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Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Seventh National Report
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Section A. Introduction

A.1. Presentation of the report

This document comprises the Seventh National Report by Spain to comply with the provisions of Article 32 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, made at Vienna on 5 September 1997.

This report will be examined at the review meeting of the Contracting Parties established in Article 30 of said Convention, which is to begin in May 2021. The preparation hereof involved the Ministry for Ecological Transition and Demographic Challenge (MITERD), the Nuclear Safety Council (CSN), Empresa Nacional de Residuos Radiactivos, S.A., S.M.E. (Enresa) and the Nuclear Energy Committee (CEN) of the electrical companies. This Report summarises the actions implemented mainly from 1 June 2017 until 1 April 2020, although the information and data contained herein refer to the figures available as at 31 December 2019, unless some other date is explicitly specified.

The baseline for the authoring of the Report takes into account the International Atomic Energy Agency (IAEA) document INFCIRC/604 "Guidelines regarding the Form and Structure of National Reports", adopted by the Contracting Parties under the provisions of Article 29 of the Convention.

By way of introduction, Section A.2 contains an executive summary of the progress seen since the Sixth National Report, including pending actions indicated in Section K of said Report, and those others resulting from the commitments given by Spain at the sixth review meeting, with reference to the article of the Report under which they are developed. It was likewise felt appropriate to include a new Section A.3 detailing some of the measures adopted in Spain in connection with those shared issues that were to be addressed in this National Report, as agreed by the Contracting Parties at the sixth review meeting.

In general, Sections A, B, C and D aim to be self-explanatory, while the remaining sections simply detail the developments occurring or the actions performed in order to fulfil the articles of the Convention, referring to previous National Reports or to the Annexes in order to avoid repetition. The latter include additional information as to the applicable regulations within the sphere of the Convention, the process for licensing nuclear facilities, the management of nuclear and radioactive emergencies in Spain, the funding of activities under the General Radioactive Waste Plan (GRWP), the regime governing civil liability for nuclear damages, and the synoptic matrix.

Section K of this report presents an account of the process of continuous safety improvement, based on the explicit identification of areas for improvement in progress and planned. This sec-

tion also indicates a number of the main strengths and developments undertaken by Spain within the sphere of the Convention which could serve as a reference for other Contracting Parties. This section likewise indicates the key conclusions drawn from the combined IRRS-ARTEMIS peer review mission by the IAEA, the first of this type conducted in Spain in October 2018. Lastly, the same section corroborates the commitment of Spain and its institutions to the international community and the principles of openness and transparency in the sphere of regulations and safety.

The analysis conducted during the process of preparing this Report allows us to assert that while there is always room for improvement, Spain complies with the objectives, requirements and measures set out in the Joint Convention, and has in place the necessary infrastructure and experience for the safe management of spent fuel and radioactive waste, from the institutional, administrative, technical and economic/financial perspectives.

A.2. Executive summary: Developments within the context of spent fuel management and radioactive waste management subsequent to the Sixth National Report

The purpose of this executive summary is to highlight the key developments and actions taken by Spain since the last National Report, in the sphere of spent fuel and radioactive waste management handled in Spain.

The spent fuel managed in Spain comes from seven nuclear reactors in operation, at five sites, along with the Santa María de Garoña Nuclear Power Plant, which ceased operations in 2013, and the José Cabrera Nuclear Power Plant, currently in the process of being decommissioned, while the Vandellós I reactor is in the latent phase. These power plants are also, according to the Convention, radioactive waste management facilities.

There are also other nuclear facilities in operation: the Juzbado Nuclear fuel Factory in Salamanca and the solid radioactive waste disposal facility in Sierra Albarrana (El Cabril Disposal Facility) in the province of Cordoba. The CIEMAT (Centre for Energy-related, Environmental and Technological Research) in Madrid is currently in the process of decommissioning a number of its obsolete facilities. Radioactive waste is also produced at around a thousand hospital, industrial and scientific facilities. Lastly, radioactive waste may be generated as a result of the presence of sources and other radioactive materials at facilities or in activities not covered by the regulatory system. Subsection B.3 describes in detail the source of spent fuel and waste.

Overview of the Vandellós II Nuclear Power Plant, Tarragona

Section K of the Sixth National Report indicated the following areas for improvement and planned actions in Spain to improve safety in the management of radioactive waste and spent fuel:

- ✓ Transposition into the Spanish legal system of Council Directive 2013/59/Euratom, of 5 December 2013, laying down of the basic safety standards for protection against the dangers arising from exposure to ionising radiation; and Council Directive 2014/87/Euratom, of 8 July 2014, amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.
- ✓ The continuity of work regarding the licensing of a Centralised Temporary Storage (ITS) facility for all spent fuel produced by Spanish nuclear power plants.
- ✓ The approval of a Seventh General Radioactive Waste Plan (GRWP).
- ✓ The effective application of a safety culture at the Nuclear Safety Council (CSN).

The developmental status of these initiatives was updated and debated during the presentation of the Report at the sixth Convention review meeting, following which a request was also made for the Seventh National Report to present an account of progress under the various challenges indicated, in connection with the licensing of the aforementioned CTS, maintenance of duly qualified and trained personnel within the nuclear sector, and approval of the review of the regulations regarding the control and recovery of orphan sources. The Country Group also raised two suggestions for Spain, one regarding ongoing participation by the public for the establishment of the CTS facility, and another regarding the adoption of the GRWP.

Although various sections of this Report address these matters in depth, the key advances achieved regarding these topics are highlighted below, along with other developments seen in the management of radioactive waste and spent fuel, or in connection with this:

View of the fuel Element Factory at Juzbado, Salamanca.

a) Main regulatory developments regarding the pre-existing regulatory framework, set out in Annex A

i) Council Directive 2014/87/Euratom of 8 July 2014, amending Directive 2009/71/Euratom, establishing a Community framework for the nuclear safety of nuclear installations, has served to reinforce the European regulatory framework in the field of nuclear safety, following the Fukushima Daiichi nuclear power plant accident in March 2011. Said Directive establishes that the Member States shall establish and maintain a national legislative, regulatory and organisational framework for the nuclear safety of nuclear installations, setting out national nuclear safety requirements covering all stages of the life-cycle of nuclear installations. It likewise provides that all stages in the lifespan of an installation shall have the aim of preventing accidents, and if these do occur, attenuating their consequences.

Although it is held that the Spanish regulatory framework already to a great extent incorporated the various requirements imposed by Directive 2014/87/Euratom, the Regulation on nuclear safety at nuclear facilities (RSNIN) approved by Royal Decree 1400/2018, of 23 November 2018, served to complete the transposition of said Directive into the Spanish legal system. Further information regarding this Regulation may be found in Article 19.2 of this Report.

ii) Council Directive 2013/59/Euratom of 5 December 2013, laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, is the result of the modification and consolidation of five previous directives, which it repeals, establishing uniform basic safety standards applicable to the protection of the health of persons subjected to occupational, medical and population exposure to risks arising from ionising radiation. The Directive applies to any situation of planned, existing or emergency exposure that would entail a risk of exposure to ionising radiation that cannot be considered negligible from the perspective of radiation protection or in connection with the environmental context.

Given its complexity, the Directive is being transposed into Spanish law by means of various regulatory provisions, the scope of application of which is attributed to different Ministries and to the Nuclear Safety Council, with an indication being given below only of those that are of the greatest significance within the scope of this Convention.

A proposed Royal Decree approving a new Regulation on the protection of health against risks arising from exposure to ionising radiation, which would repeal the current Regulation in this matter, is currently still being processed. Meanwhile, the amendments made by this new Regulation and by the aforementioned Regulation on nuclear safety at nuclear facilities, require a review of the Regulation on nuclear and radioactive facilities (RINR) which has until now been in force, having been approved by Royal Decree 1836/1999, of 3 December 1999, in order consistently to complete the regulatory framework concerning nuclear energy, with this revision transposing those aspects of Directive 2013/59/Euratom affecting its scope of application, and aligning its contents with the provisions of the aforementioned Regulations.

Likewise, this revision of the RINR makes provision for the information committees, which had previously been held only in those municipalities where nuclear power plants are located in order to inform the surrounding population during the construction, operation and decommissioning of such plants, furthermore to be ex-

tended to centralised spent nuclear fuel or radioactive waste storage facilities, in line with the suggestion made to Spain in this regard at the sixth review meeting.

Additional information as to the provisions being processed may be found in Section K.2 of this Report.

Meanwhile, Royal Decree 451/2020, of 10 March 2020, on the control and recovery of orphan radioactive sources, incorporates within Spanish legislation Directive 2013/59/Euratom, with regard to the actions to be taken for the detection, control and management of orphan sources. Detailed information in this regard may be found in Article 28.1 of this Report.

Mention should lastly be made of Order ETU/1185/2017, of 21 November 2017, regulating the declassification of waste materials generated at nuclear facilities, partially transposing into Spanish law the aforementioned Directive 2013/59/Euratom, with regard to the declassification of solid waste materials generated at nuclear facilities. Detailed information regarding the order may be found in Article 19.2.

b) Adoption of a Seventh General Radioactive Waste Plan (GRWP)

The Sixth GRWP currently in force already contains strategies and initiatives to be undertaken in the fields of radioactive waste management, including spent fuel and the decommissioning of facilities, in addition to the corresponding economic/financial provisions in order to pay for them.

However, both the need to update these provisions and to adapt to the requirements of the new Directive 2011/70/Euratom demand that the Government adopt a new Plan.

In this regard, although the Spanish regulatory framework had already brought in the requirement for the establishment of a national programme long before the Directive took effect (the first GRWP dates from 1987), the adoption of the Seventh GRWP will be performed in accordance with this new EU framework, aligned with its requirements and including those aspects that were not explicitly present in the Sixth GRWP.

On 10 March 2020, in accordance with the provisions of Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste, Enresa therefore submitted a GRWP proposal to the Secretary of State for Energy at the MITERD, to begin the processing of a draft Seventh Plan. Under the terms of Nuclear Energy Law 25/1964, of 29 April 1964, said Plan will need to be approved by the Government at the proposal of the MITERD, following a report by the CSN and consultation with Spain's Autonomous Regions with regard to the regulation of territory and environment. The GRWP will likewise need to be subjected to a Strategic Environmental Assessment which, according to Environmental Assessment Law 21/2013, of 9 December 2013, will include the corresponding public information process, along with consultations with the Public Authorities affected, and stakeholders. More detailed information may be found in Section B.1 of this Report.

c) Situation of Centralised Temporary Storage (CTS) for spent fuel

The Sixth GRWP currently in force, approved in June 2006, provides for the construction and commissioning of a Centralised Temporary Storage (CTS) facility as

a basic strategy for the management of spent fuel from the Spanish nuclear power plants, until a definitive solution is available.

In accordance with the environmental regulations, in August 2013 Enresa submitted the request for the project to be subjected to the Environmental Impact Assessment (EIA) procedure, enclosing the corresponding Initiation Document, in order to determine the content and scope of the Environmental Impact Study (EIS). Said Study was presented in May 2014 and subjected to the process of consultation with the entities and bodies affected, along with a public participation process for the corresponding arguments to be raised.

Likewise, with regard to nuclear regulations, in January 2014 Enresa presented the former MINETAD (Ministry of Energy, Tourism and the Digital Agenda)[1], with the request for site and construction authorisations for the CTS as a nuclear facility. In turn, the MINETAD sought the mandatory report from the Nuclear Safety Council in connection with both requests. The CSN issued a favourable opinion on the prior authorisation in July 2015.

However, on 5 July 2018 the Secretary of State for Energy of the former MITECO (Ministry for Ecological Transition) requested that the CSN suspend issuance of the report required from said body with regard to the construction authorisation request, in order to allow an analysis of the current circumstances and forecasts, and to establish a planning schedule aligned with them, to be specified in the Seventh General Radioactive Waste Plan. More detailed information in this regard may be found in Section B.4 of this Report.

d) Actions at other temporary spent fuel storage facilities

Those Spanish nuclear power plants that are in operation store their spent fuel in their own pools. During the period covered by this Report, the Almaraz and Vandellós II power plants requested renewal of their operational authorisation, and as a result, as part of the requirements under the regulations in force, the corresponding Periodic Safety Reviews of the facility are being conducted, including the pools, as detailed in Articles 8 and 9.1.

Furthermore, some power plants have found it necessary to implement individualised temporary storage (ITS) facilities to supplement the storage capacity of their pools, or in response to the need to undertake dismantling, until such time as a centralised storage solution is available. During the period covered by the Report, the ITS facilities already in place at Trillo, José Cabrera and Ascó, have been joined by those at Almaraz and Santa María de Garoña (further details may be found in Section D.1).

Likewise, the Cofrentes Nuclear Power Plant has begun the licensing of a new ITS (operations are expected to begin in the coming months), while the Trillo power plant has had to embark on the licensing of a modification to the facility in order to provide capacity for a greater inventory of spent fuel. Such action is also expected for the existing ITS at the Santa María de Garoña power plant (further details in Articles 6, 7, 8 and 9.1 of this Report).

[1] *The Ministry of Energy, Tourism and the Digital Agenda (MINETAD) was responsible for nuclear energy, before this was transferred to the Ministry for Ecological Transition (MITECO), with responsibility now lying with the Ministry for Ecological Transition and Demographic Challenge (MITERD).*

View of the Cofrentes Nuclear Power Plant, Valencia.

View of the Cofrentes Nuclear Power Plant ITS, now at the licensing stage.

e) Significant actions in connection with radioactive waste management facilities

Spain manages low and intermediate level radioactive waste (LILW), and also very low level waste (VLLW) at the El Cabril Disposal Centre. Said facility has authorised capacity to manage VLLW allowing it to manage the waste expected to be generated, while in the case of LILW, Enresa expects to apply for authorisation to increase capacity. Further details are given in Section B.5 and Article 13.

f) Significant actions concerning the decommissioning of facilities

As indicated previously, decommissioning work continues at the José Cabrera Nuclear Power Plant, having begun in 2010, with the partially dismantled Vandellós I reactor having been in its latent phase since 2005, with an estimated duration of 25 years.

Both projects have served to develop knowledge, capacities and tools, both generic and specific, for the planning, organisation and optimisation of nuclear facility decommissioning activities. Particular relevance is given to the experience acquired in the integration of decommissioning activities and waste management, the technologies applied for the dismantling of major components and the volume reduction practices implemented, as well as the estimation of forecast decommissioning costs, taking as the reference point the lessons learned from the analysis of the real costs involved in decommissioning the José Cabrera Nuclear Power Plant. More detailed information as to these projects may be found in Section D.5.

The experience built up on these projects will be vital in the planning and execution of the remaining decommissioning processes, and in particular the forthcoming decommissioning of the Santa María de Garoña Nuclear Power Plant, where operations ceased in 2013, with definitive status from 2017 onwards. In the specific case of this power plant it was not possible to plan decommissioning or preparatory ac-

View of the LILW disposal vaults of the Southern Platform of the El Cabril Disposal Facility.

tivities during the final operational stage, and the decommissioning application had therefore not been submitted by the licensee by the date when this Report was issued.

g) Effective application of a safety culture at the Nuclear Safety Council (CSN)

The concept of *"safety culture"* was coined by the International Atomic Energy Agency (IAEA) following the Chernobyl nuclear power plant accident in April 1986. Said accident highlighted the importance in safety terms of aspects connected with a safety culture, defined as the set of characteristics and attitudes on the part of organisations and individuals, establishing that safety and protection objectives must be given overarching priority in accordance with their importance.

The IAEA General Safety Requirement Part 2 "*Leadership and Management for Safety*" establishes that one of the fundamental aspects to be guaranteed by the management system of a regulatory body is the fostering of a strong safety culture, regular assessment of this, together with the development of improvement plans based on results.

On 12 January 2017 the CSN Plenary approved the document entitled "*CSN Safety Culture Policy*". This document defines the safety culture at CSN as a set of characteristics and attitudes shared by all staff, ensuring that fulfilment of the organisation's mission is the highest priority, present at all times throughout all activities.

In order to draw up the *CSN Safety Culture Policy* document, a working party was set up to consult the initiatives existing in this field at an international level, with the aim of drawing on information about the different approaches employed by regulatory bodies in the practical implementation of this concept, and collating all publications issued by international bodies in the field as reference material for the execution of the project.

The aforementioned CSN working party likewise issued a proposed action plan to foster and reinforce the safety culture at the organisation. One of the points included in this plan is the execution of an assessment of the safety culture at the body.

By 2018 the CSN had already begun the activities required to develop an internal self-assessment of the safety culture within the body itself. In this regard, training initiatives were undertaken, covering the organisation's staff at all levels, with the aim of teaching and explaining the meaning and attributes of the concept of a safety culture, specifically in the case of a regulatory body, with the aim of raising awareness among staff as to the importance of this concept. This training initiative lays the foundations in order to build a shared safety culture language, alongside the initial mechanism to provide the necessary preparations to understand and contribute to the process of self-assessment, which will require the collaboration and participation of all staff at the organisation.

At its meeting held on 29 January 2020, the CSN Plenary approved the hiring of an external company to support the organisation in the process of its safety culture self-assessment. This process will last 12 months, and will be conducted between 2020 and 2021.

h) Actions concerning the availability of financial resources

The Fund for the financing of GRWP activities, covering the activities undertaken by Enresa not only with regard to radioactive waste and spent fuel management, but also the dismantling and decommissioning of nuclear facilities, alongside structural and R&D costs, is endowed by means of income from the various levies, including financial returns generated on these funds, as detailed in Annex D.

Over the period covered by this Report the levy for nuclear power plants in operation was updated, in order to align this with the current estimates of future costs and the operational period of power plants as established on the basis of the draft 2021-2030 Integrated National Energy and Climate Plan (PNIEC). More detailed information regarding this matter may be found in Article 22.2 of this Report.

i) Combined IRRS-ARTEMIS mission

In October 2018 Spain received a combined IRRS-ARTEMIS peer review mission (*the first of its type*), under the auspices of the International Atomic Energy Agency.

The final report resulting from the mission identified certain recommendations and suggestions that need to be addressed, to which end an Action Plan was established, with the corresponding actions, owners and milestones. The mission team also indicated as good practice the process of incorporating the best techniques in CTS design, alongside numerous capacities for spent fuel management.

The report resulting from the mission is available via the website of the MITERD and CSN, while a summary may be found in Section K.4 of this Report.

j) Maintenance of qualified and trained personnel in the nuclear sector

Detailed information in this regard may be found in Article 22.1 of this Report, in order to present an account of the main developments here.

A.3. Overarching common issues: Developments within the context of spent fuel management and radioactive waste management subsequent to the Sixth National Report

The Contracting Parties gathered at the sixth review meeting agreed, where applicable, to address in the national reports for the seventh review meeting the actual measures adopted in the implementation of the following matters:

Application of national SF and RW management strategies

As identified at the sixth review meeting, as occupancy of existing temporary storage facilities (pools, individualised temporary storage) or disposal facilities (El Cabril Disposal Facility) for radioactive waste or spent fuel gradually increases, and until such time as a solution is found to the difficulties, including social acceptance, in setting up new sites, the need is to guarantee the availability of adequate capacity to allow for the safe and optimal operation of the facilities currently in use.

One of the main ways to optimise existing capacity which Spain has been employing is to reduce waste generation to a level as low as reasonably possible, in terms of both activity level and volume, through the application of appropriate design measures and appropriate operational and decommissioning practices, including the recycling and reuse of materials, enshrined as a general principle in Royal Decree 102/2014, of

21 February 2014, on the responsible and safe management of spent nuclear fuel and radioactive waste, and in the General Radioactive Waste Plan (GRWP).

In accordance with both provisions, minimising the generation of low and intermediate level waste (LILW) and very low level waste (VLLW) and the corresponding volume, with a view to optimising occupancy of the vaults at the El Cabril Disposal Facility, remains a constant operational approach. In this regard, the policy of cooperation between Enresa and the main waste producers is maintained and reinforced, with involvement at joint working parties, developing and employing treatment, decontamination and characterisation units at the various power plants (both in operation and being dismantled), along with the joint implementation of projects serving to apply technologies and equipment to reduce volume, declassify and decontaminate, and ensure the application of management approaches serving to achieve such optimisation.

The approach is to be promoted with regard to volume reduction include in particular drying, waste decontamination, treatment through the smelting of large-scale equipment and components, and waste material declassification projects.

Meanwhile, in 2018 Enresa set up its first plant for the treatment of contaminated soil associated with the José Cabrera Nuclear Power Plant decommissioning project, with the aim of reducing the inventory and volume of very low level waste (VLLW) by means of a washing process capable of achieving declassification levels. The design of this plant was viewed favourably by the CSN on 13 July 2016, along with the results of the commissioning tests on 6 June 2018.

Aerial view of the El Cabril Disposal Facility (Cordoba).

In Spain, as in many other countries, a number of industrial activities which use and process raw materials with radioactive content of natural origin take place, thereby generating waste materials with radioactive contents. In accordance with EU standards, the Spanish regulations in the radiological field allow for this type of activity and establish the conditions under which some type of control is required on radiological grounds.

Order IET/1946/2013, of 17 October 2013, governing the management of waste generated in activities using materials containing natural radionuclides, thus establishes the values for concentrations of activity (exemption/declassification levels) which, if they are not exceeded, allow such waste to be managed conventionally, or otherwise require that the licensee of the operation conduct a radiological impact study in order to ascertain the resulting effective annual dose for members of the public and for employees. The Order establishes that if certain values are exceeded, such materials must be managed by Enresa as radioactive waste.

One notable development in comparison with the Sixth National Report for the Joint Convention is Order ETU/1185/2017, of 21 November 2017, governing the declassification of waste materials generated at nuclear facilities. This Order partially transposes into Spanish law Council Directive 2013/59/Euratom, of 5 December 2013, regarding the declassification of solid waste materials generated at nuclear facilities. As a result of this Order, the previous case-by-case administrative authorisation system has been replaced with a model allowing the licensees of the facilities themselves to conduct the classification of waste materials, in accordance with the levels established in Annex I to the Order. Detailed information regarding the order may be found in Article 19.2.

Image of the soil treatment plant at the José Cabrera Nuclear Power Plant.

In any event, as indicated in the draft Seventh GRWP, the estimates made in the analysis of the capacity of the LILW vaults are currently in place at the El Cabril Disposal Facility indicated the need to set up new vaults at this site. This is in order to avoid any impact on the planning of operation and decommissioning of other waste-generating facilities, and to be able to continue with the normal storage of such waste.

Construction of the new LILW vaults is proposed only at the El Cabril Disposal Facility site, as it has in place systems for treatment and conditioning, temporary storage, verification of the quality of the waste and other ancillary systems. This will furthermore avoid overlapping operational costs, as the existing facilities will continue operating to manage VLLW during the same period.

Mention should lastly be made of the optimisation of storage space at the El Cabril Disposal Facility resulting from the commissioning in 2008 of the supplementary VLLW waste storage facility (see D.3). Very low-level radioactive waste is, according to the IAEA, a type of material which, given its low radioactive contents and lower level of hazardousness, may be placed in installations specifically designed for the disposal of radioactive waste if so approved by the competent authorities, and under the conditions defined by them. This approach offers a graded focus which links the inherent characteristics of this sub-class of radioactive waste to the design of specific installations. By the date when this Report was finalised, the El Cabril Disposal Facility had 4 vaults authorised for VLLW, with an overall capacity of 130,000 m^3, two of the four vaults having been built.

Safety implications of long-term management of spent fuel

Ever since the 1983 National Energy Plan, and as reflected in successive GRWPs since then, Spain has opted for a once-through cycle. As a consequence, the strategy set out in these Plans provided for the establishment of a Deep Geological Repository (DGR) as the solution for the disposal of spent fuel (SF) and high-level waste (HLW) generated at Spanish facilities.

Nonetheless, in line with the conclusions reached in the debates conducted for the sixth review of the GRWP, such a solution must be supported by clear safety arguments and by research programmes serving to support this approach.

The first two GRWPs, approved in 1987 and 1991, proposed a site selection plan, along with studies and monitoring of procedures implemented at an international level, and the corresponding research and development activities. The subsequent Plans gradually incorporated design activities, performance evaluation and the corresponding R&D projects, serving on the one hand to develop and validate the corresponding technologies for the characterisation of the sites, and on the other to develop models and obtain the relevant process parameters with an impact on safety evaluation.

Nonetheless, the Fifth GRWP, approved in 1999, postponed any decision as to final solutions until 2010, as the scientific and technological advances made over recent decades towards disposal remained subject to problems of social acceptance, prompting calls for a delay in decision-making and an open-minded approach to other management options.

It was therefore deemed appropriate to postpone the most significant decisions regarding the DGR in connection with the selection of the candidate site or possible underground experimental laboratories, while a more in-depth analysis continued as to the viability and possible influence of new technologies in the disposal of high-level and long-lived waste, and in general an open-minded attitude towards any option which could contribute to more appropriate and socially acceptable management.

As a result, both this Plan and the Sixth GRWP, approved in 2006, emphasised as a strategic objective the desirability of having a Centralised Temporary Storage (CTS) facility in place for SF and HLW until a definitive solution became operational, while refocusing the activities pursued in previous plans with regard to the DGR towards the consolidation and updating of the knowledge acquired, taking advantage of international developments in this field.

The actions scheduled in the Sixth GRWP in order to undertake those initiatives which previously proved necessary in order to support the decision-making process, included, among others, presentation to the Sub-Directorate-General for Nuclear Energy of the MITERD of a report on the "Generic Basic Projects" for the DGR, to compile the level of knowledge acquired by Enresa with regard to the disposal of SF and HLW. This report was accompanied by another on decision-making processes with regard to the disposal of SF and HLW in countries facing similar issues to Spain.

More recently, the recommendations of the review team of the combined IRRS-ARTEMIS mission[2] focused, with regard to waste management and among other matters, on the need for progress with the plans to develop a DGR project for the country. To this end, the Action Plan derived from the conclusions of the ARTEMIS mission establishes the actions, milestones and owners required in order to underpin progress on said project, with the participation of the three main institutions involved (MITERD, CSN and Enresa). The actions undertaken as a consequence of the Action Plan will be consistent with the operational approaches of the forthcoming GRWP, once this has been adopted. By the date when this Report was finalised, the degree of implementation of this Action Plan remained preliminary.

The reports which are being updated in connection with the DGR, in accordance with the above, refer to the following areas: design and engineering of a DGR in clay, and safety assessment in this medium; design and engineering of a DGR in granite, and safety assessment in this medium; selection and characterisation methodologies; and regulatory and normative framework. The reports themselves, produced by Enresa, are supplemented by a number of external reports.

In any event, we have over recent years seen the confirmation of spent fuel storage periods that are longer than the initial estimates, normally as a result of the delay in the implementation of definitive solutions for this purpose. Hence the development of standards, regulations, analytical and inspection methods associated with the renewal of the licences for the management systems employed for storage, so as to allow storage to continue in safe conditions.

In this regard, the operators of the Spanish nuclear power plants and Enresa presented the CSN with an action plan for the coordinated presentation of Life Management Programmes associated with the spent fuel management systems employed in Spain (casks and storage and transport systems), thereby complying with the requirements of Article 4.4 of CSN Instruction IS-29, on temporary spent fuel and high-level radioactive waste storage facilities[3] and Article 33 of the Regulation on nuclear safety at nuclear facilities[4] (RSNIN), approved by Royal Decree

[2] *As indicated in the Report, in October 2018 Spain received a combined IRRS-ARTEMIS peer review mission of the International Atomic Energy Agency.*

[3] *Article 4.4 of IS-29: "During the planned storage period, the licensee will be required to implement a life management programme for those systems, structures and components defined as being safety-critical, and to define the frequencies of preventive or corrective maintenance, periodic testing and inspection required in order to maintain the safety of the temporary storage by means of the required reliability and qualification".*

[4] *Article 33 of the RSNIN: "The licensee must implement an ageing management programme for safety-critical structures, systems and components in accordance with the applicable specific regulations, in order to ensure maintenance of their functions under the planned design conditions, throughout the operational phase of the facility".*

1400/2018, of 23 November 2018, and in anticipation of the forthcoming renewal of the licences of certain systems employed in Spain.

In particular, the first of the renewals of the design authorisation of a storage cask which, having been laden with spent fuel for a period of 20 years, must be issued in accordance with the requirements of CSN Instruction IS-20, on safety requirements for spent fuel storage casks[5], will take place in 2022. Said regulations establish the requirements for the licensing renewal of such systems, and compliance with the life management criteria to be considered from the design phase onwards.

Meanwhile, the IAEA recently published its SSR-6 Regulation for the Safe Transport of Radioactive Material, which will shortly be incorporated within the Spanish legal framework, according to which licence renewals for transport systems must also be considered as prior storage of waste, where applicable, within the life management of the system.

The aforementioned Life Management Programmes will include analyses and periodic inspection proposals as to the characteristics guaranteeing fulfilment of safe conditions in each of the systems. In this regard, Enresa also plays an active role in international initiatives connected with these fields, such as those under the auspices of the EPRI (Electric Power Research Institute) within the "*Extended Storage Collaboration Programme*" (ESCP), and the Coordinated Research Programme (CRP) of the IAEA on the Life Management Programmes. These initiatives research long-term spent fuel storage conditions, in particular involving fuel with a higher degree of burn-up, and also those of the storage system itself.

Enresa is also involved, alongside other members of CEIDEN[6], in the organisation of projects to develop methodologies and inspection methods for spent fuel storage systems. One example was the installation of optical fibres in a concrete system at the José Cabrera Nuclear Power Plant to demonstrate the viability of temperature measurement under real conditions, in collaboration with ENSA (Equipos Nucleares, S.A., S.M.E,) and the CSIC-IFCA (Higher Scientific Research Council - Cantabria Institute of Physics). Enresa has also promoted research projects into the mechanical behaviour of high burn-up fuels under storage and transport conditions, and determination of source terms as the basis for the design of the systems employed.

In summary, spent fuel management now entails a temporary storage stage prior to disposal in a deep geological repository (DGR), which will extend for longer than initially planned. Hence the need to analyse the behaviour of spent fuel under the conditions in which it will remain stored during this period, as well as subsequent transport conditions, until such time as the DGR is available. This entails the development of life management plans and ageing programmes for the storage technologies in use, thereby serving to fulfil safety requirements.

With regard to the disposal programme, taking into account the information already developed and available with regard to geological formations in the country, the non-specific conceptual designs with no defined site, and the safety and behaviour evaluation exercises included in the models developed by means of the various R&D plans, the main decisions to be considered will be concerned with the definition of the site selection process, alongside the establishment of a regulatory framework allowing the development of all aspects of the DGR project. Until a

[5] *Article 5.1.b of IS-20: "Approval of the design… shall have a maximum validity period of 20 years from the date of issuance of the corresponding Decision. The application for extension or renewal of the Authorisation must be submitted at least one year in advance of the deadline, and shall be accompanied by corroboration that fuel storage has not adversely affected the safety-critical structures, systems and components of the cask, in accordance with the applicable requirements".*

[6] *Technological nuclear fission energy platform with the mission of coordinating national R&D&I needs and efforts in the field of such technology.*

site is available, allowing it to be characterised so as to evaluate its viability, no progress is feasible as to aspects that are so closely connected with the characteristics of the site in question.

Lastly, research activities will essentially focus on increasing the depth of knowledge as to the behaviour of the spent fuel, engineering barriers and site characterisation techniques, along with radionuclide migration models.

Connection Between Long-Term Management And Disposal Of Disused Sealed Radioactive Sources

The management of sources in Spain has developed thanks to the regulatory framework which has since 1986 given Enresa the power to conduct a range of actions in this regard, such as the removal of sources or their temporary storage and disposal. Detailed information regarding this framework may be found in Article 28.1 of this Report.

