usually granted without any limitation in time. An exception are the storage facilities for spent fuel and radioactive waste from reprocessing. Here the licence period is currently limited to 40 years starting from the emplacement of the first cask. An extension of the storage licence may only take place on imperative grounds and after this issue has been discussed in the German *Bundestag*.

The licence application is submitted in written form to the competent licensing authority and shall be accompanied by documents containing all the relevant data required for the assessment. The documents to be enclosed depend on the type of facility and handling. Based on the submitted documents, the licensing authority examines whether or not the licence prerequisites have been met. All federal, *Länder*, local and other regional authorities whose jurisdiction is affected are to be involved in the licensing procedure, including in particular the authorities responsible for civil engineering, water, regional planning and disaster control.

If an environmental impact assessment is to be carried out, it is determined and described in a report what impact a project will have on humans, on animals, plants, biodiversity, soil, water, ambient air, the climate, the landscape and cultural goods. The public

and specialist authorities, as well as citizens and authorities in neighbouring countries that may be affected, may express comments and opinions on the report.

The final decision of the licensing authority is based on the entirety of the application documents, opinions of authorised experts consulted, the opinion of the BMU and the authorities involved, as well as the findings from objections raised in the public hearing.

The interaction between the authorities and organisations involved and the participation of the public is shown in Figure E-3 by the example of a nuclear approval procedure for a disposal facility.

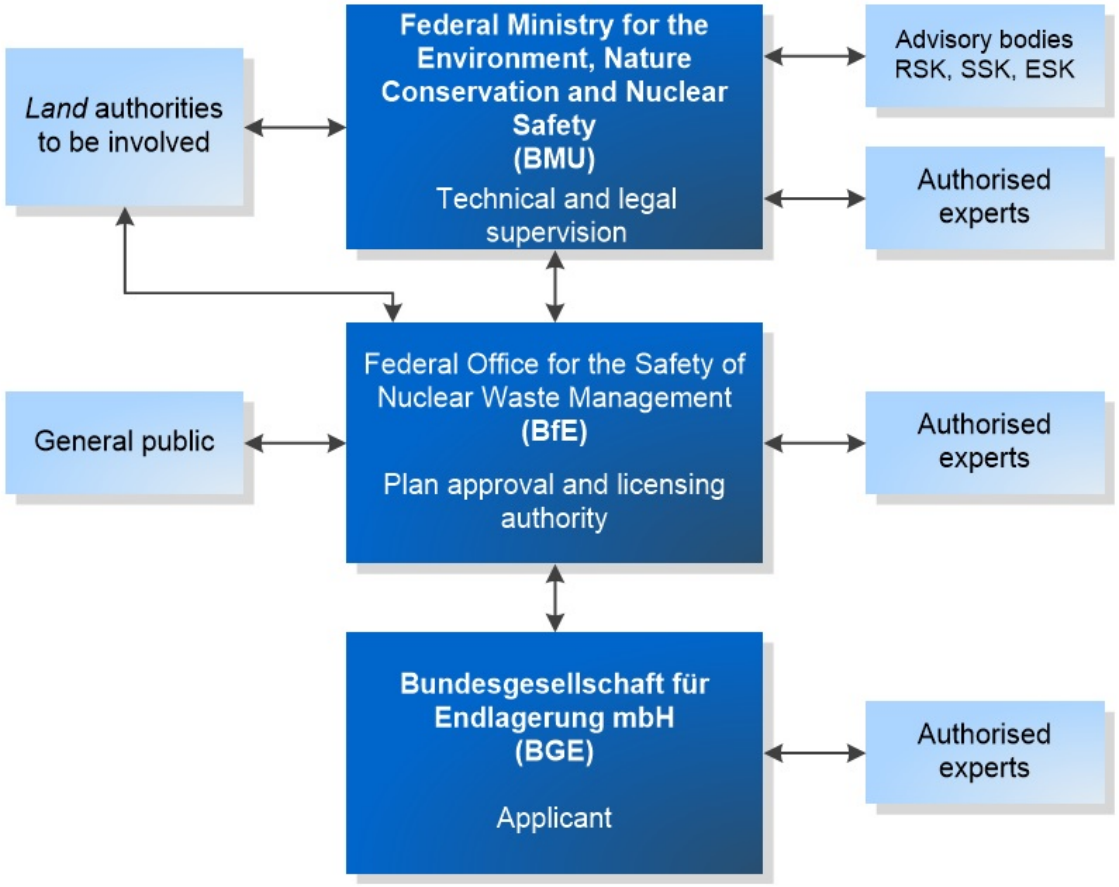

Figure E-3: Parties involved in a nuclear approval procedure for a disposal facility

The actual details and procedure of e.g. licensing in accordance with § 7 AtG are regulated in more detail in the Nuclear Licensing Procedure Ordinance (AtVfV). The basis for the decision on the licence application is that the applicant submits all necessary licensing documents to the competent authority. During the decision-making process, the competent authority specifies within the licence in writing, in which way it reviewed the information and documents of the applicant and which legal provisions have been taken into account for it. In addition, it is to be specified in the licensing notice what type of facility will be licensed and what conditions must be fulfilled. A licence may only be granted if the licensing requirements stated in the AtG or in other legal provisions have been fulfilled. For review of the information and documents submitted, the licensing authority may appoint independent technical experts, but the responsibility for the licensing decision remains with the authority.

E.3.2 System of appropriate controls and reporting obligations

Throughout their operating lives, including construction and decommissioning, nuclear facilities are subject to continuous regulatory supervision, after having been granted the necessary approval, according to § 19 AtG and the associated nuclear ordinances. Where nuclear facilities or the handling of nuclear fuel have been licensed according §§ 6, 7 or 9 AtG, the *Länder* carry out nuclear supervision. As regards federal facilities according to § 9a AtG for the safekeeping and disposal of radioactive waste, the BfE exercises regulatory supervision.

The legal basis for documentation and reporting of radioactive waste is § 70 StrlSchV. It requires communicating to the competent authority extraction, production, acquisition, transfer and other dispositions of radioactive substances within one month, specifying type and activity. In addition, the inventory is reported annually. The competent authority is entitled to verify the correctness of record keeping at any time. According to §§ 72 and 73 StrlSchV, the operators and those handling nuclear fuel are required to document the arising and whereabouts of waste and to submit the documentation to the authorities. Furthermore, regular inspections and own measurements at the approval holders' are carried out.

Figure E-4 shows the parties involved in the supervision of a disposal facility.

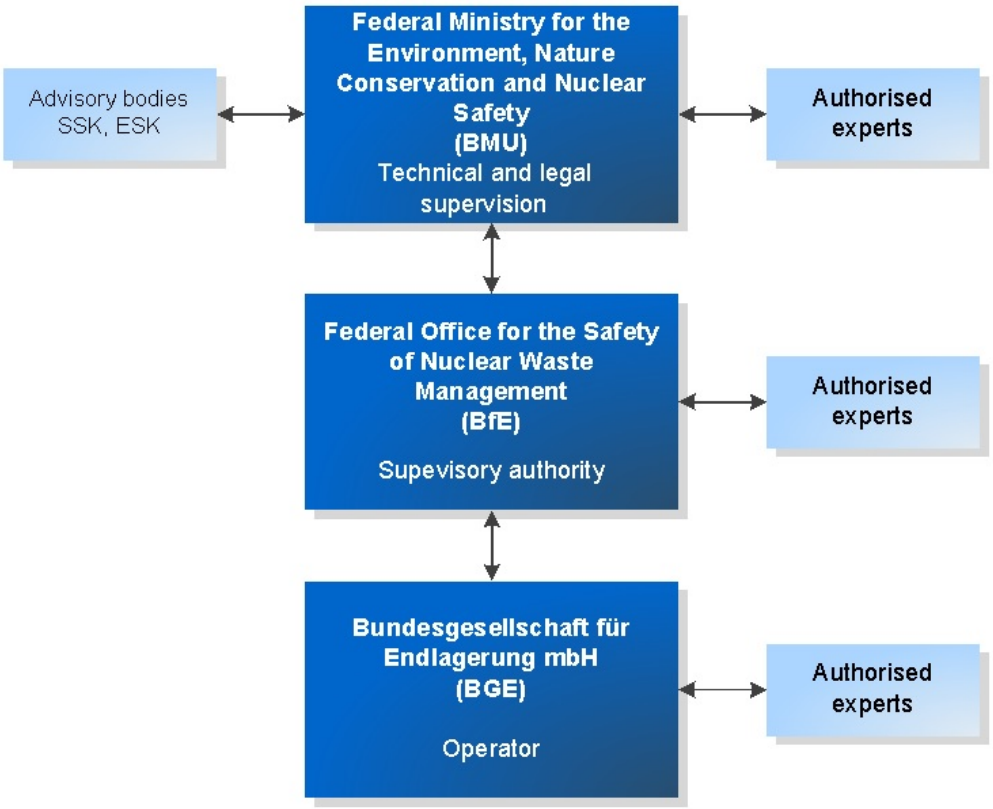

Figure E-4: Parties involved in the supervision of a disposal facility

E.3.3 Enforcement actions

As regards the implementation of the national regulations, the supervisory authority may, in accordance with § 19 AtG, require the approval holder to comply with the national safety requirements and the terms of the respective licence. Moreover, for i.a. nuclear facilities, § 327 of the Criminal Code (StGB) stipulates that whoever operates, possesses, substantially modifies or decommissions such a facility without the required permit shall be punished. Under certain conditions, laid down in § 17 and § 9b, para. 3 AtG, the nuclear approval authority may also impose obligations subsequently in order to ensure safety. If a nuclear installation or facility poses a major hazard to workers or the general public and if this hazard cannot be eliminated within a reasonable period of time by means of appropriate measures, then the authority must revoke the approval granted. Revocation is also possible if prerequisites for the approval cease to apply at a later date, or if the approval holder violates legal provisions or decisions by the authorities.

E.3.4 Allocation of responsibilities for spent fuel and radioactive waste management (including funding)

§ 9h AtG stipulates i.a. that the obligation under § 7c, sentence 1 AtG shall apply to the facilities for radioactive waste management accordingly, according to which the holder of a licence or a plan approval notice for such a facility cannot delegate the responsibility for nuclear safety.

The management of spent fuel and radioactive waste is based on the polluter-pays principle. According to § 9a, para. 1 AtG, the producers of radioactive residues are required to ensure that these are utilised without detrimental effects or are disposed of as radioactive waste in a controlled manner. This means that, as a general principle, the producers are responsible for the conditioning, storage and disposal of the spent fuel and the radioactive waste, without full congruence between implementation and financing responsibilities.

For radioactive waste to be delivered to *Land* collecting facilities, the aforementioned responsibilities and ownership of the waste are transferred to these facilities upon delivery.

According to the Act on the Reorganisation of Responsibility in Nuclear Waste Management, entered into force on 16 June 2017, the implementation and financing of storage and disposal for the cases regulated by law will in the future be the responsibility of the Federation. The funds for it were made available to the Federation by the operators and transferred to a waste management fund (see also Chapter I). Implementation and financing of decommissioning and dismantling of nuclear power plants as well as proper packaging of radioactive waste remain the responsibility of the operators and is ensured by provisions to be formed under commercial law. The use of disposal facilities and *Land* collecting facilities is generally (re-)financed through costs (fees and expenses) and charges which have to be paid by the party delivering radioactive waste.

According to § 9a, para. 3 AtG, the *Länder* establish *Land* collecting facilities for the radioactive waste generated within their territory. The Federation has to establish facilities for the disposal of radioactive waste.

E.3.5 Public information and participation

Licensing and approval procedures are usually carried out with the participation of the public. Through public participation within the framework of the Nuclear Licensing Procedure Ordinance and the Environmental Impact Assessment Act (UVPG) as well as informing the public in accordance with the legislation on freedom of information, in particular the Environmental Information Act (UIG), it is ensured that the public is adequately involved and that it has access to all the necessary information regarding the safety of planned facilities for the treatment of spent fuel and radioactive waste.

Further provisions relating to the information and participation of the public within the framework of the search for a repository are regulated in the Repository Site Selection Act.

In-depth information on public participation can be found in the *Report for the Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.

E.3.6 Update and improvement of the regulatory framework and the national framework

The authorities responsible for the development of the rules and regulations of the Federal Government and the *Länder* review the regulatory framework and perform updates. In order to identify any need for amendments to the national regulatory framework, a systematic evaluation of the state of the art in science and technology and of international rules and regulations is carried out on a continual basis. This is done through the participation of the BMU in international committees, by evaluating the work results of the relevant international, multi- and bilateral bodies and institutions, from the results of research programmes funded by the BMU and from other international specialist contacts and international specialist literature. The results of site-independent, application-oriented basic research in the context of project funding by the BMWi or the work of its subordinate authorities – the Federal Institute for Geosciences and Natural Resources (BGR) and the Federal Institute for Materials Research and Testing (BAM) – are also considered in the review and update of the national regulations. Moreover, international regulations constitute additional sources of knowledge in the determination of the state of the art in science and technology. The BMU is supported in this by, among others, the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH.