The preferred operational approach regarding radioactive sources is return to the original supplier, or if this is not possible, temporary storage and disposal, both at the El Cabril Disposal Facility.

With regard to temporary storage, disused sources removed by Enresa have since 1993 been held in temporary storage at the El Cabril Disposal Facility.

With regard to the disposal of disused sources, this takes place at the El Cabril Disposal Facility, the near-surface centralised disposal facility for LILW, as Spain does not have any DGR. A distinction may be made between separate periods during which different management models were applied, with the experience being presented below:

Detail of casks for the disposal of LILW in the disposal vaults of El Cabril.

- ✓ From 1993 to 2000: disused sealed sources use temporarily stored at the El Cabril Disposal Facility, irrespective of the life of the isotope in question, were managed in accordance with compliance with the waste acceptance criteria for disposal in low and intermediate level vaults as established in the provisional operational permits granted to the El Cabril Disposal Facility.
- ✓ From 2000 to 2014: disused sealed sources temporarily stored at the El Cabril Disposal Facility with a half-life less than or equal to that of Co-60 were managed in accordance with compliance with the acceptance criteria for storage units, at either level 1 or level 2[7], for disposal in the low and intermediate level vaults as established in the operational authorisation.
- ✓ Since 2014: Aside from the above, sources with isotopes with a half-life greater than that of Co-60 and equal to or less than that of Cs-137 are also managed, in accordance with fulfilment of level I storage unit acceptance criteria.

Disused sealed sources temporarily stored at the El Cabril Disposal Facility with a half-life greater than that of Cs-137 cannot be disposed of without prior authorisation of the Nuclear Safety Council.

Rehabilitation of former sites or facilities

The current General Radioactive Waste Plan allows for the need to manage large volumes of waste (of the order of around 75 million tonnes of mine tailings and around 14 million tonnes of process tailings) with a low radioactive content of natural origin. This waste was generated as a consequence of activities in the initial phase of the fuel cycle, and has, in accordance with international practice, been managed at the sites housing the mining and uranium concentrate production facilities themselves.

The legislative framework is established by Mines Law 22/1973, of 21 June 1973, and Royal Decree 975/2009, of 12 June 2009, on the management of waste from extractive industries and protection and rehabilitation of the area affected by mining activities, requiring the authorisation of a restoration plan for the area affected by mining operations.

The connection with the nuclear and radiological field is defined in the Regulation on nuclear and radioactive facilities, approved by Royal Decree 1836/1999, of 3 December 1999, which establishes that

> *"operation and execution of permits for uranium mine restoration plans shall, before being granted by the competent authority, require a mandatory and binding report by the Nuclear Safety Council with regard to radiation protection".*

As a result, the restoration and rehabilitation of former mining and uranium concentrate manufacturing sites has received the attention of the nuclear and radioactive regulatory authority, as in the case of the former Andújar Uranium Mill Plant (FUA). The rehabilitation of these mining and uranium concentrate production sites initially comprised on-site stabilisation of the waste generated, through the input of covering materials acting as geo-mechanical and radiological protective barriers to minimise the risk of intrusion, erosion, dispersal of the products stored, and to combat the risk of exposure to radon in nearby population centres.

[7] *The storage units are classified in accordance with their mass activity at level 1 or 2.*

The main restoration actions applied to mining sites were conducted essentially in the period from the late 1990s until the first decade of this century, following the corresponding authorisations. Those sites which were recently restored and are in their surveillance and compliance period are set out in Section D.5 of this Report (Facilities in Final Decommissioning Phase). With regard to these sites in the compliance phase, the licensee implements a Surveillance and Maintenance Plan, as established in the terms of the authorisations.

Some of the mines have recently applied for the finalisation of this Surveillance and Maintenance Plan. The CSN has reached the conclusion that the Surveillance and Compliance Plan must be maintained for an undefined period, in accordance with results as they are obtained.

With regard to long-standing facilities, particular mention should be made of the initiatives undertaken at the Centre for Energy-Related, Environmental and Technological Research (CIEMAT). CIEMAT has authorisation to operate as a unique nuclear facility, granted by means of a Decision of the former Ministry of Industry and Energy, issued on 15 July 1980. The facility houses both nuclear and radioactive installations in two separate groups: a number of non-operational installations which have been shut down and are either in the dismantling phase for decommissioning or have been decommissioned, and another group of operational radioactive installations of the second and third category.

The dismantling of those installations that have been shut down and are in the decommissioning phase was authorised by Ministerial Order of 14 November 2005, designated as PIMIC-D (PIMIC-Decommissioning). CIEMAT is the licensee and Enresa the party responsible for performing the decommissioning activities. At present, all the nuclear installations covered by PIMIC-D have been dismantled and rehabilitation work has been completed on two areas of the site (land) where the presence of radioactivity as a result of past activities had been identified.

Section B.

Policies and Practices

Section B. Policies and Practices

This section covers the obligations set out in Article 32, paragraph 1, of the Convention.

> **Article 32.1.** *In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:*
>
> *i. Spent fuel management policy;*
>
> *ii. Spent fuel management practices;*
>
> *iii. Radioactive waste management policy;*
>
> *iv. Radioactive waste management practices;*
>
> *v. Criteria used to define and categorise radioactive waste.*

B.1. General policy and strategy for the management of radioactive waste and spent fuel

According to the provisions of Article 38 bis of Nuclear Energy Law 25/1964, of 29 April 1964, regarding the management of radioactive waste, including spent nuclear fuel, and the dismantling and decommissioning of nuclear facilities, this constitutes an essential public service reserved for State ownership, entrusted to the public corporation Empresa Nacional de Residuos Radiactivos, S. A., S.M.E. (Enresa) in accordance with the terms of the General Radioactive Waste Plan (GRWP) approved by the Government. For these purposes, Enresa is established as an internal resource and technical service of the State Administration, performing the functions entrusted to it by the Government.

The Government is responsible for establishing the national policy and programme for radioactive waste management, including spent nuclear fuel, and the dismantling and decommissioning of nuclear facilities, through approval of the General Radioactive Waste Plan.

According to Royal Decree 102/2014, of 21 February 2014, this Plan must make provision for the responsible and safe management of spent nuclear fuel and radioactive waste, the required actions, strategies and technical solutions to be undertaken in Spain in the short, medium and long term for the purpose of the responsible and safe management of spent nuclear fuel and radioactive waste, the dismantling and decommissioning of nuclear facilities and all other activ-

ities connected with the foregoing, including economic and financial provisions and the measures and instruments required for implementation.

The Plan is drawn up by Enresa and approved by the Government, at the proposal of the Ministry for Ecological Transition and Demographic Challenge (MITERD), following a report from the Nuclear Safety Council (CSN), and consideration of the opinions of the Spanish Autonomous Regions with regard to the regulation of territory and environment, industry and social agents, as well as a public consultation process conducted via the MITERD website. The Spanish Parliament is subsequently informed of the approved Plan.

In accordance with the regulations in force, the Plan is periodically reviewed, taking into account scientific and technical advances, the experience acquired, and the recommendations, lessons learnt and good practices derived from peer review processes, and establishes the reference framework for national spent fuel and radioactive waste management strategies.

For the purposes of verification of compliance with the GRWP, Enresa shall prepare and submit the following to the MITERD, responsible for strategic management and monitoring and control of Enresa actions and plans, both technical and economic:

- ✓ During the first half of each year, an account including technical and economic aspects regarding activities in the previous year, and the degree of compliance with the corresponding budget, in addition to an updated economic/financial study as to the cost of the activities set out in the GRWP, and the alignment of said cost with the financial mechanisms in force.
- ✓ By 30 November each year, a technical/economic justification of the annual budget corresponding to the next year, and the forecast for the four following years.
- ✓ During the month following each calendar quarter, a budgetary monitoring report corresponding to said quarter.

Meanwhile, during the first quarter of each year, Enresa shall submit to the CSN, which is responsible for control of safety in the management of spent nuclear fuel and radioactive waste and the execution of studies, assessments and inspections of the plans, programmes and projects required for all phases of such management, information as to the activities undertaken during the previous year and the forecasts for the year in progress with regard to the provisions of the GRWP.

The Sixth GRWP approved by the Council of Ministers on 23 June 2006 currently remains in force. Nonetheless, although at present there are no significant changes to radioactive waste and spent fuel management policy and the strategies contained in the Sixth GRWP remain valid, the approval of a new Plan is deemed appropriate for various reasons.

First of all, the need for the Plan to reflect updated technical solutions and economic forecasts on the basis of which Enresa performs its tasks, and of which the competent authorities are informed in the various reports, accounts and justifications referred to above.

Likewise, the next GRWP will need to be aligned with the regulatory framework derived from Council Directive 2011/70/Euratom, establishing an EU framework for responsible and safe management of spent nuclear fuel and radioactive waste. Said Directive establishes that the Plan must be subject to periodic review in accordance with scientific and technical advances, the experience acquired, and recommendations, lessons learned and good practices derived from the international peer review processes covered thereby. Likewise, both the Directive and

the Royal Decree [8] transposing it included certain content required for the GRWP but not currently covered by the Sixth Plan.

In addition, the forecasts for the draft 2021-2030 National Integrated Energy and Climate Plan (PNIEC) submitted by the Government of Spain to the European Commission in February 2019, and updated in January 2020, as agreed in the Protocol signed between the owners thereof and Enresa in March 2019, providing for the orderly decommissioning of Spain's nuclear power plants over the timeframe 2027-2035, represents a modification to the scenario set out in the Sixth GRWP.

Lastly, and in consideration of all the foregoing, the international team of experts on the combined IRRS-ARTEMIS peer review mission conducted in Spain in October 2018 set out a recommendation that an update to the GRWP be undertaken.

On 10 March 2020, Enresa therefore in accordance with the provisions of Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste, submitted a GRWP proposal to the Secretary of State for Energy at the MITERD, thereby beginning the processing of a draft Seventh GRWP. For information purposes, said draft was made available to the public via the website of the MITERD.

The corresponding process, the structure of which is indicated in Figure 1, is required to comply both with specific nuclear regulations, and also environmental regulations.

- ✓ Under the terms of Nuclear Energy Law 25/1964, said Plan will need to be approved by the Government, at the proposal of the MITERD, following a report by the CSN with regard to nuclear safety and radiation protection, along with prior consultation with the Autonomous Regions with regard to the regulation of territory and the environment.
- ✓ The GRWP will likewise need to be subjected to a Strategic Environmental Assessment, in accordance with Environmental Assessment Law 21/2013, of 9 December 2013, comprising the following actions:
  - ⇨ On the initiative of the Secretary of State for Energy (SEE), the Secretary of State for the Environment (SEMA) must submit the draft GRWP and an Initial Strategic Document (DIE) to the Public Authorities affected and stakeholders in order to conduct prior consultations over a period of at least 45 business days, serving to determine the scope of the Strategic Environmental Study (EAE).
  - ⇨ Once this has been determined, Enresa shall draw up a new revision of the draft, in addition to the Strategic Environmental Study, and a lay-person summary thereof, to be subjected by the SEE to the processes of public information and consultation with the Public Authorities affected and stakeholders, over a period of at least 45 business days.
  - ⇨ The outcome of these processes will serve to produce a new revision of the GRWP which, together with a new version of the EAE and the outcome of the consultations, will be referred to the SEMA for analysis and subsequent issuance of the Strategic Environmental Statement (DAE), the environmental conditions of which will be included in the GRWP.

[8] *Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste.*

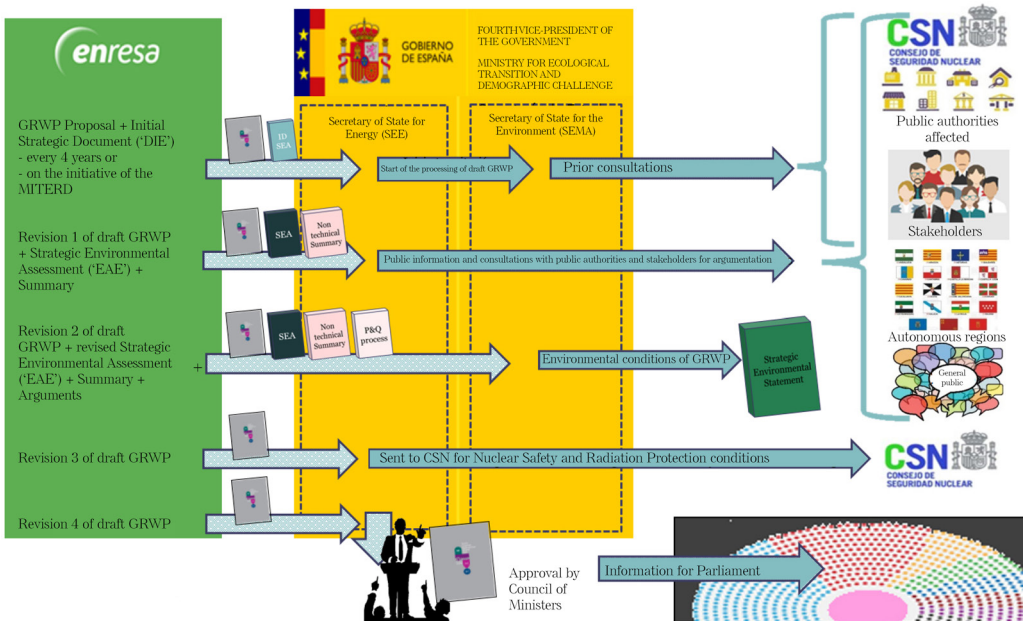


Figure 1. Structure of the procedure for the approval of the Seventh GRWP.

The current draft being processed for the Seventh GRWP adjusts the reference scenario on the basis of the provisions of the 2021-2030 Integrated National Energy and Climate Plan (PNIEC) and updates the timeframe of the Plan, as well as the technical/economic forecasts, while in general terms maintaining the policy and strategies for radioactive waste and spent fuel management contained in the Sixth Plan, although in certain cases there is an additional analysis of other options, as may be seen in the following sections.

B.2. Classification of radioactive waste

The concept of radioactive waste is defined in Article 2 of Nuclear Energy Law 25/1964:

> *"'Radioactive waste' is any discarded material or product with no planned use, and which contains or is contaminated with radionuclides of concentrations or activity levels higher than those established by the Ministry of Energy, following a report by the Nuclear Safety Council"*

Waste is categorised in Spain in accordance with the management facilities authorised for a certain volume, radiological inventory and certain specific activity concentration limits, in accordance with the nature of the different radioactive elements present. In practice, the different categories of facility correspond to the radioactive waste classification criteria adopted by the IAEA and the European Commission:

- ✓ What is known as Low and Intermediate Level Waste (LILW) comprises waste with an activity level essentially caused by the presence of beta- or gamma-emitting radio-

nuclides, with a short or intermediate half-life (less than 30 years) and with a very low, limited content of long-lived radionuclides. This group comprises waste which may be temporarily stored, treated, conditioned and disposed of at the El Cabril Disposal Facility in the province of Cordoba. This includes Very Low Level Waste (VLLW), comprising a subset of low and intermediate level waste, and in general revealing specific activity levels of between one and 100 Bq per gramme, potentially rising as high as several thousand in the case of certain radionuclides with low radio-toxicity, or in the case of small amounts.

- ✓ High Level Waste (HLW) contains long-lived alpha-emitters with a half-life of more than 30 years, in appreciable concentrations which generate heat because of the effect of radioactive disintegration, as they have a high specific activity. The main exponent in this group is spent fuel (SF) discharged from nuclear reactors, which in accordance with Spanish policy is considered to be waste. This is currently stored in the pools of nuclear power plants and the Individualised Temporary Storage (ITS) facilities in place at some plants. The plan for the future is that such waste should be stored at a surface-level Centralised Temporary Storage (CTS) facility, once this is operational, before subsequently being disposed of in the Deep Geological Repository (DGR).
- ✓ Meanwhile, "Special Waste (SW)" refers to additions for nuclear fuel, neutron sources, used in-core instrumentation, or replaced components derived from the reactor vessel system and the internal reactor components, generally of metallic nature, which because of their radiological characteristics cannot be managed at the installations of the El Cabril Disposal Facility. As long-lived waste with a significant activity level, temporary storage and disposal of such materials is handled similarly to HLW.

B.3. Generation of spent fuel and radioactive waste

Spain generates and has generated radioactive waste at nuclear facilities and radioactive facilities distributed nationwide, as may be seen in Figure 2.

The inventories generated to date have been produced by the regular operation of nuclear and radioactive facilities and the implementation of decommissioning projects at various facilities, including the Vandellós I and José Cabrera Nuclear Power Plants, and installations in disuse covered by the PIMIC-D project undertaken at the CIEMAT, as well as radiological incidents which have occasionally occurred at conventional facilities, associated with the processing and recycling of scrap metal.

The waste currently produced is derived from:

- ✓ Operation of nuclear power plants (seven reactors, plus the Santa María de Garoña Nuclear Power Plant, where operations have now ceased);
- ✓ Operation of the Fuel Element Factory at Juzbado, Salamanca,
- ✓ The CIEMAT facility improvement project (PIMIC);
- ✓ Operation of radioactive facilities for industrial, medical, agricultural and research purposes;
- ✓ Operation of the El Cabril Disposal Facility itself;

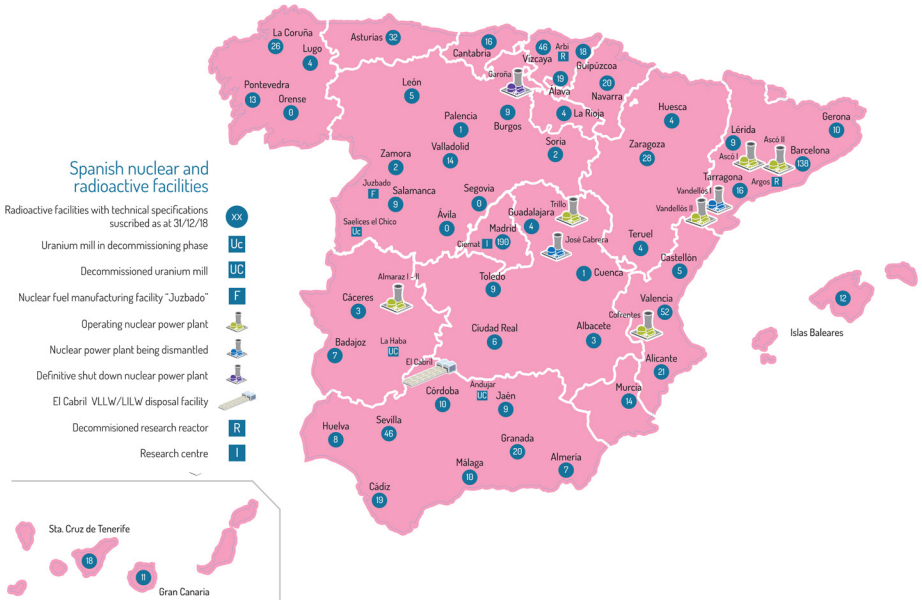


Figure 2: Location of nuclear reactors and other radioactive waste-generating facilities.

Meanwhile, Figure 3 presents a map of the existing nuclear power plants in Spain.

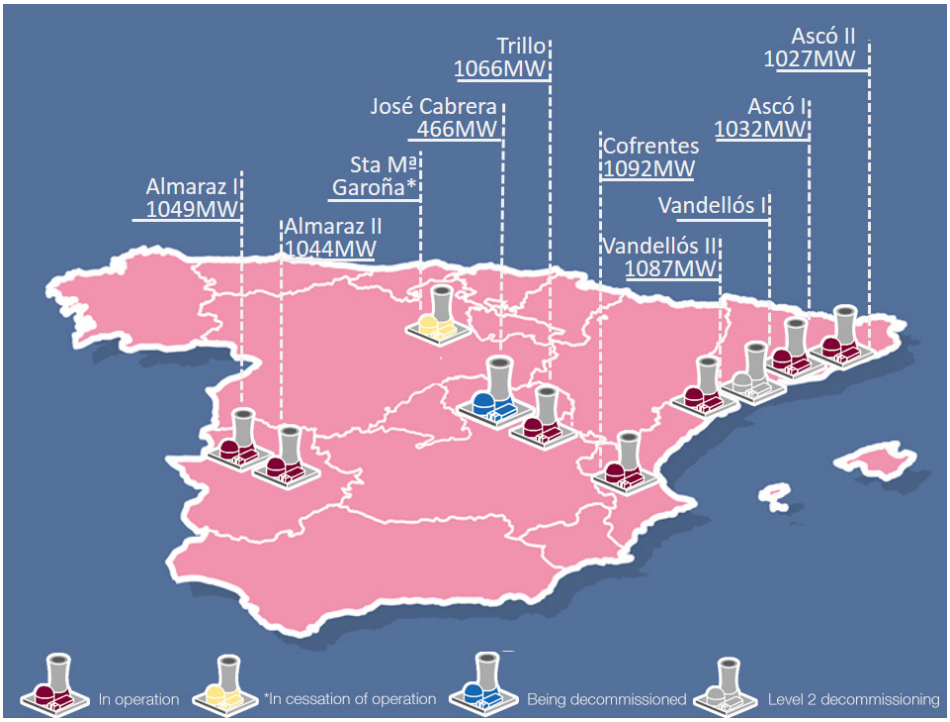


Figure 3: Map of nuclear power plants in Spain.

- ✓ Decommissioning of the José Cabrera Nuclear Power Plant.
- ✓ Waste may occasionally be generated as a consequence of other specific activities (incidents).

In order to estimate the volumes of waste expected to be generated as a consequence of the operation of the current portfolio of nuclear facilities, the draft Seventh GRWP adopts the following reference scenario:

- ✓ Once-through fuel cycle, in other words no provision for the option of reprocessing SF.
- ✓ Termination of operations at nuclear power plants in accordance with the provisions of the draft 2021-2030 Integrated National Energy and Climate Plan (PNIEC), based on the Protocol signed by and between the plant owners and Enresa in March 2019, which provides for the orderly termination of operations at Spanish nuclear power plants over the timeframe 2027-2035.
- ✓ Commissioning of Centralised Temporary Storage (CTS) for SF and HLW in 2028, with plans for a Cask Holding Facility (CHF) as part of the facility, in 2026. The presumed operational period for this facility is 60 years.
- ✓ Total and immediate decommissioning of light water nuclear power plants. Preparatory work at the site will begin at least three years in advance of the date of definitive cessation, with provision for the transfer of ownership and the commencement of decommissioning works at least three years after definitive cessation. During these six years work will be performed to empty the pools, preparatory tasks for decommissioning and issuance of decommissioning authorisation and transfer of ownership to Enresa. Once this authorisation is obtained, decommissioning works will begin, with an estimated duration of ten years. In the case of the Vandellós I Nuclear Power Plant, the final phase of dismantling will take place from 2030 onwards, and will last fifteen years. The surveillance period established for the sites following completion of the work will be ten years, prior to the declaration of definitive decommissioning.

According to the estimates as at 31/12/2019, the total volume of radioactive waste generated to date in Spain is 73,550 m^3, of which 24,600 m^3 is VLLW, 41,300 m^3 LILW, 200 m^3 special waste, 7,450 m^3 spent fuel and high level waste. In accordance with the above, the amounts of spent fuel and radioactive waste generated and managed in Spain to date, and the amounts forecast in the future, are detailed in Table 1.

Table 1: Spent fuel and radioactive waste generated and forecast in Spain

TYPE OF WASTE	APPROXIMATE VOLUME (m^3)		
	INVENTORY AT 31/12/19	FORECAST GENERATION	TOTAL INVENTORY
VLLW	24.600	98.900	123.500
LILW	41.300	55.200	96.500
SW	200	5.900	6.100
SF AND HLW	7.450	2.950	10.400
TOTAL	73.550	162.950	236.500

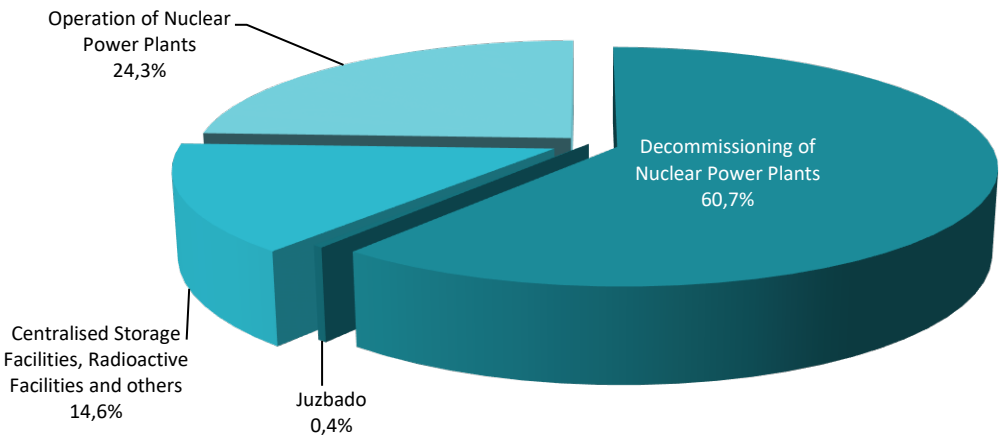


Figure 4: Source of LILW and VLLW generated and forecast in Spain.

In terms of their source, Figure 4 indicates the distribution by source of all LILW and VLLW generated and forecast to be generated in Spain.

In addition, significant quantities of tailings have been produced in Spain as a result of uranium mining and the manufacturing of concentrates (of the order of 75 million tonnes of mine tailings and some 14 million tonnes of process tailings), with a low radioactive content and which, depending on their concentration, require specific management action. In most cases "on-site" stabilisation has to date been the preferred management method.

B.4. Policies and practices for spent fuel management

The ongoing spent fuel management policy remains the once-through cycle, with provision having been made for the necessary strategies for temporary storage until a definitive solution is available, as set out in the draft of the Seventh GRWP.

B.4.1. Temporary storage

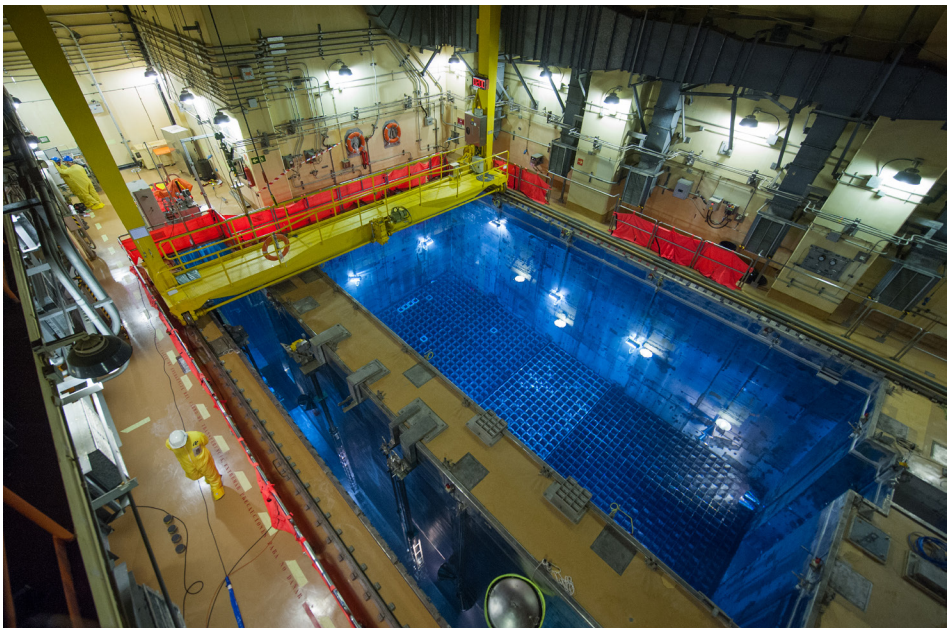
The purpose of temporary storage is to provide sufficient capacity to accommodate spent fuel (SF) generated by Spanish nuclear power plants until such time as a definitive solution is available. In line with this goal, the draft Seventh GRWP maintains the key strategies contained in the current Plan:

- ✓ Centralised temporary storage of the SF, high level waste (HLW) and special waste (SW) at one single facility, the most significant milestone being the commissioning of the Centralised Temporary Storage (CTS) facility.
- ✓ Provision of additional SF, HLW and SW storage facility at those nuclear power plants where operational or decommissioning needs so demand, until such capacity can be fulfilled by the CTS.

The spent fuel of light water power plants generated within the Spanish nuclear portfolio has been stored in the pools of the power plants in question, as may be seen in Section D.1 of this Report. As an initial measure adopted in response to the expected saturation of their capacity, over the course of the 1990s the original pool frames were progressively replaced with other more compact designs, serving in most cases significantly to postpone the need to establish additional storage capacity facilities beyond the pools themselves. The updated inventory of pools may be consulted in Section D.2, while matters regarding their operation are addressed in Article 9.

However, five Spanish nuclear power plants (Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña) already have individualised temporary storage (ITS) authorised at the sites themselves for the dry storage of spent fuel, to supplement pool storage at the plants or as an alternative with a view to decommissioning. The details of these facilities may be found in Sections D.1 and D.2, and in Article 9.

In any event, during the period covered by this Report it proved necessary to license a design modification to the Trillo Nuclear Power Plant, in order to add a new cask design to the 32 casks in place at its ITS, giving a total of 80 units. Additional details as to the process of licensing this modification may be found in Articles 6, 7, 8 and 9.1.



View of the pool at the Vandellós II Nuclear Power Plant.

Similarly, the ITS at the Santa María de Garoña Nuclear Power Plant was designed and built at the time based on the hypothesis of continued operation of the power plant, and the expectation is therefore that authorisation for an increase in its capacity will be needed, so as to allow all the spent fuel to be stored with a view to the decommissioning of the plant.

There are also plans over the coming months for a new ITS to begin operation at the Cofrentes Nuclear Power Plant. As in the previous cases, this temporary storage facility will be located at the power plant site itself, and in accordance with the RINR, it is being licensed as a modification to the power plant design. All other issues connected with the site are described in Article 6, the design and construction are covered by Article 7, and the safety assessment prior to construction and operation in Articles 8 and 9.1 of this Report.

In any event, the basic strategy covered by the draft Seventh GRWP for the temporary storage of spent fuel (SF), high level waste (HLW) and special waste (SW) remain the construction of a Centralised Temporary Storage (CTS) facility. The situation regarding the licensing of this is described in Article 6.

However, the environmental documentation accompanying the draft Seventh GRWP allows for and analyses different technically and environmentally viable and reasonable alternatives: one single Centralised Temporary Storage (CTS) site, or several Decentralised Temporary Storage (DTS) sites. The analysis has therefore from the outset been approached from the perspective that with all options open, and the general public and various stakeholders having the opportunity to set out their arguments, a decision must be reached during the processing of the Plan as to whether to maintain the current strategy included in the current draft Seventh GRWP, or to opt for an alternative to this.

B.4.2. Disposal

Following a period of temporary storage, the draft Seventh GRWP makes provision for the option of a Deep Geological Repository (DGR) as a final management strategy for nuclear power plant spent fuel and high level waste, in accordance with the indications given in the preamble to Directive 2011/70/Euratom, which acknowledges that the idea generally accepted by technical personnel is that at present the DGR represents the most sustainable and safest option as a waste management endpoint. In this regard, the main initiatives are intended to develop the technological capacities and social acceptance required in order to steer and implement the future disposal solution for SF, HLW and SW in a DGR.

Further details as to this management process may be found in Article 10 of this Report.

B.5. Policies and practices for the management of radioactive waste

As indicated in the introduction to this Report, the Government is responsible for establishing the policy for the management of radioactive waste, including spent nuclear fuel, and the dismantling and decommissioning of nuclear facilities, through the approval of the GRWP. This function of the Government is established by law, in Article 38 bis of Nuclear Energy Law 25/1964 (LEN).

As the management of high level waste and special waste is associated with spent fuel management, and has therefore already been addressed in previous subsections, this subsection refers only to the policy for the management of low and intermediate level waste (LILW).

As previously stated in earlier National Reports, LILW is produced in Spain as a result of the operation and decommissioning of regulated nuclear and radioactive facilities using radioactive substances or materials. It may also prove necessary to manage waste resulting from incidents at facilities that do not require authorisation within the regulatory framework for nuclear energy (such as steelworks, metal recycling plants, etc.). In order to address these latter cases, provision has been made for appropriate mechanisms for prevention and, where applicable, recovery of control over radioactive materials, ensuring safe management thereof as waste should the circumstances arise.

It may at present be stated that Spain has achieved an overall solution for the management of LILW, as it has in place an integrated system equipped with the necessary capacities and established on the basis of assignment of responsibilities to a set of clearly identified agents, operating in a structured manner.

Within this system, nuclear facilities have their own capacities for the treatment and conditioning of LILW in accordance with the waste acceptance specifications applied by Enresa for the El Cabril Disposal Facility. In all other cases, the producers hand over their waste to Enresa in accordance with the agreed technical specifications, and the latter performs the required tasks of treatment and conditioning at its installations at the El Cabril Disposal Facility, as detailed in Article 16.2 of this Report.

The El Cabril Disposal Facility in the province of Cordoba represents the backbone of the national LILW waste management system. The fundamental aim is the disposal of this type of waste in solid form, and the facility also has treatment and conditioning installations to process waste derived from radioactive facilities and any resulting from collection from non-regulated facilities. Conditioning of all types of LILW waste is likewise performed at the storage units before the waste is placed in the disposal vaults. The El Cabril Disposal Facility also has laboratories for the characterisation and verification of waste to conduct tests so as to improve knowledge and acceptance methodology for the different streams of waste, and to verify their characteristics, along with workshops, laboratories and other ancillary systems required for the facility to function.

In December 2019, 21 of the 28 LILW vaults were full, representing 76% of the approved LILW storage capacity. The need for additional storage capacity has been identified on the basis of current inventory estimates. This will therefore require a modification to the current authorisation of the facility so as to increase the quantity of waste that this site can store. Enresa has to this end already begun preparatory tasks for the licensing of this modification. Bearing in mind that the El Cabril Disposal Facility installations are deemed fundamental for the management of all LILW in Spain, the expansion of its capacity within an appropriate timeframe has become a priority objective, as acknowledged in the draft Seventh GRWP being processed.

Furthermore, since 2008 very low level radioactive waste (VLLW) has been stored in a specific vault for the disposal of this category of waste. Two of the four planned vaults have been built and are in operation, with authorisation having been granted for an overall volume in all four vaults of 130,000 m^3. The estimation is that the available storage capacity for VLLW is sufficient in order to cover all the foreseen needs.

With regard to the optimisation of vault occupancy, efforts continue to be made in the application of technologies and volume reduction, declassification and decontamination equipment.

Image of the LILW disposal vaults at the El Cabril Disposal Facility.

The approaches to be promoted with regard to volume reduction include in particular the drying of waste, treatment by means of smelting large-scale equipment and components, and waste declassification projects.

Meanwhile, with regard to activities involving disposal, waste categorisation, methods and techniques to understand the behaviour of the storage system and safety assessment, particular mention should be made of the following operational approaches:

- ✓ Analysis of forecast inventories and available capacities.
- ✓ Improvements in radioactive waste characterisation and package measurement techniques.
- ✓ Definition of management pathways for waste currently not accepted for disposal at the El Cabril Disposal Facility.
- ✓ Acquisition of information and development of methodological and instrumental improvements to optimise the safety assessment of these facilities.
- ✓ Continuation of studies as to the durability of the engineering barriers of the storage system.
- ✓ Continuation of data gathering and analysis on the test covers implemented to support the definitive design of the disposal covers.
- ✓ Study of new storage unit configurations different from those already established, as a consequence of the replacement or dismantling of large-scale equipment and components of nuclear installations.

Image of the VLLW disposal vaults at the El Cabril Disposal Facility.

- ✓ Design and testing of new transport containers better suited to the new needs of decommissioning operations.

With regard to the adaptation and improvement of the functionality offered by the El Cabril Disposal Facility, and with the resources available for future situations, the main initiatives being undertaken are:

- ✓ Provision of new handling resources to increase the operational capacity of VLLW disposal.
- ✓ Assessment of the design of the new vaults, taking into account the results of decommissioning operations and the preparation of support documentation for their construction.

Continuation of radioactive facility support actions to optimise "on-site" management of the waste they generate.

Section C.

Scope of application

Section C. Scope of application

This section covers the requirements set out in Article 3 of the Convention as to the scope of application.

Article 3: Scope of application

1. *This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.*
2. *This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.*
3. *This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.*
4. *This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.*

The scope of application of the Convention in Spain extends to the following:

- ✓ Spent nuclear fuel derived from the operation of nuclear power plants for electricity generation.
- ✓ Radioactive waste derived from the nuclear fuel cycle, and waste derived from the application of radioisotopes in industry, agriculture, research and medicine, or originating as a consequence of past activities, incidents and accidents which involved radioactive materials.
- ✓ Discharges from nuclear and radioactive facilities.

Section D.

Inventories and lists

Section D. Inventories and lists

Article 32. Reporting

(…)

2. This report shall also include:

i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

iv) an inventory of radioactive waste that is subject to this Convention that:

a. is being held in storage at radioactive waste management and nuclear fuel cycle facilities;

b. has been disposed of; or

c. has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D.1. Spent fuel management facilities

The spent nuclear fuel from those power plants in operation is stored in the pools at the plants themselves, as is also the case at Santa María de Garoña, where operations have ceased. Meanwhile, the Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña Nuclear Power Plants have dry Individualised Temporary Storage (ITS) facilities. These dry temporary storage facilities are located within the nuclear power plant site itself, and are licensed as a modification to the design of the plant. Table 2 shows the existing facilities.

Table 2: Existing spent fuel storage facilities

Name of the facility	Location (Province)	Type of storage
Almaraz I Nuclear Power Plant	Cáceres	Pool Dry storage
Almaraz II Nuclear Power Plant	Cáceres	Pool Dry storage
Vandellós II Nuclear Power Plant	Tarragona	Pool
Ascó I Nuclear Power Plant	Tarragona	Pool Dry storage
Ascó II Nuclear Power Plant	Tarragona	Pool Dry storage
Cofrentes Nuclear Power Plant	Valencia	Pool
Sta. M. Garoña Nuclear Power Plant	Burgos	Pool Dry storage
Trillo Nuclear Power Plant	Guadalajara	Pool Dry storage
José Cabrera Nuclear Power Plant	Guadalajara	Dry storage

Pools

The storage pools at the Trillo and Santa María de Garoña nuclear power plants are located in the reactor building. At the other power plants in operation, the pools are located in a building adjacent to the containment building, with the two buildings connected by the transfer channel. Where there are two reactors on the same site, as in the cases of Almaraz and Ascó, each unit of the power plant has its own pool. In the case of the Cofrentes Nuclear Power Plant there is also a pool in the reactor building used for temporary storage of fuel during reloading periods.

The spent fuel storage pools, with an initial capacity which at most power plants was increased in the 1990s by replacing the racks with other high-density models, have a reserve capacity to store a complete reactor core if necessary, this being a requirement for the operation of nuclear power plants.

Individualised Temporary Storage (ITS) facilities for dry spent fuel storage (Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña Nuclear Power Plants)

✓ **Trillo Nuclear Power Plant**

The cask storage at the Trillo Nuclear Power Plant has been in operation since mid-2002. This is a surface-level rectangular building with a pre-authorised capacity to hold up to 32 casks of the ENSA-DPT type, each loaded with 21 SIEMENS/KWU type I, type II and type III spent fuel elements, authorised during the period of the report up to a total of 80, using type ENUN 32P casks.

The ENSA-DPT metal cask was designed for the safe transportation and storage of 21 PWR 16 x 16-20 fuel elements from a light water reactor of the Kraftwerk Union (KWU) type. The design complies with the requirements of 10 CFR 72 of the IAEA Regulations for the Safe Transport of Radioactive Materials, and the Spanish transport regulations.

With regard to the ENUN 32P, it can safely transport and store 32 fuel elements of up to 58 GWd/tHM, 4.75% initial enrichment and a minimum of 7.6 years of cooling. The facility already stores two casks of this type.

Image of the interior of the Trillo Nuclear Power Plant ITS.

✓ **José Cabrera Nuclear Power Plant**

The José Cabrera Nuclear Power Plant definitively ceased operation in April 2006. The alternative selected in accordance with the strategy established in the GRWP currently in force was for complete and immediate decommissioning, and as a result, once this process has been completed the site can be released in full for unrestricted usage. As a prior step, the spent fuel stored in the pool was transferred to the dry temporary storage constructed at the power plant site itself, a description thereof being given in the Fifth National Report.

Since it began operation in 2008, the power plant ITS, which stores all the SF generated during operation of this facility (377 fuel elements, in 12 HI-STORM 100Z systems, based on welded capsules with a concrete casing) has been operated routinely.

In addition, the decommissioning of the power plant gave rise to a series of special waste elements as a consequence of the cutting of some of the internal elements of the reactor. This waste, which cannot be disposed of at the El Cabril Disposal Facility, is currently stored in four HI-SAFE 100Z casks located in the power plant ITS, alongside those housing the spent fuel. This waste will also be sent to the CTS facility once it becomes available in the future.

Overview of the José Cabrera Nuclear Power Plant ITS.

✓ **Ascó Nuclear Power Plant**

In order to avoid reaching saturation level in the pools of the two units at the Ascó Nuclear Power Plant, it proved necessary to construct and commission a dry ITS facility to provide additional storage capacity at the power plant site.

The ITS comprises two storage slabs with seismic resistance, one for each unit, 16 storage casks per slab having been authorised, with a total combined capacity of up to 1,024 fuel elements. This is an outdoor facility the licensing of which was completed in April 2013, and which has now been in operation since May that year.

In this case the chosen storage system was HI–STORM 100, similar to that used at the José Cabrera ITS, but adapted for the fuel used by the power plant.

In December 2019, twenty-one HI–STORM modules were loaded with 32 fuel elements each, and these are now in the ITS. The storage licence allows spent fuel of up to 55 GWd/tHM, with a maximum initial enrichment of 5% and a minimum of 5 years of cooling. However, in order to comply with the licence of the associated HI–STAR transport system, the storage casks that have to date been loaded contain low-burnup fuel (<45 GWd/tHM). The transport licence is being reviewed in order to include fuel of the same degree of burnup as that authorised for storage (up to 55 GWd/tHM).

View of the Ascó Nuclear Power Plant ITS.

✓ **Almaraz Nuclear Power Plant**

During the period covered by this Report, the licensee of the Almaraz Nuclear Power Plant built and commissioned a dried Individualised Temporary Storage facility at the site.

The Directorate-General for Energy Policy and Mines authorised execution and assembly by means of a Decision dated 14 December 2016, while commissioning was authorised by a Decision of 27 July 2018, both with a prior report by the CSN and following execution of the corresponding environmental impact assessment, with the Environmental Impact Statement being issued by the Secretary of State for the Environment on 7 November 2016.

The ITS has authorised capacity for 20 casks of the ENUN 32P type, which can store 32 PWR-type fuel elements. This cask is similar to the new model selected to increase ITS capacity at the Trillo Nuclear Power Plant, with a different rack to accommodate the Westinghouse 17x17 type of fuel element.

The burnup limit authorised for storage is 65 GWd/tHM, but only 45 GWd/tHM for transport, and so for the moment it will only store fuel with this lower burnup level. The ITS currently has 2 casks in storage.

Cask in the Almaraz ITS.

✓ **Santa María de Garoña Nuclear Power Plant**

During the period covered by this Report, the licensee of the Santa María de Garoña Nuclear Power Plant constructed and commissioned a dry Individualised Temporary Storage facility at the site. The Directorate-General for Energy Policy and Mines authorised execution and assembly by means of a Decision dated 13 October 2015, while commissioning was authorised by a Decision of 2 July 2018, both with a prior report by the CSN and following execution of the corresponding environmental impact assessment, with the Environmental Impact Statement being issued by the Secretary of State for the Environment on 30 September 2015.

In this case the dry storage facility has two seismic slabs, each of which is authorised to carry 16 dual-purpose ENSA-ENUN 52B type metal casks with capacity to store up to 52 BWR type fuel elements with a relatively low degree of burnup and higher cooling times. 5 casks were manufactured at the time with a view to the continuation of operations at the power plant. However, since the power plant definitively ceased activity in 2017, all the fuel currently remains in the pool. A reassessment of the dry storage facility in order to house the complete inventory from the pool will therefore be required.

Overview of the Santa María de Garoña Nuclear Power Plant ITS.

D.2. SF inventory (elements and U mass)

The total amounts of spent fuel in existence in Spain at 31 December 2019 are shown in Table 3.

Table 3: Spent nuclear fuel in existence in Spain (31 December 2019)

Name of the facility	Characteristics of the fuel elements	Total capacity/reserve core (number of elements)	Stored SF (number of elements)	Stored SF (tU)
Almaraz I Nuclear Power Plant	PWR 17x17	1,804/157	1,512	697
		ITS with capacity for 20 casks holding 32	64	30
Almaraz II Nuclear Power Plant	PWR 17x17	1,804/157	1,564	722
Vandellós II Nuclear Power Plant	PWR 17x17	1,594/157	1,332	606
Ascó I Nuclear Power Plant	PWR 17x17	1,421/157	1,096	502
		ITS with capacity for 16 casks holding 32	384	174
Ascó II Nuclear Power	PWR 17x17	1,421/157	1,164	534
		ITS with capacity for 16 casks holding 32	288	131
Cofrentes Nuclear Power Plant	BWR 8x8, 9x9	5,404/624	4,736	851
Sta. M. Garoña Nuclear Power Plant	BWR 8x8, 9x9	2,609/400	2,505	440
José Cabrera Nuclear Power Plant	PWR 14x14	ITS with capacity for 12 casks holding 32	377 (12 casks)	100
Trillo Nuclear Power Plant	PWR 16x16	805/177	556	263
		ITS with capacity for 80 casks, 32 casks holding 21 and 48 casks holding 32	736	347

D.3. List of radioactive waste management facilities

Article 2 of the Joint Convention defines a *"Radioactive waste management facility"* as follows: "*Radioactive waste management facility*" means any facility or installation the primary purpose of which is radioactive waste management, including a nuclear facility in the process of being decommissioned only if it is designated by the Contracting Party as a radioactive waste management facility;

The scope of this definition does not include "*small-scale producers*", since their radioactive waste is collected and processed by Enresa at the El Cabril Disposal Facility. The radioactive waste management facilities are therefore the following:

✓ **Nuclear power plants in operation**

All the nuclear power plants have treatment facilities for their liquid waste and conditioning of solid waste (pre-compaction and immobilisation). There are also temporary storage facilities at each power plant to house waste prior to transport to the El Cabril Disposal Facility.

Overview of the Trillo Nuclear Power Plant.

✓ **Vandellós I Nuclear Power Plant in decommissioning phase**

This has a facility established in the pit of the reactor building for the temporary storage of low and intermediate level waste generated during the decommissioning process, as a specific intermediate solution for the temporary storage of graphite waste derived from the fuel element sleeves.

View of the facility protecting the casing of the Vandellós I Nuclear Power Plant reactor.

✓ **José Cabrera Nuclear Power Plant in the decommissioning phase**

The power plant has its own liquid and solid waste treatment facilities which have remained in use following cessation of operations at the plant. The waste resulting from

Evolution of decommissioning of the José Cabrera Nuclear Power Plant.

some decontamination tasks currently in progress is treated in these facilities and temporarily stored at the plant prior to dispatch to the El Cabril Disposal Facility.

A new facility has been in operation since 2016 for the treatment and decontamination of decommissioning waste using chemical and mechanical means with the aim of reclassifying certain LILW as VLLW. Meanwhile, in 2018 Enresa set up its first plan for the treatment of contaminated soil associated with the José Cabrera Nuclear Power Plant decommissioning project, with the aim of reducing the inventory and volume of VLLW by means of a washing process capable of achieving declassification levels. The design of this plant was viewed favourably by the CSN on 13 July 2016, along with the results of the commissioning tests on 6 June 2018.

✓ **CIEMAT (temporary storage and processing facilities)**

The Centre for Energy-Related, Environmental and Technological Research (CIEMAT) holds authorisation to perform conditioning activities for low and intermediate level solid waste generated at the centre, and provisionally to store sources or other radioactive material within transport containers where they comply with the requirements established in the national regulations for the transport of hazardous goods by road.

The CIEMAT treats and conditions waste derived from research activities at the centre, essentially connected with developments for radioactive waste management, monitoring of materials and other activities involving the use of radioactive materials and tracers.

During the period covered by the last Sixth National Report, the CIEMAT expanded its temporary storage capacities in order to allow it to store very low level or de-classifiable waste derived from the execution of the PIMIC Project (see subsection D.5) through authorisation for the use of pre-existing buildings which were conditioned for this purpose.

✓ **Juzbado Fuel Plant**

As with the nuclear power plants, it has a treatment plan for its liquid waste, through drying and immobilisation in cement. Precompaction is performed for the preconditioning of the facility's solid waste, with cement immobilisation being used for final conditioning. The existing temporary storage facility serves as the intermediate stage prior to the transportation of waste to the El Cabril Disposal Facility.

✓ **El Cabril Disposal Facility for low and intermediate level waste**

The El Cabril Disposal Facility has treatment and conditioning systems in place for solid and liquid waste. These systems are intended to treat and condition all waste so requiring prior to disposal at the facility. In accordance with the system of responsibilities derived from the GRWPs, most waste treated and conditioned at El Cabril is derived from radioactive facilities generated at the site itself, although the facility also has the systems required for the final conditioning of waste derived from nuclear facilities prior to disposal in the disposal vaults.

A) Low and intermediate level waste (LILW)

⇨ Treatment and conditioning of radioactive facility waste.

Waste produced by small-scale producers (radioactive facilities with industrial, medical, agricultural and research functions) is segregated by such sites on their own premises, and subsequently transported to El Cabril. The waste is trans-

Aerial view of the North and South disposal platforms for LILW.

ferred in accordance with a collection agreement signed between the producer and Enresa, which follows the waste categorisation system established by the MITERD.

The treatment of the different types of waste at the El Cabril facility is performed so as to minimise the production of secondary waste and to generate conditioned packages which comply with the conditions required for subsequent inclusion in storage units.

The conditioning building at El Cabril has a specific area for the treatment and conditioning of small-scale producer waste, as described in the Fourth National Report.

⇨ Final conditioning of major producer waste.

Major producers (nuclear power plants and fuel element plants) must condition their LILW in packages which comply with the Enresa acceptance criteria for transportation as far as the El Cabril Disposal Facility, and so in the main do not require subsequent treatment processes. There is also a second category comprising packages pre-compacted at source because of their physical characteristics. The El Cabril Disposal Facility has a drum compactor with 1200 t capacity.

In both cases the packages are conditioned in storage units.

⇨ Temporary storage at the El Cabril Disposal Facility.

The El Cabril Disposal Facility has access to three sets of installations used for the temporary storage of solid waste: the "modules", the transitional reception building, and the radioactive material and resources storage facility.

The first of these comprise three buildings built in the 1980s for the temporary storage of long-term waste. Each of them has nominal capacity for 5,000 drums holding 220 L. The process of characterisation of units produced prior to 1992 is still ongoing, in order for them to be transferred to the disposal vaults once compliance with the acceptance criteria has been verified. In addition, these facilities are used to accommodate heterogeneous and special waste pending subsequent treatment for disposal.

The transitional reception building located at the El Cabril site itself has a buffer storage area for LILW packages.

The storage facility for radioactive material and sources has provided capacity for integration and safekeeping of the material requiring individualised management in one single physical enclosure.

- Disposal at the El Cabril Disposal Facility.

The low and intermediate level waste storage system at El Cabril has been in operation since 1992 and is of the near-surface type, with 28 vaults with a capacity of 320 positions each, for type CE-2A disposal units. The vaults are grouped into two platforms. Reconditioned waste packages are transferred to the storage units which, once full, are transported as far as the disposal platform and positioned within the vaults.

Image of the filling of a LILW disposal vault.

B) Very low level waste (VLLW)

Since 2008 the El Cabril facility has had a specific disposal area for very low level waste (VLLW), with provision for four vaults and a total authorised volume of 130,000 m^3. Two vaults have so far been constructed, with a total storage capacity of approximately 90,000 m^3. Each vault comprises a vessel excavated into the ground with a series of drainage and waterproofing materials laid on top to prevent the dispersal of any possible leachates into the environment. This allows for disposal of this type of contaminated material, derived above all from the dismantling of installations, the specific activity of which is hundreds of times lower than the LILW currently disposed of in the other area of El Cabril.

The VLLW arrives at the El Cabril Disposal Facility in drums, bags or metal containers, and is sent directly to the vault or temporarily received in the Technology Building. This has systems in place for stabilisation by means of inerting and cavity filling.

Table 4 contains the list of radioactive waste management facilities, indicating their location, purpose and key characteristics.

Image of the interior of the VLLW disposal vault at El Cabril.

Table 4: radioactive waste management facilities

Name of the facility	Location (Province)	Main purpose	Other characteristics
Almaraz I Nuclear Power Plant	Cáceres	Treatment, prior conditioning and temporary storage	Facilities for the management of waste caused by the operation of each of the nuclear power plants themselves
Almaraz II Nuclear Power Plant	Cáceres	Treatment, prior conditioning and temporary storage	
Vandellós II Nuclear Power Plant	Tarragona	Treatment, prior conditioning and temporary storage	
Ascó I Nuclear Power Plant	Tarragona	Treatment, prior conditioning and temporary storage	
Ascó II Nuclear Power Plant	Tarragona	Treatment, prior conditioning and temporary storage	
Cofrentes Nuclear Power Plant	Valencia	Treatment, prior conditioning and temporary storage	
Sta. M. Garoña Nuclear Power Plant	Burgos	Treatment, prior conditioning and temporary storage	
Trillo Nuclear Power Plant	Guadalajara	Treatment, prior conditioning and temporary storage	
José Cabrera Nuclear Power Plant	Guadalajara	Treatment, prior conditioning and temporary storage	
Vandellós I Nuclear Power Plant	Tarragona	Temporary storage	Facilities to store some of the waste derived from decommissioning of the plant
Juzbado Plant	Salamanca	Treatment, prior conditioning and temporary storage	Facilities to manage technological waste from operation of the plant
CIEMAT	Madrid	Prior conditioning and temporary storage	Facilities within the nuclear research centre
El Cabril Disposal Facility	Córdoba	Temporary storage	3 concrete modules + transitional reception building + storage facility for nuclear material and sources
		Disposal	28 near-surface reinforced concrete vaults for LILW
			2 vaults in trench for VLLW

D.4. Inventory of temporary storage or disposal

Table 5 shows the inventory of radioactive waste at 31 December 2019.

Table 5: Inventory of radioactive waste

Name of the facility	Installation type	Type of waste	Volume (m^3)
Almaraz I-II Nuclear Power Plant	Nuclear Power Plant	VLLW	682
		LILW	1,367
Vandellós II Nuclear Power Plant	Nuclear Power Plant	VLLW	186
		LILW	268
Ascó I-II Nuclear Power Plant	Nuclear Power Plant	VLLW	744
		LILW	616
Cofrentes Nuclear Power Plant	Nuclear Power Plant	VLLW	871
		LILW	1,342
Sta. M. Garoña Nuclear Power Plant	Nuclear Power Plant	VLLW	370
		LILW	650
Trillo Nuclear Power Plant	Nuclear Power Plant	VLLW	53
		LILW	131
José Cabrera Nuclear Power Plant	Nuclear Power Plant	VLLW	413
		LILW	32
		SW	31
Vandellós II Nuclear Power Plant	Nuclear Power Plant	VLLW	756
		LILW	1,582
		SW	158
Juzbado Plant	Fuel element factory	VLLW	196
		LILW	69
CIEMAT	Research centre	VLLW	137
		LILW	20
El Cabril facility	Temporary storage	VLLW	2,828
		LILW	719
	Disposal	VLLW	17,383
		LILW	34,471

D.5. Installations in decommissioning phase

✓ **Vandellós I Nuclear Power Plant**

The Vandellós I Nuclear Power Plant was in operation from 1972 until October 1989, when it suffered an accident in its conventional zone. This power plant using French technology is the only graphite-gas type plant built in Spain. Following definitive suspension of its operating licence, the then Ministry of Industry and Energy in 1992 accepted the decommissioning option proposed by Enresa for complete decommissioning of the plant in two phases. The Plan comprised the partial decommissioning of the facility (IAEA Level 2), followed by a latent period of some 25 years until complete decommissioning (IAEA Level 3).

Image of the Vandellós I Nuclear Power Plant under decommissioning, currently in latent period.

Although the level 2 decommissioning project ended in June 2003, it was not until January 2005 that the latent phase formally began, following issuance of the Ministerial Decision. During this period surveillance and control activities have been undertaken, in order, once the established waiting period has passed, to be able properly to embark on full decommissioning of the facility and its site.

✓ **José Cabrera Nuclear Power Plant**

The José Cabrera Nuclear Power Plant ceased operations in April 2006, following the decision by the authorities not to renew its operating permit. The plant is of the pressurised water reactor (PWR) type, with a limited power rating (160 MW). It was the first nuclear power plant in operation in Spain, having been started up in 1968.

As previously indicated in the Fifth National Report, as a result of the Ministerial Order of 1 February 2010 the facility was licensed to Enresa for decommissioning.

According to the strategy established by the Sixth GRWP, the power plant is being decommissioned under the immediate and complete dismantling strategy of the IAEA, in order to release the site for other uses.

As indicated in previous subsections, the spent fuel is currently stored in an ITS at the power plant site itself.

✓ **CIEMAT facilities**

The Integrated Plan for the Improvement of the CIEMAT Installations (PIMIC) comprises the dismantling of certain obsolete installations for which no future use is foreseen, to make use of the spaces released so as to undertake other activities. The Plan is controlled and supervised by the CSN and the MITERD. Over the course of the process, most of the activities have been undertaken by Enresa, although the CIEMAT retains responsibility as the licensee of the facility, and provide the necessary support.

Enresa has collaborated with CIEMAT in the dismantling of certain obsolete installations, including the management and dispatch of waste to the El Cabril Disposal Facility. Over the period 2017-2019 work continued for the decontamination, declassification and restoration of the various installations and areas of land.

Enresa will continue to support CIEMAT in the final phase of this project within the context of management of the remaining waste, including processes of characterisation, decontamination, declassification and removal of contaminated land.

✓ **Quercus uranium concentrate manufacturing plant in Saelices el Chico, Salamanca**

The Quercus uranium concentrate manufacturing plant is located at the Saelices del Chico mining site in the province of Salamanca. It has been in a state of definitive shutdown since 2003, following the Order of the Ministry of Economy of 14 July 2003 declaring the cessation of operations.

At present, activities at the facility focus on the treatment of the liquid effluent collected at the different drainage points on the existing mining site in the area (open pit water) and supernatant liquid from the tailings dike, for conditioning and discharge.

Enusa Industrias Avanzadas S.A., S.M.E. (ENUSA), as the plant licensee, applied for authorisation for dismantling and closure on 14 September 2015, in accordance with the modifications made as a result of the entry into force of Royal Decree 102/2014, for the responsible and safe management of spent nuclear fuel and radioactive waste. Said application is currently being assessed by the CSN.

Meanwhile, the Decision of the Directorate-General for Quality and Environmental Assessment and the Natural Environment, of 9 March 2018, set out a favourable environmental impact statement as to the execution of the Phase I project for the dismantling and closure of the Quercus uranium concentrate manufacturing plant in the municipality of Saelices el Chico, Salamanca, having concluded that no significant adverse impacts would result.

The dismantling of the facilities will be conducted in three phases (I, II and III). The scope of the work in Phase I will comprise the dismantling and removal of industrial buildings (cutting, chopping, scrapping and pressing) and work to manage the materials and waste generated in the aforementioned operations.

Upon conclusion of Phase I the as-built documentation for the works will be presented, together with the application for authorisation for Phase II and the Proposed Surveillance and Control Programme for the actions in Phase I. Once the required water quality has been achieved in order to allow it to be discharged directly into public watercourses in Phase II, the application will be filed for Phase III, comprising the final decommissioning in order to deal with the last of the remaining structures and installations. Following completion of the work in Phase III the new final as-built documentation for the works will be presented, together with the proposed surveillance and control programme for the compliance period, including the programmes for the three decommissioning Phases.

✓ **Other facilities and sites**

Surveillance and maintenance activities have continued with the scope and duration required by the CSN at all those restored mining/uranium concentrate manufacturing sites that are in the Compliance phase (Elefante Plant and restored mining sites in Saelices El Chico, and the Andújar Uranium Plant) or in the long-term surveillance phase following the Declaration of Decommissioning (Lobo-G Plant), the main purpose being to verify compliance with the environmental and radiological objectives of the Restoration Project.

D.6. Decommisioned facilities

During the period between generation of the Fifth National Report and this Report, no declarations of decommissioning were issued for any facility, and the situation as regards decommissioned facilities is therefore the same as in the Fifth National Report.

Section E.

Legislative and regulatory system

Section E. Legislative and regulatory system

Article 18. Implementing measures

Article 18. Implementing measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

Spain has an appropriate legislative, regulatory and administrative framework in order to comply with the obligations derived from this Convention. The Ministry for Ecological Transition and Demographic Challenge (MITERD) and the Nuclear Safety Council (CSN) continue to work, each within its remit, on the continuous improvement of the regulatory development of aspects connected with waste and spent fuel management.

This development takes into account the applicable national regulations, international experience and regulations, in particular analysis of the applicability of the IAEA programme of standards for safe waste management, and all those elements which, although not included in the regulations, have served successfully to address aspects arising in the authorisations granted to date for the management of radioactive waste.

Article 19. Legislative and regulatory framework

Article 19. Legislative and regulatory framework

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.*
2. *This legislative and regulatory framework shall provide for:*
   - *(i) The establishment of applicable national safety requirements and regulations for radiation safety;*
   - *(ii) A system of licensing of spent fuel and radioactive waste management activities;*

(iii) A system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence;

(iv) A system of appropriate institutional control, regulatory inspection and documentation and reporting;

(v) The enforcement of applicable regulations and of the terms of the licences;

(vi) A clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.

3. When considering whether to regulate radioactive materials such as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

The legislative and regulatory framework governing safe management of RW and SF is integrated within a broader context, namely that governing nuclear energy, and comprises a legislative corpus made up of laws, regulations and Safety Instructions (the last of these issued by the Nuclear Safety Council (CSN)), compiled in detail in Annex A, with the main developments being as set out in Articles 19.2 and 19.3. The regime for authorisations (detailed in Annex B) has undergone no significant developments, nor have the inspection or disciplinary regime or the assignment of responsibilities (all summarised in Article 19.1).

19.1. General aspects of the regulatory framework

Regulatory procedure

It is the task of Government to approve the regulatory developments of the laws passed by Parliament, with the Ministry for Ecological Transition and Demographic Challenge (MITERD) currently being the ministerial Department responsible for processing and submitting regulatory proposals in the field of nuclear energy. The generation of proposed regulatory developments in the field of nuclear energy is duly coordinated by the MITERD and the CSN. In any event, where proposals refer to matters that could affect nuclear safety or radiation protection, initiative lies with the CSN, which passes proposals on to the MITERD to be processed with the Government.