In addition, the BMU seeks information on safety-related and generic issues as well as on operating experience in all types of nuclear facilities by consulting its advisory bodies the RSK, the ESK and the SSK. The statements made by these commissions have an impact on the updating of the national rules and regulations.

Overall, it is ensured that the state of the art in science and technology, but also findings from operation, research and licensing (learning processes) lead to an adaptation of the regulatory framework and the national framework.

F. Article 6 – Competent regulatory authority

Article 6.1
Each Member State shall establish and maintain a competent regulatory authority in the field of safety of spent fuel and radioactive waste management.

Article 6.2
Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with the promotion or utilisation of nuclear energy or radioactive material, including electricity production and radioisotope applications, or with the management of spent fuel and radioactive waste, in order to ensure effective independence from undue influence on its regulatory function.

Article 6.3
Member States shall ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework as described in Article 5(1)(b), (c), (d) and (e).

In the field of nuclear energy and nuclear waste management, there are basically two different types of administration.

This is, on the one hand, the direct federal administration. As higher federal authority, the BfE is the competent licensing and supervisory authority for facilities for disposal that are to be established by the Federation according to § 9b AtG. The BfE is also the licensing authority for licences pursuant to § 6 AtG.

On the other hand, there is the administration by the *Länder* on behalf of the Federal Government which in the field of nuclear waste management mainly concerns the storage of radioactive waste. The competent supervisory and licensing authorities of the *Länder* report to the Federal Government on law enforcement upon demand. The Federal Government has the right to require the submission of reports and documents and may issue binding directives to the *Land* authority in the individual case. The Federal Government may assume the competence for the subject matter, i.e. the decision in the case, by exercising its right to issue directives. The competence to execute the duties, i.e. the execution of the decision towards the applicant or licensee, remains with the competent *Land* authority.

More details on the organisational framework of the regulatory authority in the Federal Republic of Germany are given in Chapter E.2.

F.1 Principle of separation

As state administrative bodies, approval and supervisory authorities at both federal and *Land* level are generally required by the Constitution to act in accordance with law and justice (see Article 20(3) GG).

At the level of the supreme federal authorities, state-organisational separation is ensured by the competence of the BMU for all decisions relating to nuclear safety and radiation protection and the competence for energy industry policy lying with the BMWi.

At the *Länder* level, the principle of separation is adhered to on the basis of organisational provisions. The unbiased, safety-oriented decision-making is additionally strengthened in terms of state organisation law through the legality and appropriateness supervision of the administrative action of the *Land* authorities by the BMU, having competence for issues of nuclear safety and radiation protection at the highest federal level. This ensures within the democratically legitimised supervision established at the governmental level that the assertion of safety-relevant interests by the regulatory authorities will take place independently of economic or other extraneous influences and interests. This also applies to the regulatory framework accordingly. All groups that contribute to the safety of nuclear installations and facilities are involved in the review and, where required, updating of the regulatory framework. Safety-related interests have priority over economic interests.

According to § 9a, para. 3 AtG, the organisation of the planning, construction, operation and closure of facilities for the disposal of radioactive waste is a federal task which has been assigned to the federally-owned private-law company BGE being subject to nuclear supervision by the BfE.

The BMU is responsible for supervising the execution of tasks by the BfE in terms of legality and appropriateness.

In addition, there are federal authorities being responsible for specific issues of nuclear safety and radiation protection as well as for spent fuel and radioactive waste management. So, for example, the Federal Office of Economics and Export Control (BAFA, within the area of responsibility of the Federal Ministry for Economic Affairs and Energy) is responsible for the import and export of radioactive materials as defined in § 3 AtG.

All approval decisions are made in an evidence-based and documented administrative procedure so that all decisions in this area are also independent and safety-oriented.

F.2 Human and financial resources of the licensing authorities

The responsibility for organisation, staffing and financial resources of the nuclear authorities of the Federal Government lies with the BMU. The rights and obligations of the Federation and the *Länder* are sketched out by the Basic Law.

The staff of the BMU, the two federal offices (BfE und BfS) and the competent supreme *Land* authorities consists of civil servants appointed for life and public service employees. The legal civil servants or public service employees are required to have qualified at university and to have passed the corresponding examinations. The scientific-technical civil servants are required to have completed a corresponding course at a university or a university of applied sciences. Furthermore, there are high demands on the reliability and impartiality of authority staff. § 12, para. 1 AtG stipulates the requirements to be established with regard to the training, professional knowledge and skills, reliability and impartiality also for the case of consultation of persons and organisations as authorised technical experts by the competent authorities (see § 20 AtG).

The staffing needs of the BMU and the two federal offices are regularly checked by means of a review of the public functions and tasks and adjusted where required. The

staff appointment schemes of the authorities on which the staffing is based are part of the federal budget that is drawn up by the Federal Government and adopted by the budgetary legislator (*Bundestag*). For staffing of the authorities competent for reactor safety and radiation protection of the *Länder*, these are responsible.

In nuclear approval and supervisory procedures, the *Land* authorities consult, as a rule, authorised experts (see § 20 AtG). In performing its function of federal supervision, the BMU is supported as regards scientific and technical issues by the BfS, the BfE, by advisory bodies (especially the ESK), GRS as technical expert organisation of the Federation and, where required, also by other authorised experts.

The costs arising from approval and supervision of nuclear installations and facilities are basically refinanced in accordance with § 21 AtG (costs for decisions on applications, including review of the results of safety reviews) as well as in accordance with § 21a AtG (costs for the use of facilities pursuant to § 9a, para. 3 AtG). Fees for the consultation of authorised experts are also reimbursed by the applicant or the approval holder as expenses.

G. Article 7 – Approval holders

Article 7.1
Member States shall ensure that the prime responsibility for the safety of spent fuel and radioactive waste management facilities and/or activities rest with the licence holder. That responsibility can not be delegated.

Article 7.2
Member States shall ensure that the national framework in place require licence holders, under the regulatory control of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as is reasonably achievable, the safety of the radioactive waste and spent fuel management facility or activity in a systematic and verifiable manner. This shall be achieved through an appropriate safety assessment, other arguments and evidence.

Article 7.3
As part of the licensing of a facility or activity the safety demonstration shall cover the development and operation of an activity and the development, operation and decommissioning of a facility or closure of a disposal facility as well as the post-closure phase of a disposal facility. The extent of the safety demonstration shall be commensurate with the complexity of the operation and the magnitude of the hazards associated with the radioactive waste and spent fuel, and the facility or activity. The licensing process shall contribute to safety in the facility or activity during normal operating conditions, anticipated operational occurrences and design basis accidents. It shall provide the required assurance of safety in the facility or activity. Measures shall be in place to prevent accidents and mitigate the consequences of accidents, including verification of physical barriers and the licence holder's administrative protection procedures that would have to fail before workers and the general public would be significantly affected by ionising radiation. That approach shall identify and reduce uncertainties.

Article 7.4
Member States shall ensure that the national framework require licence holders to establish and implement integrated management systems, including quality assurance, which give due priority for overall management of spent fuel and radioactive waste to safety and are regularly verified by the competent regulatory authority.

Article 7.5
Member States shall ensure that the national framework require licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to the safety of spent fuel and radioactive waste management as laid down in paragraphs 1 to 4.

G.1 General requirements relating to the approval holder

The licence holder has primary responsibility for the safety of a spent fuel management facility or a radioactive waste management facility. The licence may only be granted if the applicant complies with the legal prerequisites for licensing pursuant to §§ 6, 7, 9 and 9b AtG or § 9 StrlSchV, respectively. The approval prerequisites include i.a. that the responsible persons are trustworthy and have the requisite technical qualification, that adequate safety is demonstrated and that construction and operation have to be such that the necessary precautions against damage have been taken as are necessary in the light of the state of the art in science and technology.

In the case of companies with a number of authorised board members to represent it, the licence holder has to nominate to the competent authority the individual from the circle of authorised board members who assumes the role of radiation protection supervisor. The radiation protection supervisor is responsible for the entire area of radiation

protection pursuant to § 31, para. 1 StrlSchV. § 31, para. 2 StrlSchV stipulates that he has to appoint a sufficient number of radiation protection officers for technical activities and monitoring of operation. Together with the radiation protection supervisor, these ensure due compliance with all protection and supervisory provisions of the Radiation Protection Ordinance. According to § 32, para. 5 StrlSchV, the radiation protection officers must not be hindered in the performance of their duties or suffer any disadvantages by virtue of their activities.

In order to better meet the specific requirements of nuclear safety in facilities licensed under § 7, para. 1 AtG or facilities licensed under § 6 AtG, the additional position of a nuclear safety officer has been created as a further instance within the company organisation. It is his responsibility to supervise nuclear safety issues in all areas of operation and in doing so must act independently of the corporate interests of cost-effective facility operation. He should be involved in all activities concerning modifications, should assess any reportable events and the evaluation of operating data, and has the right to report directly and at any time to the facility manager.

When performing their tasks, the radiation protection officers, together with the nuclear safety officer, act independently from the company hierarchy.

Any enforcement measures on the part of the competent authorities will always be directed in the first instance at the holder of the licence, with the objective that the ultimately responsible individuals will personally meet their respective obligations. If this is not the case, the authority can question the trustworthiness of such individuals, which is a prerequisite for granting the licence. Consequently, in such cases, any proceedings relating to an administrative or criminal offence will be directed at individual persons.

If radioactive substances are lost, found or misused, the *Land* concerned is likewise responsible for averting nuclear-specific danger. In severe cases, it is supported in this task by the BfS. This applies, in particular, to the finding of radioactive substances for which no other responsible party can be identified.

If there is no licence holder or other party responsible for management or storage facilities for radioactive waste, or such a person fails to meet his obligations, then responsibility for the safety of the facility or related activities shall rest with the competent *Land*.

In cases where the direct owner of nuclear fuels has no authorisation for possession, he shall establish authorised possession pursuant to § 5, para. 2 AtG. If such authorised possession cannot be established, the BfE shall temporarily take the nuclear fuels into its charge (“government custody”) according to § 5, para. 3 AtG. Such a situation may also arise if nuclear fuels are found or in case of loss of authorisation on the part of the private licence holder (e.g. in case of licence withdrawal). If, however, the supervisory authority issued any other order under § 19, para. 3 AtG, then this order shall have priority over government custody. Whoever is responsible for nuclear fuels under government custody shall also ensure authorised possession outside government custody (see § 5, para. 3 sentence 2 AtG). This does not only apply to the direct owner who delivered to the authority responsible for custody but also to the owners of utilisation and consumption rights to nuclear fuel held in government custody, and to anyone who

is required to take over or take back nuclear fuel from a third party (see § 5, para. 3 sentence 3 AtG).

According to § 23d, para. 8 AtG, the BfE is responsible for the execution of government custody.

The BfE may cause the private licensees to (re-)assume their responsibility with regard to the handling of nuclear fuels by issuing orders stipulating that nuclear fuels under government custody are to be returned to the charge of the private owners.

The operation of an installation or facility is continuously monitored so that any safety-significant disturbances of operation and accidents will be reliably detected and the counter-measures specified in the operating manual can be taken. In addition, the prescribed condition of the safety-relevant systems and equipment of a facility or installation is ensured by regularly recurring inspections. Their frequency depends on the safety significance of the component to be inspected. The recurring inspections are laid down in a testing manual. The results of the recurring inspections are to be documented and are available for the purpose of long-term monitoring.

G.2 Periodic safety review (PSR)

The ESK has developed guidelines for the conduct of periodic safety reviews for storage facilities for spent fuel, heat-generating and other radioactive waste in casks. The periodic safety review pursues the overall objective of regularly reviewing and assessing the nuclear safety of the respective installation or facility and continuously improving it. The results of the review and assessment are to be submitted to the nuclear supervisory authority.

The PSRs are conducted every ten years after the start of operation (emplacement of the first cask). Furthermore, a monitoring concept is set up to control long-term and ageing effects during service life of the storage facility applied for. The monitoring concept also includes the obligation to report on the condition of the storage building and of the components required for storage at intervals of ten years.

Within the framework of the PSR, the safety report is periodically reviewed every ten years. In addition, the safety report is also continuously reviewed within the framework of regulatory supervision.

G.3 Safety demonstrations

Safety demonstrations are already furnished within the approval procedure. As a consequence of the events in Japan in March 2011, the ESK has conducted a stress test for facilities for spent fuel and radioactive waste management in the Federal Republic of Germany. The investigations and reviews have shown that the storage facilities for spent fuel and radioactive waste with negligible heat generation fulfil the highest stress level and achieve the highest degree of protection in almost all load cases. Furthermore, the

stress test did not reveal any deficiencies in design requirements of the facilities considered.

For a repository for high-level radioactive waste, a comprehensive safety case will be prepared for all operating states of the repository. In this respect, facility-specific safety analyses are carried out for the emplacement operation, including sealing, and for long-term safety, taking into account defined design basis accidents, to verify the protection of operating staff, the general public and the environment as required by the StrlSchV und StrlSchG. This includes an analysis and representation of the robustness of the repository system.

The site-specific safety analysis and the safety assessment comprise all information, analyses and arguments verifying the long-term safety of the repository and explain why confidence is placed on this assessment. During emplacement operation, a safety review shall also be conducted every ten years, taking into consideration the state of the art in science and technology. With the amended Repository Site Selection Act, it was introduced that the BMU will in the future define the safety requirements for disposal in a statutory ordinance.

G.4 Management systems

The management system identifies those processes that are necessary to achieve the organisational goals, including the provision of means necessary for compliance with all requirements and for task performance. Safety management is designed in such a way that a high level of confidence in the quality of the organisation and in the compliance with all safety requirements and existing limits, reference levels and criteria is justified. It ensures that the safety standards of the licence holder can be assessed on a continual basis in the light of advancing information.

A safety management system is set up to realise the safety management. It includes all specifications, regulations and organisational tools for the handling of safety-relevant activities and processes. All its elements are derived and justified in a comprehensible manner. Interactions, interfaces and delimitations between different processes are designed and described in a comprehensible manner. The documentation of the management system includes, for example for storage facilities for spent fuel and heat-generating waste, the following:

- the company’s safety policy,
- a description of the management system,
- a description of the roles and responsibilities, their assignment, the decision-making structures and the interaction with the management, the performers and those who have to assess the performance,
- a description of the cooperation with relevant external organisations, and
- a description of the processes, including information regarding preparation, independent review, performance and documentation of the work. In addition, the

measures for assessment and, if applicable, improvement of the processes and activities are to be described.

The safety management system, that is generally part of an integrated management system, gives highest priority to ensuring and continuously improving safety over other management objectives and supports the development and maintenance of a high safety culture. As part of the operating manual, the management system is reviewed by the supervisory authority.

G.5 Human and financial resources

For the safe operation of nuclear installations or facilities, the licence holder is required to provide for and maintain adequate human resources. This staff must have the necessary competence for the tasks to be performed. All licence applications for construction, operation, decommissioning or a major modification shall be accompanied by the proof of the qualification of the responsible persons as well as of the necessary knowledge of the staff otherwise engaged during operation of the installation. The measures of the operator to ensure adequate staffing are reviewed by the supervisory body on the basis of the reports submitted.

The public vocational training system in the Federal Republic of Germany provides good conditions for the operators of nuclear facilities that they can recruit skilled workers, foremen, technicians, engineers and scientists who received, within their school education and vocational training, technical basic training complying with the professional requirements which is documented by a state-approved certificate. As a result of the freedom of movement within the European Union, there has been an additional increase in the potential of appropriately trained applicants. The operators of nuclear facilities – both state-owned and privately owned – for their part try to recruit qualified personnel.

For compliance with the obligations relating to spent fuel or radioactive waste management safety of the nuclear facility, the respective operator has to provide for and keep available adequate financial resources. According to § 7c AtG, this has already been regulated by law for nuclear facilities. An extension of this obligation to other nuclear waste management facilities takes place with the implementation of Directive 2011/70/Euratom. This obligation ensures that the party obliged must ensure that adequate financial resources are available when required for the fulfilment of the standardised obligations with regard to the safe management of radioactive waste. Proof of adequate financial resources must be provided in the light of the respective licence. Thus, financial resources must not be withdrawn as far as this would adversely affect safety-related interests.

G.6 Interdependencies

The decommissioning of radioactive waste management facilities is taken into account already at the design stage and during their construction, with the analogous application of the stipulations and recommendations contained in the statutory rules and regulations and non-mandatory guidance instruments on the decommissioning of nuclear facilities.

With regard to facilities for the dry storage of HLW casks, the ESK guidelines are also applicable. These guidelines state that a storage facility must be designed and constructed in such a way that it can either be decommissioned or reused or removed in compliance with the radiological protection regulations.
Regarding the planning and construction of radioactive waste management facilities, the design ensures that the decommissioning of these facilities at a later stage takes place with due regard for the radiological protection of operating personnel and adherence to the radiological protection regulations. In particular, structural prerequisites must be generated in order to ensure the use of specific decontamination and dismantling methods, including remote-controlled methods, during the subsequent decommissioning of the facility.

For this reason, a corresponding concept for decommissioning must already be available at the design and construction stage of the facility. This concept includes specifications regarding the intended decommissioning option, which depends primarily on whether the radioactive waste management facility is constructed as part of a major nuclear facility, thus being integrated into the decommissioning procedure of this facility, or whether it constitutes a separate site, thus entailing an independent decommissioning procedure, directly related to this facility. Further decisive parameters of the decommissioning concept are determined by the composition of the radioactive waste treated at the facility, in particular by whether or not it involves waste containing fissile material. Within the context of the decommissioning concept, the operator plans the decommissioning procedure, assuming that any residual quantities of the radioactive waste treated at the facility have been removed beforehand. The decommissioning concept also incorporates the requirements with regard to decontamination and dismantling methods and thus the radiological protection of the personnel. Since activation by neutrons can be virtually excluded, these requirements result from the contamination of components. In this respect, however, it is important to consider that during treatment of waste containing fissile material or waste with other alpha-sources, contamination from alpha-emitting nuclides may also be present. The requirements relating to the proposed decontamination methods take into account the minimisation of individual and collective doses to achieve a condition adequate for the performance of decommissioning and dismantling work, as well as the reduction of volume and the recovery of residues as harmlessly as possible, with due regard for the secondary waste generated. The requirements relating to the dismantling methods depend on the technological task (material, size of the components, environmental conditions, accessibility), the radiation protection conditions (existing activity, potential for aerosol formation, risk of contamination, confinement of mobile activity, limitation of the individual and collective dose), and the intended subsequent treatment as a residue for reuse, conventional disposal, or disposal as radioactive waste.

The decommissioning of the Karlsruhe Vitrification Plant (VEK), for example, will primarily be performed using the equipment required for operation, which was already considered in the design of the facility. The planned steps and measures for decommissioning of the facility were described by the applicant in his safety case.

Regarding the consideration of interdependencies in the context of disposal, see the explanations on product control in Chapter D.

H. Article 8 – Expertise and skills

Article 8
Member States shall ensure that the national framework require all parties to make arrangements for education and training for their staff, as well as research and development activities to cover the needs of the national programme for spent fuel and radioactive waste management in order to obtain, maintain and to further develop necessary expertise and skills.

H.1 Education and training of staff

The operator is obliged to provide education and further training of his personnel pursuant to § 7c, para. 2 sentence 3 AtG in conjunction with § 9h AtG.

When using external personnel, the applicant has to ensure that the necessary knowledge is available, where required, by persons in support of them. This also applies to the case that knowledge is communicated by the contractor. Adequate proof is presented to the supervisory body upon request.

The maintenance of competence for and the know-how transfer within specialist positions takes place through training programmes as well as a long-term "parallel recruitment". Here, the young staff accompanies the experienced staff at the specialist position assigned to them up to three years depending on the tasks. Further, continuous promotion of junior staff takes place by intensive cooperation of the plant operators with the universities and the nuclear research institutions which comprises the promotion of professorships in the field of nuclear engineering, funding of Ph.D. students as well as internships and courses for students.

The Federation ensures that the requirements for the experts of all parties involved that are responsible for the safety of spent fuel and radioactive waste within the national framework with regard to education and training as well as to research and development cover the needs of the National Programme.

Proof of expertise and skills are furnished on the basis of the relevant guidelines on technical qualification. For the experts to be involved, the related specifications comprise, e.g., the function-related initial qualification, education and training requirements, performance of training, the acquisition of practical experience and, depending on the intended area of work, the examinations required. The technical qualification is to be renewed by attending courses at specified intervals.

Besides in-house education and training courses offered for authority staff by the supervisory bodies and the Federal Academy for Public Administration (BAköV), in principle, the same training opportunities are available to this staff as to the operating staff of nuclear waste management facilities. These are, in addition to courses at the KWS Power-Tech Training Center Essen and its simulator courses, education and training activities of the TÜV academies and GRS. Furthermore, the BGZ intends to establish a company-owned academy. Its main purpose will be the provision of central training courses on the maintenance of technical qualification in radiation protection for all BGZ sites and, moreover, the performance of all further training measures of all BGZ business premises. In addition, it is intended to integrate topics of nuclear waste management into an already

existing M.A. degree programme of the Aachen University of Applied Sciences, campus Jülich, for the winter semester 2019/2020 to be able to attract and recruit qualified personnel for the BGZ. In addition to the continuing education and further training courses offered by the Federal Republic of Germany, all staff of the authorities and technical expert organisations are also provided with the offers and training opportunities offered by the European Nuclear Safety Training and Tutoring Institute (ENSTTI).

H.2 Research and development

Seen in the long term and against the background of the time span of the realisation of a repository project, consistent and sustainable promotion of young researchers is of the utmost importance in Germany to ensure the maintenance of competence in the required disciplinary fields. In this context, the promotion of research at universities has a special significance, through which a targeted promotion of young scientists in specific fields of knowledge takes place. The Federation makes a substantial contribution to building up, developing and maintaining scientific and technical competence as well as to promoting young researchers in the field of nuclear waste management. Moreover, it continuously updates the state of the art in science and technology through corresponding research and development in addition to providing the scientific and technical basis for the realisation of a repository.

The respective current energy research programme of the Federal Government provides the guideline of the Federal Republic of Germany on research and development in the energy sector, thereby describing i.a. the priorities of research policy with respect to the funding area of nuclear safety and disposal research. With these programmes on research and development, the Federation ensures covering the needs of the National Programme.

Corresponding funding concepts and funding announcements for research and development of the competent ministries (BMBF and BMWi) substantiate these framework conditions and specify defined research priorities, including the promotion of young researchers. International cooperation plays an important role here. Currently, the 6th Energy Research Programme is being conducted (a 7th Energy Research Programme is in preparation). Supporting this ongoing research and innovation process through the Energy Research Programme is a strategic element of the Federal Government's energy policy.

Further details on the implementation of the energy research programme are set out in the funding concept for research on radioactive waste management (2015 – 2018) of the BMWi. The objectives of this application-oriented, site-independent project funding are i.a. the creation of the scientific and technical basis for the realisation of a repository for high-level radioactive waste and the development of the necessary methods and techniques for specific measures for the preparation of disposal. The constructor and operator of storage facilities is thus provided with the necessary tools and the methodical basis. In addition, the insights gained are also used in the review and updating of the existing national regulations. For example, the research projects carried out as part of the BMWi project funding for safety analysis and safety demonstration methods for repository con-

cepts in clay and crystalline rock provide important information considered in the development of the ordinance relating to safety requirements for the disposal of high-level radioactive waste *(Endlagersicherheitsanforderungsverordnung)* pursuant to § 26 StandAG. In addition to disciplinary research funding, the promotion of interdisciplinary and transdisciplinary research approaches is becoming increasingly important and is increasingly being taken into account. Corresponding research projects envisage a joint consideration of scientific-technical and humanist-social science-based approaches (that is, sciences that are thematically far apart) as well as the reflection of scientific work beyond the circle of scientists, for example with civil society and also on questions of acceptance. The projects of nuclear waste management research funded by the BMWi thus make a substantial contribution to building up, developing and maintaining the scientific and technical competence as well as to promoting young researchers in the field of nuclear waste management in Germany.

Details on the research priorities in connection with the safe and orderly management of spent fuel and radioactive waste are contained in Chapter 21.2 on nuclear waste management and 20.5 on the decommissioning of nuclear facilities of the BMU's departmental research plan. An example of the investigations carried out as part of its departmental research are the projects initiated by the BMU by way of precaution on extended storage of spent fuel and heat-generating radioactive waste. In these projects, basic information and data on national and international experience are compiled to be able to assess the safety issues related to the extended storage of fuel assemblies at an early stage and to be able to make competent assessments on corresponding concepts and strategies for their future storage.

International cooperation is an important component in the context of research and development activities and thus constitutes a central part of the programmes. As regards the scientific cooperation, in particular, the cooperation in the European underground laboratories plays a central role. The cooperation between German research institutions and international partners is based on bilateral agreements with disposal facility organisations or on agreements with state institutions, e.g. also for scientific and technical cooperation. In addition, contributions are made for the participation of German research institutions in OECD/NEA activities. Furthermore, co-financing of EU research projects takes place.

Participation in international activities to further develop the regulatory requirements and to evaluate experiences, e.g. via the Western European Nuclear Regulators Association (WENRA), contributes to further developing the technical and scientific basis with focusses especially on the assessment of the state of the art in science and technology and long-term safety of repository sites.

I. Article 9 – Financial resources

Article 9
Member States shall ensure that the national framework require that adequate financial resources be available when needed for the implementation of national programmes referred to in Article 11, especially for the management of spent fuel and radioactive waste, taking due account of the responsibility of spent fuel and radioactive waste generators.

Regarding the obligation to finance the management of spent fuel and radioactive waste, i.e. waste processing, storage and disposal, the polluter-pays principle applies. Accordingly, the waste producers shall principally bear the costs of disposal.

Exceptions relate to installations and facilities for which the State has to bear the costs, such as special dismantling projects, the Morsleben repository for radioactive waste and the Asse II mine. In addition, financing of the decommissioning (incl. dismantling) of the nuclear installations and facilities of the public sector, and management of radioactive waste from them is ensured by the Federation and the *Länder* from the public budgets.