The Nuclear Safety Council is responsible for issuing its own regulations through the approval of Instructions, which are technical standards in the field of nuclear safety, radiation protection, emergencies and physical protection, incorporated within the domestic legal structure on a binding basis for those parties affected by the scope of application, once they have been notified or published in the Official State Gazette. It may likewise issue Supplementary Technical Instructions and Technical Instructions, which are administrative acts with binding status for those parties addressed by them, their purpose being to ensure the maintenance of safe requirements and conditions at facilities and in activities, along with optimal compliance with the requirements established in each authorisation, or they may otherwise be issued by the CSN in discharging its responsibilities. Lastly, the CSN issues Circulars and Guides which are, respectively, technical information documents and technical recommendations, which do not have binding status.

A compendium of the main binding provisions with the status of a Law, Regulation or Instruction of the CSN which are applicable to the scope of this Convention may be found in Annex A.

Authorisation procedure

Nuclear Energy Law 25/1964 establishes the regime for the granting of authorisations for nuclear and radioactive facilities, explicitly prohibiting the usage and storage of nuclear fuel and radioactive waste without having obtained the corresponding authorisation. This regime, which has been subjected to successive amendments since it was first approved, is developed by the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999.

Under said regime, the MITERD is responsible for granting the corresponding authorisations for nuclear and radioactive installations, except for category 2 and 3 radioactive installations[9] where this responsibility has been transferred to the Autonomous Regional Government[10]. Prior to the granting of any authorisation for a nuclear or radioactive facility, the MITERD must request reports from all authorities with responsibilities for the matter in question. In terms of nuclear safety and radiation protection, a report must also be issued by the Nuclear Safety Council (CSN), with binding status if it constitutes a refusal, or with regard to the limits and conditions imposed in the event of approval. Meanwhile, the Secretary of State for the Environment at the MITERD is responsible for issuing the Environmental Impact Statement for those projects that so require. The Autonomous Regions are likewise consulted in the field of territorial and environmental regulations. More detailed information with regard to the procedure for the authorisation of nuclear and radioactive facilities may be found in Annex B. Figure 5 presents in diagrammatic form the system for the authorisation of nuclear facilities.

Meanwhile, the CSN is responsible for granting and revoking the licensing and accreditation of personnel operating nuclear and radioactive facilities, and the diplomas of personnel of technical radiation protection units or services, as required. The CSN likewise has the task of granting and revoking authorisations of the Personal Dosimetry Services, the Radiation Protection Services, and the Technical Radiation Protection Units.

System of inspection and assessment of facilities

In accordance with the functions attributed to the CSN by Law 15/1980, of 22 April 1980, creating the Nuclear Safety Council, said body will perform inspection and control of nuclear and radioactive facilities in each phase of their life, in order to confirm implementation in accordance with the regulations in force and the limits and conditions of the authorisations granted. CSN inspection notices are published on its website, following redaction of any details that could affect confidentiality or that cannot be disclosed because they are legally protected, because they affect personal privacy, national defence and public security, commercial or industrial secrecy, intellectual property rights, or the existence of punitive or disciplinary proceedings in progress, among other factors.

[9] *According to the classification of said facilities in the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, of 3 December 1999.*

[10] *The Spanish State is made up of seventeen Autonomous Regions, plus the Autonomous Cities of Ceuta and Melilla. The authorisation of category 2 and 3 radioactive installations has been transferred to the Autonomous Governments of Aragon, Asturias, Cantabria, Castile-Leon, Catalonia, Ceuta, Extremadura, Galicia, Madrid, Murcia, Balearic Islands, Canary Islands, La Rioja, Navarre, Basque Country and Valencia.*

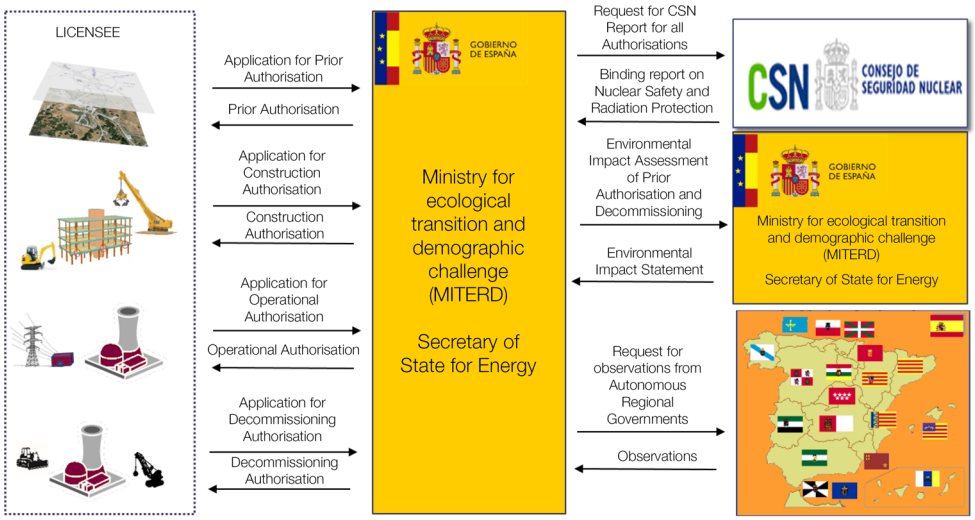


Figure 5: Structure of the nuclear facility authorisation system.

With regard to other matters, such as physical safety, emergency preparedness and environmental impacts, the application of inspection and evaluation actions is exercised in coordination with the bodies of other ministerial departments which also enjoy powers in accordance with the subject matter.

Disciplinary regime

The disciplinary regime regarding nuclear energy is established in Chapter XIV (Articles 85 to 93) of Nuclear Energy Law 25/1964. The main aspects of the disciplinary regime were described in depth in the Third National Report.

The Nuclear Safety Council will, where applicable, propose the initiation of the corresponding disciplinary investigation with regard to any events that could constitute an infringement in the field of nuclear safety, radiation protection or physical protection, informing the Directorate-General for Energy Policy and Mines at the MITERD, this being the body responsible for instigating the investigation both of the events constituting the infringement noted, and any relevant circumstances that might be required in order properly to categorise the events.

Likewise, once a disciplinary investigation has been initiated in the field of nuclear safety, radiation protection or physical protection, the Nuclear Safety Council will as a mandatory requirement issue a report for the due categorisation of the events involved in the proceedings. This report will be issued if the investigation was not initiated at the proposal of the Nuclear Safety Council, or in the event that, although it was, the proceedings cover other details beyond those communicated by the Council itself.

In addition to the above, Law 25/1964 provides for empowerment for the CSN directly to adopt coercive measures, such as disciplinary notices, with the corresponding fines associated with these, and warnings.

The Directorate-General for Energy Policy and Mines of the MITERD will handle disciplinary investigations of nuclear and radioactive facilities, except for category 2 and 3 radioactive facil-

ities for which responsibility has been transferred to the Autonomous Regional Governments. It will likewise submit proposed penalties before the disciplinary authority determined in law in accordance with the seriousness of the infringement, which within the scope of Central Government is: the Council of Ministers, the Minister of Energy Transition and Demographic Challenge, or the Director-General for Energy Policy and Mines.

Allocation of responsibilities

The allocation of functions and responsibilities within the legal system in the field of nuclear energy remains essentially the same as in place previously. The legal and regulatory framework for the management of spent fuel and the management of radioactive waste, lying within the general framework governing nuclear energy in Spain, clearly establishes the responsibilities of the different actors. A description is given below only of the responsibility lying with producers of radioactive waste and Empresa Nacional de Residuos Radiactivos, S. A., S.M.E. (Enresa), since the distribution of functions among the competent authorities is described at length in Article 20.

Royal Decree 102/2014, on the safe and responsible management of spent nuclear fuel and radioactive waste, establishes that the main responsibility with regard to spent nuclear fuel and radioactive waste will lie with those that produced it or, where applicable, the licensee of the authorisation to which this responsibility has been entrusted. Those responsible will instigate and apply integrated management systems, including quality assurance, giving due priority to safety and the overall management of spent nuclear fuel and radioactive waste, which may be subject to periodic verification.

In accordance with Article 38 bis of Nuclear Energy Law 25/1964, the management of radioactive waste, including spent nuclear fuel, and the dismantling and decommissioning of nuclear facilities, constitute an essential public service reserved for State ownership. Enresa is entrusted with management of this public service in accordance with the provisions of the General Radioactive Waste Plan approved by the Government. This applies without prejudice to any liabilities that might be attached to those producing such materials or the licensees of authorisations to which such responsibility is entrusted, in accordance with the terms set out in the above paragraph. The functions of Enresa are currently governed by Royal Decree 102/2014.

Enresa, in entirely public ownership, was created by Royal Decree in 1984, and is owned by CIEMAT, a national research centre attached to the Ministry of Science and Innovation, and SEPI (Sociedad Española de Participaciones Industriales), a public law agency which serves as the holding corporation for state-owned industrial ventures, attached to the Ministry of Finance. Supervision of Enresa is the responsibility of the MITERD, through its Secretary of State for Energy, who conducts strategic management and monitoring and control of its actions and plans, both technical and economic.

The tasks entrusted to Enresa, aside from the performance of its inherent activities comprising the management of spent fuel and radioactive waste and the decommissioning of nuclear facilities, include the generation of proposals for the General Radioactive Waste Plans, which it subsequently submits to the MITERD for review and to be processed by the Government, along with administrative and financial administration of the Fund for the financing of GRWP activities, under the supervision of a Fund Monitoring Committee, as well as scrutiny of the responsible economic and financial authorities of National Government.

In order to allow Enresa to perform its activities regarding the management of radioactive waste and spent fuel, the licensees of nuclear and radioactive facilities, and the licensees of facilities or activities not subject to the regime of authorisations under nuclear legislation, are

obliged to sign certain technical and administrative specifications with Enresa, approved by the MITERD and with a prior report by the Nuclear Safety Council, defining the conditions for the receipt of such materials by Enresa, some of which have already been approved, replacing the previous "standard contracts" which had previously governed these obligations.

19.2. Developments in the main legislative and regulatory provisions governing the management of spent fuel and radioactive waste

This subsection describes developments which have occurred or are in progress in the regulatory provisions with the status of legislation or regulation in the field of spent fuel and radioactive waste management.

i) Royal Decree 1400/2018, of 23 November 2018, approving the Regulation on nuclear safety at nuclear facilities (RSNIN)

Council Directive 2014/87/Euratom, amending Directive 2009/71/Euratom, establishing a Community framework for the nuclear safety of nuclear installations, has served to reinforce the European regulatory framework in the field of nuclear safety, following the Fukushima Daiichi nuclear power plant accident in March 2011.

Article 4.1(b) of the Directive specifically establishes that the Member States shall establish and maintain a national legislative, regulatory and organisational framework for the nuclear safety of nuclear installations, setting out national nuclear safety requirements covering all stages of the life-cycle of nuclear installations.

In the case of Spain, Nuclear Energy Law 25/1964 represents the legal framework establishing the principles and basic requirements for nuclear safety at such facilities, while Law 15/1980, of 22 April 1980, creating the Nuclear Safety Council, enshrines said body's status as the sole authority responsible for this matter in Spain. The CSN has been developing and regulating the nuclear safety of nuclear facilities by means of various Instructions, which have binding status.

The existence of this legal framework, together with the regulatory framework comprising the Regulation on nuclear and radioactive facilities, meant that it was not previously necessary to transpose Directive 2009/71/Euratom, which Directive 2014/87/Euratom subsequently amended in certain significant aspects.

In this regard, the latter Directive establishes that all phases of the lifespan of a facility shall have the aim of preventing accidents, and if these do occur, attenuating their consequences, avoiding: a) early radioactive releases that require emergency measures outside the site but without sufficient time for their application; and b) major radioactive emissions that require protection measures for the population that must not be limited in duration or area. This security objective must be imposed on new facilities and be considered as the reference point for the application of improvements in the case of those already in existence.

The new Directive likewise made other changes with regard to the previous Directive, both within the context of the regulatory authority, reinforcing such aspects as effective independence, adequate availability of human and financial resources, transparency, prevention of conflicts of interest, and other matters.

Notable requirements have likewise been established on the part of licensees, such as the liability of the licensee, which may not be delegated, the reinforcement of process-

es involved in the demonstration of safety (licensing processes and Periodic Safety Reviews), a safety-focused management system, the reinforcement of the safety culture, the reinforcement of the structures and resources required for on-site emergency management and coordination for external management, the availability of adequate financial and human resources, the qualifications of staff on the workforce and subcontracted staff, training, reinforcement of the concept of defence in depth, with an emphasis on the early notification of incidents.

With regard to the Member State, the Directive maintained the obligation established in Directive 2009/71/Euratom to conduct a self-assessment of its national framework and competent regulatory authorities at least every 10 years, inviting an international peer review in these areas in order constantly to improve nuclear safety, while also adding the obligation to conduct a peer review of "specific safety-related aspects" at least every six years, and also whenever an accident causes situations requiring emergency measures outside the site.

In any event, although the Spanish regulatory framework already included to a great extent the various requirements imposed by Directive 2014/87/Euratom, there was no specific regulatory standard in place as to nuclear safety at nuclear facilities, although Royal Decrees had established regulations for other matters within this sphere, such as radiation protection (Regulation of health protection against ionising radiation, approved by Royal Decree 783/2001), radioactive waste management (RD 102/2014, on the responsible and safe management of spent nuclear fuel and radioactive waste), physical protection (RD 1308/2011, on the physical protection of facilities and nuclear materials and of radioactive sources) and the processes for licensing such facilities (Regulation on nuclear and radioactive facilities, approved by RD 1836/1999).

Likewise, certain aspects of the Directive were not covered by the Spanish legal system, and the decision was therefore taken to incorporate these, alongside certain other elements derived from the various CSN Instructions, in one unified text with regulatory status: the Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018.

The RSNIN brings together the main general provisions which nuclear facilities must fulfil in the field of nuclear safety, and completes the incorporation within Spanish law of Council Directive 2014/87/Euratom, with regard to basic nuclear safety requirements. These requirements, which facilities must fulfil throughout their entire life-cycle, are intended to:

- guarantee a high level of nuclear safety to protect workers and the general public against risks resulting from ionising radiation derived from nuclear facilities;
- maintain nuclear safety and promote improvements thereto.

The provisions of the RSNIN apply to the following facilities:

- All nuclear power plants or reactors, nuclear fuel enrichment facilities, nuclear fuel element production facilities, spent nuclear fuel reprocessing facilities, spent nuclear fuel or high level radioactive waste temporary storage facilities.
- Radioactive waste temporary storage facilities located on the site itself and directly connected with the facilities listed in subsection (a).

Specifically, Article 6 establishes the following safety objectives for nuclear facilities: "*The siting, design, construction, commissioning, operation and dismantling of nuclear facilities must aim to:*

a) Prevent accidents, and in the event that they do occur, attenuate their consequences.

b) Avoid, either by physical impossibility or by being extremely unlikely with a high level of confidence:

- *1. early radioactive releases that require emergency measures outside the site without sufficient time for their application;*
- *2. major radioactive emissions that require protection measures for the population that must not be limited in duration or area".*

In particular, this subsection (b) of Article 6 must be interpreted as a reference for the proper implementation of reasonably feasible nuclear safety improvements at those nuclear facilities that obtained their construction authorisation prior to 14 August 2014.

More detailed information with regard to the additions made to this Regulation may be found in various articles of this Report.

ii) Royal Decree 451/2020, of 10 March 2020, on the control and recovery of orphan radioactive sources

The key developments regarding this Royal Decree are set out in Article 28 of this Report.

iii) Order ETU/1185/2017, of 21 November 2017, governing the declassification of waste material generated at nuclear facilities

In general, authorisations for the declassification of waste material with radioactive content generated at nuclear facilities had been granted in Spain on a case-by-case basis by the MITERD, following a report by the Nuclear Safety Council, and in accordance with the technical guidelines of the European Commission set out in the document Radiation Protection 122 Part 1: "*Practical Use of the Concepts of Clearance and Exemption, 2000*".

However, following the entry into force of the new Council Directive 2013/59/Euratom, laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, the declassification levels set out in the aforementioned technical publication by the European Commission were replaced with those established in Annex VII to said Directive. This indicates that materials that are to be disposed of, recycled or reused may be managed outside regulatory control, provided that the activity level concentrations with regard to solid material do not exceed the declassification values indicated in Annex VII, Table A of the Directive; or they fulfil the specific declassification levels (and associated requirements for specific materials) established in national legislation or by the competent national authority, in accordance with the general criteria for exemption and declassification established in Annex VII of the Directive, while also taking into account the technical guidelines provided by the EU.

Order ETU/1185/2017, regulating the declassification of waste material generated at nuclear facilities, partially transposes into Spanish domestic legislation the aforementioned Directive 2013/59/Euratom, with regard to the declassification of solid waste material generated at nuclear facilities. It thus replaces the previous case-by-case administrative authorisation system with a model allowing the licensees of nuclear facilities in operation or being decommissioned themselves to conduct declassification of solid waste material, in accordance with the levels established in Annex I to the Order.

As provided in the Order, the impacted waste material generated at nuclear facilities revealing radionuclide contamination at levels of isotopic activity per unit of mass lower than or equal to the declassification levels established in Annex I to the Order may be managed by conventional means, in accordance with the applicable management regulations, following the criteria set out in Annex II to the Order. The management of declassified waste material may not be performed at facilities exclusively dedicated to such material, as technological dilution with other waste must be guaranteed. The order indicates that, before embarking on the process of declassification, the licensee of the facility must present the Nuclear Safety Council with a testing plan for the radiological characterisation of the waste material and the calendar for execution thereof. The results of this plan will be sent to the CSN for approval.

Meanwhile, any waste matter that exceeds the levels established by the Order will continue to require authorisation from the MITERD, following a favourable report by the CSN.

Furthermore, the Order guarantees the traceability of such waste material until it is handed over to the final managers, which will be the responsibility of the licensee of the facility by means of the corresponding registration and archive system, which must at all times be kept up-to-date and available to the CSN.

19.3. Developments in the regulatory provisions of the Nuclear Safety Council

The regulatory capacity of the CSN is established in Article 2 of Law 15/1980, which created the body, empowering it to present the Government with the required regulatory proposals in the field of nuclear safety and radiation protection, along with any revisions it might deem appropriate. It may furthermore produce and approve Instructions, Circulars and Guides of a technical nature regarding nuclear and radioactive facilities and activities connected with nuclear safety and radiation protection, as well as the physical protection of nuclear and radioactive material and installations. These functions are more extensively developed in the Bylaws of the CSN, approved by Royal Decree 1440/2010.

Compliance with Instructions is mandatory; Safety Guides are recommended standards for those parties that they address, and Circulars are technical documents purely for information purposes.

Between 2017 and 31 December 2019, one new CSN Instruction was approved:

- ✓ Nuclear Safety Council Instruction IS-43, establishing criteria for the notification of events concerning physical safety on the part of nuclear facilities.

  It establishes criteria to demand that licensees of nuclear power plants, in operation or shut down and while the nuclear fuel is stored there, serve notice of events occurring at the site that could be connected with the physical safety of a nuclear facility. This notification of events regarding physical protection was excluded from IS-10 of 30 July 2014, establishing the criteria for notification of events to the Council by nuclear power plants.

The modification of three CSN Instructions already in force was likewise approved.

- ✓ Nuclear Safety Council Instruction IS-27, Revision 1, on general nuclear power plant design criteria.

Since its application in 2010 certain specific aspects of this Instruction have been revised, while its scope has been limited to Structures, Systems and Components that are "*safety-related*", with "safety-relevant" aspects being governed by IS-26 (on Basic Nuclear Safety Requirements Applicable to Nuclear Facilities), and IS-30 (on Requirements for the Fire Protection Programme at Nuclear Power Plants).

✓ Nuclear Safety Council Instruction IS-22, Revision 1, on safety requirements for the management of ageing and long-term operation of nuclear power plants.

This Instruction was revised in order to update and clarify the CSN requirements for the development of a process for the management of the ageing of structures, systems and components of nuclear power plants, including the case of the long-term operating period.

✓ Nuclear Safety Council Instruction IS-11, Revision 1, on the licensing of nuclear power plant operating staff.

Since it was published in 2007, this has been revised to incorporate the explicit requirement for the Systematic Training Design in line with recognised international standards so as to guarantee the qualifications of power plant staff. Conditions have also been improved for active continuation in the position of holders of operator or supervisor licences at nuclear power plants, and recovery in the event of loss.

Article 20. Regulatory body

Article 20. Regulatory body

1. *Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.*
2. *Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organisations are involved in both spent fuel or radioactive waste management and in their regulation.*

The regulatory function within the context of nuclear energy in Spain corresponds to the following authorities (a summarised diagram of the regulatory authorities and the main national RW management system agents may be found in Figure 6), which act in accordance with their powers within the scope of application of the Convention, subject to the context established by the legislation in force:

✓ **The Government** is responsible for defining energy policy, including nuclear policy and radioactive waste management, as well as issuing regulatory standards at the proposal of those ministerial departments with powers in these areas.

The Government will therefore issue regulations with the status of a Royal Decree, and will approve the regulatory developments of Laws passed by the Spanish Parliament.

The Ministry for Ecological Transition and Demographic Challenge (MITERD) is currently the ministerial Department responsible for issuing and processing regulatory proposals in the field of nuclear energy. Where these proposals refer specifically to nuclear safety or radiological protection, this responsibility lies with the CSN.

With regard to radioactive waste, according to Article 38 bis of Nuclear Energy Law 25/1964, of 29 April 1964, the Government is responsible for defining policy for the management of radioactive waste, including spent fuel, and the dismantling and decommissioning of nuclear facilities, through approval of the General Radioactive Waste Plan (GRWP).

The Government is likewise responsible for reviewing the tariffs of the Fund used to finance GRWP activities, on the basis of the updated economic/financial report on the cost of the corresponding activities, as established in the Sixth Additional Provision of Electrical Sector Act 54/1997, of 27 November 1997, declared to remain valid by Electrical Sector Law 24/2013, of 26 December 2013.

- ✓ **The Ministry for Ecological Transition and Demographic Challenge (MITERD)** is the ministerial Department of Central Government responsible for granting, modifying, suspending or revoking the authorisations of nuclear and radioactive facilities[11], subject to the mandatory and, where applicable, binding reports[12] of the Nuclear Safety Council (CSN) with regard to nuclear safety and radiation protection, in addition to any reports that must be issued by other departments or bodies of Central Government in other matters in accordance with the provisions of the specific regulations. The Government likewise has the task of issuing regulatory proposals in furtherance of the legislation in force, adopting provisions in furtherance of governmental regulations, and applying the disciplinary regime in the field of nuclear energy.
- ✓ The Governments of those **Autonomous Regions** which have by legal provision[13] been transferred executive functions attributed to the MITERD.
- ✓ The **Nuclear Safety Council (CSN),** which according to the provisions of the Law creating this body (Law 15/1980, of 22 April 1980) is the only competent State body in the field of nuclear safety and radiological protection, as a Public Law agency independent of Central Government, with its own legal personality and assets, independent of those of the State.

  In order to exercise the powers and functions established by law, the CSN must deal with the Spanish Parliament (Congress and Senate) and with the Government, as well as its responsible ministerial departments, and the Autonomous Governments.

  With regard to the relationship with Parliament, the corresponding Committee of the Lower House of Parliament monitors the activities of the CSN, by means of the report which the CSN presents to it each year, through periodic appearances and at the request of Lower House or its own request, to provide information on significant matters. The Committee may likewise call on other public authorities or entities connected with nuclear energy to appear before it. As a result of such appearances, the Lower

[11] *In the case of Category 2 and 3 radioactive facilities, the Autonomous Regions are responsible for exercising the executive functions of the MITERD if these powers have been transferred to them by legal provision.*

[12] *The CSN reports are binding wherever they are negative, or if they are positive, with regard to any stipulations they might impose.*

[13] *Specifically, authorisation of category 2 and 3 radioactive installations has been transferred to the Autonomous Governments of Aragon, Asturias, Cantabria, Castile-Leon, Catalonia, Ceuta, Extremadura, Galicia, Madrid, Murcia, Balearic Islands, Canary Islands, La Rioja, Navarre, Basque Country and Valencia.*

House of Parliament may, at the proposal of the Committee, call on the Government, the MITERD or the CSN, depending on the matter in question, to establish certain measures or initiate regulatory procedures. Similarly, the CSN appears before the responsible Upper House Committee, at the behest of said institution or at its own request in order to report on matters lying within its purview.

Meanwhile, the CSN deals with the Government essentially via the Secretary of State for Energy at the MITERD for all aspects concerning the processing of authorisations in all phases of site selection, construction, running, operation and decommissioning of nuclear and radioactive facilities. The MITERD is responsible for requesting that the CSN issue the mandatory and, where applicable, binding reports, with regard to nuclear safety and radiation protection, prior to the granting of any type of authorisation for facilities. The CSN will issue the Government with proposals for new regulations and the revision of the existing regulations in the field of nuclear safety, radiation protection and also the physical protection of nuclear and radioactive material and facilities, in collaboration with the competent authorities, and as required in accordance with international obligations entered into in this field. The CSN may likewise propose the instigation of disciplinary investigations where applicable.

The CSN likewise has dealings with the Secretary of State for the Environment (SEMA) at the MITERD, essentially through participation in environmental impact assessment procedures with regard to the assessment of the environmental radiological impact of facilities that could cause such an impact.

The CSN likewise deals with other ministerial departments both in order more effectively to perform its functions, and in order to cooperate in areas of shared interest. Aside from the MITERD, the main ministerial departments with which the CSN has dealings are:

- Ministry of Interior and Ministry of Defence, with regard to the handling of emergencies, physical protection and civil protection in response to radiation risk.
- Ministry of Education and Professional Training and the Ministry of Universities, with regard to the training of secondary education teachers.
- Ministry of Health: The CSN collaborates with this Ministry in matters connected with radiation protection (protection of patients, workers, the public and the environment).
- Ministry of Foreign Affairs, the European Union and Cooperation.

It should also be emphasised that both the MITERD and the CSN maintain a relationship in their respective spheres of responsibility with the Parliaments and Governments of the Autonomous Regions.

With regard to the MITERD, Spanish law allows for the possibility that some of the powers corresponding to Central Government may be transferred to the Autonomous Regions. As previously mentioned, various Autonomous Regions exercise executive functions originally attributed to the MITERD by the Regulation on nuclear and radioactive facilities (RINR) in connection with Category 2 and 3 radioactive facilities.

The MITERD is also obliged to convey the information presented in requests for authorisation to those Autonomous Regions which house facilities, or whose territory is included within the operational zone of the Nuclear Emergency Plan of facilities, in order to allow them to raise the relevant arguments with regard to territorial or environmental regulation.

Meanwhile, with regard to the CSN, in accordance with the provisions of Law 15/1980 it may delegate the Autonomous Regions to exercise functions attributed to said body, pursuant to the

general criteria agreed by the CSN itself for the implementation thereof. Delegation agreements are signed for this purpose, under the terms of which the powers attributed to the CSN by law remain subject to its responsibility. The CSN currently has delegation agreements in place with nine Autonomous Regions: Principality of Asturias, Catalonia, Galicia, Balearic Islands, Canary Islands, Murcia, Navarre, Basque Country and Valencia. A representative of those Autonomous Regions that have nuclear facilities within their territory or that have delegation agreements in place with the CSN will belong to the Advisory Committee for information on public participation regarding nuclear safety and radiation protection.

It should lastly be added that according to the Bylaws of the CSN, it must provide the Government, Upper and Lower Houses of Parliament, the Regional Governments and Parliaments and the Local Authorities concerned with timely information as to any circumstance or event affecting the safety of nuclear and radioactive facilities or the radiological quality of the environment anywhere within national territory. The CSN must furthermore each year send a report as to its activities to the Regional Parliaments of those Autonomous Regions whose territory contains nuclear facilities.

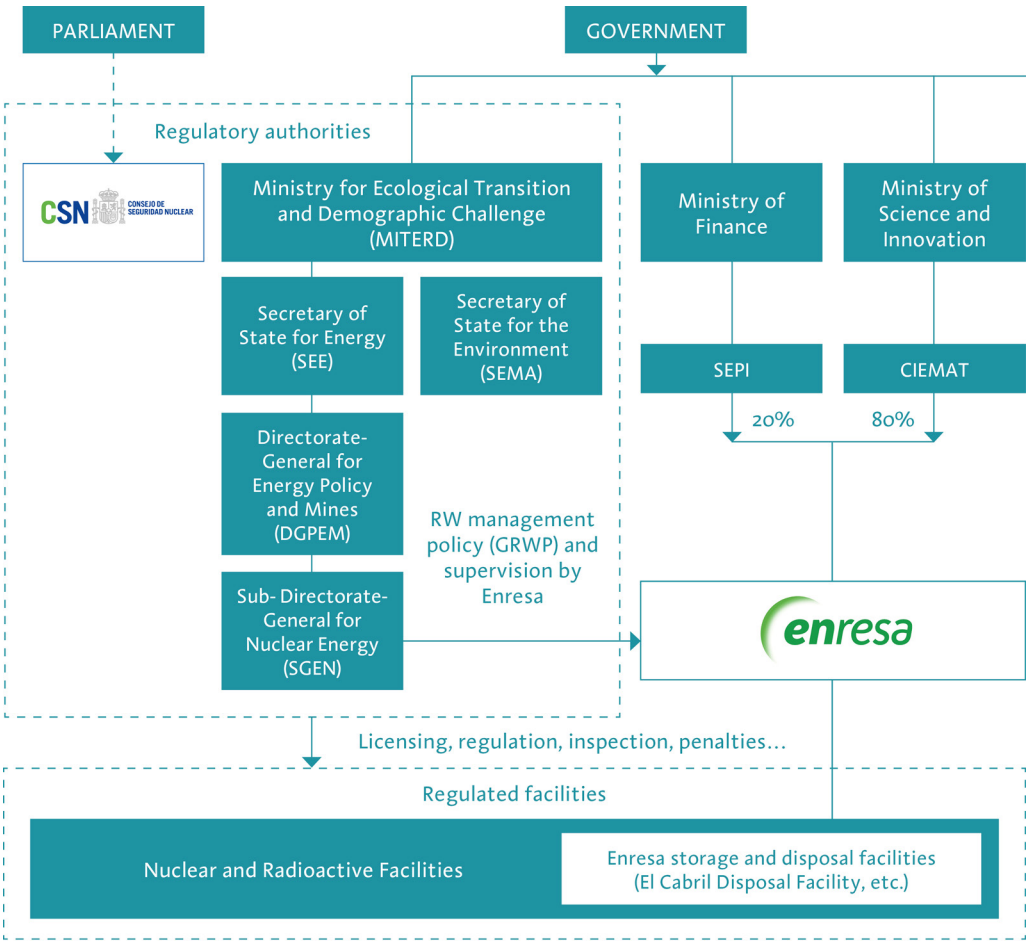


Figure 6: Table summarising agents within the national RW management system.

20.1. Structure, responsibilities and functions of the ministry for ecological transition and demographic challenge (miterd)

20.1.1. Organisational structure

At present, Royal Decree 139/2020, of 28 January 2020, establishing the basic organisational structure of ministerial departments, establishes the new designation of the Ministry for Ecological Transition and Demographic Challenge (MITERD) in addition to its constituent senior and executive bodies.