A number of radioactive waste types from research, medicine and industry must first be delivered to the *Land* collecting facilities to be established by the *Länder* pursuant to § 9a, para. 3 AtG and stored there. After conditioning and packaging, the *Land* collecting facilities deliver the radioactive waste to a disposal facility. According to §§ 21 et seq. AtG the waste producers have to bear the costs.

According to § 9a, para. 1 AtG, operators of nuclear power plants or other nuclear installations shall utilise generated residual radioactive material as well as disassembled or dismantled radioactive components without detrimental effects or dispose them of as radioactive waste in a controlled manner.

With the Act on the Reorganisation of Responsibility in Nuclear Waste Management, which came into force on 16 June 2017, both the action and financial responsibilities have been reorganised for the scope of application of this Act.

The Act regulates the responsibilities for the decommissioning and dismantling of nuclear power plants and for the disposal of radioactive waste in the long term. The operators of nuclear power plants covered by the Act will continue to be responsible for the entire management and financing of decommissioning, dismantling and proper packaging of the radioactive waste, while the Federation will be responsible for the implementation and financing of storage and disposal.

On 26 June 2017, the Federation and electric power utilities signed a public-law agreement reaffirming the redistribution of responsibilities laid down in the Act. The agreement also ended numerous legal disputes between utilities and the State related to the management of radioactive waste and the nuclear phase-out.

The individual acts outlined in the following are part of the Act:

With the entry into force of the Waste Management Fund Act, the waste management fund was established in 2017 in the legal form of a foundation under public law. The purpose of the waste management fund is to secure the financing of the costs for the

safe management of the radioactive waste from the commercial use of nuclear energy in Germany already existing and arising in the future. For this purpose, the waste management fund reimburses the costs incurred by the Federation in connection with this task and deposits the funds transferred by the nuclear power plant operators. Waste management costs are the costs of storage and disposal of radioactive waste as well as the associated measures which are to be reimbursed by the waste management fund according to the provisions of the Waste Management Transfer Act, the Repository Site Selection Act, the AtG and the ordinances issued hereunder. On 3 July 2017, the operators of the nuclear power plants paid the financial means for storage and disposal of around 24.1 billion euros into the waste management fund. This amount includes a so-called basic amount as well as a risk premium of around 6.3 billion euros, which is intended to cover cost and interest risks beyond the calculated waste management costs. The waste management fund will invest the funds paid in a sustainable manner in order to secure the long-term financing of the costs of storage and disposal. The fund submits reports.

The Act Regulating the Transfer of Financing and Action Obligations for the Management of Radioactive Waste from Operators of Nuclear Power Plants (Waste Management Transfer Act – EntsÜG) regulates the transfer of radioactive waste and storage facilities to the BGZ established and entrusted with the task of storage by the Federation and transfer of the further waste management obligation to this company and its financing by the waste management fund. With effect from 1 January 2019, the operators will transfer the local storage facilities for spent fuel to the BGZ free of charge. On 1 January 2020, the storage facilities for low- and intermediate-level radioactive waste specified in the act will be transferred to the BGZ.

With the transfer, the obligation under § 9a, para. 1 AtG to ensure the controlled disposal of the delivered radioactive waste, in particular the obligation to deliver the radioactive waste to a disposal facility pursuant to § 9a, para. 2, sentence 1 AtG and of storage until delivery to such a facility, is transferred to the BGZ. The BGZ reimburses the transitionally still active operators the necessary expense for the operation of the storage facilities, which also includes construction costs and retrofits that will become necessary after the entry into force of this Act due to changed operational requirements. The BGZ prepares an annual statement of income and expenditure at the end of the financial year.

The Act on Transparency Regarding the Costs of Decommissioning and Dismantling of Nuclear Power Plants and the Packaging of Radioactive Waste (Transparency Act) introduces obligations of nuclear power plant operators to provide information to the Federal Office for Economic Affairs and Export Control (BAFA). Accordingly, the operators are required to provide BAFA with a detailed annual statement of the provisions recognised in the balance sheet for their remaining so-called dismantling obligations, i.e. for decommissioning and dismantling of their facilities and for the proper packaging of radioactive waste, on the basis of the financial statement. The Federal Government submits a report to the German *Bundestag* annually (for the first time as per 30 November 2018) for a summary assessment of the information obtained.

The Act on the Follow-up Liability for Dismantling and Waste Management Costs in the Nuclear Energy Sector (Follow-up Liability Act) regulates the companies' follow-up liability for their operating companies for the costs of decommissioning and dismantling of the nuclear power plants and the packaging of radioactive waste.

Further information on costs and funds can be found in the *Report on the cost and financing of the disposal of spent fuel and radioactive waste*.

J. Article 10 – Transparency

Article 10.1
Member States shall ensure that necessary information on the management of spent fuel and radioactive waste be made available to workers and the general public. This obligation includes ensuring that the competent regulatory authority inform the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations.

Article 10.2
Member States shall ensure that the public be given the necessary opportunities to participate effectively in the decision-making process regarding spent fuel and radioactive waste management in accordance with national legislation and international obligations.

Information is made available to the general public in accordance with national legislation and international obligations. In this regard, in particular information relating to the applicable regulatory framework, monitoring of the environment, reportable events, radiological emergency situations, but also to the topic of radioactive waste management are to be listed.

In addition to the site-specific monitoring of the vicinity of nuclear power plants according to the Guideline on Emission and Immission Monitoring (REI), the general environmental radioactivity is recorded by extensive measurements in the entire territory of the Federal Republic of Germany, i.e. also in the vicinity of waste management facilities, by means of the Integrated Measurement and Information System for the Monitoring of Environmental Radiation (IMIS) in accordance with the StrlSchG. The data are published in the annual reports "Environmental Radioactivity and Radiation Exposure" issued by the BMU and are partly accessible to the public via the Internet.

Events in nuclear waste management facilities for which reporting is mandatory are classified by the licence holders of these facilities according to the International Nuclear Event Scale (INES) of the International Atomic Energy Agency. The licence holders inform the public about all reportable events in their facilities. Own staff will be informed internally about these events. The BfE records these events and informs all *Länder* authorities and technical experts in quarterly reports and the general public in monthly and annual reports on its website.

With respect to the obligation of informing the general public in the event of radiological emergency, stipulations are laid down in the StrlSchV and in the StrlSchG. Here, a distinction is made between the information to be provided to the public in advance as general preparation for a radiological emergency without having such a situation, and the relevant information to be provided to the public in an actual emergency to keep the impacts of this special event as low as possible.

Public information relating to spent fuel and radioactive waste management through the competent authorities and their project management organisations mainly takes place through the publicly available annual reports and their respective websites, or for specific topics through separate publications. The websites are usually also available in English. With the transfer of operator tasks from the BfS to the BGE on 25 April 2017, the BGE has taken over the information centre “INFO KONRAD” in Salzgitter, “INFO Morsleben”

close to the Morsleben repository for radioactive waste, and “INFO ASSE” close to the Asse II mine for informing the public.

In general, the public can access environmental information according to the Environmental Information Act.

In parallel with the wide range of information provided to the public, the public is involved within the framework of the licensing procedure for radioactive waste management facilities. By this, it is given the opportunity to bring in their interests directly into the procedure.

If a licence procedure is to be carried out with public participation, the applicant has to submit, inter alia, an understandable brief description of the facility and the change applied for to inform the public. A safety report, which is checked by the competent authority with the help of technical experts in the course of the licensing process, is also to be prepared by the applicant. It essentially serves to describe the impacts related to the change, including the possibly changed effects of design basis accidents, and the precautionary measures set out, so that affected persons can assess whether they want to act to safeguard their rights. The licence authority takes account of the objections in their decision-making and presents this in the approval statement.

As part of the drafting of the National Programme and in case of future major changes to it, a Strategic Environmental Assessment (SEA) has been and will be carried out by the BMU according to the Environmental Impact Assessment Act. To this end, the potential environmental impacts to be expected from the implementation of the National Programme are determined and presented in an environmental report for public participation. In the framework of the SEA, the environmental impacts of the National Programme, including the alternatives considered, are assessed with public involvement, also involving the neighbouring countries.

The public is to be given intensive participation in the procedure for the selection of a site for the high-level radioactive waste repository at the national and regional level. The bearer of the public participation is the BfE. The licence procedure pursuant to § 9b, para. 1a AtG, which follows the decision to locate, also contains participatory elements, in particular participation by the public in the context of the required environmental impact assessment.

At the national level, the National Citizens’ Oversight Committee was formed in December 2016. In a transitional phase, this board is composed of nine members, six of which are renowned public figures appointed by the *Bundestag* and the *Bundesrat*. The other three members are citizens who were selected from a random sample according to a qualified selection system and appointed by the Federal Environment Minister. Among these three members is a representative of the young generation. It is intended, to double the number of members of the board to 18 persons in the summer of 2018. On 28 June 2018, three more citizens have already been appointed by the BMU.

The central task of the National Citizens’ Oversight Committee is to accompany the process of site selection as a mediating and independent body until reaching a decision on a site, in particular with regard to public participation. For this purpose, advice may be

sought from a scientific advisory board, which can be convened by it, or from external experts or scientific opinions.

At the level of the regions concerned, the so-called regional conferences will be institutionalised. They should be provided with necessary appropriations to be able to accompany the repository site selection procedure critically and constructively by involving independent expertise. A council of the regions will improve networking of the regions concerned by the repository site selection procedure including communities of the existing storage facilities for high level radioactive waste and spent fuel, already concerned by the future disposal issue.

The StandAG includes detailed information about the conducts of the site selection procedure and the associated requirements (see Chapter 2 StandAG) as well as the criteria and requirements for site selection.

For other aspects of public participation, see also Chapter 5 of the *Programme for the Responsible and Safe Management of Spent Fuel and Radioactive Waste (National Programme).*

K. Articles 11 and 12 – National programmes

Article 11.1
Each Member State shall ensure the implementation of its national programme for the management of spent fuel and radioactive waste ('national programme'), covering all types of spent fuel and radioactive waste under its jurisdiction and all stages of spent fuel and radioactive waste management from generation to disposal.

Article 11.2
Each Member State shall regularly review and update its national programme, taking into account technical and scientific progress as appropriate as well as recommendations, lessons learned and good practices from peer reviews.

Article 12.1
The national programmes shall set out how the Member States intend to implement their national policies referred to in Article 4 for the responsible and safe management of spent fuel and radioactive waste to secure the aims of this Directive, and shall include all of the following:

a) the overall objectives of the Member State's national policy in respect of spent fuel and radioactive waste management;
b) the significant milestones and clear timeframes for the achievement of those milestones in light of the over-arching objectives of the national programme;
c) an inventory of all spent fuel and radioactive waste and estimates for future quantities, including those from decommissioning, clearly indicating the location and amount of the radioactive waste and spent fuel in accordance with appropriate classification of the radioactive waste;
d) the concepts or plans and technical solutions for spent fuel and radioactive waste management from generation to disposal;
e) the concepts or plans for the post-closure period of a disposal facility's lifetime, including the period during which appropriate controls are retained and the means to be employed to preserve knowledge of that facility in the longer term;
f) the research, development and demonstration activities that are needed in order to implement solutions for the management of spent fuel and radioactive waste;
g) the responsibility for the implementation of the national programme and the key performance indicators to monitor progress towards implementation;
h) an assessment of the national programme costs and the underlying basis and hypotheses for that assessment, which must include a profile over time;
i) the financing scheme(s) in force;
j) a transparency policy or process as referred to in Article 10;
k) if any, the agreement(s) concluded with a Member State or a third country on management of spent fuel or radioactive waste, including on the use of disposal facilities.

Article 12.2
The national programme together with the national policy may be contained in a single document or in a number of documents.

K.1 National Programme

The *Programme for the Responsible and Safe Management of Spent Fuel and Radioactive Waste (National Programme)* was drafted under the leadership of the BMU (see Chapters A.3, E).

The Federal Government meets its reporting obligation imposed by Directive 2011/70/Euratom by submitting several documents (see Figure K-1). The National Programme contains a programmatic overview of the spent fuel and radioactive waste management planning. The current status of spent fuel and radioactive waste management

is reported every three years in *the Report for the Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. Progress in the implementation of the National Programme will also be reported every three years (for the first time by 23 August 2015) within the framework of the *Report on the Implementation of Directive 2011/70/Euratom* to the European Commission. In this context, the *Inventory of Radioactive Waste (Current inventory and prediction)* will also be updated and submitted to the European Commission. This also applies to the *Report on the Costs and Financing of the Management of Spent Fuel and Radioactive Waste*.

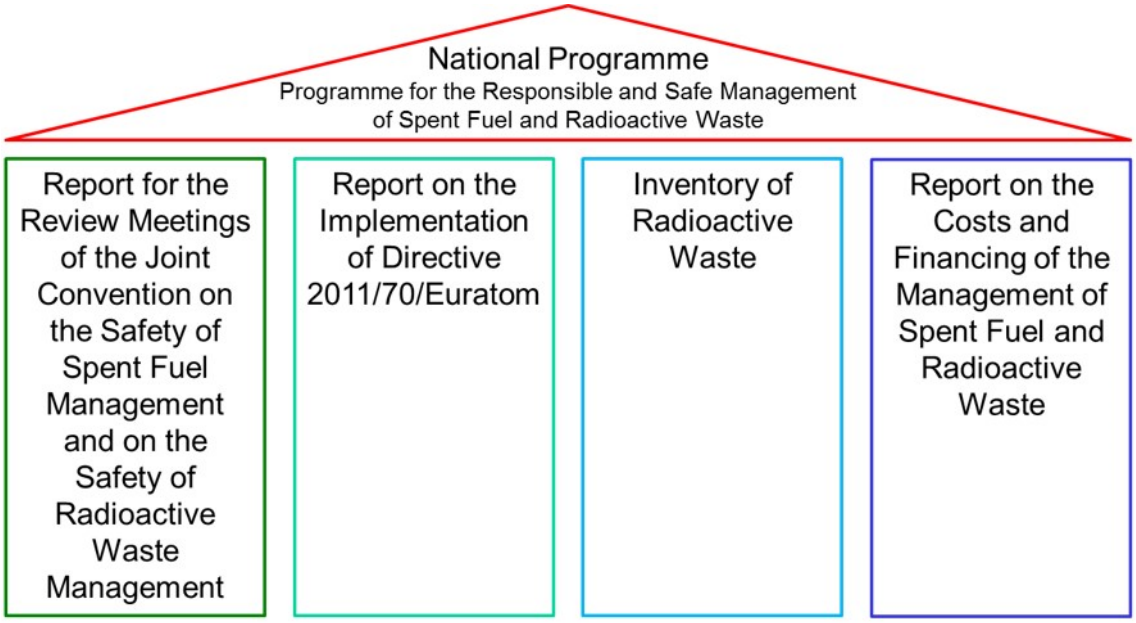

Figure K-1: Concept of the Federal Government to fulfil its reporting obligation within the framework of Directive 2011/70//Euratom

K.2 Implementation of the National Programme

Waste management under national responsibility

On 26 June 2017, 33 irradiated fuel assemblies with low-enriched uranium (LEU) were transported from the Berlin research reactor BER II to the United States of America for the last time. The underlying agreement applies to fuel assemblies that were irradiated until May 2016.

According to the new legal situation, which has been in effect since 16 May 2017, a licence for the export of spent fuel from installations for the fission of nuclear fuel for research purposes may only be granted for serious reasons of non-proliferation of nuclear fuel or for reasons of a sufficient supply of fuel elements for medical and other top level research purposes. An exception to this is the shipment of fuel assemblies pursuant to sentence 1 with the aim of producing waste packages that are suitable for disposal and that are to be disposed of in Germany. Notwithstanding sentence 1, a licence for the

export of spent fuel assemblies pursuant to sentence 1 shall not be granted if the spent fuel is stored in Germany on the basis of a licence pursuant to § 6 AtG.

Thus, Germany continues to fulfil its obligation to ensure that the management of radioactive waste is a national responsibility and that disposal should take place in Germany.

Repository for high-level radioactive waste

For the selection of a repository site for high-level radioactive waste, the Act on the Search and Selection of a Site for a Repository for Heat-Generating Radioactive Waste and for the Amendment of Other Laws was adopted, which entered into force on 27 July 2013.

In May 2014, the Commission on the Storage of High-Level Radioactive Waste was convened on the basis of the StandAG to prepare the site selection procedure. In July 2016, after two and a half years of work, the Commission published its final report “Responsibility for the Future – A fair, transparent procedure for the selection of a national disposal site”.

The recommendations of the Commission were implemented i.a. in the Act Amending the Act on the Search and Selection of a Site for a Repository, which entered into force on 16 May 2017.

The report of the Commission has not resulted in any necessary adjustments to the National Programme, so that the National Programme is no longer subject to reservations.

By the establishment of the BfE and the BGE, a reorganisation of the organisational structure has already been implemented at the legislative level.

The planned steps in the realisation of a geological disposal for high-level radioactive waste are shown in Figure K-2 and Figure K-3.

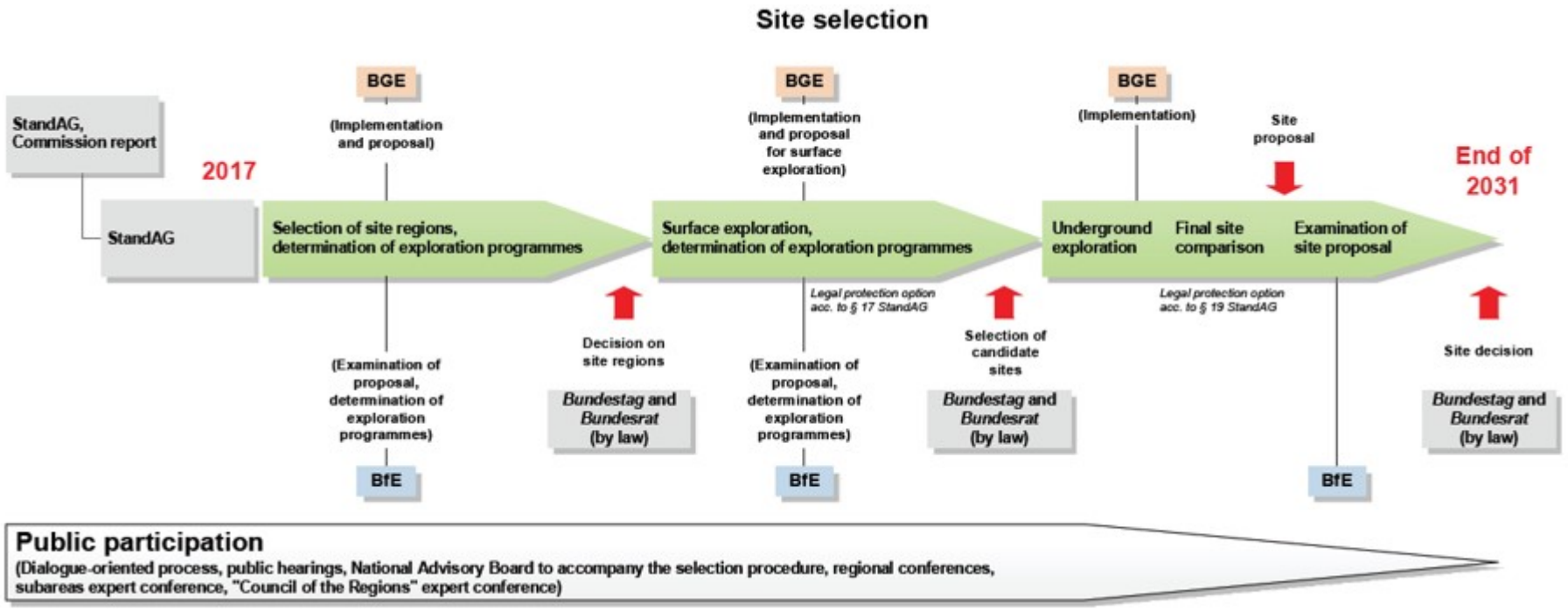

Figure K-2: Steps in the site selection for a repository for high-level radioactive waste, including responsibilities

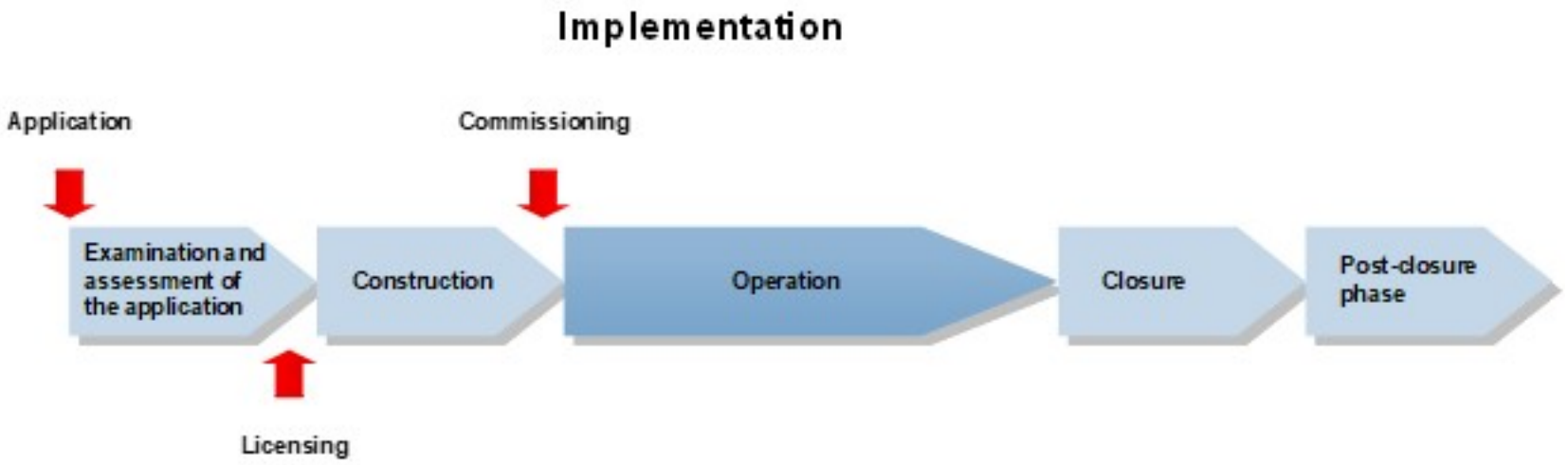

Figure K-3: Steps in the implementation of a repository for high-level radioactive waste

Currently, the Federal Republic of Germany is in the first phase of site selection. The BGE as project implementer started the site selection procedure in September 2017 and since then has been working on the evaluation of the requested geoscientific information of the *Land* authorities. This is necessary to achieve fastest possible determination of the sites for surface exploration.

There are currently no delays in implementing the National Programme.

Dismantling of the nuclear power plants

As part of the implementation of the KFK recommendations, the AtG was amended so that nuclear power plants, whose authorisation for power operation expired or whose power operation has ceased permanently, are to be decommissioned and dismantled without delay. In individual cases, the competent authority may permit temporary exceptions for plant components as far and as long as this is necessary for reasons of radiation protection.

Extended storage

In Germany, spent fuel and high-level radioactive waste are kept in dry storage until they are delivered to a disposal facility. The storage licences for the storage facilities are currently limited to 40 years and expire between 2034 and 2047, but commissioning of a disposal facility is not expected before 2050. Against this background, it will be necessary to extend the licensed storage period. In § 6, para. 5, sentence 2, the AtG subjects the renewal of storage licences to the existence of imperative ground and requires prior referral to the German *Bundestag*.

The BMU and the BfE have initiated projects by way of precaution in which basic information and data on national and international experience are collected in order to identify safety issues related to the extended storage of fuel assemblies and to assess concepts and strategies for their future storage. In addition, within its project funding, the BMWi promotes the creation and further development of scientific bases for the assessment of the long-term behaviour of casks and waste under storage-specific loading conditions and during the subsequent transports prior to disposal. It is expected that the currently established concept of dry storage (storage buildings and casks) maintains its safety functions even for considerably longer periods of time than 40 years.

Konrad repository

In March 2018, the BGE announced that the completion of the Konrad repository would be delayed by four and a half years. The basis for the estimate that completion is to be expected in the first half of 2027 was a TÜV Rheinland expert opinion commissioned by the BGE. In the framework of this expert opinion, all information about the former organisations involved in the construction of the repository was examined for their schedule

relevance for the first time. The TÜV experts have assessed the uncertainties in the construction of the repository.

According to previous planning, an average of 10,000 m³ of radioactive waste should be emplaced in the Konrad repository per year in one-shift operation. The BGE has now been asked to shorten the total operating time by means of two-shift operation during emplacement and thus compensate for part of the delay. It is planned to establish a central facility for keeping waste ready for disposal in the Konrad repository. This could improve the logistical process of emplacement and larger volumes could be disposed of on an annual average.

Overall, no significant deviations from the long-term plans for the disposal of radioactive waste with negligible heat generation are expected.

Morsleben repository for radioactive waste

The BfS, which was responsible for the closure of the Morsleben repository for radioactive waste until April 2017, has developed a closure concept based on extensive investigation programmes. This concept provides for an almost complete backfilling of the mine, sealing of the emplacement areas and sealing of the shafts, on which a licensing procedure is pending at the currently competent authority of the *Land* of Saxony-Anhalt. The planning documents for closure also included a long-term safety case. On 31 January 2013, the ESK submitted a statement on the long-term safety case for the Morsleben repository for radioactive waste (ERAM) on behalf of the BMU in which it concludes that the long-term safety considerations of the BfS should be adapted to the state of the art in science and technology. The implementation of the ESK recommendations requires additional proofs and a revision of the application documents.

K.3 Review and publication of the National Programme

On behalf of the Federal Government, the BMU reviews the National Programme regularly to ensure that it is up to date.

The national strategy for spent fuel and radioactive waste management is completed by or based on decisions that have been taken by the legislator and are reflected in the relevant regulations, such as the AtG.