Within the MITERD, the Secretary of State for Energy is the senior authority in the field of energy, and within said secretarial department, the Directorate-General for Energy Policy and Mines (DGPEM) is the executive body which performs the functions detailed in the following subsection within the specific field of nuclear energy.

Within the DGPEM, the Sub-Directorate-General for Nuclear Energy (SGEN) is the executive body responsible for the practical execution of these functions. The SGEN also has dealings with other executive bodies and general services of the MITERD integrated within and outside the Department of the Secretary of State for Energy in order to exercise its functions, such as the Technical Secretariat-General for the processing of regulatory proposals, or the State Attorney's Office for legal consultations and support, among other aspects.

Annex G of this Report includes an organisational chart of the MITERD, highlighting those bodies that are attributed functions regarding the Convention, together with a block diagram indicating the structure of the functional areas and services of the SGEN.

20.1.2. Powers and functions

According to the legal structure in force, the MITERD is one of the authorities with powers and functions within the Spanish regulatory system in the field of energy, and in particular nuclear energy. It should be clarified that the generation of electrical energy in Spain is fully liberalised, and as a result the actions of Government, via the MITERD, are confined to the definition of guideline energy planning, and the regulation of the different energy sectors. The MITERD therefore plays no role in either the development or the promotion of nuclear energy.

Those powers in the field of nuclear energy attributed to the different bodies remain substantially unchanged with regard to the Sixth National Report. The MITERD exercises the following powers and functions lying within the scope of the Joint Convention:

- ✓ It grants authorisations for nuclear and radioactive facilities, except for those second and third category radioactive facilities located in Autonomous Regions that have had executive functions corresponding to Central Government transferred to them, following a favourable report by the CSN.
- ✓ It draws up regulatory proposals and applies the disciplinary regime established in Nuclear Energy Law 25/1964. Where regulatory developments refer to nuclear safety or radiation protection, the CSN is responsible for drawing up proposals.
- ✓ It manages administrative records (with regard to the transport of nuclear and radioactive materials, radioactive facilities, activities involving the sale of radioactive devices and materials, etc.).

- ✓ It defines the radioactive waste management policy.
- ✓ It contributes to the definition of R&D policy, in coordination with the Ministry of Science and Innovation. On the initiative of the MITERD, a Strategic Nuclear Energy R&D Committee (CEIDEN) was set up for this purpose in 1999[14], the predecessor of the current Nuclear Fission Energy R&D Technological Platform of the same name, its purpose being to bring together all actors connected with the nuclear energy sector, including not only the MITERD itself, but also the CSN, universities and research centres, operators and industry associations, in order to identify synergies and shared points of interest in the research activities and programmes undertaken by the former, and to take part in international programmes. Within the context of radiation protection, the new National Radiation Protection R&D Platform (PEPRI) was set up in 2014, with the overall objective of promoting R&D&I and innovation activities focused on protection against radiation.
- ✓ It monitors compliance with the international commitments signed by Spain in the field of nuclear energy, in particular with regard to safeguards, non-proliferation and civil liability for nuclear damage.
- ✓ It has dealings with the international bodies specialising in nuclear energy within the context of the Eurotunnel Treaty and its related committees and working parties, within the framework of the IAEA and the OECD Nuclear Energy Agency (NEA) with regard to the European Reconstruction and Development Bank, and the European Nuclear Energy Forum, etc.

20.1.3. Human resources and training

The SGEN, which is the Sub-Directorate-General responsible for implementing the functions of the MITERD in the field of nuclear energy, is fully staffed by public officials belonging to the different Central Government Bodies. The normal system for recruitment to positions at the various units of the MITERD, including the SGEN, is by competitive examination for those covered by a public job offer, followed by a selective training course. Meanwhile, such jobs are open within the SGEN to those applying through the competitive transfer process for public officials from other fields of Central Government Administration, provided that the bodies from which they are transferred are compatible with the demands applicable to the jobs at the MITERD for which they are applying.

The SGEN currently has 13 employees. 77% of the public officials who belong to the SGEN at present have a university education, most of them industrial engineers belonging to the State Industrial Engineers Body, although there are also public officials belong to other bodies of engineers. There is a balanced distribution of the workforce in terms of knowledge and experience in the field of administration and nuclear technology, in accordance with service requirements.

The budget of the Directorate-General for Energy Policy and Mines, which is the executive body to which the SGEN belongs, is covered by the General State Budget, in the same way as any other organisational unit of the ministerial departments of Central Government.

The training programme for SGEN personnel forms a part of the general MITERD training programme, which covers both training in technical energy-related matters, and also in administrative, legal and economic fields.

[14] The CEIDEN currently has 110 members and 120 partner bodies, with the CSN holding the position of Chair, renewable every two years.

20.2. Structure, powers and functions of the Nuclear Safety Council (CSN)

20.2.1. Organisational structure of the CSN

Law 15/1980, of 22 April 1980, creating the Nuclear Safety Council, and the Bylaws of the Nuclear Safety Council, approved by Royal Decree 1440/2010, of 5 November 2010, establish, respectively, in Article 4 and Title II, Chapters IV and 5, the following structure for the CSN:

- ✓ The Plenary, the senior management body of the Nuclear Safety Council, comprises a Chairperson and four Directors.
- ✓ The Secretariat-General, responsible for the following Sub-Directorates and Units:
  - ⇨ Sub-Directorate for Personnel and Administration
  - ⇨ Sub-Directorate for Information Technologies
  - ⇨ Sub-Directorate for Legal Consultancy.
  - ⇨ Planning, Assessment and Quality Unit
  - ⇨ Inspection Unit
  - ⇨ Research and Knowledge Management Unit.
- ✓ The Technical Directorate for Nuclear Safety, responsible for the following Sub-Directorates:
  - ⇨ Sub-Directorate for Nuclear Power Plants
  - ⇨ Sub-Directorate for Nuclear Engineering
  - ⇨ Sub-Directorate for Nuclear Technology.
- ✓ The Technical Directorate for Radiation Protection, responsible for the following Sub-Directorates:
  - ⇨ Sub-Directorate for Operational Radiation Protection
  - ⇨ Sub-Directorate for Emergencies and Physical Protection
  - ⇨ Sub-Directorate for Environmental Radiation Protection

Annex G of this Report includes an organisational chart of the CSN.

The senior management bodies of the CSN are the Plenary and the Presidency, acting in fulfilment of their respective responsibilities as a collegiate managerial body. The Plenary comprises a Chairperson and four Directors, appointed from among persons of established standing in the matters entrusted to the CSN, with particular importance given to their independence and objectivity of judgment.

The Chairperson and the Directors will be appointed by the Government at the proposal of the MITERD, following an appearance by the individual proposed for the position before the corresponding Committee of the Lower House of Parliament, on the terms provided by the Regulation of the Lower House. The Lower House will, by means of a resolution passed by three fifths of the members of the responsible Committee, register its acceptance or reasoned veto within a period of one calendar month of receipt of the corresponding notification. Once this deadline has passed, if no explicit opinion has been issued by Lower House of Parliament, the corresponding appointments will be deemed to have been accepted.

The Council will be assisted by a Secretariat-General, responsible for the administrative and legal operational bodies in order to fulfil its purposes, along with those internal or external technical bodies established in the Bylaws. The Secretary-General will act as the secretary of the CSN Plenary, attending meetings with the right to speak but not to vote.

The CSN's managerial bodies also include other Technical Directorates and the Technical Bureau Directorate of the Chairperson:

- ✓ The Technical Directorate for Nuclear Safety, grouping together all functions involving the safety of nuclear facilities, except for the storage of low and intermediate level radioactive waste, which are the responsibility of the Technical Directorate for Radiation Protection. It likewise handles matters regarding the safe transportation of nuclear waste and radioactive materials. It is responsible for three Sub-Directorates: Nuclear Facilities, Engineering and Nuclear Technology.
- ✓ The Technical Directorate for Radiation Protection is responsible not only for the inspection and control of radioactive facilities, radiation protection of workers and low and intermediate level radioactive waste management, but also the field of radiation protection of the general public and the environment, and radiation emergencies. This Directorate is responsible for three Sub-Directorates: Environmental Radiation Protection, Operational Radiation Protection, and Emergencies and Physical Protection.
- ✓ The Technical Bureau of the Presidency assists the Chairperson of the CSN, with responsibility for performing specific tasks entrusted to it by the Chairperson, in addition to those connected with the activities of the Plenary as a collegiate body.

20.2.2. Powers and functions of the CSN

The CSN is a Public Law entity, independent of Central Government and with its own distinct legal personality and its own assets, independent of those of the State, as the sole body responsible for nuclear safety and radiation protection at the national level.

The functions of the CSN are essentially listed in Article 2 of Law 15/1980 and Title I of its Bylaws, without prejudice to responsibilities shared with other national bodies as set out in other standards or legislation in force. With regard to the scope of the Convention, the functions of the CSN are, in summary, as follows:

- ✓ It issues mandatory reports to the MITERD with regard to authorisations for nuclear and radioactive facilities, and for all activities connected with the manipulation, processing, storage and transport of nuclear and radioactive substances; it issues reports prior to the decisions issued in exceptional circumstances and cases by the MITERD in connection with the removal and safe management of radioactive materials.
- ✓ With regard to radioactive waste, it informs the MITERD of concentrations of levels of activity for consideration as such, in those materials containing or incorporating radioactive substances and for which no use is planned.
- ✓ It presents the Government with proposals as to the regulations required within its purview. It likewise draws up and approves Instructions, Guides and Circulars of a technical nature with regard to nuclear safety and radiation protection.
- ✓ It proposes the initiation of disciplinary investigations within the sphere of its responsibilities. The Council will also as a mandatory requirement issue a report within a period of three months for the appropriate classification of events if disciplinary

proceedings in the field of nuclear safety, radiation protection or physical protection have been initiated by another body, or at the reasoned request of the CSN itself, and in the event that the proceedings involve details other than those notified by the CSN. Penalties will be imposed by the executive body of Central Government or the Autonomous Regional Governments.

The CSN is likewise empowered to serve disciplinary notices on licensees and to propose corrective measures and, where applicable, to impose coercive fines.

- ✓ It performs surveillance and control of nuclear and radioactive facilities, conducting inspection and control of nuclear and radioactive facilities throughout all phases, and inspects the transport, manufacture and approval of equipment with radioactive sources or that generate ionising radiation, and the approval or ratification of packages intended for the transport of radioactive substances.
- ✓ It oversees and controls the doses of radiation received by operational personnel and discharges of radioactive materials outside nuclear and radioactive facilities, together with their individual or cumulative impact on the surroundings of such facilities.
- ✓ It conducts studies, assessments and inspections of the plans, programmes and projects required for all phases of radioactive waste management and for new designs.
- ✓ It will likewise issue a prior report on the General Radioactive Waste Plan that the MITERD submits to the Government for approval
- ✓ It maintains official relations with similar bodies abroad and takes part in international bodies with responsibilities for nuclear safety or radiation protection, and advises the Government as to commitments with such bodies or with other countries.
- ✓ It informs public opinion as to the matters within its purview, without prejudice to the publication of its administrative actions on the legally established terms.

  The CSN is obliged to inform the general public of all significant events concerning nuclear and radioactive facilities; the reports that it issues are made public, as are the notices resulting from the inspections performed; a public information procedure is established during the preparatory stage of CSN Instructions and technical guides.
- ✓ It collaborates with the competent authorities in preparing the criteria applicable to external emergency plans and physical protection plans for nuclear and radioactive facilities.

  For all aspects connected with nuclear safety and radiation protection, it coordinates support and response measures to address emergency situations.

  It inspects, evaluates, controls, proposes and adopts any preventive and corrective measures that might be required in response to exceptional or nuclear or radiological emergency situations, where these originate in facilities, equipment, companies or activities not subject to the nuclear legislation authorisations regime.
- ✓ It establishes and monitors research plans in the field of nuclear safety and radiation protection.
- ✓ It archives and safeguards documentation to be sent to the Nuclear Safety Council by the licensees of nuclear facility operational authorisations when they definitively cease operations, and prior to the transfer of ownership and granting of authorisation for decommissioning.

20.2.3. International relations of the CSN

International relations play a fundamental role in the work performed by the CSN. The international activities of the CSN take place on two different levels: multilateral, through international forums, institutions and organisations, and bilateral, through agreements with counterpart institutions.

The overarching activity within the field of international multilateral relationships comprises involvement by CSN on the executive bodies, committees and working parties of a range of international organisations, such as the International Atomic Energy Agency (IAEA) and the OECD Nuclear Energy Agency (OECD-NEA), and also within the context of the institutions of the European Union (EU). The CSN likewise collaborates with non-governmental international institutions, such as the International Commission on Radiological Protection (ICRP).

During this period the CSN took part in activities concerning compliance with the commitments given by Spain as a contracting party under the following international Conventions:

- ✓ Convention on Nuclear Safety - the CSN acts as national liaison and coordinates the preparation of the national reports.
- ✓ Joint Convention, collaborating with the MITERD in the preparation of the National Reports.
- ✓ Convention on the Physical Protection of Nuclear Material.
- ✓ OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic.
- ✓ Convention on Early Notification of a Nuclear Accident.
- ✓ Convention on Assistance in the Case of A Nuclear Accident or Radiological Emergency.

Meanwhile, the CSN is involved in the following groups and associations of nuclear regulators:

- ✓ International Nuclear Regulators Association (INRA).
- ✓ Western European Nuclear Regulators Association (WENRA).
- ✓ Heads of the European Radiological Protection Competent Authorities (HERCA).
- ✓ Ibero-American Forum of Radiological and Nuclear Regulatory Bodies (FORO).

With regard to bilateral relations, the CSN has signed agreements and maintains activities in the fields of nuclear safety, radiation protection and waste management with numerous counterpart bodies.

The CSN plays an active role in the IAEA technical cooperation programme, contributing experts for participation in seminars, hosting placements and scientific visits by foreign experts, and organising activities in Spain in the field of safe radioactive waste management.

20.2.4. Human resources, training and funding of the CSN

- ✓ **Human resources:**

  As the body responsible for such a field as nuclear safety and radiation protection, the CSN requires specialist technical personnel in this field. These technical personnel comprise public officials belonging to the Nuclear Safety and Radiation Protection

Body, as established in Article 8 of Law 15/1980, creating the CSN, appointed by means of competitive examination organised by the CSN itself. Aside from such personnel, the organisation also includes public officials from other Public Authority Bodies, temporary personnel and employees without public official status.

As at 31 December 2019, the CSN had a staff of 417 employees, 211 of them public officials of the Nuclear Safety and Radiation Protection Body, dedicated to the inspection, control and monitoring of the functioning of nuclear and radioactive facilities, a further 117 public officials belonging to the bodies and hierarchies of other Public Authorities, 25 temporary employees, 7 Senior Officers, and 57 regular employees. Women account for 52.76% of the total CSN workforce, and men the remaining 48.24%. The average age of the organisation's personnel is 53 years. As for staff qualifications, 71.22% have a higher education qualification, 6.23% intermediate qualifications, and 22.5% have other qualifications.

One priority goal of the CSN is to incorporate new public officials to offset the loss of staff as a result of retirement. Since 2017, 33 new posts have been advertised, and 8 new public officials have joined the CSN workforce. The remaining 25 correspond to job offers from 2018 and 2019, which were advertised jointly and will be filled in 2020.

✓ **CSN Personnel Training Plan:**

Since it was first set up, the Nuclear Safety Council has placed particular emphasis on the training of all its personnel. This emphasis has taken the specific form of annual training plans establishing the annual provision for training activities, organised internally or in partnership with external specialist bodies, along with involvement by CSN personnel in activities organised by other institutions and covering a wide range of geographical and thematic areas. Training activities have focused on scientific and technical training; legal and administrative training; and the development of managerial, organisational and communication skills, as well as the use of working tools and procedures.

The 2017, 2018 and 2019 Training Plans were drawn up in accordance with the needs raised by the Technical Directorates and the remaining Sub-Directorates and Units involved, with the contents being clustered around seven training programmes:

⇨ Technical Mastery and Refresher Courses:

- Nuclear Safety sub-programme.
- Radiation Protection sub-programme.
- Support Areas sub-programme.
- Initial Technical Training sub-programme (NS and RP) (since 2015).

⇨ Managerial Development.

⇨ Administrative and Legal Management

⇨ Occupational Risk Prevention.

⇨ IT.

⇨ Languages.

⇨ Skills.

In 2017 training covered a workforce of 454 people, with 107 courses being delivered and 21,940 hours dedicated to training, with a training budget amounting to

€420,010. In 2018, a workforce of 439 employees received 113 courses, with 21,467 hours being dedicated to training, and a training budget of €250,050. In 2019, a workforce of 435 employees received 97 courses, with 21,723 hours being dedicated to training, and a training budget of €328,050.

The 2017 and 2018 training plans included a sub-programme to deliver the necessary training for public officials on work placements and who had passed the successive competitive examination processes to be admitted to the Nuclear Safety and Radiation Protection Body, as authorised under successive public employment offers.

✓ **Financing:**

The budgets for the expenditure and income of the CSN are incorporated within the General State Budget, and as such approval for these budgets lies with Parliament. The two most significant items under the income budget are first of all the fees, public levies and other income that the CSN obtains in consideration for its services, and to a lesser extent State transfers, which have gradually been reduced through the application of budgetary containment and fiscal consolidation policies. The funding of the CSN is therefore at present derived almost entirely from its own resources.

⇨ Fees, public levies and other income are governed by Fees and Public Levies Law 14/1999, of 4 May 1999, for services provided by the Nuclear Safety Council. The most significant fees in terms of their amount are those obtained through:

– Execution of studies, reports and inspections prior to operational and decommissioning authorisations for nuclear and radioactive facilities granted by the MITERD.

– Inspection and control of nuclear and radioactive facilities in operation, and related activities.

– Granting of licences for personnel intended to operate or supervise the functioning of nuclear and radioactive facilities.

Public levies are used to finance reports, trials or studies into new designs, methodologies, simulation models or verification protocols connected with nuclear safety or radiation protection.

This funding subsection accounted in the 2019 financial year for 99.55% of the total budget.

⇨ State transfers. The CSN conducts controls of radiation protection measures intended for the general population and the environment. These functions are not subject to public price and tariff levies, and are instead financed under the General State Budget, via the MITERD. The funding budgeted in this regard comprised 0.45% of the total.

20.2.5. CSN Management System

The CSN has implemented a process-focused Management System based on the requirements of the IAEA (GS-R3) and standard ISO 9001: 2008. The processes covering all the body's activities have been classified as follows:

✓ Strategic, including the functioning of the Plenary, information and communication, and regulatory development.

- ✓ Operational, including authorisation, assessment, supervision and control of facilities and activities (including transport); licensing of personnel; radiation protection of workers, of the public and the environment; emergency management and physical safety.
- ✓ Support, including institutional and international relations; research and development; economic and human resource management (including training); information systems; documentation, and administration of the Management System.

The documents describing the system are organised in a hierarchical structure: System Manual, Process Map, Organisation Manual and Procedures. All these documents, in addition to the information and documentation required in order to perform regulatory activities, are available to all personnel via the CSN intranet, with certain exceptions justified on grounds of security or confidentiality.

The Management System is subject to continuous improvement. Aside from assessments of the fulfilment of plans and objectives, the CSN has an established audit plan and is subject to external assessments by national and international bodies.

- ✓ The internal audit plan makes provision for all processes to be audited with the established frequency, ranging from 2 to 5 years depending on the importance of the process and the legal requirements applicable to it. There is a specific audit programme for activities entrusted to Autonomous Regions.
- ✓ Aside from being subject to the economic/financial checks and audits required of all public bodies, the CSN must also systematically report to the Spanish Parliament and the parliaments of those Autonomous Regions containing nuclear facilities. Parliament is responsible for continuous monitoring of the actions of the CSN.

20.2.6. Knowledge management at the CSN

With regard to the qualifications and skills of the technical personnel of the CSN in order properly to perform their mission, the CSN has developed and is implementing a knowledge management model specifically tailored to its needs, based on the recommendations of the IAEA, and incorporated within the organisation's integrated management system.

The process of knowledge management at the CSN must address the four basic cornerstones of the model recommended by the IAEA. The structure is based on a horizontal and cyclical process, with the following stages:

- ✓ Identification of the capabilities needed by the CSN to perform its mission (Necessary capabilities).
- ✓ Periodic evaluation of the resources available at the CSN (Available resources).
- ✓ Permanent evaluation of shortcomings, lacks and losses of information, documentation and knowledge from the CSN (Shortcomings and lacks).
- ✓ Programme for the preservation of critical knowledge and continuous improvement of capabilities (Acquisition and preservation).
- ✓ Internal communication plan to guarantee distribution and accessibility of knowledge and information (Accessibility and availability).
- ✓ Independent evaluation programme and periodic review of the process (Evaluation and review).

In the years 2016 to 2019 activities focused on the programme for the preservation of critical knowledge and the continuous improvement of capabilities, with an action plan being developed in this field, focused on the preservation/recovery of the knowledge and experience of CSN technicians born before 1952.

The methodology employed in this critical knowledge preservation programme comprises the following phases:

- ✓ Preparatory Phase: identification of holders of critical knowledge.
- ✓ Extraction Phase and systematisation of knowledge.
- ✓ Exploitation Phase: deployment of an agenda to make use of the systematised knowledge.

In this regard the CSN has a computerised tool in place, KITE, to support the RECOR process (transparent extraction of critical knowledge). This is an ongoing process.

The CSN has also embarked on a process of creating knowledge communities, and in 2019 set up the first knowledge community to address the topic of Lessons Learned, deemed to be of interest as a horizontal activity involving both Technical Directorates.

20.2.7. Independence of the regulatory body

The independence of the CSN is explicitly provided for in the Law which created the body:

> *"The Nuclear Safety Council is created as a Public Law entity, independent of Central Government Administration, with its own legal personality and assets, independent of those of the State, and as the sole body responsible for the field of nuclear safety and radiation protection. It shall be governed by its own Bylaws drawn up by the Council and approved by the Government, the text of which shall be conveyed to the competent Committees of the Upper and Lower Houses of Parliament prior to publication, and through any specific provisions addressed thereto, without prejudice to the supplementary application of the principles of standard or special legislation."*

This same declaration of independence is set out in Article 2.4 of the Bylaws of the CSN, which states that

> *"The Nuclear Safety Council acts in the pursuit of its activities and for the fulfilment of its purposes with organisational and functional autonomy, fully independent of Public Authorities and stakeholders. It is likewise subject to parliamentary and judicial control. Any decisions adopted by the Plenary and the Chairperson of the Nuclear Safety Council in performing the public functions attributed to them shall mark the end of the corresponding administrative channel".*

Meanwhile, Article 8.2 of the Law creating the CSN empowers the Council

> *"in accordance with any standards established in the Bylaws to hire the services of personnel, companies and national or foreign organisations solely in order to perform work or to draw up specific studies, provided that it can be confirmed that there is no connection with those affected by the services contracted. Under no circumstances may personnel from outside the CSN directly participate in deci-*

sion-making as to administrative proceedings in progress. The CSN shall establish the necessary resources to ensure that any personnel, companies and organisations hired externally abide at all times by the obligations of independence required while providing their services".

Likewise, according to the Law creating the CSN itself, any reports issued by the CSN to the MITERD regarding nuclear safety, radiation protection and physical protection prior to any decisions that the MITERD might adopt in the field of the granting of authorisations will in all cases be mandatory, and furthermore binding if they constitute negative opinions or the refusal to grant authorisation, and likewise with regard to any conditions that they might impose if the decision is positive.

20.2.8. Transparency in regulatory and public information activities

In its strategic plan for the period 2017-2022, the CSN recognises as one of its fundamental values the principle of transparency, based on the capacity to provide the general public with relevant, valid and verifiable information in all matters connected with nuclear safety and radiation protection.

This policy of transparency is rooted in Law 15/1980, creating the CSN, amended by Act 33/2007, of 7 November 2007. It likewise incorporates aspects that are governed by the Aarhus Convention, ratified by Spain in 2004 and expressed in national legislation in the form of Law 27/2006, of 18 July 2006, governing the rights of access to information, public participation and access to justice in the field of the environment.

Meanwhile, the 2007 amendment to the Law creating the CSN extended the requirements with regard to public information, so as to increase the organisation's transparency and achieve greater public trust in the actions of the CSN. The Law establishes three channels for this demand:

- ✓ The transfer of information to State institutions:

  Each year the CSN sends the Spanish Parliament and the regional parliaments of those Autonomous Regions that have nuclear facilities within their territory, a detailed report on its activities. Likewise, as part of its relationship with Parliament, the CSN responds to parliamentary initiatives (oral and written questions, non-legislative proposals, etc.) and complies with the decisions issued on its annual reports.

- ✓ Information committees in the vicinities of nuclear facilities:

  The law establishes that the CSN must promote and participate in information forums in the vicinities of such facilities, presided by the MITERD in order to address aspects connected with the control and monitoring of nuclear and radioactive facilities and emergency preparedness. The functioning of these Information Committees is governed by the RINR.

- ✓ Public information policy:

  Article 14 of Law 15/1980 establishes the need to facilitate access to information and participation by individual citizens and civil society. This entails an obligation to inform the media and stakeholders of significant events connected with the functioning of facilities, placing particular emphasis on the communication of any events and incidents that might affect safety, their possible radiological impact on people and the environment, and the corrective measures to be applied.

In this regard, the CSN website publishes facilities inspection notices, information on the operational statuses of nuclear power plants and information on environmental quality measured by the Network of Automatic Stations and the Environmental Radiological Surveillance Network. Meanwhile, the minutes of meetings of the Council and technical reports providing the basis for the decisions that it reaches are also published. Likewise, the CSN website is updated with the results of the systematic evaluation programme applied to the functioning of power plants, known as the Integrated Power Plant Supervision System (SISC), which incorporates novel supervisory methods focused on observation of the performance of nuclear power plants in operation, through functional indicators and the evaluation of the findings of inspections conducted by the CSN.

In the event of any significant occurrence or incident at nuclear and radioactive facilities, the website publishes the associated news items, summaries and press releases. In parallel, the CSN addresses direct requests for information from the media, with all the flexibility that technical demands allow.

With regard to citizen participation:

- ✓ The CSN is obliged to subject its safety guides and instructions to public comment during the preparation process, to which end it provides an online platform on its corporate website which can be used to submit comments. The MITERD likewise reports on the regulations in force in the field of nuclear energy, and submits proposals for royal decrees and regulations to the mandatory public consultation procedure via its website.

- ✓ Advisory Committee for information on public participation

  The law creating the CSN establishes the constitution of an Advisory Committee for public participation and information, which began its operations on 23 February 2011. The purpose of this committee is to issue recommendations to the CSN to improve transparency, access to information and public participation in the fields for which it is responsible.

  The Advisory Committee comprises representatives of the main national stakeholders, including ministries, universities, professional associations, electricity industry bodies, mayors of municipalities in the vicinity of nuclear power stations, and charitable organisations.

Other channels of communication:

- ✓ Communication on the international stage

  One of the strategic operational approaches of the CSN for the period 2017-2022 is to promote policies for institutional relations and communication with other bodies existing at the international level. To this end the CSN is actively involved in the various international forums so as to exchange experiences and technical and regulatory knowledge in the field of nuclear safety and radiation protection, learn about good practice serving to reinforce the safety of installations in Spain, and to reinforce the international coordination of emergency response plans.

- ✓ Educational activities and interactive information centre

  The CSN undertakes a broad spectrum of activities, both technical and educational, addressing topics connected with its work. These activities include in particular the organisation of conferences, seminars and training events, as well as an extensive

publishing schedule, which includes the publication of the nuclear safety and radiation protection journal Alfa.

The CSN also has an interactive information centre which receives a great many visits (recently having reached 100,000 visitors), mostly from educational establishments and national and international institutional delegations.

Section F.

Other safety-related provisions

Section F. Other safety-related provisions

Article 21. Responsibility of the licensee

Article 21. Responsibility of the licensee

1. *Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.*
2. *If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.*

21.1. Responsibility of the licensee with regard to safety

Spanish legislation establishes as a basic principle that the overarching responsibility for the safety of waste management facilities lies with the licensee.

The legal principles assigning responsibility to the licensee of the facilities are set out in Nuclear Energy Law 25/1964, of 29 April 1964 (LEN), the Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018, of 23 November 2018, Royal Decree 102/2014, of 21 February 2014, on the responsible and safe management of spent nuclear fuel and radioactive waste, and the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, of 3 December 1999. From the perspective of civil liability for nuclear damage, the licensee of the facility is likewise designated as being liable for compensation for damages up to the limit set out in law.

The LEN establishes that the licensee of nuclear or radioactive facilities or activities connected with ionising radiation will be responsible for their safety, defining said figure as the natural or legal person responsible for the entirety of a nuclear or radioactive facility, as specified in the corresponding authorisation, while furthermore emphasising that this responsibility cannot be delegated. Furthermore, the RSNIN clarifies that this responsibility includes control of the activities of any contractors and subcontractors that could affect the nuclear safety of such facilities.

To this end, the RSNIN indicates that the licensee of a nuclear facility authorisation must, throughout the life-cycle of the facility, have in place the necessary technical, economic and human resources, with appropriate qualifications and skills, and an appropriate organisational structure in order to maintain nuclear safety and to ensure an adequate emergency response capacity.

Meanwhile, Royal Decree 102/2014 establishes that the holders of authorisations shall instigate and apply integrated management systems, including quality management, affording due priority to safety in the overall management of spent nuclear fuel and radioactive waste, which may be subject to periodic verification.

The RINR establishes that in order to obtain the different authorisations, the applicant must present the organisation intended as the supervisor of the project, and guarantee quality during the successive phases of the facility. A detailed description of each of the positions at the operator's organisation and the responsibilities assigned to them with regard to nuclear safety and radiation protection is likewise required, along with presentation of the organisation planned for future operation of the facility, and the preliminary operational staff training structure.

The RINR furthermore indicates that the licensee of the facility is responsible for ensuring that all natural or legal persons involved there as contractors or subcontractors perform their activities under safe conditions, and at all times within the provisions of official documents.

According to Law 25/1964, the State will be the designated owner of radioactive waste once it has entered disposal. It will likewise handle any surveillance that might be required following the final decommissioning of a nuclear or radioactive facility once the time period established in the corresponding decommissioning declaration has passed.

21.2. Liability for nuclear damage

During the period covered by the report no developments occurred with regard to the regime governing civil liability for nuclear damage, the details are therefore given in Annex E.

Article 22. Human and financial resources

Article 22. Human and financial resources

Each Contracting Party shall take the appropriate steps to ensure that:

(i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;

(ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;

(iii) financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

22.1. Availability and qualification of human resources

Legal framework

In Spain, Article 37 of Nuclear Energy Law 25/1964, of 29 April 1964, establishes an obligation as to availability and aptitude regarding the personnel of nuclear and radioactive facilities, while the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, of 3 December 1999, governing the regime of administrative authorisations, lists the requirements for the organisation that must be presented by the licensee in the various authorisations for the licensing of a facility, in addition to personnel accreditations and licences.

Said national provisions serve to fulfil Directive 2011/70/Euratom, establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, which was adopted subsequently. Article 7 of said Directive requires national regulatory frameworks to 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. Aside from this obligation, with reference to licence holders, Article 8 extends the obligation to have knowledge and skills in place to all parties involved in radioactive waste management.