In accordance with the principle of transparency in the field of waste management in the Federal Republic of Germany, the National Programme is published together with the supporting reports on the website of the BMU. The environmental report, which was prepared as part of the SEA of the National Programme, as well as information on how the comments from participation of authorities and the public on the National Programme have been taken into consideration are also published there.

One part of the National Programme refers to the construction of the repository for high-level radioactive waste. In this respect, the Repository Site Selection Act establishes chronological milestones and the framework conditions for the required information and

participation of the public. For public information, the corresponding project information is provided, primarily by using the websites of the institutions involved.

L. Peer reviews and self-assessment

Article 14 – Reporting

Article 14.3

Member States shall periodically, and at least every 10 years, arrange for self-assessments of their national framework, competent regulatory authority, national programme and its implementation, and invite international peer review of their national framework, competent regulatory authority and/or national programme with the aim of ensuring that high safety standards are achieved in the safe management of spent fuel and radioactive waste. The outcomes of any peer review shall be reported to the Commission and the other Member States, and may be made available to the public where there is no conflict with security and proprietary information.

As an international review that complies with the requirements of Directive 2011/70/Euratom, an IRRS (Integrated Regulatory Review Service) mission will take place in the Federal Republic of Germany from 3 March to 13 April 2019 and an ARTEMIS (IAEA Radioactive Waste Management Integrated Review Service) mission by the end of 2019.

As part of the missions, notably the ARTEMIS mission, the up-to-dateness of the National Programme is reviewed in the framework of the self-assessment and subsequent peer review by international experts.

M. Measures planned to improve safety

In order to ensure safety in the area of spent fuel and radioactive waste management, legal and enforcement requirements are being steadily and consistently further developed. This concerns, for example, the following:

- As regards the AVR (Arbeitsgemeinschaft Versuchsreaktor) cask storage facility in Jülich, the licensing procedure for extended storage of spent fuel from the AVR could not be completed by 31 July 2014. On 2 July 2014, an order was issued by the competent state ministry to clear the interim storage facility. Three options are considered: 1. Transport of the fuel element spheres to the Ahaus transport cask storage facility; 2. Shipment of the fuel element spheres to the United States of America; 3. Construction of a new storage facility in Jülich. Until the final decision, all three options are kept open and further specified.

- The decommissioning concept of the Morsleben radioactive waste repository provides for almost complete backfilling of the mine, sealing of the emplacement areas and sealing of the shafts. The long-term safety case submitted by the BfS is to be adapted to the state of the art in science and technology by the now competent BGE.

- In addition to the use of existing facilities and reclassification of rooms and plant areas within the nuclear power plant, the establishment of new treatment centres and storage facilities is also planned plant-specifically for the provision of the necessary treatment and storage capacities for decommissioning waste. At the sites Neckarwestheim, Philippsburg, Grafenrheinfeld, Biblis, Unterweser and Brunsbüttel, corresponding licences according to § 7 StrlSchV were applied for and some of them already granted.

- According to §§ 12 et seq. StandAG, the site selection procedure shall be reversible. The possibility of retrieval of waste during operation and temporary recoverability after sealing of the repository shall also be possible. The decision on the selection of exploration sites for surface and subsequent underground exploration as well as the final decision on the site are determined by federal laws.

N. List of abbreviations

ARTEMIS	IAEA Radioactive Waste Management Integrated Review Service
AtG	Atomgesetz *Atomic Energy Act*
AtSMV	Atomrechtliche Sicherheitsbeauftragten- und Meldeverordnung *Nuclear Safety Officer and Reporting Ordinance*
AtVfV	Atomrechtliche Verfahrensverordnung *Nuclear Licensing Procedure Ordinance*
AVR	Arbeitsgemeinschaft Versuchsreaktor Jülich *Experimental nuclear reactor at Jülich*
BAFA	Bundesamt für Wirtschaft und Ausfuhrkontrolle *Federal Office for Economic Affairs and Export Control*
BfE	Bundesamt für kerntechnische Entsorgungssicherheit *Federal Office for the Safety of Nuclear Waste Management*
BfS	Bundesamt für Strahlenschutz *Federal Office for Radiation Protection*
BGE	Bundes-Gesellschaft für Endlagerung mbH *Federal Company for Radioactive Waste Disposal*
BGZ	BGZ Gesellschaft für Zwischenlagerung mbH *Company for radioactive waste storage*
BMBF	Bundesministerium für Bildung und Forschung *Federal Ministry of Education and Research*
BMU	Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (früher Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB)) *Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (formerly Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB))*
BMWi	Bundesministerium für Wirtschaft und Energie (früher Bundesministerium für Wirtschaft und Technologie) *Federal Ministry for Economic Affairs and Energy (formerly Federal Ministry of Economics and Technology)*
CNS	Convention on Nuclear Safety
ENSREG	European Nuclear Safety Regulators Group
ERAM	Endlager für radioaktive Abfälle Morsleben *Morsleben repository for radioactive waste*
ESK	Entsorgungskommission *Nuclear Waste Management Commission*
EU	European Union
FARS	Fachausschuss Reaktorsicherheit *Technical Committee for Nuclear Safety*
FAS	Fachausschuss Strahlenschutz *Technical Committee for Radiation Protection*
FAVE	Fachausschuss nukleare Ver- und Entsorgung *Technical Committee for Nuclear Fuel Cycle Matters*

GG	Grundgesetz *Basic Law for the Federal Republic of Germany*
GRS	Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH
HLW	High-level waste
HM	Heavy metal
IAEA	International Atomic Energy Agency
ILW	Intermediate-level waste
IMIS	Integrierte Mess- und Informationssystem zur Überwachung der Umweltradioaktivität *Integrated measurement and information system for monitoring environmental radioactivity*
INES	International Nuclear Event Scale
IRRS	Integrated Regulatory Review Service
KFK	Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs *Commission to Review the Financing for the Phase-out of Nuclear Energy*
KTA	Kerntechnischer Ausschuss *Nuclear Safety Standards Commission*
LLW	Low-level waste
NaPro	National Programme
OECD/NEA	Organisation for Economic Co-operation and Development/Nuclear Energy Agency
OSPAR	Oslo-Paris Convention
PSR	Periodic safety review
REI	Richtlinie zur Emissions- und Immissionsüberwachung kerntechnischer Anlagen *Guideline concerning Emission and Immission Monitoring of Nuclear Installations*
RSK	Reaktor-Sicherheitskommission *Reactor Safety Commission*
SEA	Strategic Environmental Assessment
SSK	Strahlenschutzkommission *Commission on Radiological Protection*
StandAG	Standortauswahlgesetz *Repository Site Selection Act*
StGB	Strafgesetzbuch *Criminal Code*
StrlSchG	Strahlenschutzgesetz *Radiation Protection Act*
StrlSchV	Strahlenschutzverordnung *Radiation Protection Ordinance*
UFOPLAN	Umweltforschungsplan *Environmental research plan*
UIG	Umweltinformationsgesetz *Environmental Information Act*

VLLW	Very low-level waste
WENRA	Western European Nuclear Regulators Association

O. Annex

P.1. List of international treaties in the fields of nuclear waste management, nuclear safety, radiation protection, liability and national implementing provisions

National legislation on nuclear safety and radiation protection

- Gesetz zur geordneten Beendigung der Kernenergienutzung zur gewerblichen Erzeugung von Elektrizität vom 22. April 2002 (BGBl. I 2002, Nr. 26, S. 1351)

- Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren (Atomgesetz – AtG) in der Fassung der Bekanntmachung vom 15. Juli 1985 (BGBl. I 1985, Nr. 41, S. 1565), das zuletzt durch Artikel 1 des Gesetzes vom 26. Juli 2016 (BGBl. I 2016, Nr. 37, S. 1843) geändert worden ist, berichtigt am 15. Dezember 2016 (BGBl. I 2016, Nr. 61, S. 2930)
  Hinweis: Die Änderung durch Artikel 1 des Gesetzes vom 29. August 2008 (BGBl. I 2008, Nr. 40, S. 1793) tritt erst in Kraft, wenn das Protokoll vom 12. Februar 2004 zur Änderung des Übereinkommens vom 29. Juli 1960 über die Haftung gegenüber Dritten auf dem Gebiet der Kernenergie in der Fassung des Zusatzprotokolls vom 28. Januar 1964 und des Protokolls vom 16. November 1982 nach seinem Artikel 20 in Kraft tritt (vgl. Pariser Übereinkommen).

- Fortgeltendes Recht der Deutschen Demokratischen Republik aufgrund von Artikel 9 Abs. 2 in Verbindung mit Anlage II Kapitel XII Abschnitt III Nr. 2 und 3 des Einigungsvertrages vom 31. August 1990 in Verbindung mit Artikel 1 des Gesetzes zum Einigungsvertrag vom 23. September 1990 (BGBl. II 1990, Nr. 35, S. 885 und 1226), soweit dabei radioaktive Stoffe, insbesondere Radonfolgeprodukte, anwesend sind:

  - Verordnung über die Gewährleistung von Atomsicherheit und Strahlenschutz – AtStrlSV – vom 11. Oktober 1984 (GBl. (DDR) I 1984, Nr. 30, S. 341) und Durchführungsbestimmung zur Verordnung über die Gewährleistung von Atomsicherheit und Strahlenschutz – AtStrlSVDBest – vom 11. Oktober 1984 (GBl. (DDR) I 1984, Nr. 30, S. 348, berichtigt GBl. (DDR) I 1987, Nr. 18, S. 196)

  - Anordnung zur Gewährleistung des Strahlenschutzes bei Halden und industriellen Absetzanlagen und bei Verwendung darin abgelagerter Materialien – StrSAblAnO – vom 17. November 1980 (GBl. (DDR) I 1980, Nr. 34, S. 347)

- Gesetz zum vorsorgenden Schutz der Bevölkerung gegen Strahlenbelastung (Strahlenschutzvorsorgegesetz – StrVG) vom 19. Dezember 1986 (BGBl. I, Nr. 69, S. 2610), zuletzt geändert durch Artikel 91 der Verordnung vom 31. August 2015 (BGBl. I 2015, Nr. 35, S. 1474)

- Gesetz zur Suche und Auswahl eines Standortes für ein Endlager für Wärme entwickelnde radioaktive Abfälle und zur Änderung anderer Gesetze (Standortauswahlgesetz – StandAG) vom 23. Juli 2013 (BGBl. I 2013, Nr. 41, S. 2553), zuletzt geändert durch Artikel 309 der Verordnung vom 31. August 2015 (BGBl. I 2015, Nr. 35, S. 1474)

- Gesetz zur Fortentwicklung des Gesetzes zur Suche und Auswahl eines Standortes für ein Endlager für Wärme entwickelnde radioaktive Abfälle und andere Gesetze vom 5. Mai 2017 (BGBl. I 2017, Nr. 26, S. 1074)

- Verordnung über den Schutz vor Schäden durch ionisierende Strahlen (Strahlenschutzverordnung – StrlSchV) vom 20. Juli 2001 (BGBl. I 2001, Nr. 38, S. 1714), berichtigt am 22. April 2002 (BGBl. I 2002, Nr. 27, S. 1459), zuletzt geändert durch Artikel 8 des Gesetzes vom 26. Juli 2016 (BGBl. I S. 1843)
  Hinweis: geändert durch Artikel 2 des Gesetzes vom 29. August 2008 (BGBl. I 2008, Nr. 40, S. 1793), diese Änderung tritt erst in Kraft, wenn das Protokoll vom 12. Februar 2004 zur Änderung des Übereinkommens vom 29. Juli 1960 über die Haftung gegenüber Dritten auf dem Gebiet der Kernenergie in der Fassung des Zusatzprotokolls vom 28. Januar 1964 und des Protokolls vom 16. November 1982 nach seinem Artikel 20 in Kraft tritt

- Verordnung über das Verfahren bei der Genehmigung von Anlagen nach § 7 des Atomgesetzes (Atomrechtliche Verfahrensverordnung – AtVfV) vom 3. Februar 1995 (BGBl. I 1995, Nr. 8, S. 180), zuletzt geändert durch Artikel 4 des Gesetzes vom 9. Dezember 2006 (BGBl. I 2006, Nr. 58, S. 2819)

- Verordnung über die Deckungsvorsorge nach dem Atomgesetz (Atomrechtliche Deckungsvorsorge-Verordnung – AtDeckV) vom 25. Januar 1977 (BGBl. I 1977, Nr. 8, S. 220), zuletzt geändert durch Artikel 74 des Gesetzes vom 8. Juli 2016 (BGBl. I 2016, Nr. 34, S. 1594)

- Verordnung über Vorausleistungen für die Einrichtung von Anlagen des Bundes zur Sicherstellung und zur Endlagerung radioaktiver Abfälle (Endlagervorausleistungsverordnung – EndlagerVlV) vom 28. April 1982 (BGBl. I, Nr. 16, S. 562), die zuletzt durch Artikel 9 des Gesetzes vom 26. Juli 2016 (BGBl. I 2016, Nr. 37, S. 1843) geändert worden ist
  Hinweis: Die Änderung durch Artikel 5 des Gesetzes vom 27. Januar 2017 (BGBl. I 2017, Nr. 5, S. 114) tritt erst an dem Tag in Kraft, an dem die Europäische Kommission die beihilferechtliche Genehmigung erteilt oder verbindlich mitteilt, dass eine solche Genehmigung nicht erforderlich ist; das Bundesministerium für Wirtschaft und Energie gibt den Tag des Inkrafttretens im Bundesgesetzblatt bekannt