In any event, the provisions regarding personnel qualifications have been further reinforced following the adoption of said Directive, through the inclusion of a subsection in the RINR in September 2011, according to which personnel working at nuclear and radioactive facilities and whose functions are connected with nuclear safety, radiation protection or physical protection, or whose activity could in any way interfere in the functioning of the installation, must fulfil the conditions of appropriate physical and psychological suitability, and may be subjected to preventive analyses and controls to detect the consumption of intoxicating or narcotic substances. In accordance with this article, said controls have been applied both to direct employees of nuclear facilities and to their contractors.

In the case of nuclear facilities, the Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018, establishes that the holder of an authorisation for a nuclear facility must throughout the life-cycle of the facility have the necessary human resources in place, with appropriate qualifications and skills, in addition to a suitable organisational structure to maintain nuclear safety and to ensure an adequate emergency response capacity. To this end the licensee must:

- ✓ Establish an overall personnel training policy in accordance with the importance of this aspect, and that acknowledges the significance of nuclear safety.
- ✓ Guarantee appropriate qualifications on the part of personnel performing functions with an impact on the nuclear safety of the facility.
- ✓ Implement and update initial and ongoing training programmes for the personnel of the facility, taking into account a systematic training design.

The CSN has furthermore issued various instructions defining the qualifications requirements of personnel working at nuclear facilities.

CSN Instruction IS-11, on the licensing of operational personnel at nuclear facilities, and IS-12, on the qualifications and training of unlicensed personnel at nuclear facilities with functions connected with the safe operation of the plant, define the efficient and safe performance of the tasks assigned to each job. The term "qualifications" includes academic qualifications, experience, and initial and ongoing training.

In addition, CSN Instruction IS-03, on qualifications to obtain recognition as an expert in protection against ionising radiation, details the training and experience requirements that the CSN deems necessary for such expert status, which therefore applies both to the supervisors of the Radiation Protection Service and the technical staff working under them.

Meanwhile, CSN Instruction IS-06 defines the scope and content of training programmes in the field of radiation protection for workers outside the sphere of nuclear facilities, applying to external companies, facilities and external workers.

The procedures and practices of nuclear power plants are established in accordance with the requirements defined by the CSN in the aforementioned instructions, including both personnel on their workforce and permanent or occasional contractors within the scope of the definition of standard profiles and the analyses of suitability in order to fulfil these training requirements.

Internal organisation of the personnel of facilities

Each nuclear facility has a Head of Operations or technical supervisor who supervises all employment and commercial operations, with the power to suspend the functioning of the facility. The figures of Head of Radiation Protection Service, Supervisor and Operator of nuclear or radioactive facilities are likewise defined, requiring specific licences to be held. Each of these licences is assigned personally, empowers the holder to perform work at a specific facility, and is granted by the CSN following an examination of the candidates' competence by a panel designated by the CSN, in order to allow them to take responsibility for the corresponding service or technical unit, or to serve as the Head of a Radiation Protection Service.

In the operational application granted in accordance with the procedure indicated in the RINR, the Functional Regulation for the facility contains the organisational structure of the licensee, including the functions and responsibilities of all positions connected with nuclear safety and radiation protection, the basic training and skills development programmes for personnel, with or without a licence, the technical skills required for each specific task, and any re-training programmes that might be deemed appropriate. Modifications to this Regulation must be approved by the Directorate-General for Energy Policy and Mines at the MITERD, following a mandatory report by the CSN.

Meanwhile, the Internal Emergency Plan defines the responsibilities and human resources required in order to address emergency situations.

Once the facilities begin operations, the CSN conducts periodic inspections, focused above all on ascertaining the academic qualifications, experience and training required for each type of job, the basic radiation protection training of all operatives, the scope of the re-training programmes, and confirmation that they cover changes in regulations, design modifications, and relevant operational experience. In this regard, the licensees must send the CSN an annual report summarising the main training and re-training activities of their personnel connected with nuclear safety or radiation protection.

Methods employed to analyse the skills required and the training needs with regard to all safety-related activities undertaken at nuclear power plants

In order to analyse the skills required and training needs with regard to nuclear safety-related activities undertaken at nuclear facilities, the chosen option is a systematic design inspired by the SAT (Systematic Approach to Training) methodology, with the following aims: learning ob-

jectives in accordance with the results obtained from a prior analysis of the position; the design and implementation of the training and skills development programme, based on the aforementioned learning objectives; the tools and human resources required for satisfactory achievement; evaluation of the degree of personal fulfilment of the established learning objectives; and lastly, the evaluation and review of the training and skills development programme, based on the on-the-job performance of personnel.

Both initial and ongoing training programmes are derived from this systematic process. The degree of complexity has been established in accordance with the various positions of employment, being more complete for personnel holding an operating licence.

Training committees have been set up for the effective management of training programmes, the involvement of line managers being essential in order to ensure that training focuses on improving staff performance.

The licensee of the nuclear power plant must ensure that all personnel hold appropriate qualifications for the functions that will be assigned to them.

New personnel and those reassigned to a different position are qualified in accordance with the regulations and the application of the aforementioned SAT methodology, requiring:

- ✓ Initial training completed by new personnel in accordance with the training plan defined for each position.
- ✓ Required training performed by personnel changing position following the corresponding analysis of the additional training that they would require in order to hold the new position.
- ✓ On-the-job training, under the supervision of experienced personnel.
- ✓ Overlap where necessary.

The renewal of qualifications takes place on average every five years.

Provisions for the initial skills development and re-training of operational personnel, including simulator training

The initial qualification process for power plant control room operators lasts 36 months, divided between classroom hours, tutored study, simulator practice and on-the-job training. Simulator practice must last at least 240 hours, and on-the-job training 1,200 hours.

The initial qualifications required for control room supervisors include a minimum of three years of experience as an operator, and completion of a minimum 12-month training programme, including at least 100 hours of simulator practice and 500 hours of on-the-job training.

Once the operator or control room supervisor licence is issued, an annual ongoing training programme comprising 100 hours of tuition and a minimum of 20 hours in the simulator is required. In current practice, the latter comprises between 40 and 50 hours per year.

For personnel with a control room operations licence, the regulations require that this be renewed every six years.

The complete process is documented and is regularly inspected.

Over recent years a combined working party has been set up comprising the Spanish nuclear power plants, the CSN and the leading national contractor in the field of training, with the aim of improving the process for the issuance of new licences, focused on optimising content and the

time dedicated to initial training programmes, while also improving the documentation in development of the syllabus topics.

Simulator capacities of nuclear power plants used for skills development with regard to faithful reproduction of the power plant and scope of simulation

Each nuclear power plant has its own simulator comprising a complete replica of the control room

Over the period covered by this Report, simulator capacity has been improved, extending the operational range to normal, abnormal and emergency operational manoeuvres, including operation with reduced primary inventory and operations under fuel reloading conditions. The simulators have incorporated the improvements made to the digital control systems of the plants with the utmost physical and functional accuracy, employing cutting-edge simulation solutions. The most significant design modifications have been installed on the simulators in advance, allowing them to serve as validation platforms from both the functional perspective and in aspects connected with Human Factor Engineering.

Provisions for the skills development of maintenance and technical support personnel

As mentioned previously, the procedures and practices of nuclear power plants are aligned with fulfilment of the requirements defined by the CSN in the aforementioned instructions, aside from the requirements likewise indicated by Article 8 of the RSNIN.

Improvements to skills development programmes as a result of new knowledge derived from the analysis of safety, operational experience, development of methods and skills development practices

As has been the case over recent years, the initial and ongoing training programmes have incorporated training and qualifications requirements derived from new tasks performed by personnel as a result of the implementation of improvements at nuclear power plants following the Fukushima accident, generally involving a significant practical training component. It has likewise proved necessary to undertake the development of exercises with an integrated emergency scope involving all members of the organisation with a role in emergency management, both those covered by the design specifications and those giving rise to severe accidents beyond the design specifications of the facility.

Methods employed to evaluate the sufficiency of personnel at nuclear power plants

Workforce planning is conducted by taking into account the implementation of the Strategic Plan, retirement plans and the time dedicated to the qualification activities described. One distinctive feature is that control room vacancies are planned eight years in advance.

Calculation of the dimensions required for a qualified and experienced workforce is based on:

- ✓ Fulfilment of the applicable regulations.
- ✓ Experience of the workload associated with the different processes for the operational management of power plants.
- ✓ Benchmarking performed with power plants of the same technology and similar regulations.

Policy principles governing the use of personnel contracted to support or supplement the in-company personnel of the licence holder

The principles applicable to personnel contracted to support or supplement the in-company personnel of the licence holder in order to achieve a high functional level include the following:

- ✓ The ultimate responsibility for guaranteeing nuclear safety lies with the managers of the licensee organisation, and cannot be delegated to support personnel.
- ✓ The standards and expectations for the performance of support personnel activities are the same and of the same level as required for in-company personnel.
- ✓ Support personnel are familiar with and employ the same processes as the licensee organisation to perform their activities.
- ✓ Support personnel working independently (in other words under their own supervision) are duly qualified with appropriate criteria set at the same level as required for in-company personnel.
- ✓ Occupational safety expectations are clearly communicated to support personnel working at the plant.
- ✓ The roles and responsibilities of the supervisor, irrespective of whether this figure belongs to the internal workforce or support personnel, are clearly defined and robustly implemented in the supervision of support personnel activities.

Methods employed to evaluate the qualifications and skills of contractor personnel

In order to evaluate the qualifications and skills of contractor personnel, the licensee must adopt the necessary measures to guarantee that selection of the external company is appropriate, as defined in CSN Instruction IS-12:

- ✓ Confirmation that the quality system of the external company provides for adequate measures to ensure the skills of its personnel, including training and skills development programmes and the necessary records to demonstrate qualifications.
- ✓ Confirmation prior to commencement of the work that the personnel assigned by the external company to perform the contracted jobs have the required qualifications.
- ✓ Satisfactory completion of the basic training programme segments (except for tasks performed under escort) and the specific training for the nuclear plant (except where there is permanent supervision by nuclear power plant personnel) as applicable to perform the tasks assigned to the personnel designated by the external company, prior to commencement of the work.

In addition, the licensee must demand that permanent contractors comply with an ongoing training programme designed in accordance with the criteria defined in the aforementioned IS-12, allowing workers to maintain qualifications in order to perform the contracted jobs in a proper fashion.

Description of national supply and demand for experts in the field of nuclear science and technology

New hirings are planned sufficiently in advance in order to allow enough time to schedule the training required for personnel replacing those who are retiring, with an adequate overlap to transfer the greatest possible amount of knowledge to the replacement. In the case of organisational reinforcement, the required training is given before on-the-job work begins.

In Spain there are various educational programmes that provide students with an in-depth knowledge of the theoretical and practical fundamentals of nuclear engineering and the technology associated with energy generation by nuclear fission. These educational programmes draw on the collaboration of the CSN, the licensees and national and international bodies. Notable examples include:

- ✓ Master in Nuclear Science and Technology (Universidad Politécnica de Madrid).
- ✓ Master in Nuclear Engineering and Applications (CIEMAT and Universidad Autónoma de Madrid).
- ✓ Master in Radiation Protection at Radioactive and Nuclear Facilities (Universidad Politécnica de Valencia).
- ✓ Master in Nuclear Engineering (Universidad Politécnica de Cataluña).
- ✓ European Master in Nuclear Energy-EMINE (Universidad Politécnica de Cataluña).

Currently there are very few Spanish students studying for a master's qualification in Spain in disciplines associated with nuclear technology, and the risk therefore exists that some programmes might fold because of a lack of students. In the case of international master's courses delivered in Spain in these disciplines, they may be maintained as they have a significant proportion of students from other countries.

Meanwhile, demand for employees on the part of nuclear power plants is not always filled with the supply provided by the aforementioned master's courses. Power plants therefore have specific training programmes in place for vacancies in various posts which are typically filled with other technical and engineering profiles, as well as individuals with specific training in these disciplines, so as to cover all the knowledge, abilities and expectations required in order safely to fulfil these functions.

The Nuclear Safety Council has established four Professorships of Nuclear Safety and Radiation Protection to promote training and skills, as well as R&D development, in the field of nuclear safety and radiation protection, with the goal of encouraging young professionals with training in these fields to join the sector. This was considered a high-performing area as a result of the IRRS-ARTEMIS peer review mission conducted in Spain in 2018.

Methods employed for the analysis of skills, availability and sufficiency of additional personnel required for the management of very serious accidents, comprising contracted personnel or personnel from other nuclear facilities

An Emergency Response Organisation comprises the operating personnel, collaborating companies and External Support organisations as established in the Internal Emergency Plan. The baseline for establishing the Emergency Response Organisation if an accident occurs comprises the personnel present on the shift at the power plant when the emergency begins, along with staff on call who are sent to the power plant in accordance with the terms of the Internal Emergency Plan. Depending on the seriousness and characteristics of the event, the organisation progressively expands until it reaches its maximum level so as to be in a position to address all the planned mitigation measures.

An Emergency Response Organisation must be of appropriate dimensions to be able to deal with the actions required so as to address design specification accidents and to implement mitigation strategies derived from analyses of situations that go beyond the design specifications, in accordance with the terms established in the POE and GGAS, as well as the procedures developing the internal emergency plan of the facility.

In order ultimately to define the provision and human resources required at any given moment for an Emergency Response Organisation at a nuclear power plant, the licensees have devised a specific methodology so as to guarantee the capacity to address and mitigate events caused by extreme occurrences that would constitute a condition going beyond the design specifications established for the power plant, alongside potential events causing extensive damage across the entire site.

This methodology has been developed on the basis of the nuclear industry standards of the USA (NEI 06-12 rev. 2, NEI 12-06 rev. 1, NEI 12-01 rev. 0, NEI 10-5 rev. 0), and also the various post-Fukushima ITCs issued by the CSN, and the associated Safety Guides.

A common methodology has been developed with the aim of creating a process that is dynamic and sustainable over time, such that all Spanish nuclear power plants can at all times confirm and review how changes made to the facility or the organisation, operational experiences arising, or improvements implemented at the facilities, could affect the provisions required to mitigate emergencies. A sequential process, which serves periodically to evaluate the impact of the various requirements arising at the Emergency Response Organisation of the power plant and to modify it appropriately in accordance with any changes that might be identified.

All actions, and therefore the provisions made, are established with internal resources. In other words, any possible support and external resources, such as the Emergency Support Centre (CAE), the Military Emergencies Unit (UME), external organisations or personnel from other nuclear power plants are established as additional assistance, but are not taken into account in calculating the dimensions of the internal resources.

Regulatory control and examination activities

The CSN performs supervisory and control activities with regard to the human resources of nuclear power plants as follows:

- ✓ Each plant is required to have analysed and documented the technical capacity requirements and minimum provision of human resources at each organisational department for the safe operation of the plant.

- ✓ Each plant is required to analyse and document organisational and human resource changes connected with nuclear safety or radiation protection functions, so as to ensure that they continue to perform their functions in a proper fashion and that the change and change management have no negative impact on safety.
- ✓ Each year the nuclear power plants send the CSN a report with the modifications or updates connected with the optimisation of human resources at their organisation.

As already indicated, with regard to the qualifications of personnel performing safety-related functions at nuclear power plants, the CSN has in place instructions IS-11 for licensed operational personnel, and IS-12 for all other personnel.

With regard to licensed operational personnel, the granting of the licence by the CSN requires appropriate prior qualifications on the part of the candidates, who must also pass the examination tests (written, control room simulator and plant) established by the CSN Operational Licences Panel. The renewal of operational licences is granted by the CSN every six years, upon application and confirmation of fulfilment of the requirements established in IS-11.

The CSN conducts biennial inspections of the personnel training programmes of nuclear facilities, for both the internal workforce and permanent and occasional contractors. These inspections cover both licensed operational personnel and all other personnel performing safety-related functions. These inspections include aspects connected with supervision of the policy, organisation, human and material resources, processes and procedures of the licensee for the systematic design of personnel training, the resulting training programmes and their implementation, along with checks as to the fulfilment of personnel qualifications requirements (academic qualification, experience, initial and ongoing training). Likewise, the scope of these inspections includes aspects connected with maintaining the physical and functional accuracy of simulators providing a replica of the entire scope of the plant.

Human resources available at Enresa

Enresa is entrusted with management of radioactive waste and spent nuclear fuel and the dismantling and decommissioning of nuclear facilities (Article 38 bis of Nuclear Energy Law 25/1964; Article 9 of Royal Decree 102/2014, for the safe and responsible management of spent nuclear fuel and radioactive waste). By virtue of these regulations, Enresa is considered to be the licensee of its facilities for the management of spent nuclear fuel and radioactive waste, and acts as the licensee of those other activities that it undertakes for which this status is determined. Enresa is therefore the operator responsible for the installations of the El Cabril Disposal Facility, the process of decommissioning the Vandellós I and José Cabrera Nuclear Power Plants, and also the Centralised Temporary Storage (CTS) once this is operational.

As at 31 December 2019, Enresa had a workforce of 321 people, 183 of whom were employed at the headquarters in Madrid, 119 on the premises of the El Cabril Disposal Facility, 6 on the dismantling and decommissioning projects at the Vandellós I Nuclear Power Plant, 11 on the dismantling project corresponding to the José Cabrera Nuclear Power Plant, and 2 on the planning of the CTS project.

The average age of Enresa employees is 52 years. The ageing of personnel, a circumstance shared with other organisations in the sector, entails on the one hand the need to hire new employees, and on the other the need to guarantee appropriate transfer of knowledge between more experienced employees and new hirings.

In this regard, the legal nature of Enresa as a public enterprise does not facilitate the desired flexibility for the hiring of personnel. With regard to knowledge management, in 2018 Enresa adopted a General Training Plan designed to address the specific needs of each Directorate. On

the one hand, this Plan introduces a principle of flexibility, since the first factor in determining the training initiatives to be undertaken is the judgment indicated by each Directorate; and on the other it emphasises corporate training in matters of relevance for the entire workforce, such as information technology and legislation. Certain posts or areas at Enresa facilities require specific training in accordance with regulatory requirements, and it must be ensured that this training is given.

In the area of safety culture, certain measures have been introduced in response to the requirements imposed by the CSN (in particular CSN Instruction IS-19, on the requirements of the management system of nuclear facilities). This is the case of the integrated management committees at the El Cabril Disposal Facility and at José Cabrera, and the creation of a safety culture team at headquarters in Madrid, with employees from the other workplaces, alongside the plans which are regularly issued with regard to continuous improvements to the safety culture.

In terms of training as an integral element of R&D: the infrastructure and coordination area of the Enresa R&D plan includes a series of initiatives regarding knowledge management, feedback and knowledge transfer. In this regard, Enresa is involved in various national and international initiatives addressing the analysis and preservation of knowledge, skills and aptitudes.

22.2. Availability of financial resources

Spain has been making allocations to a Fund for the financing of activities set out in the General Radioactive Waste Plan (GRWP) since Enresa was first set up in 1984. The Fund is independent of waste producers, and draws almost exclusively on their contributions, and to a lesser extent the financial returns on the funds. This Fund is used for the imputation of costs involved in the management of radioactive waste and spent fuel, the dismantling of nuclear facilities, structural costs and R&D projects, assignments to municipalities affected by nuclear power plants or radioactive waste or spent nuclear fuel storage facilities, and taxes derived from activities connected with said storage.

The Fund is currently regulated by the Sixth Additional Provision of Electrical Sector Law 54/1997, of 27 November 1997, and Royal Decree 102/2014, of 21 February 2014, for the safe and responsible management of spent nuclear fuel and radioactive waste. During the period covered by this Report were no significant developments in the financing system, which is summarised in Annex D to this Report.

It should nonetheless be emphasised that during the period covered by this Report there was an update to the levy corresponding to nuclear power plants in operation in order to align this with the present estimates of future costs and their operational duration, as set out in the draft 2021-2030 Integrated National Energy and Climate Plan (PNIEC). In accordance with the terms set out in the aforementioned Sixth Additional Provision of Law 54/1997, the Government is responsible for revising the levy rates and taxation elements in order to determine the payments charged, by Royal Decree. In accordance with the above, the Government passed Royal Decree 750/2019, of 27 December 2019, modifying the fixed unit rate with regard to the levy used to finance the services of Enresa, paid by nuclear power plants in operation. This serves to guarantee the availability of sufficient financial resources in the Fund in order safely to undertake the activities set out in the GRWP with regard to this levy.

As for radioactive facilities in the nuclear fuel cycle, their dismantling and decommissioning or closure is not covered by the Fund. In this case the RINR establishes the obligation on their licensees to provide a financial guarantee or bond, before they begin operations, so as to guarantee their future decommissioning and the management of the resulting radioactive waste. This guarantee must be lodged before the operational authorisation is granted, and must be

proportionate, so as to cover any costs and contingencies that might arise in the processes of dismantling and decommissioning or closure of the facility, even in the event of insolvency, cessation of operations or any other contingency. The Directorate-General for Energy Policy and Mines of the MITERD may authorise the updating of this guarantee in the event of circumstances or modifications at the facility that could have a significant impact on its dismantling and decommissioning or closure, or in accordance with work already performed in connection with such activities.

Article 23. Quality assurance

Article 23. Quality assurance

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

Article 4.2 of Royal Decree 102/2014, of 21 February 2014, for the safe and responsible management of spent nuclear fuel and radioactive waste, completing the transposition of Directive 2011/70/Euratom, establishes that producers of radioactive waste and spent nuclear fuel shall instigate and apply integrated management systems, including quality management, affording due priority to safe management, which may be subject to periodic verification.

All activities connected with spent fuel and radioactive waste management in Spain are subject to a quality guarantee programme (PGC). The party responsible for establishing and implementing this Programme is the holder of the authorisation for the facility or regulated activity. The PGC must comply with standard UNE 73-401 "*Quality assurance at nuclear facilities*", the requirements of which are equivalent to those in Appendix B of 10 CFR 50 of the US NRC, and the IAEA code and guides 50-C/SG-Q, on quality assurance in nuclear power plants and other nuclear facilities.

In 2008 the Nuclear Safety Council issued IS-19, on the requirements of the management system at nuclear facilities, the origins of which lie in IAEA *Safety Requirement* N0. GS-R-3 "*The Management System for Facilities and Activities*". This Instruction, applicable since 1 January 2010, affects all nuclear facilities throughout their life-cycle, in other words from selection of the site up until dismantling and decommissioning. The main change is the need to integrate requirements within nuclear and radioactive safety aspects, occupational risk prevention, environment, physical protection, quality and economic aspects, in order to guarantee the protection of people and the environment.

Lastly, the Regulation on nuclear safety at nuclear facilities (RSNIN) approved by Royal Decree 1400/2018, incorporates content from Directive 2014/87/Euratom with regard to the establishment of basic nuclear safety requirements applicable to nuclear facilities throughout their entire life-cycle. Among other aspects, the holders of authorisations for nuclear facilities must establish and continuously improve an integrated management system covering nuclear safety, occupational risk prevention, environmental protection, physical protection, quality and economic aspects, so as to guarantee that nuclear safety is properly taken into account in all the organisation's activities.

23.1. Quality assurance in spent fuel and radioactive waste management

The Enresa Quality System is described in the document entitled Quality Manual. This includes the mandatory quality regulations requirements (UNE 73.401, CSN Instructions and Safety Guides, including among others, the aforementioned IS-19); in addition to other voluntary standards, as in the case of standard UNE-IN ISO 9001. This Manual also sets out a summary of how said requirements are to be fulfilled, with references to those procedures establishing the corresponding regulations.

For each facility, project or relevant activity, Enresa draws up a Quality Assurance Programme, which is an adaptation of the Corporate Quality Manual in accordance with the specific features of each facility, project and activity. It is this document, among others, which is presented for approval when authorisation is required by the MITERD.

A third level of documentation includes over a thousand procedures governing the activities of Enresa, some general and others specific to facilities, projects or activities.

In order to ensure that quality assurance programmes and the development thereof are properly established, the Quality Assurance Department reviews all documentation in the system, along with the various documents and records generated within the context of the Quality System, to guarantee that they include and comply with the quality requirements defined in both external and internal regulations.

Verification of the proper application of the quality programmes is implemented by means of various tools: the first barrier is the generation of procedures defining mature systems equipped with self-control mechanisms applied by those performing the activities, and supervision by their managers, along with the generation of records providing evidence of the actions taken. The second barrier comprises internal independent assessment activities, specifically all the audits, inspections, supervisions and documentation reviews conducted by the Quality Management Department. The third barrier corresponds to independent external assessments, such as the CSN inspections themselves and third-party audits of those companies accredited by the ENAC (National Accreditation Agency), providing independent certification of quality systems.

It is important to emphasise that the quality of Enresa activities is also defined by all those suppliers providing products or services for Enresa, and the relevant measures are therefore also applied to such parties to ensure the quality of what they supply. These actions include in particular a review of purchase documentation before calling for offers, so as to ensure that quality requirements are included; prior and periodic assessment of Enresa suppliers; audits; inspections of the purchases made upon delivery, or the services provided during the course of performance, and even inspections at the suppliers' own factories during the manufacturing of elements. The documents describing the specific systems proposed by the supplier within the context of its quality system are likewise reviewed, in order to ensure that they comply with the defined requirements.

Meanwhile, Enresa has maintained Integrated Management Systems on the premises of the El Cabril Disposal Facility, the system implemented for the dismantling and decommissioning of the José Cabrera Nuclear Power Plant, as well as the Integrated Management Manual for the project of design and licensing of the CTS, in all cases prioritising nuclear safety over all other aspects.

Work continues in connection with CSN Instruction IS-19 and Integrated Management on the implementation of a strong safety culture based on eight principles defined by Enresa. Since 2016, when the organisation conducted an internal self-assessment, work has been performed

on the implementation of the various actions derived from this process, the aim being to conduct a new external assessment over the course of 2020.

Following on from planning, execution and control, the final management phase is improvement. In order to address this phase, Enresa implemented an integrated corporate safety improvement system known as *SIM*, which allows all personnel to play their part in identifying and managing non-conformities, corrective actions and improvement actions applicable to corporate activities and facilities. This tool compiles on average 300 incidents per year, providing the opportunity to improve processes and therefore safety.

23.2. Quality assurance programme evaluation and inspection system.

Over the period corresponding to the Seventh National Report, assessment and inspection activities continue with regard to quality assurance programmes and quality plans with reference to spent fuel and radioactive waste management. These activities are connected with:

- ✓ Licensing of new individualised temporary storage (ITS) facilities, as design modifications.
- ✓ Licensing and design modifications of spent fuel transport and storage casks.
- ✓ Design modifications of previously licensed facilities.
- ✓ Transport of radioactive material.

Assessment activities:

- ✓ Cofrentes Nuclear Power Plant ITS quality plan.
- ✓ Revision 4 of the Safety Study of the ENUN 32P cask.
- ✓ Quality Plans and Quality Manual applicable to the application for a favourable appreciation of the design of the dual-purpose HI-STAR 150 cask for storage.
- ✓ Quality Plan applicable to the application for a favourable appreciation of the design of the dual-purpose HI-STAR 100 cask for storage.
- ✓ Assessment of the new Quality Assurance Programmes referred to in IS-19 and of the changes already approved that involve a reduction in requirements.

Inspection activities:

- ✓ Detailed design of the ENUN 32P and 52B casks.
- ✓ Two inspections are performed each year of the Corrective Actions Programme of nuclear power plants, along with an inspection every two years of the Juzbado fuel element factory.
- ✓ The CSN is also involved in the inspections conducted of the Integrated Management Systems of nuclear facilities.

Transport of radioactive materials:

- ✓ Aside from specific checks performed by the CSN Transport Area as to particular aspects of carriers' quality assurance programmes, the governing body's Quality Assurance Area conducts an inspection every two years of a selected carrier in order to analyse overall compliance with its quality assurance programme.

Meanwhile, Article 7 of the RSNIN sets out specific changes regarding the Integrated System and quality requirements. CSN Instruction IS-19 on the requirements of the management system for nuclear facilities fulfils this Regulation, the purposes of this technical standard being as follows:

- ✓ Improve the safety performance of organisations by means of planning, control and supervision of activities connected with nuclear safety under normal, transitory and emergency situations.
- ✓ Foster and promote a strong safety culture through the development and underpinning of appropriate attitudes and behaviours with regard to nuclear safety among individuals and groups, to ensure that they perform their tasks safely.

IS-19 also makes provision for nuclear facilities on the terms set out in the aforementioned Article 7 of the regulation:

- ✓ Technical, economic and human resources with appropriate skills and qualifications.
- ✓ Safety policy focused on continuous improvement.
- ✓ Establishment of an integrated management system (including the promotion and enhancement of an organisational culture).
- ✓ The influence of human and organisational factors throughout the life-cycle of the facility.
- ✓ The guarantee that quality requirements are defined and applied appropriately throughout the life-cycle of the facility.
- ✓ Assurance by the facility that contractors and subcontractors for which it is responsible and whose activities could affect the safety objective of Article 6 of the regulation have access to appropriate human, technical and economic resources.

Article 24. Operational radiation protection

Article 24. Operational Radiation Protection

1. *Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:*
   - *i) he radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, with economic and social factors being taken into account;*
   - *ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and*
   - *iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.*
2. *Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:*

i) to keep exposure to radiation as low as reasonably achievable, with economic and social factors being taken into account; and

ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

3. Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

The provisions in the field of radiation protection under Spanish regulations are essentially set out in Law 15/1980, of 22 April 1980, creating the CSN, and the Regulation on health protection against ionising radiation (RPSRI), approved by Royal Decree 783/2001, 6 July 2001.

The Law creating the Nuclear Safety Council assigns the function of supervision and control of levels of radioactivity to said body, both in the interior and exterior of nuclear facilities and in the Spanish fuel cycle, along with any individual or cumulative impact on the surrounding area, control of the doses received by operational personnel and reports and advice for the Government with regard to commitments given to other countries or international bodies in the field of nuclear safety and radiation protection.

The basic standards for the radiation protection of exposed workers and members of the public against the risks resulting from exposure to ionising radiation are established in the RPSRI. This regulation transposes the provisions of EU Directive 96/29/Euratom into Spanish law, while implementing the basic recommendations of ICRP-60.

The basic standards of radiation protection of exposed workers and members of the public against risks resulting from exposure to ionising radiation likewise apply to those facilities where spent fuel and radioactive waste are stored.

As a development in addition to the provisions of the aforementioned regulation, the CSN has published various Instructions which advise nuclear facility licensees as to the procedures to follow so as to comply with certain of these provisions. For further details, see the Report on previous years.

Meanwhile, the Regulation on nuclear safety at nuclear facilities (RSNIN) approved by Royal Decree 1400/2018 indicates in Article 9 that the siting, design, construction, commissioning, operation and decommissioning of a nuclear facility must ensure that the doses received by exposed workers and by the public in the event of any operational situation are justified, are as low as reasonably possible, and below the values established in the specific standards and applicable requirements.

24.1. Worker protection

24.1.1. Measures adopted in order to ensure that exposure to radiation is kept as low as reasonably achievable.

The basic principles of justifying, optimising and limiting individual doses are incorporated within Spanish law in the aforementioned Regulation on health protection against ionising radiation.

The principle of optimisation, which enjoys an established hierarchical priority over the other two principles, represents the fundamental basis for current theory as to radiation protection, and is formulated on the following terms:

> *"Individual doses, the number of persons exposed and the likelihood of potential exposure occurring must be kept at a level as low as reasonably possible, while taking into account economic and social factors".*

Application of the principle of optimisation demands that a particular emphasis be placed on all radiation protection measures intended to prevent exposure to radiation, essentially based on:

- ✓ Assessment of the radiological risk associated with any activity entailing the use of ionising radiation (prior to practical implementation).
- ✓ Radiological classification of workers involved in accordance with the radiological risk inherent in the work to be performed.
- ✓ Radiological classification of workplaces in accordance with the levels of foreseeable radiation and contamination.
- ✓ Application of appropriate control measures and standards for the different categories of exposed workers and the different workplaces.