- Verordnung über den kerntechnischen Sicherheitsbeauftragten und über die Meldungen von Störfällen und sonstigen Ereignissen (Atomrechtliche Sicherheitsbeauftragten- und Meldeverordnung – AtSMV) vom 14. Oktober 1992 (BGBl. I 1992, Nr. 48, S. 1766), zuletzt geändert durch Artikel 1 der Verordnung vom 8. Juni 2010 (BGBl. I 2010, Nr. 31, S. 755)

- Verordnung über die Verbringung radioaktiver Abfälle oder abgebrannter Brennelemente (Atomrechtliche Abfallverbringungsverordnung – AtAV) vom 30. April 2009 (BGBl. I 2009, Nr. 24, S. 1000), zuletzt geändert durch Artikel 76 des Gesetzes vom 8. Juli 2016 (BGBl. I 2016, Nr. 34, S. 1594)

- Verordnung für die Überprüfung der Zuverlässigkeit zum Schutz gegen Entwendung oder Freisetzung radioaktiver Stoffe nach dem Atomgesetz (Atomrechtliche Zuverlässigkeitsüberprüfungs-Verordnung – AtZüV) vom 1. Juli 1999 (BGBl. I 1999, Nr. 35, S. 1525), die zuletzt durch Artikel 10 des Gesetzes vom 26. Juli 2016 (BGBl. I 2016, Nr. 37, S. 1843) geändert worden ist

- Verordnung zur Festlegung einer Veränderungssperre zur Sicherung der Standorterkundung für eine Anlage zur Endlagerung radioaktiver Abfälle im Bereich des Salzstocks Gorleben (Gorleben-Veränderungssperren-Verordnung – Gorleben VSpV) vom 25. Juli 2005 (BAnz. Nr. 153a vom 16. August 2005), geändert durch Artikel 1 der Verordnung vom 7. Juli 2015 (BAnz AT 21.07.2015 V1)

- Gesetz zur Kontrolle hochradioaktiver Strahlenquellen vom 12. August 2005 (BGBl. I 2005, Nr. 49, S. 2365), berichtigt am 11. Oktober 2005 (BGBl. I 2005, Nr. 64, S. 2976)
  Hinweis: Umsetzung der Richtlinie 2003/122/EURATOM vom 22. Dezember 2003 zur Kontrolle hochradioaktiver umschlossener Strahlenquellen und herrenloser Strahlenquellen

- Zehntes Gesetz zur Änderung des Atomgesetzes vom 17. März 2009 (BGBl. I 2009, Nr. 15, S. 556)

- Dreizehntes Gesetz zur Änderung des Atomgesetzes vom 31. Juli 2011 (BGBl. I 2011, Nr. 43, S. 1704)

- Gesetz zur Beschleunigung der Rückholung radioaktiver Abfälle und der Stilllegung der Schachtanlage Asse II vom 20. April 2013 (AtGÄndG) (BGBl. I 2013, Nr. 19, S. 921)

- Gesetz über die Errichtung eines Bundesamtes für kerntechnische Entsorgungssicherheit – BfkEG – vom 23. Juli 2013 (BGBl. I 2013, Nr. 41, S. 2553), geändert durch Artikel 310 der Verordnung vom 31. August 2015 (BGBl. I 2015, Nr. 35, S. 1474)

- Vierzehntes Gesetz zur Änderung des Atomgesetzes vom 20. November 2015 (BGBl. I 2015, Nr. 46, S. 2053)
  Hinweis: Umsetzung weiterer Vorgaben der 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

- Gesetz zur Neuordnung des Rechts zum Schutz vor der schädlichen Wirkung ionisierender Strahlung, Bundesrat Beschlussdrucksache 342/17(B) (12. Mai 2017)

- Gesetz zur Neuordnung der Organisationsstruktur im Bereich der Endlagerung (EndLaNOG) vom 26. Juli 2016 (BGBl. I 2016, Nr. 37, S. 1843), zuletzt geändert durch die Berichtigung des Gesetzes zur Neuordnung der Organisationsstruktur im Bereich der Endlagerung vom 15. Dezember 2016 (BGBl. I 2016, Nr. 61, S. 2930)

- Gesetz zur Neuordnung der Verantwortung in der kerntechnischen Entsorgung vom 27. Januar 2017 (BGBl. I 2017, Nr. 5, S. 114)

Other national legal provisions also to be applied in nuclear safety and radiation protection

- Strafgesetzbuch – StGB – vom 13. November 1998 (BGBl. I 1998, Nr. 75, S. 3322), das zuletzt durch Artikel 2 Absatz 4 des Gesetzes vom 22. Dezember 2016 (BGBl. I 2016, Nr. 65, S. 3150) geändert worden ist
  Hinweis: Die Änderungen durch Artikel 16 Absatz 8 des Gesetzes vom 30. Juni 2016 (BGBl. I 2016, Nr. 31, S. 1514) treten an dem Tag in Kraft, der dem Tag folgt, an dem in Verordnungen und Richtlinien der EU benannte technische Regulierungsstandards in Kraft treten.

- Raumordnungsgesetz – ROG – vom 22. Dezember 2008 (BGBl. I 2008, Nr. 65, S. 2986), zuletzt geändert durch Artikel 124 der Verordnung vom 31. August 2015 (BGBl. I 2015, Nr. 35, S. 1474)

- Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz – BImSchG) in der Fassung der Bekanntmachung vom 17. Mai 2013 (BGBl. I 2013, Nr. 25, S. 1274), das zuletzt durch Artikel 1 des Gesetzes vom 30. November 2016 (BGBl. I 2016, Nr. 57, S. 2749) geändert worden ist

- Gesetz zur Ordnung des Wasserhaushalts (Wasserhaushaltsgesetz – WHG) vom 31. Juli 2009 (BGBl. I 2009, Nr. 51, S. 2585), das zuletzt durch Artikel 1 des Gesetzes vom 4. August 2016 (BGBl. I 2016, Nr. 40, S. 1972) geändert worden ist; die Änderung durch Artikel 4 Absatz 76 des Gesetzes vom 7. August 2013 (BGBl. I 2013, Nr. 48, S. 3154) tritt am 14. August 2018 in Kraft; die Änderung durch Artikel 4 Absatz 73 des Gesetzes vom 18. Juli 2016 (BGBl. I 2016, Nr. 35, S. 1666) tritt am 1. Oktober 2021 in Kraft

- Gesetz über Naturschutz und Landschaftspflege (Bundesnaturschutzgesetz – BNatSchG) vom 29. Juli 2009 (BGBl. I 2009, Nr. 51, S. 2542), das zuletzt durch Artikel 19 des Gesetzes vom 13. Oktober 2016 (BGBl. I 2016, Nr. 49, S. 2258) geändert worden ist; die Änderung durch Artikel 4 Absatz 100 des Gesetzes vom 7. August 2013 (BGBl. I 2013, Nr. 48, S. 3154) tritt am 14. August 2018 in Kraft; die Änderung durch Artikel 4 Absatz 96 des Gesetzes vom 18. Juli 2016 (BGBl. I 2016, Nr. 35, S. 1666) tritt am 1. Oktober 2021 in Kraft

- Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen (Kreislaufwirtschaftsgesetz – KrWG) vom 24. Februar 2012 (BGBl. I 2012, Nr. 10, S. 212), zuletzt geändert durch Artikel 4 des Gesetzes vom 4. April 2016 (BGBl. I 2016, Nr. 15, S. 569)

- Gesetz über die Umweltverträglichkeitsprüfung – UVPG – vom 24. Februar 2010 (BGBl. I 2010, Nr. 7, S. 94), zuletzt geändert durch Artikel 2 des Gesetzes vom 30. November 2016 (BGBl. I 2016, Nr. 57, S. 2749); die Änderung durch Artikel 4 des Gesetzes vom 13.Oktober 2016 (BGBl. I 2016, Nr. 49, S. 2258) tritt am 1. Januar 2017 in Kraft
  Hinweis: Umsetzung der Richtlinie 2011/92/EU vom 13. Dezember 2011 (ABl. 2012, L 26) und der Richtlinie 2001/42/EG vom 27. Juni 2001 (ABl. 2001, L 197)

- Bundesberggesetz – BBergG – vom 13. August 1980 (BGBl. I 1980, Nr. 48, S. 1310), das zuletzt durch Artikel 4 des Gesetzes vom 30. November 2016 (BGBl. I 2016, Nr. 57, S. 2749) geändert worden ist; die Änderung durch Artikel 4 Absatz 68 des Gesetzes vom 18. Juli 2016 (BGBl. I 2016, Nr. 35, S. 1666) tritt am 1. Oktober 2021 in Kraft

- Baugesetzbuch (BauGB) in der Fassung der Bekanntmachung vom 23. September 2004 (BGBl. I 2004, Nr. 52, S. 2414), das zuletzt durch Artikel 6 des Gesetzes vom 29. Mai 2017 (BGBl. I S. 1298) geändert worden ist

Bilateral agreements in the field of nuclear safety and radiation protection

- Abkommen zwischen der Bundesrepublik Deutschland und der Bundesrepublik Österreich über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 23. Dezember 1988; Gesetz dazu vom 20. März 1992 (BGBl. II 1992, S. 206); in Kraft seit 1. Oktober 1992 (BGBl. II 1992, S. 593)

- Abkommen zwischen der Bundesrepublik Deutschland und dem Königreich Belgien über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 6. November 1980; Gesetz dazu vom 30. November 1982 (BGBl. II 1982, S. 1006); in Kraft seit 1. Mai 1984 (BGBl. II 1984, S. 327)

- Abkommen zwischen der Bundesrepublik Deutschland und der Schweizerischen Eidgenossenschaft über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 28. November 1984; Gesetz dazu vom 22. Januar 1987 (BGBl. II 1987, S. 74); in Kraft seit 1. Dezember 1988 (BGBl. II 1988, S. 967)

- Abkommen zwischen der Bundesrepublik Deutschland und dem Königreich Dänemark über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 16. Mai 1985; Gesetz dazu vom 17. März 1988 (BGBl. II 1988, S. 286); in Kraft seit 1. August 1988 (BGBl. II 1988, S. 619)

- Abkommen zwischen der Bundesrepublik Deutschland und der Französischen Republik über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 3. Februar 1977; Gesetz dazu vom 14. Januar 1980 (BGBl. II 1980, S. 33); in Kraft seit 1. Dezember 1980 (BGBl. II 1980, S. 1438)

- Abkommen zwischen der Bundesrepublik Deutschland und der Regierung der Republik Ungarn über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 9. Juni 1997; Gesetz dazu vom 7. Juli 1998 (BGBl. II 1998, S. 1189); in Kraft seit 11. September 1998 (BGBl. II 1999, S: 125)

- Abkommen zwischen der Bundesrepublik Deutschland und der Republik Litauen über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 15. März 1994; Gesetz dazu vom 12. Januar 1996 (BGBl. II 1996, S. 27); in Kraft seit 1. September 1996 (BGBl. II 1996, S. 1476)

- Abkommen zwischen der Bundesrepublik Deutschland und dem Großherzogtum Luxemburg über die gegenseitige Hilfeleistung bei Katastrophen oder

schweren Unglücksfällen vom 2. März 1978; Gesetz dazu vom 7. Juli 1981 (BGBl. II 1981, S. 445); in Kraft seit 1. Dezember 1981 (BGBl. II 1981, S. 1067)

- Abkommen zwischen der Bundesrepublik Deutschland und dem Königreich der Niederlande über die gegenseitige Hilfeleistung bei Katastrophen einschließlich schweren Unglücksfällen vom 7. Juni 1988; Gesetz dazu vom 20. März 1992 (BGBl. II 1992, S. 198); in Kraft seit 1. März 1997 (BGBl. II 1997, S. 753 und S. 1392)

- Abkommen zwischen der Bundesrepublik Deutschland und der Republik Polen über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 10. April 1997; Gesetz dazu vom 7. Juli 1998 (BGBl. II 1998, S. 1178); in Kraft seit 1. März 1999 (BGBl. II 1999, S. 15)

- Abkommen zwischen der Bundesrepublik Deutschland und der Russischen Föderation über die gegenseitige Hilfeleistung bei Katastrophen oder schweren Unglücksfällen vom 16. Dezember 1992; Gesetz dazu vom 19. Oktober 1994 (BGBl. II 1994, S. 3542); in Kraft seit 11. Juli 1995 (BGBl. II 1997, S. 728)

- Vertrag zwischen der Bundesrepublik Deutschland und der Tschechischen Republik über die gegenseitige Hilfeleistung bei Katastrophen und schweren Unglücksfällen vom 19. September 2000; Gesetz hierzu vom 16. August 2002 (BGBl. II 2002, Nr. 31); in Kraft seit dem 1. Januar 2003 (BGBl. II 2003, Nr. 2)