These measures are set out in radiation protection manuals, which must receive a favourable verdict from the Nuclear Safety Council.

24.1.2. Measures adopted to ensure that no worker is, under normal circumstances, exposed to doses of radiation greater than the national dose limitation provisions, duly taking into account internationally approved radiation protection standards

The RPSRI establishes the following limits on doses for exposed workers at nuclear facilities and in the fuel cycle in Spain:

- ✓ Effective dose limit: 100 mSv over five consecutive official years, subject to a maximum effective dose of 50 mSv in any official year.
- ✓ Skin dose limit (averaged over 1 cm2): 500 mSv per official year.
- ✓ Crystalline lens dose limit: 150 mSv per official year.
- ✓ Dose limit for hands, forearms, skin and ankles: 500 mSv per official year.

Control of the radiation doses received by exposed workers is in most cases conducted by means of individual surveillance, using passive physical dosimeters. There are however cases in which radiological surveillance of the working area may be sufficient, if the radiological risk is sufficiently low.

Dosimetric surveillance of workers exposed to ionising radiation in Spain is governed by the aforementioned regulation, which establishes that individual dosimetry must be performed by Personal Dosimetry Services explicitly authorised by the CSN.

The regulatory provisions established in the RPSRI determine that all exposed workers must have a dosimetric record opened for them, registering all doses received by them over the course of their professional activity. Said provisions assign responsibility to the licensee of the practice for archiving these records until the employee has reached the age of 65 years, and in all cases for a period of at least 30 years from the date when the worker leaves its employment.

In 1985 the CSN agreed to implement a National Dosimetric Bank (BDN) in Spain, which would centralise the dosimetric records of all exposed workers at nuclear facilities and in the fuel cycle in Spain.

The BDN is managed by the CSN, and at the close of the 2019 dosimetric year contained records for a total of approximately 26,783,616 dosimetric measurements, corresponding to 395,733 workers and 82,164 facilities. Each of these measurements is associated with information as to the type of facility and the type of work performed by the worker.

The number of persons exposed to ionising radiation subject to dosimetric control in Spain in 2019 amounted to 117,647.

Personal dosimetry

With regard to the dosimetric results corresponding to the year 2019 for nuclear power plants as a whole, it should be emphasised that 8,797 were exposed workers engaged in this area and subject to dosimetric control. These dosimetric readings represented a collective dose of 3,687.91 mSv/person, the overall mean individual dose value for this group being 1.15 mSv/year, calculation of this parameter taking into account only workers with significant doses. These figures are broken down by in-house and contractor personnel in Table 6.

Table 6: Dosimetric results corresponding to 2019 for nuclear power plants as a whole

	OVERALL	IN-HOUSE	CONTRACTORS
No. of exposed workers	8,797	1,992	6,847
Collective dose (mSv/person)	3,687.91	444.01	3,243.9
Mean individual dose (mSv/year)	1.15	0.94	1.18

In 2019 there were 592 exposed employees working at the Juzbado factory. Dosimetric readings represented a collective dose of 68.51 mSv/person. If one takes into account only workers with significant doses, the mean individual dose for this group is 0.52 mSv/year.

During 2019 there were 165 exposed employees working at the El Cabril Disposal Facility. The dosimetric readings represented a collective dose of 0.88 mSv/person. If one takes into account only workers with significant doses, the mean individual dose for this group was 0.15 mSv/year.

24.2. Protection of the public

The RPSRI explicitly requires the application of the ALARA philosophy to the radiation protection of members of the public. This philosophy applies to all stages of the licensing of Spanish nuclear facilities, as set out in the official operational documentation for each such site.

With regard to the limitation of doses, the RPSRI establishes the following dosage limits for members of the public:

- ✓ An effective dose limit of 1 mSv per official year. Nonetheless, under special circumstances authorisation may be granted for a higher effective dose value in one single official year, provided that the average over five consecutive official years is no higher than the aforementioned value.
- ✓ Without prejudice to the above, an equivalent dose limit per official year of 15 mSv is established for the crystalline lens, and 50 mSv for the skin.

24.2.1. Limitation of discharges at nuclear facilities

The operational permits of all Spanish nuclear facilities establish as part of the Technical Functional Specifications (ETF) the system of limitation, surveillance and control of radioactive effluent.

At nuclear power plants the detailed development of this system for limitation, surveillance and control of radioactive effluent is included in the External Dose Calculation Manual (MCDE), while at the El Cabril Disposal Facility and the Juzbado nuclear fuel plant, this is developed in the Specifications document itself.

At nuclear power plants, both during operation and during the shutdown and decommissioning stage, an effective dose limit of 0.1 mSv/year is applied for each unit within the site. This limit, which refers to periods of 12 consecutive months, applies to radioactive liquid and gas effluent emissions as a whole. Said limit likewise applies to radioactive effluent emissions from the Juzbado nuclear fuel plant.

The El Cabril Disposal Facility was licensed on the basis of a zero discharge criterion for liquid radioactive effluent, with only gaseous radioactive effluent being emitted into the environment, for which the discharge limit is an effective dose of 0.01 mSv over 12 consecutive months.

One aspect of interest is that at Spanish nuclear power plants the water from the irradiated fuel storage pools does not constitute an input into liquid radioactive effluent treatment systems.

24.2.2. Verification of compliance with the discharge limits

The licensees of Spanish nuclear facilities must each month estimate the individual critical public doses on a cumulative basis over 12 consecutive months, so as to verify compliance with the established limits. This calculation is performed on the basis of the results of the sampling programmes and analyses of radioactive effluent in accordance with the methodology described in the MCDE.

In order to determine activity released into the environment, liquid and gaseous radioactive effluents are always sampled prior to (batch discharge) or at (continuous discharge) the discharge point.

Since 2008 the recording of activity levels obtained through application of these sampling and analysis programmes has been conducted in accordance with the criteria of Recommendation 2004/2/Euratom, regarding standardised information on gaseous and liquid radioactive effluent discharged into the environment by nuclear power plants and reconditioning plants under normal operating conditions.

The results of the sampling and analysis programmes, and the estimations of doses and other relevant effluent data, are sent to the CSN each month.

In addition, in accordance with Article 53 of the RPSRI, the licensees perform an estimate each year of the reference group dose, taking into account the most realistic criteria. The reference groups considered are equivalent to critical groups as described in publication ICRP-60.

In accordance with the ETFs, the licensees implement Environmental Radiological Surveillance Programmes (PVRA) in the area of influence of nuclear facilities. The results of the PVRA, which are sent to the CSN each year, serve to ascertain the real impact of discharges into the environment.

24.2.3. Control of discharges

According to the regulatory requirements, Spanish nuclear facilities have liquid and gaseous effluent treatment systems in place serving to collect, store and process the different types of liquid and gaseous radioactive waste generated during the normal operation of the facilities, and during foreseen operational incidents.

The release of radioactive effluents into the environment must comply with the established limits, while furthermore aiming to be as low as possible in accordance with economic and social factors, and the best available techniques (Instruction IS-26).

According to the RINR, licensees must implement a continuous improvement programme in accordance with the evolution of the applicable regulations, technological advances and operational experience. Specifically, Article 8.3 of said regulation establishes that the licensees must continuously oversee improvements to radiation protection conditions at their facility, to which end they will be required to analyse the best techniques and practices available in accordance with the requirements established by the Nuclear Safety Council, and to implement those that prove suitable in the judgment of said body.

Likewise, the licensees of nuclear power plants must conduct a Periodic Safety Review serving as the basis every 10 years for:

- ✓ analysis of the overall performance of the facility;
- ✓ demonstration that the lessons learned from the analysis of operational experience have been properly implemented; and
- ✓ assessment of whether relevant changes made at new generation plants are applicable to the facility.

As a result, the Spanish regulatory system in the field of radioactive effluent control provides the appropriate framework for the effective application of a clearly established policy requiring the implementation of the applicable technological advances, fulfilling the requirements and recommendations of the competent international bodies, and incorporating the necessary measures to ensure that discharges are limited and the impact on the public and the environment is minimised.

Discharges during the years 2017, 2018 and 2019 from Spain's nuclear power plants and from the Juzbado fuel element plant and El Cabril Disposal Facility are summarised in Tables 7 and 8, respectively.

Table 7: Activity of radioactive effluent from nuclear power plants (Bq)

	PWR Power Plants						BWR Power Plants	
	José Cabrera Nuclear Power Plant (2)	Almaraz I y II Nuclear Power Plant	Ascó I Nuclear Power Plant	Ascó II Nuclear Power Plant	Vandellós II Nuclear Power Plant	Trillo Nuclear Power Plant	Sta. Mª Garoña Nuclear Power Plant (3)	Cofrentes Nuclear Power Plant
Liquid effluents								
2017								
Total except Tritium and Dissolved Gases	3,41 10^{6}	6,91 10^{9}	3,24 10^{9}	4,52 10^{9}	2,52 10^{9}	4,86 10^{8}	6,14 10^{7}	1,14 18^{8}
Tritium	1,39 10^{9}	4,45 10^{13}	1,83 10^{13}	2,93 10^{13}	1,03 10^{13}	8,31 10^{12}	1,30 10^{11}	1,10 10^{12}
Dissolved Gases	--	7,13 10^{7}	3,62 10^{8}	1,25 10^{7}	1,30 10^{7}	(4)	--	1,27 10^{8}
2018								
Total except Tritium and Dissolved Gases	5,44 10^{8}	8,26 10^{9}	1,69 10^{9}	1,11 10^{9}	8,64 10^{9}	1,94 10^{8}	6,53 10^{7}	9,44 10^{7}
Tritium	1,03 10^{8}	3,51 10^{13}	2,65 10^{13}	4,63 10^{13}	1,52 10^{13}	2,24 10^{13}	1,92 10^{11}	8,87 10^{11}
Dissolved Gases	--	3,22 1^{08}	5,40 10^{7}	5,88 10^{6}	1,03 10^{8}	(4)	--	ND
2019								
Total except Tritium and Dissolved Gases	8,28 10^{7}	1,54 10^{10}	1,50 10^{9}	1,48 10^{9}	2,88 10^{9}	2,05 10^{8}	1,63 10^{8}	8,40 10^{7}
Tritium	3,09 10^{7}	4,73 10^{13}	1,54 10^{13}	1,73 10^{13}	2,58 10^{13}	1,12 10^{13}	1,91 10^{11}	4,94 10^{11}
Dissolved Gases	--	ND	8,99 10^{6}	9,76 10^{6}	4,06 10^{7}	(4)	--	1,10 10^{7}
Gaseous effluents								
2017								
Noble Gases	--	1,49 10^{11}	1,10 10^{11}	1,02 10^{10}	2,31 10^{8}	2,97 10^{11}	ND	1,16 10^{15}
Halogens	--	ND	ND	ND	4,10 10^{3}	ND	--	1,37 10^{9}
Particles	4,81 10^{4}	5,70 10^{4}	1,68 10^{6}	6,30 10^{6}	2,17 10^{6}	ND	9,34 10^{5}	1,03 10^{7}
Tritium	3,55 10^{8}	3,67 10^{12}	5,22 10^{11}	6,82 10^{11}	5,11 10^{11}	6,55 10^{11}	1,49 10^{11}	2,21 10^{12}
Carbon-14	--	1,09 10^{11}	2,77 10^{11}	1,57 10^{11}	1,51 10^{11}	1,75 10^{11}	--	3,01 10^{11}
2018								
Noble Gases	--	5,80 10^{11}	3,03 10^{11}	8,18 10^{10}	6,14 10^{10}	3,88 10^{11}	ND	8,28 10^{12}
Halogens	--	ND	ND	ND	3,09 10^{5}	ND	--	2,57 10^{8}
Particles	ND	8,37 10^{4}	1,56 10^{6}	1,18 10^{6}	4,58 10^{7}	ND	9,34 10^{5}	1,71 10^{6}
Tritium		3,12 10^{12}	5,17 10^{11}	6,81 10^{11}	2,27 10^{12}	5,79 10^{11}	1,19 10^{11}	7,79 10^{11}
Carbon-14	--	1,71 10^{11}	8,76 10^{10}	1,17 10^{11}	2,61 10^{11}	2,68 10^{11}	--	3,10 10^{11}
2019								
Noble Gases	--	2,21 10^{11}	6,21 10^{10}	5,19 10^{10}	2,62 10^{11}	2,78 10^{11}	ND	2,76 10^{12}
Halogens	--	ND	ND	ND		ND	--	
Particles	ND	1,42 10^{5}	1,09 10^{6}	1,31 10^{6}	1,74 10^{7}	ND	8,52 10^{5}	5,57 10^{6}
Tritium	--	3,52 10^{12}	2,59 10^{11}	8,09 10^{11}	7,21 10^{11}	1,10 10^{12}	1,01 10^{11}	4,24 10^{11}
Carbon-14	--	1,93 10^{11}	7,72 10^{10}	3,41 10^{11}	4,68 10^{11}	3,12 10^{11}	--	1,12 10^{11}

(1) ND = Not Detected.
(2) Power plant in process of decommisioning since 1 February 2010.
(3) Power plant with operations definitively terminated since 6 July 2013.
(4) Liquid discharges do not entrain dissolved gases as they are eliminated in the treatment process.

Table 8: Activity of gaseous radioactive effluent from the El Cabril Disposal Facility and the Juzbado fuel element plant (Bq)

El Cabril Disposal facility					
Gaseous Effluents	Total Alfha	Total Beta	Total Gamma (1)	Tritium	Carbon-14
2017	1,80 10^4	8,73 10^4	ND	1,42 10^7	1,33 10^7
2018	1,33 10^4	5,70 10^4	ND	1,69 10^9	9,03 10^7
2019	1,65 10^4	7,70 10^4	ND	1,91 10^8	2,51 10^8
Juzbado Plant					
Liquid Effluents	Alfa Total				
2017	2,14 10^7				
2018	1,79 10^7				
2019	2,42 10^7				
Gaseous Effluents	Alfa Total				
2017	7,32 10^4				
2018	6,85 10^4				
2019	3,98 10^4				

(1) ND = Not Detected

In the case of the José Cabrera Nuclear Power Plant, effluent discharged into the environment was generated as a consequence of the tasks being performed during the decommissioning phase, while in the case of the Santa María de Garoña Nuclear Power Plant, which is currently in a state of definitive cessation of operations, discharges occurred as a consequence of the tasks performed prior to decommissioning. Meanwhile, during the years under consideration there were no radioactive effluent discharges into the environment from the Vandellós I Nuclear Power Plant, which is in the latent phase.

These discharges represent a minimal risk to members of the public and the population as a whole, as revealed by the doses resulting from discharges in the three years under consideration, which did not exceed 4.0% in the case of Spanish nuclear power plants, 7.6% in the case of the El Cabril Disposal Facility, of the discharge limit authorised in each case.

24.2.4. Unplanned or uncontrolled discharges

In order to prevent unplanned or uncontrolled discharges of radioactive material into the environment, Spanish nuclear facilities have in place:

- ✓ Surveillance instrumentation serving to detect such discharges;
- ✓ Discharge isolation devices, in the event that the preset values are exceeded;
- ✓ Activation of alarms if abnormal conditions are detected;
- ✓ Administrative checks.

Nonetheless, if despite these measures there is an uncontrolled or unplanned discharge, the licensees of nuclear facilities must adopt the necessary measures to arrest or control the discharge (if possible), and to minimise its impact on the exterior. They must likewise identify the cause or causes that led to it, and define the actions to be adopted in order to avoid any recurrence. All of these aspects must be notified to the CSN for analysis and approval.

The PVRA implemented by the licensees of nuclear facilities served to identify increases in activity in the environment as a result of such discharges, and to confirm the efficacy of the measures adopted to mitigate their effects.

Article 25. Emergency preparedness

Article 25. Emergency preparedness

1. *Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.*
2. *Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.*

The legislative and regulatory framework, the national emergency structure, the assignment of responsibilities, the emergency preparedness measures, the role of the regulatory body, etc., are described in Annex C to this Report.

This subsection aims to reflect only the main developments or actions taking place during the reporting period.

25.1. Developments in the legislative and regulatory framework to address emergency situations

The framework of regulatory standards to deal with emergency situations has been reinforced through a series of provisions summarised below:

- ✓ Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018, of 23 November 2018. These requirements include the issuance of instructions as to the responsibilities of the licensee of nuclear facilities applicable in the event of emergency situations. A summary is given of the most significant articles in this regard:
  - ⇨ Article 7, on the organisation and management system, establishes that the licensee must, throughout the entire life-cycle of the facility, have in place the necessary technical, economic and human resources, with appropriate skills and qualifications and an appropriate organisational structure, in order to maintain nuclear

safety and to ensure an appropriate response capacity to deal with emergency situations.

- ⇨ Article 28, on procedures and guides, establishes that the licensee must:

  1. Have in place, for any operational system which could be encountered by the facility, a consistent set of procedures and guides for normal, abnormal and emergency conditions, specifying the actions to be taken so as to maintain safe conditions at the facility, to re-establish the main safety functions or to mitigate the loss thereof, maintaining the goal of safety established in Article 6 of this Regulation.
  2. Verify and validate operating procedures and guides before they enter into force.
  3. The key procedures and guides updated in order to reflect the situation of the facility and of the organisation, and the experience and knowledge acquired.
  4. Guarantee that the personnel involved are properly trained in the handling and application of the procedures and guides.
  5. Ensure that at sites with more than one unit, the procedures and guides for normal, abnormal and emergency conditions take into account the safe operation and management of accidents in each of the units of the site simultaneously.

- ⇨ Lastly, Article 29, on emergencies, establishes that the licensee must:

  1. Have in place an internal emergency plan as provided in the Regulation on nuclear and radioactive facilities, approved by Royal Decree 1836/1999, of 3 December 1999.
  2. Ensure the availability of appropriate resources at the site for the management of emergency conditions, and mechanisms to receive external assistance.
  3. Establish the channels and procedures required to collaborate with the competent authorities in the implementation of external emergency plans, information for the population, and the response established in these provisions to protect the population in the event of accident, on the terms set out in National Civil Protection System Law 17/2015, of 9 July 2015; in Royal Decree 1546/2004, of 25 June 2004, approving the Basic Nuclear Emergency Plan (PLABEN), and in Royal Decree 1564/2010, of 19 November 2010, approving the basic guidelines for the planning of civil protection in the event of radiological risk, and other applicable regulations.

✓ Both the Basic Nuclear Emergency Plan (PLABEN), approved by Royal Decree 1546/2004, of 25 June 2004, and the Basic Radiological Risk Guide (DBRR), approved by Royal Decree 1564/2010, of 19 November 2010, were amended during the period covered by this Report by means of Royal Decree 734/2019, of 20 December 2019, amending basic guides for civil protection planning and state level protection plans, to improve support for people with disability and other particularly vulnerable groups in emergency response.

✓ Article 3, paragraph 1, of Royal Decree 1564/2010, approving the DBRR, provided that the CSN shall establish and gather data and information as required to draw up a national Catalogue of facilities or activities that could give rise to emergency situations because of radiological risk, and shall update such data and information with the required frequency. As a consequence, in 2011 the CSN produced the docu-

ment on criteria for the establishment of the National Catalogue of facilities or activities that could give rise to radiological risk emergency situations as indicated in the DBRR. In 2019 the CSN website implemented IT application functionality for controlled access to the aforementioned Catalogue, providing the Directorate-General for Civil Protection and Emergencies of the Ministry of the Interior and the Autonomous Regions with information as to updates on facilities and activities entailing a radiological risk throughout national territory.

- ✓ The Nuclear Emergency Plan of the Navy (PENAR) was established in 1988 to react to possible accidents suffered by nuclear-powered vessels mooring or anchoring in authorised Spanish ports, and was subsequently revised in 2018 to align it with the corresponding Spanish regulations.
- ✓ The National Civil Protection Strategy approved by the Nuclear Safety Council was published by Order PCI/488/2019, of 26 April 2019, and includes a subsection dedicated to nuclear and radiological risk, listing the regulatory and management instruments in place in Spain in order to address nuclear and radiological risk.

25.2. Application of emergency preparedness measures, including the role of the regulatory body and other agencies

- ✓ Internal Response Level

  During this reporting period, and for nuclear power plants, as a result of the latest improvements implemented following the stress tests, the Internal Emergency Plans (PEI) were revised for coordination with the authorities of the External Nuclear Emergency Plan, where provision is made for the activation of the Filtered Containment Venting System (SVFC). Both the activation of the SVFC, and the activation of the Alternative Emergency Management Centre, were included by the licensees in the corresponding PEI development procedures.

  A *Guardia Civil* Response Unit (UR) has been deployed at all nuclear power plant sites in operation. A revision of the PEI has begun in order to include this UR/PEI interface, to be set out at each site in a PEI development procedure.

  The PEI of nuclear power plants have also been revised to include a triggering event solely connected with the level and temperature of the water in the spent fuel pool. Another revision of the PEI takes into account events indicating extensive damage beyond the Design Specifications, for which Guides for Emergency Management with Extensive Damage and Guides for Mitigation of Extensive Damage have been drawn up.

  As mentioned previously, the individualised temporary storage (ITS) facilities are now in operation at the José Cabrera nuclear power, where the dismantling process is now being concluded, and at Trillo, Ascó and Almaraz, as well as the Santa María de Garoña Nuclear Power Plant ITS, which does not yet have fuel stored, while the Cofrentes Nuclear Power Plant ITS is in the process of being licensed.

  The Santa María de Garoña Nuclear Power Plant, which is in a state of definitive cessation of operations, has revised its PEI to align it with the risk associated with the dismantling phase.

- ✓ External Response Level

During the period covered by the Report, for emergencies managed under the Basic Civil Protection Guide to address Radiological Risk, the CSN issued a favourable opinion on revision 1 of the Special Plan to address Radiological Risk of the Autonomous Region of Extremadura.

25.3. Emergency Preparedness and Response

In order to fulfil the missions entrusted to the CSN under the Emergencies Law, and those set out in the CSN Emergency Action Plan itself, there has been an increase in resources and one-hour call-out personnel groups.

All nuclear facilities, nuclear power plants in operation or decommissioning, and all other nuclear facilities, continue to stage their required internal emergency drills, covering complex accident scenarios serving to ascertain the operability of the PEIs in response to any hypothetical accident postulated for each facility. In addition, at those sites with two units, scenarios have over recent years been designed involving a simultaneous and different impact on the two units. Likewise, in accordance with the criteria established by the CSN, these drills may be used to activate the CSN Emergency Response Organisation, and may be subject to specific inspection.

25.4. Arrangements at the international level, including with neighbouring countries, where necessary

The bilateral agreement that the CSN has signed with the ASM (the French regulatory body) in the field of emergencies includes, among other objectives, the aim for both organisations swiftly to inform one another of any nuclear or radiological accident occurring anywhere within their territory that could affect any part of national territory or generate concern among their citizens.

The CSN continues to take part at the meetings of the HERCA *Working Group Emergencies* (WGE), which previously reflected the concerns raised by the WENRA mutual emergency support group.

Work is currently being undertaken on the fact that, although at the earliest phase of an accident there are substantial uncertainties as to the accident and its potential radiological impact, those managing the emergency are required to adopt protection decisions. This demands considerable flexibility in decision-making. In this regard, the HERCA WGE has, for those countries affected by a nuclear accident, proposed the coordination of decisions and the response mechanism for the early stage of the accident, referred to as the HERAC-WENRA group: the *Common Situation Report* or *Common Approach* based on the following principles:

- ✓ Mutual trust and understanding
- ✓ Coordination of activities
- ✓ Alignment of recommendations between neighbouring countries

The objective is to develop mechanisms serving to implement protective measures during an emergency in a consistent manner along shared borders between countries, without the need to change each country's procedures.

Article 26. Decommissioning

Article 26. Decommissioning

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

i) qualified staff and adequate financial resources are available;

ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;

iii) the provisions of Article 25 with respect to emergency; and

iv) records of information important to decommissioning are kept.

According to the Regulation on nuclear and radioactive facilities (RINR), decommissioning is

> *"the process under which the licensee of a facility, having obtained the corresponding authorisation, performs activities for decontamination, disassembly of equipment, demolition of structures and removal of materials, in order ultimately to allow the site to undergo full or restricted release. The process of decommissioning ends with a final decommissioning declaration, which releases the licensee of a facility from its liability as the operator thereof, and in the case of restricted release of the site, defines the applicable usage limitations and the party responsible for maintaining these and overseeing compliance".*

Information on the process of licensing the decommissioning of nuclear facilities is set out in Annex B to this Report.

26.1. Decommissioning organisation and responsibilities

The dismantling and decommissioning of nuclear facilities in Spain constitutes an essential public service the management of which is entrusted in Article 38 bis of Nuclear Energy Law 25/1964 to Enresa, which will act as licensee in operations involved in the dismantling and decommissioning of nuclear facilities and, where applicable, radioactive facilities. The object and functions of Enresa in connection with dismantling/decommissioning are referred to in Article 9 of Royal Decree 102/2014, of 21 February 2014, for the safe and responsible management of spent fuel and radioactive waste.

In accordance with the RINR, when authorisation to operate a nuclear facility ends, responsibility for decommissioning initially lies with the licensee of the facility itself which, following the granting of the corresponding authorisation, is responsible for what are known as preliminary dismantling activities. Before the dismantling authorisation is granted, the licensee of the operational authorisation must have conditioned the radioactive waste from operations generated during the operation thereof in accordance with the acceptance criteria of the storage facility to which it will be transferred. The licensee of the facility must secondly have offloaded the fuel from the reactor and the irradiated fuel storage pools, or in default of the latter action, have in place a spent fuel management plan approved by the MITERD.

Once the operational licensee of the facility has concluded the aforementioned preliminary dismantling activities, the facility must be temporarily transferred to Enresa in order for disman-

tling to proceed. The obligations and requirements resulting from this transfer of licensee status are specified and established in the technical and administrative acceptance specifications between Enresa and the owners of the nuclear facilities, as referred to in Article 11 of Royal Decree 102/2014, and must first be approved by the MITERD.

The organisation and responsibility of Enresa, as the licensee of facilities in the process of decommissioning, are legally defined in the RINR itself.

26.2. Financing of decommissioning

In general, the dismantling and decommissioning of nuclear facilities is financed in the same manner as reported in the previous National Report. For further details as to the financing system, please consult Annex D.

26.3. Radiation protection and emergencies during decommissioning

As described in the previous National Report, nuclear facilities in the decommissioning phase are still considered to be nuclear facilities until the corresponding final decommissioning declaration has been granted, subject to the RINR. In this regard the regulations indicated in the subsection referring to compliance with the provisions of Articles 24 "*Operational radiation protection*" and 25 "*Emergency preparedness*" of this Convention continue to apply in full.

26.4. Document archive for dismantling and decommissioning

The RINR establishes the obligation on the licensees of nuclear facilities properly to compile and preserve all information regarding the operational stage. This regulation likewise demands that all authorised nuclear facilities should during their operation have dismantling and decommissioning provisions in place for the facility, describing among other aspects the disposal of radioactive waste generated and a study of the cost and economic and financial provisions to guarantee decommissioning (Article 20(j) of the RINR).

The agreements for the transfer of licensee status establish in contractual terms the mechanisms and procedures allowing Enresa to access all operational archives of the facility. Enresa is therefore able to draw on all information available deemed relevant for the design and execution of the corresponding dismantling and decommissioning plan.

Section G.

Safe management of spent nuclear fuel

Section G. Safe management of spent nuclear fuel

This section comprises the obligations derived from Articles 4 to 10 of the Convention

Article 4. General safety requirements

Article 4. General safety requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management, individuals, society and the environment are adequately protected against radiological hazards. In so doing, each Contracting Party shall take the appropriate steps to:

(i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;

(ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted;

(iii) take into account interdependencies among the different steps in spent fuel management;

(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

(v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;

(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;

(vii) aim to avoid imposing undue burdens on future generations.

Spent fuel produced at Spanish nuclear power plants is first of all stored in the reactor pools. Once they no longer offer sufficient capacity, or where necessary with a view to decommissioning, the fuel is transferred to dry individualised temporary storage (ITS) facilities built on site at the power plants themselves. By the date when this report was finalised, there were ITS facilities in place at the following nuclear power plants: Trillo, José Cabrera (in decommissioning phase), Ascó, Almaraz and Santa María de Garoña. There are likewise plans for a new facility of this type to begin operations at the Cofrentes Nuclear Power Plant

The ITS facilities in operation employ dry storage casks: dual-purpose metal casks approved for storage and transport in the case of the Trillo and Almaraz power plants, and concrete and metal storage systems in the case of José Cabrera and Ascó. The Santa María de Garoña Nuclear Power Plant is authorised for the use of dual-purpose metal containers, although its fuel remains in the pool awaiting a re-assessment of the ITS to be capable of housing the entire inventory of its pool. The subsection corresponding to Article 7.3 of this report provides more detailed information as to the technologies applied.

Spent fuel storage facilities are nuclear facilities or form part of nuclear facilities governed by the general applicable legal and regulatory framework (see Annex A), essentially comprising Law 25/1964, of 29 April 1964, on nuclear energy (LEN), Royal Decree 102/2014, on safe and responsible management of spent nuclear fuel and radioactive waste, the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, the Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018, the Regulation on health protection against ionising radiation (RPSRI), approved by Royal Decree 783/2001, along with both environmental legislation and the following Safety Instructions (ISs) issued by the CSN:

- ✓ CSN Instruction IS-20, on safety requirements concerning spent fuel storage casks.
- ✓ CSN Instruction IS-26, on basic nuclear safety requirements applicable to nuclear facilities.
- ✓ CSN Instruction IS-29, on safety criteria at temporary spent fuel and high-level waste storage facilities.

These Instructions incorporate the requirements of the IAEA and the WENRA reference levels, and in the case of Instruction IS-26, the safety requirements of Nuclear Safety Directive 2009/71/Euratom.

4.1. Measures to guarantee the maintenance of subcritical conditions and heat dissipation

Maintenance of subcritical conditions and adequate heat dissipation in temporary spent fuel storage facilities and systems constitute safety requirements incorporated by means of the application of technical and administrative or control systems, subject to analysis, assessment and surveillance.

The measures adopted by the licensees of facilities to comply with these requirements are described in the Safety Studies, an official document presented with the application for authorisation for the different phases of the facility, and in the Technical Functional Specifications, likewise a mandatory document for the operation of nuclear facilities.

These measures take into account the criteria established in the IAEA technical standards and the regulations in the country of origin of the technology (US NRC 10 CFR 50, in the case of the power plant pools, and US NRC 10 CFR 72, in the case of dry storage facilities and systems).

These criteria and requirements have been incorporated within national regulations by means of the aforementioned Nuclear Safety Council Instructions, in particular IS-20 and IS-29.

4.1.1. Measures to guarantee the maintenance of subcritical conditions

There has been no change since the last National Report in the criteria and methods employed for the maintenance of subcritical conditions in spent fuel storage facilities. The design criterion adopted for the maintenance of subcritical conditions (both in the pools and in the dry storage casks) is that the neutron multiplication factor (Keff), including all biases and uncertainties with a level of confidence of 95%, should be below 0.95 under normal, abnormal or accident operating conditions.

The methods employed for this purpose are as follows:

- ✓ in nuclear reactor pools, a safe geometrical configuration is organised and maintained, with the use of fixed or dissolved neutron poisons (except in BWR reactors); initial enrichment is limited, and credit is given to the degree of burnup of the fuels;
- ✓ in dry storage casks, maintenance of subcritical conditions is based on the geometry of the rack, the presence of neutron-absorbing materials as an inherent or fixed part thereof, and the administrative limits as to the U-235 enrichment of the fuel and the degree of burnup attained.