Multilateral agreements in the field of nuclear safety and radiation protection with national implementing provisions

- Gemeinsames Übereinkommen über die Sicherheit der Behandlung abgebrannter Brennelemente und über die Sicherheit der Behandlung radioaktiver Abfälle – Übereinkommen über nukleare Entsorgung (Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, INFCIRC/546) vom 5. September 1997, in Kraft seit 18. Juni 2001; 72 Vertragsparteien (04/16), Depositar: IAEA Gesetz hierzu mit amtlicher Übersetzung vom 13. August 1998 (BGBl. II 1998, Nr. 31, S. 1752) in Kraft für Deutschland seit 18. Juni 2001 (BGBl. II 2001, Nr. 36, S. 1283)

- Übereinkommen über die Umweltverträglichkeitsprüfung im grenzüberschreitenden Rahmen - Espoo-Konvention (Convention on the Environmental Impact Assessment in a Transboundary Context - EIA) vom 25. Februar 1991, in Kraft seit 10. September 1997
  45 Vertragsparteien (07/16), Depositar: UN
  1. Änderung der Espoo-Konvention vom 27. Februar 2001, in Kraft seit 26. August 2014
  29 Vertragsparteien (07/16), Depositar: UN
  2. Änderung der Espoo-Konvention vom 4. Juni 2004, noch nicht in Kraft, zwischen Deutschland, Österreich, Schweiz und Lichtenstein abgestimmte deutsche Übersetzung
  28 Vertragsparteien (07/16), Depositar: UN
  Gesetz zur Espoo-Konvention und der 1. Änderung mit amtlicher Übersetzung (Espoo-Vertragsgesetz) vom 7. Juni 2002 (BGBl.II 2002, Nr. 22, S. 1406)

Espoo-Konvention in Kraft für Deutschland seit 6. November 2002
1. Änderung der Espoo-Konvention in Kraft für Deutschland seit 26. August 2014 (BGBl.II 2014, Nr. 24, S. 758)
Gesetz zur 2. Änderung mit amtlicher Übersetzung (Zweites Espoo-Vertragsgesetz) vom 17. März 2006 (BGBl.II 2006, Nr. 7, S. 224)

- Übereinkommen über die Verhütung von Meeresverschmutzung durch das Einbringen von Abfällen und anderen Stoffen – London Dumping Convention LDC (Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, INFCIRC/205) vom 29. Dezember 1972, in Kraft seit 30. August 1975, mit seither 5 Änderungen 87 Vertragsparteien (06/16)
  Gesetz hierzu vom 11. Februar 1977 (BGBl. II 1977, Nr. 8, S. 165), zuletzt geändert durch Gesetz vom 25. August 1998 (BGBl. I, Nr. 57, S. 2455)
  in Kraft für Deutschland seit 8. Dezember 1977 (BGBl. II 1979, Nr. 13, S. 273)
  Protokoll LCProt1996 (IMO) vom 7. November 1996 zu diesem Übereinkommen (ersetzt die ursprüngliche Konvention), in Kraft seit 24. März 2006, Änderung vom 2. November 2006, diese in Kraft seit 10. Februar 2007
  47 Vertragsparteien (07/16) Depositare: Mexiko, Russische Förderation, UK, USA Gesetz dazu vom 9. Juli 1998 (BGBl. II 1998, Nr. 25, S. 1345), zuletzt geändert durch Verordnung vom 24. August 2010 (BGBl. II 2010, Nr. 24, S. 1006)
  Protokoll LCProt1996 in Kraft für Deutschland seit 24. März 2006 (BGBl. II 2010, Nr. 35, S. 1429)
  Hinweis: Keine Einbringung von Materialien mit Radioaktivitätswerten oberhalb de-minimis-Konzentrationen

- Übereinkommen über die Haftung gegenüber Dritten auf dem Gebiet der Kernenergie – Pariser Übereinkommen (Convention on Third Party Liability in the Field of Nuclear Energy – Paris Convention) vom 29. Juli 1960, ergänzt durch das Protokoll vom 28. Januar 1964 in Kraft seit 1. April 1968,
  ergänzt durch das Protokoll vom 16. November 1982, das Protokoll vom 12. Februar 1982, in Kraft seit 7. April 1988 und ergänzt durch das Protokoll vom 12. Februar 2004, noch nicht in Kraft 16 Vertragsparteien (11/15), Depositar: OECD
  Gesetz dazu vom 8. Juli 1975 (BGBl. II 1975, Nr. 42, S. 957), zuletzt geändert durch Artikel 30 des Gesetzes vom 9. September 2001 (BGBl. I 2001, Nr. 47, S. 2331)
  in Kraft für Deutschland seit 30. September 1975 (BGBl. II 1976, Nr. 12, S. 308),
  Gesetz dazu vom 21. Mai 1985 (BGBl. II 1985, Nr. 19, S. 690)
  in Kraft für Deutschland seit 7. Oktober 1988 (BGBl. II 1989, Nr. 6, S. 144)
  Gesetz zum Protokoll 2004 mit amtlicher Übersetzung vom 29. August 2008 (BGBl. II 2008, Nr. 24, S. 902)
  Hinweis: Die Bestimmungen des Pariser Atomhaftungs-Übereinkommens gelten in Verbindung mit §§ 25 ff. des Atomgesetzes in der Bundesrepublik Deutschland unmittelbar, d. h. die Haftung für nukleare Schäden bestimmt sich nach den Bestimmungen des Übereinkommens in Verbindung mit dem Atomgesetz.

- Zusatzübereinkommen zum Pariser Übereinkommen vom 29. Juli 1960 – Brüsseler Zusatzübereinkommen, (Convention Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy –

Brussels Supplementary Convention) vom 31. Januar 1963, ergänzt durch das Protokoll vom 28. Januar 1964, in Kraft seit 4. Dezember 1974,
ergänzt durch das Protokoll vom 16. November 1982, in Kraft seit 1. August 1991 und ergänzt durch das Protokoll von 2004, noch nicht in Kraft 12 Vertragsparteien (3/15), Depositar: OECD
Gesetz dazu vom 8. Juli 1975 (BGBl. II 1975, Nr. 42, S. 957), zuletzt geändert durch Artikel 30 des Gesetzes vom 9. September 2001 (BGBl. I 2001, Nr. 47, S. 2331)
in Kraft für Deutschland seit 1. Januar 1976 (BGBl. II 1976, Nr. 12, S. 308)
Gesetz dazu vom 21. Mai 1985 (BGBl. II 1985, Nr. 19, S. 690)
in Kraft für Deutschland seit 1. August 1991 (BGBl. II 1995, Nr. 24, S. 657)
Gesetz zum Protokoll 2004 mit amtlicher Übersetzung vom 29. August 2008 (BGBl. II 2008, Nr. 24, S. 902)
Hinweis: Im Brüsseler Zusatzübereinkommen verpflichten sich die Vertragsparteien, bei Schäden, die über den Haftungsbetrag des haftpflichtigen Inhabers der Kernanlage hinausgehen, weitere Entschädigungsbeträge aus öffentlichen Mitteln bereitzustellen. Dieses Übereinkommen gilt in der Bundesrepublik Deutschland nicht unmittelbar, sondern schafft nur völkerrechtliche Verpflichtungen zwischen den Vertragsstaaten.

Legal provisions of the European Union on nuclear safety and radiation protection

- Vertrag vom 25. März 1957 zur Gründung der Europäischen Atomgemeinschaft EURATOM (BGBl. II 1957, S. 1014, berichtigt S. 1678; berichtigt BGBl. II 1999, S. 1024), Konsolidierte Fassung 2016
  Der Vertrag ist in seiner ursprünglichen Fassung am 1. Januar 1958 in Kraft getreten (BGBl. II 1958 S. 1), die Neufassung trat am 1. November 1993 in Kraft (BGBl. II 1993, S. 1947), Berichtigung der Übersetzung des EURATOM-Vertrages vom 13. Oktober 1999 (BGBl. II 1999, Nr. 31)

- Richtlinie 2009/71/EURATOM des Rates vom 25. Juni 2009 über einen Gemeinschaftsrahmen für die nukleare Sicherheit kerntechnischer Anlagen (ABl. 2009 L172), zuletzt geändert durch die Richtlinie des Rates 2014/87/EURATOM vom 8. Juli 2014 (ABl. 2015, L 219), konsolidierte Fassung 2014

- Richtlinie 2011/92/EU des Europäischen Parlaments und des Rates über die Umweltverträglichkeitsprüfung bei bestimmten öffentlichen und privaten Projekten vom 13. Dezember 2011 (ABl. 2012, L 26), geändert, letzte konsolidierte Fassung 2014
  Hinweis: Umsetzung vgl. UVP-Gesetz

- Verordnung (EURATOM) 302/2005 der Kommission vom 8. Februar 2005 über die Anwendung der EURATOM-Sicherungsmaßnahmen (ABl. 2005, L 54) zuletzt geändert durch die Verordnung (EU) 519/2013 der Kommission vom 21. Februar 2013 (ABl. 2013, L 158), letzte konsolidierte Fassung 2013

- Richtlinien des Rates, mit denen die Grundnormen für den Gesundheitsschutz der Bevölkerung und der Arbeitskräfte gegen die Gefahren ionisierender Strahlungen festgelegt wurden (EURATOM-Grundnormen)

  - Richtlinie vom 2. Februar 1959 (ABl. EG 1959, Nr. 11),

- Richtlinie vom 5. März 1962 (ABl. EG 1962, S. 1633/62),
- Richtlinie 66/45/EURATOM (ABl. EG 1966, Nr. 216),
- Richtlinie 76/579/EURATOM vom 1. Juni 1976 (ABl. EG 1976, Nr. L187),
- Richtlinie 79/343/EURATOM vom 27. März 1977 (ABl. EG 1979, Nr. L83),
- Richtlinie 80/836/EURATOM vom 15. Juli 1980 (ABl. EG 1980, Nr. L246),
- Richtlinie 84/467/EURATOM vom 3. September 1984 (ABl. EG 1984, Nr. L265),
- Neufassung mit Berücksichtigung der ICRP 60 in Richtlinie 96/29/EURATOM vom 13. Mai 1996 (ABl. EG 1996, Nr. L159)

- Richtlinie 90/641/EURATOM des Rates vom 4. Dezember 1990 über den Schutz externer Arbeitskräfte, die einer Gefährdung durch ionisierende Strahlung bei Einsatz im Kontrollbereich ausgesetzt sind (ABl. EG 1990, Nr. L349)

- Richtlinie 2003/122/EURATOM des Rates vom 22. Dezember 2003 zur Kontrolle hoch radioaktiver umschlossener Strahlenquellen und herrenloser Strahlenquellen (ABl. 2003, Nr. L346 vom 31. Dezember 2003 S. 57-66)
  Hinweise: Ausgenommen sind Tätigkeiten, die unter den EURATOM-Vertrag oder eines der speziellen Nuklearhaftungsregime fallen. Die Richtlinie 2003/122/EURATOM wird mit Wirkung zum 6. Februar 2018 aufgehoben durch die Richtlinie 2013/59/EURATOM.

- Richtlinie 97/43/EURATOM des Rates vom 30. Juni 1997 über den Gesundheitsschutz von Personen gegen die Gefahren ionisierender Strahlung bei medizinischer Exposition und zur Aufhebung der Richtlinie 84/466/EURATOM (ABl. 1997, L180)

- Richtlinie 2013/59/EURATOM des Rates vom 5. Dezember 2013 zur Festlegung grundlegender Sicherheitsnormen für den Schutz vor den Gefahren einer Exposition gegenüber ionisierender Strahlung und zur Aufhebung der Richtlinien 89/618/EURATOM, 90/641/EURATOM, 96/29/EURATOM, 97/43/EURATOM und 2003/122/EURATOM (ABl. 2014, L13)

- Richtlinie 89/618/EURATOM des Rates vom 27. November 1989 über die Unterrichtung der Bevölkerung über die bei einer radiologischen Notstandssituation geltenden Verhaltensmaßregeln und zu ergreifenden Gesundheitsschutzmaßnahmen (ABl. EG 1989, Nr. L357)
  - Mitteilung der Kommission betreffend die Durchführung der Richtlinie 89/618/EURATOM (ABl. EG 1991, Nr. C103)
    Hinweis: Am 6. Februar 2018 aufgehoben durch Richtlinie 2013/59/EURATOM

- Verordnung (EURATOM) 1493/93 des Rates vom 8. Juni 1993 über die Verbringung radioaktiver Stoffe zwischen den Mitgliedstaaten (ABl. EG 1993, Nr. L148)
  - Mitteilung der Kommission vom 10. Dezember 1993 zu der Verordnung EU-RATOM/1493/93 (ABl. EG 1993, Nr. C335)

- Richtlinie 2006/117/EURATOM des Rates vom 20. November 2006 über die Überwachung und Kontrolle der Verbringung radioaktiver Abfälle und abgebrannter Brennelemente (ABl. Nr. L337 vom 5. Dezember 2006, S. 21)
- 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 (ABl. Nr. L199 vom 2. August 2001, S. 48)