4.1.2. Measures to guarantee adequate heat dissipation

The cooling system of fuel storage pools at nuclear power plants dissipates the heat generated and maintains a minimum level of water above the fuel elements, to guarantee adequate buffering against any situation.

The dry storage casks of nuclear power plants have been designed to dissipate the heat generated by the fuel elements into the atmosphere by means of passive convection, conduction and radiation mechanisms.

The dissipation of heat from the dual-purpose metal casks is facilitated by the structure of the cask itself, which assists in the conduction of heat to the exterior, along with evacuation by convection and radiation.

In the case of metal and concrete casks, the structure is ventilated by natural convection, serving to cool the capsule housed within. The capsule itself also has an internal structure which assists in the conduction of heat to the exterior, along with the convection of the inert gas within.

4.2. Measures to ensure that the generation of radioactive waste as a result of spent fuel management is kept as low as possible

The minimisation of waste generation is a principle established in the Nuclear Energy Law (Article 38). It has also been included in Royal Decree 102/2014 (Article 3(a)), transposing into Spanish law Directive 2011/70/Euratom (Article 4) on the safe and responsible management of radioactive waste.

In wet spent fuel storage systems or pools, the minimisation of waste focuses on reducing as far as possible any secondary waste produced in the purification of the water and the air cleaning and ventilation system filters of the buildings where the systems are located. The criterion of minimising waste established as a general requirement for nuclear facilities likewise applies to the design of temporary dry spent fuel storage facilities and the processes associated with the loading of fuel.

4.3. Measures to take into account interdependencies among the different steps in spent fuel management

The consideration given to the interdependencies between the different stages of radioactive waste and spent fuel management has been an intrinsic element of the legal and regulatory framework in Spain for decades. The consideration given to interdependencies is included among the general management principles listed in Royal Decree 102/2014 for the safe and responsible management of spent nuclear fuel and radioactive waste.

CSN instruction IS-26, on basic nuclear safety requirements applicable to nuclear facilities, requires with reference to radioactive waste management that the licensee identify and acknowledge in advance the interactions and relationships with other stages when reaching decisions in each radioactive waste management stage, so as to achieve a balanced equilibrium of safety and overall effectiveness.

In practice, the Radioactive Waste and Spent Fuel Management Plan (PLAGERR) is an essential document for the application of this principle. The PLAGERR, an official document for the operation of nuclear facilities, is approved by the MITERD following a report by the CSN, as part of the facility licensing process. The objectives, criteria and content of the PLAGERR are governed by CSN Safety Guide 9.03, dating from the year 2008. The respective PLAGERR plans of the nuclear power plants in operation have been aligned with this guide.

Consideration must also be given to the general strategy included in the General Radioactive Waste Plan (GRWP) as indicated in Royal Decree 102/2014:

> *"The Plan shall set out the strategies, required actions and technical solutions to be developed in Spain in the short, medium and long terms, for the purpose of safe and responsible management of spent nuclear fuel and radioactive waste, the dismantling and decommissioning of nuclear facilities, and all other activities connected with the foregoing, including the economic and financial provisions and measures and instruments necessary in order to undertake these actions".*

The consideration given to interdependencies is directly reflected in the adoption of criteria for the acceptance of radioactive waste and spent fuel which must be signed by the licensees of nuclear facilities for subsequent management by Enresa, as indicated in Article 11 of Royal Decree 102/2014, regarding technical or administrative specifications. These specifications will be valid until the end of the life of the facilities, including dismantling and decommissioning, and must have been approved by the MITERD, with a prior report by the Nuclear Safety Council.

The standard contracts that have been established over time with regard to spent fuel and radioactive waste between Enresa, as the waste manager under Spanish regulations, and the licensees of nuclear facilities, have the status of technical administrative acceptance specifications.

In this regard, a draft technical administrative acceptance specification was drawn up for spent fuel and radioactive waste, in order to update the situation between the licensees of nuclear facilities and Enresa, based on the standard contracts currently in force. This draft was submitted to the MITERD for consideration.

It should lastly be pointed out that the reporting obligations of Enresa with regard to the CSN brought in by Royal Decree 102/2014 include the requirement to submit information during the first quarter of each year as to interdependencies, agreements and interfaces of responsibilities with the licensees of other spent nuclear fuel and radioactive waste management facilities (Article 12.2 of the aforementioned Royal Decree).

4.4. Measures for the protection of people, society and the environment

The provisions for the protection of people and the environment against risks derived from nuclear and radioactive facilities are set out in the existing legal framework in Spain, as explained in Sections E and F of this Report. These provisions apply both to spent fuel storage facilities associated with nuclear power plants, and to independent spent fuel storage facilities.

In the sphere of spent fuel management, and specifically the temporary spent fuel and high level waste storage facilities, the basic criteria for worker protection are set out in Article 38 of Nuclear Energy Law 25/1964, developed in the Regulation on Health Protection against Ionising Radiation, approved by Royal Decree 783/2001.

In addition, during the period covered by this Report particular mention should be made of the approval of the Regulation on nuclear safety at nuclear facilities, approved by Royal Decree 1400/2018, the object of which is to establish the basic nuclear safety requirements applicable to nuclear facilities throughout their life-cycle, so as to guarantee a high level of nuclear safety and so protect workers and the general public against the risks resulting from ionising radiation derived from nuclear facilities…

The aforementioned general measures adopted in connection with worker protection, and those regarding the control and surveillance of effluents and optimisation of radiation protection at nuclear facilities, are set out in Article 24 of this Report.

As for radiation protection measures for people and society in the case of spent fuel storage and management facilities, these are developed on in Articles 6, 7, 8 and 9 of this Report and in Article 25 for emergency management.

In terms of environmental protection measures, these are governed by the national environmental impact assessment regulations, specifically Environmental Assessment Law 21/2013, of 9 December 2013, incorporating Directive 2001/42/EC, of 27 June 2001, on the assessment of the effects of certain plans and programmes on the environment, and Directive 2011/92/EU, of 13 December 2011, on the assessment of the effects of certain public and private projects on the environment.

In Spain, individualised temporary storage (ITS) facilities located on site at the Trillo, José Cabrera, Ascó, Almaraz and Garoña Nuclear Power plants, and also at Cofrentes, have been subjected to an environmental impact assessment (EIA) and obtained the corresponding environmental impact statement (EIS).

4.5. Measures for the consideration of biological, chemical and other risks that could be associated with spent fuel management

The prevention of biological, chemical and other non-radiological risks associated with spent fuel management is first of all governed by the standard regulations applicable to other industrial activities entailing such risk, essentially comprising environmental impact assessment legislation. Meanwhile, the limitations established for this purpose in the corresponding requirements corresponding to the authorisation of the facilities in question take into account such risks in the operation thereof. The authorisation of spent fuel management facilities requires an environmental impact assessment and an operational authorisation.

Meanwhile, the prevention of non-radiological risks faced by operational personnel at such facilities is governed by Occupational Risk Prevention Law 31/1995.

Also of importance in this regard are the provisions of CSN Safety Guide 1.6 on "*Notifiable events at Nuclear Power Plants*", which requires that events that in the judgment of the licensee thereof could have significant public repercussions (including environmental variations and occupational accidents) must be reported to said body.

4.6. Measures to avoid repercussions for future generations that are greater than those permitted for present generations

The plan is for intermediate storage of spent fuel, whether in ITS casks or in the CTS, to last for several decades. The robustness and safety of these storage systems is achieved through strict compliance with the regulations during siting, design, construction and operation, subject to a regulatory licensing and supervision framework on the part of the regulatory body. National policy in the field of spent fuel management covers the various stages required for temporary storage up until disposal in a deep geological repository, along with the necessary financial, technical and research provisions. This long-term management policy ensures that the fuel and waste remain isolated from the environment, protecting present and future generations.

Nonetheless, as mentioned in the previous paragraph, bearing in mind that fuel and waste management activities may involve various responsible figures and cover longer periods, Nuclear Energy Law 25/1964 indicates in Article 38 that, with regard to the measures to be adopted by organisations responsible for nuclear facilities, they must adopt appropriate measures in all stages of the management of spent nuclear fuel and radioactive waste, so as properly to protect people, property and the environment, in both the present and the future.

4.7. Measures to avoid imposing undue burdens on future generations

The Spanish regulatory framework establishes, by means of Nuclear Energy Law 25/1964, the Sixth Additional Provision of Electrical Sector Law 54/1997, and Royal Decree 102/2014, on the safe and responsible management of spent nuclear fuel and radioactive waste, the specific measures for this purpose connected with the assignment of responsibilities, provision of funds

to finance the activities set out in the GRWP, and provisions with regard to requirements for institutional control.

The legislation establishes the responsibilities of the different agents involved in spent fuel management: Ministry for Ecological Transition and Demographic Challenge (MITERD), regulatory body (CSN), producers and Enresa, as detailed, among others, in Articles 20 and 21 of this Report.

With regard to this subsection, the legal framework provides for the creation, endowment, and management and guarantee mechanisms of the economic Fund established to finance GRWP activities, including spent fuel management, the details of which may be found in Annex D. Through the provisions allocated to said Fund, generating facilities benefiting from the production of electricity of nuclear origin pay the costs associated with the fuel generated up until disposal thereof.

The Nuclear Energy Law also establishes that the State will assume ownership of spent fuel once disposal takes place, and will likewise handle any surveillance that might be required following the decommissioning of a nuclear facility, once the time period established in the corresponding authorisation has passed.

In this regard, Directive 2011/70/Euratom highlighted the ethical obligation of each Member State to avoid any undue burden on future generations with regard to spent nuclear fuel, and establish the Community framework to guarantee this principle.

In line with the Directive, Royal Decree 102/2014, which completed the transposition thereof into Spanish law, has the following aim:

> *"the regulation of safe and responsible management of spent fuel and radioactive waste derived from civil activities in all stages, from generation up until disposal, so as to avoid imposing undue burdens on future generations, in addition to the regulation of certain aspects regarding the financing of such activities, thereby fulfilling the Community framework".*

As a result of the above, and in accordance with Royal Decree 102/2014, the contents of the next General Radioactive Waste Plan must include

> *"concepts or plans for the period after the operational phase of a disposal facility, indicating the period of time during which the relevant controls would be maintained, alongside the resources to be employed in order to preserve knowledge as to said facility in the long term".*

Likewise, Article 9.2 of the Regulation on nuclear safety at nuclear facilities (RSNIN) approved by Royal Decree 1400/2018, establishes that the siting, design, construction, commissioning, operation and decommissioning of a nuclear facility must ensure that reasonably foreseeable radiological consequences for future generations are no greater than those permitted for the present generation.

Lastly, authorisation for the dismantling and decommissioning of facilities for the disposal of spent nuclear fuel and radioactive waste, incorporated in the regulation for the licensing of facilities as a consequence of Directive 2011/70/Euratom, seeks to guarantee the long-term safety of the storage system, which will, where applicable, determine the site areas to be subject to radiological and other surveillance and control procedures, for a specified time period.

Article 5. Existing facilities

Article 5. Existing facilities

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

Measures adopted for the revision of the safety of existing facilities

This article refers only to those facilities in existence at the moment of entry into force of the Convention in Spain. At that time, the only spent fuel management facilities were the pools of the nuclear power plants. At present the review of the safety of these pools is performed by means of Periodic Safety Reviews (RPS) of the nuclear power plants, an issue essentially addressed in Articles 8 and 9 of this Report, in addition to the application of certain measures of the Post-Fukushima National Action Plan (NAcP), described in depth in previous Reports.

Article 6. Siting of proposed facilities

Article 6. Siting of proposed facilities

1. *Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:*
   - *(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;*
   - *(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;*
   - *(iii) to make information on the safety of such a facility available to members of the public;*
   - *(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.*
2. *In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.*

The basic Spanish strategy for the management of spent fuel, as set out in the Sixth General Radioactive Waste Plan (GRWP) currently in force, provides for the temporary storage of spent fuel and high level waste on the basis of a dry storage system guaranteeing safety and the protection of people and the environment, for as long as required in order to proceed to disposal.

The facilities planned for the management of spent fuel will be assigned to the temporary storage of this fuel, on either a centralised or individualised basis. In general, the site aspects to be considered will depend on whether a new site is used, as would be the case of Centralised Temporary Storage (CTS), or whether the nuclear power plant sites themselves are used, as in the case of ITS.

6.1. Provision for new spent fuel management facilities

In line with the strategy set out in the draft Seventh GRWP, the priority objective for the coming years remains the commissioning of a Centralised Temporary Storage (CTS) facility in 2028, with plans for a Cask Holding Facility (CHF) which will form part of this facility and could become operational in 2026. Alongside this facility, the plan is for a technology park which would have an associated technology and infrastructure centre to facilitate the establishment of enterprises in the area.

This CTS will house the SF generated at Spanish nuclear power plants; the radioactive waste derived from the reprocessing of SF from the Vandellós I Nuclear Power Plant, currently in France; as well as special waste (SW), in other words waste that because of its radiological characteristics is not eligible for management on the premises of the El Cabril Disposal Facility.

To this end, in January 2014 Enresa presented the former MINETAD (Ministry of Energy, Tourism and the Digital Agenda) with the application for the site and construction authorisations for the CTS as a nuclear facility. In turn, the MINETAD requested the mandatory report from the Nuclear Safety Council in connection with both requests. The CSN issued a favourable opinion on the prior authorisation in July 2015.

However, on 5 July 2018 the Secretary of State for Energy of the former MITECO (Ministry for Ecological Transition and Demographic Challenge) requested that the CSN suspend issuance of the report required from said body with regard to the construction authorisation request, in order to allow an analysis of the current circumstances and forecasts, and to establish a planning schedule aligned with them, to be specified in the Seventh General Radioactive Waste Plan.

Bearing in mind the planned timeframes for the CTS project, during the period covered by the Report it proved necessary to begin the process of licensing an Individualised Temporary Storage (ITS) facility at the Cofrentes Nuclear Power Plant, in order to avoid reaching saturation point in its pool, and this will join those already authorised at the power plants of Trillo, José Cabrera, Ascó, Santa María de Garoña and Almaraz. To this end, the licensing of the Cofrentes ITS requires the following authorisations in accordance with nuclear and environmental regulations:

- ✓ Authorisation of execution and assembly of the design modification to the power plant for the implementation of an ITS, pursuant to Article 25.2 of the Regulation on Nuclear and Radioactive Facilities (RINR), approved by Royal Decree 1836/1999, granted on 18 June 2019 by the Directorate-General for Energy Policy and Mines, following a report by the CSN.
- ✓ Authorisation for a modification to the design of the power plant for the implementation of the design modification, in accordance with the procedure established in Article 25.1 of the RINR. This is currently pending a report by the CSN.

- ✓ Licensing of the dual-purpose spent fuel casks, for storage and subsequent transport. To this end, on 3 December 2018 an application was filed for the approval of the transport package design in accordance with Article 77 of the RINR, which will need to be authorised by the Directorate-General for Energy Policy and Mines, following a favourable report by the CSN. The design will likewise require authorisation for storage of spent fuel, in accordance with Article 80 of the RINR.
- ✓ In terms of the impact of the facility on the environment, the project was subjected to an environmental impact assessment in accordance with the procedure established in Law 21/2013, of 9 December 2013. This process culminated with the Decision of the Directorate-General for Biodiversity and Environmental Quality on 12 June 2019, formulating the favourable Environmental Impact Statement (EIS) on the project.

Meanwhile, during the period covered by this Report it proved necessary to increase the cask storage capacity of the ITS at the Trillo Nuclear Power Plant, from the originally authorised limit of 32 up to a maximum of 80. This authorisation was processed as a design modification to the power plant, in accordance with Article 25.1 RINR, granted by means of a Decision of the Directorate-General for Energy Policy and Mines on 30 November 2018, following a report by the CSN.

Similarly, the ITS at the Santa María de Garoña Nuclear Power Plant was designed and built at the time based on the hypothesis of continued operation of the power plant, and the expectation is therefore that authorisation for an increase in its capacity will be needed, so as to allow all the spent fuel to be stored with a view to the decommissioning of the plant. The licensing of this will require the corresponding authorisation for a design modification to the power plant, in accordance with Article 25.1 RINR.

The matters processed during this period in connection with the site, the criteria for assessment of radiological repercussions, public information, construction and safety of these facilities, are further developed on in Articles 6.2, 6.3, 6.4, 7 and 8 of this Report.

6.2. Measures to assess all factors connected with the site and influencing safety

The analysis of factors connected with the siting of nuclear facilities must be included in the documentation to be presented in order to obtain the corresponding authorisations, as established in the RINR (set out in Annex B to this Report), on the terms established in CSN Instruction IS-26.

Consideration must likewise be given to the terms of Article 14, "*Initial site assessment*", of the Regulation on nuclear safety at nuclear facilities (RSNIN), approved by Royal Decree 1400/2018, in other words an assessment of the potential siting of a nuclear facility to determine the effects that this could have from the nuclear safety perspective on the surrounding population and environment, and also the possible conditional factors that the site might impose on the design of the facility, including aspects regarding transport routes and emergency management.

Specifically, the application presented for prior or site authorisation encloses the study of site characterisation and the surrounding area, which must include sufficient information as to the corresponding parameters which could impact on nuclear safety or radiation protection, including demographic and ecological factors, and activities connected with land use regulations. This documentation is assessed by the CSN, which issues a report in order for the Ministry to grant authorisation.

Said information is completed in the documentation to be presented with the application for construction authorisation, and subsequently the operational application, which in addition to updated information on the site parameters, including aspects regarding soil and water use and any data that could contribute to a better understanding of the site, must also include surveillance and verification plans for the basic representative parameters.

Site factors are also assessed in the Periodic Safety Reviews to which nuclear facilities are subjected, conducted every 10 years, as well as applications for modifications to the plants, if such modifications impact on any factor concerning soil usage or the conditions initially planned for the site. Lastly, the application for dismantling and decommissioning requires the presentation of a radiological study of the site and its surrounding area.

In the case of ITS facilities, both those in existence at the Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña power plants and the facility planned at the Cofrentes Nuclear Power Plant, the safety assessment takes into account the inherent characteristics of the site in each case, ascertained by means of the successive authorisations of these power plants, and their interfaces with the corresponding storage system, with the following result:

- ✓ First of all, it is confirmed that the site factors lie within the margins contained in the Safety Study for the approval of the storage casks to be used, as required by CSN Instruction IS-20, on design requirements and usage of casks.
- ✓ Meanwhile, an analysis is conducted of any site factors that could impact on the design and settlement of the ITS concrete slab.

6.3. Criteria to assess radiological repercussions on the environment and surrounding population

In accordance with CSN Instruction IS-29, Article 3.1, the licensee of the temporary spent fuel and high level waste storage facility must as a general safety objective protect people and the environment from the harmful effects of ionising radiation. The Safety Study for the site must to this end demonstrate fulfilment of this objective both in normal operations and foreseeable operational events, and also in the event of accidents.

During normal operations and foreseeable operational events, the effective annual dose for any member of the public located beyond the controlled area must be below 250 μSv. The controlled area is to be understood as the area surrounding the temporary storage facility where the licensee exercises authority over usage, and within which the operations are performed. There must be a distance of at least 100 metres between the spent fuel or high level waste stored at the facility, and the boundary of the controlled area. In order to guarantee that exposure of the population is kept at a value as low as reasonably possible, operational restrictions may be established for the doses derived from radioactive effluent and levels of external irradiation caused at the facility.

For design specification accidents, the acceptance criteria are established in terms of an effective dose less than 50 mSv, an equivalent skin dose less than 500 mSv and an equivalent crystalline lens dose less than 150 mSv, the same applying for any member of the public located beyond the controlled area. Verification of these limits in the event of the postulated triggering events is covered by the analysis of accidents and radiological consequences incorporated in the Safety Study for the facility. The acceptable estimated frequency threshold for an event is once in a million years in order to conduct a detailed analysis of the effects of events of this type, and possible measures to mitigate them. In any event, the threshold cut-off value in order to consider an event as corresponding to the design specification must be established in the design spec-

ifications themselves. As a result, internal or external events with a lower exceedance frequency may be considered as being beyond the design specification.

In the case of individualised temporary storage (ITS) facilities on the site of the Ascó and Almaraz Nuclear Power Plants, the Santa María de Garoña Nuclear Power Plant (definitive cessation of operations) and the José Cabrera Nuclear Power Plant (being decommissioned), and also the modification to the design of the ITS at the Trillo Nuclear Power Plant for the use of ENUN 32P casks until capacity is filled, the assessment takes into account the inherent characteristics of the site, ascertained by means of the licensing and review of the plant itself, and the interface with the storage system. At these facilities, during normal operations and forecast operational events, compliance with the radiological acceptance criterion referred to above takes into account external or internal irradiation caused by the contribution made by the existing nuclear power plants on the site.

6.4. Public information as to the safety of planned spent fuel management facilities

General issues regarding information and public participation (the role of the regulatory body and other authorities, the duty to inform citizens, local information committees for nuclear power plants, website, SISC supervisory system, publication in planned standards, Law 21/2013, etc.) have already been addressed in Article 20.2.8 and subsection 3 of Annex B of this Report, and we therefore below highlight only those aspects specifically tied to information for the public with regard to the safety of spent fuel management facilities conducted for facilities planned during this period, in other words the Cofrentes Nuclear Power Plant ITS.

The MITERD subjected the design modification for implementation of an ITS at Cofrentes to the environmental impact assessment procedure established in Law 21/2013, which includes a public information procedure and consultation with affected Public Authorities and stakeholders, for a period of 30 business days. The project received arguments from two Public Authorities, two other public bodies, three companies and stakeholder organisations, as well as a number of private individuals. All of these were passed on to the licensee to allow it to consider these arguments and then make the relevant modifications in a new version of the project and of the Environmental Impact Study.

Meanwhile, the revision of the RINR makes provision for the information committees, which had previously been held only in those municipalities where nuclear power plants are located in order to inform the surrounding population during the construction, operation and decommissioning of such plants, furthermore to be extended to centralised spent nuclear fuel or radioactive waste storage facilities, in line with the suggestion made to Spain in this regard at the sixth review meeting.

Article 7. Design and construction of the facilities

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Each Contracting Party shall take the appropriate steps to ensure that:

i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;

iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

7.1. Measures in design and construction to limit the radiological impact of facilities

The objective of the radiation protection of spent fuel management facilities is established in general in Article 38 of Nuclear Energy Law 25/1964.

This objective is developed in the Regulation on nuclear safety at nuclear facilities approved by Royal Decree 1400/2018, of 23 November 2018, with regard to the prevention of accidents and avoidance of radioactive emissions (Article 6), the limitation of doses for workers and the public (Article 9), defence in depth of the facility (Article 11) by means of intrinsic safety mechanisms and multiple barriers (Article 16) ensuring compliance with safety functions, including the recoverability of spent fuel and radioactive waste (Article 17).

This objective is specifically developed upon in the CSN Safety Instructions (IS) IS-26, "*General safety requirements applicable to nuclear facilities*" and IS-29, "*Safety criteria at temporary spent fuel and high-level waste storage facilities*".

The latter Instruction, IS-29, demands that the objective of radiation protection be taken into account in the design, construction and operation of the facility, requiring that measures be adopted in order to:

- ✓ limit, minimise and control exposure to radiation on the part of people, the release of radioactive materials and the environment;
- ✓ limit the likelihood of events that could cause a loss of control over any source of radiation;
- ✓ mitigate the consequences of such events should they occur; and
- ✓ minimise the generation of radioactive waste.

In accordance with the RINR, the Safety Study to be presented with the application of the authorisation of this type of facility must demonstrate compliance with these objectives, both in normal operations, and in abnormal conditions in the event of an accident.

For ITS facilities located on the site of nuclear power plants, the application for authorisation, formulated as authorisation for a design modification to the plans in accordance with Articles 25 and 26 of the RINR, will be accompanied by the corresponding safety analysis. Safety Studies are assessed by the CSN prior to the MITERD granting the corresponding authorisation.

On a supplementary basis, in accordance with the requirements of Article 80 of the RINR, the design of the storage systems or casks used at ITS facilities must be approved by the MITERD following an assessment of the corresponding Safety Study by the CSN, in accordance with the provisions of CSN Instruction IS-20, "*Safety requirements regarding spent fuel storage casks*".

In practice, as already mentioned in previous National Reports, the process of approval of the design of the containers and authorisation of the existing ITS facilities at the Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña nuclear power plants, and the ITS currently being licensed at Cofrentes, has taken these objectives and requirements into account. Since the process covered by the Sixth Report, two ITS facilities have been authorised, one at Santa María de Garoña and another at the Almaraz Nuclear Power Plant, the licensing of which followed the same procedure as a previous ITS facilities. The casks, designed and built by the Spanish company ENSA, are of the ENUN 52B model for the Garoña Nuclear Power Plant, and the ENUN 32P model for the Almaraz and Trillo plants. During this period the Trillo ITS authorisation was also re-licensed for the use of this cask.

7.2. Provisions with a view to decommissioning

As may be seen in Annex B with reference to the process for licensing facilities, Article 17 of the RINR requires that the documentation to be presented with the application for authorisation to construct nuclear facilities should include the technological, economic and financing provisions for dismantling and decommissioning. These provisions will likewise be developed to a greater extent in the operational authorisation application, in accordance with the specifications of Article 20 of the RINR.

Likewise, Article 36 of the RSNIN requires that during the phases of design, construction and operation, the licensee must make provision for needs and take into account the activities required for the safe decommissioning of the facility. The licensee must establish and maintain a decommissioning plan for the facility in accordance with the provisions required by the RINR.

Similarly, licensing for construction and commissioning of ITS facilities on the site of power plants themselves, considered to be a modification to the power plant design, follow the provisions set out in Article 25, 26 and 27 RINR. During the period covered by the Report, the Cofrentes Nuclear Power Plant continued to licence an ITS to supplement the capacity of its pool. Likewise, the Trillo Nuclear Power Plant completed the process of relicensing its ITS in order to provide it with capacity for a greater fuel inventory, while the Santa María de Garoña Nuclear Power Plant has plans to adopt the same approach to allow the storage of all its fuel with a view to decommissioning. In accordance with the provisions of said regulation, these modifications must include considerations as to the decommissioning of the modification, which will be taken into account to the extent that they must be compatible with the decommissioning of the main facility.

7.3. Technologies employed for the storage of spent fuel

All power plants in operation or in a situation of definitive cessation of operations have a pool in place for the storage of spent fuel, this being the technology providing the greatest capacity for this purpose.

Meanwhile, the Trillo, José Cabrera (in process of decommissioning), Ascó and Almaraz power plants store spent fuel in various dry storage systems located in the ITS facilities authorised for this purpose:

- ✓ In the cases of Trillo and Almaraz, the technology employed comprises dual-purpose metal casks (storage and transport).
- ✓ The storage system employed at José Cabrera and Ascó comprises three separate components: a multi-purpose metal capsule, comprising a hermetic confinement barrier, a hybrid concrete-steel storage module, which houses the capsule for long-term storage, and the transfer casks used for capsule transfer, loading and offloading operations. The system is completed by the transport casks provided for future transport of the loaded capsule as far as the facility where the next management stage takes place.

Article 8. Assessment of safety of facilities

Article 8. Assessment of safety of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

8.1. Legal and regulatory requirements

The measures for the execution of a safety assessment prior to the construction and operation of spent fuel storage and management facilities are established by the RINR, which requires that the licensee present a Preliminary Safety Study (EPS) with the application for construction, and a Safety Study (ES) with the application for operation of nuclear facilities. In the case of the construction of individualised temporary storage (ITS) on the site of the power plants themselves, these are considered to be modifications to their design, and likewise require the execution of the corresponding safety analysis, identifying changes with regard to the ES for the facility, and requiring authorisation for execution and assembly, and further authorisation for the commissioning of the modification.

The contents of each of these safety studies, the EPS and the ES, are likewise detailed in the RINR, as indicated in Annex B to this Report. These studies must include not only the description of the site and of the facility, but also an analysis of the foreseeable accidents and their consequences, and a radiological analytical study estimating the potential radiological impact on the population and the environment.

Likewise, during the period covered by this seventh Report, the Regulation on nuclear safety at nuclear facilities (RSNIN) was approved, incorporating into Spanish law the aspects of Directive 2014/87/Euratom concerning basic nuclear safety requirements. Article 12 of said regulation requires a safety assessment of the facility (site, design and operation) in order to determine that an adequate level of nuclear safety has been attained, and that the facility complies with the safety objective.

These requirements are developed in CSN Instruction IS-26, on basic safety requirements applicable to nuclear facilities, and in further detail in Instruction IS-29, on spent fuel storage facilities, emphasising the principles of *defence in depth, protection by multiple barriers,* and *passive safety*, and also specifying that the objective of the safety analysis to be conducted by the licensee is to verify the capacity of the safety-critical elements and barriers to prevent accidents and to mitigate their consequences.

According to Article 13 of the RSNIN and the aforementioned IS Instructions, nuclear power plants and spent fuel storage facilities are obliged to conduct a Periodic Safety Review (RPS) at least every 10 years, to be supervised by the CSN. The objective of this RPS is to verify the nuclear safety of the facility and to obtain an overall assessment of its performance during the period considered, by means of a systematic analysis of all nuclear safety and radiation protection aspects. The RPS must:

a) Confirm that the facility continues to comply with its design specifications, or establish the necessary corrective measures if it does not comply in any regard.

b) Verify the availability and validity of measures for the prevention of accidents and the mitigation of their consequences, and application of the principle of defence in depth.

c) Guarantee that nuclear safety remains at a high level during the following period.

d) Implement "reasonably feasible measures" to comply with the safety objectives of the RSNIN and the corresponding Nuclear Safety Directive, 2014/87/Euratom.

Safety Guide 1.10 (Rev. 2) *Periodic safety reviews of nuclear facilities* includes the experience of the most recent safety reviews conducted at Spanish power plants and in other countries, IAEA safety guide SSG-25 "*Periodic Safety Review for Nuclear Power Plants*", the lessons learned from the Fukushima nuclear power plant accident which occurred in March 2011, the nuclear safety directives of the European Union (Council Directive 2009/71/Euratom, of 25 June 2009, and Council Directive 2014/87/Euratom, of 8 July 2014), the WENRA reference levels and the challenges associated with the ageing and obsolescence of equipment and the possible long-term operation of facilities beyond their initially planned lifespan.

In addition, the CSN has established the requirements for the management of ageing during the lifespan of design and long-term operation, by means of Instruction IS-22, Revision 1, of 15 November 2017.

Lastly, Article 15 of the RSNIN establishes the monitoring of the site conditions of facilities by means of surveillance and monitoring programmes throughout the life-cycle of the facility, the characteristics of the site and external events that could affect its nuclear safety, contextual conditions that could be affected by the potential impact of the nuclear facility and the assessment of the potential impact on the site of modifications to the facility during operation.

8.2. Application to the licensing of existing and planned facilities

The licensing of the pools associated with the design of nuclear power plants, and their individualised temporary storage (ITS) facilities are incorporated within the licensing of the power plants themselves, and are subject to the process of Periodic Safety Reviews.

During the period covered by this National Report, the RPS of the Almaraz and Vandellós II nuclear power plants were assessed, with the aforementioned scope. Particular mention should be made of the following aspects in connection with the safety improvements implemented at the facility:

- ✓ Modifications connected with the instrumentation of the spent fuel pool.
- ✓ Guides for the mitigation of extensive damage, including a series of operational actions to mitigate the consequences of the accident for the reactor, fuel element pool and containment.
- ✓ Plan for the extinguishing of major fires in order to control and extinguish a large-scale fire affecting multiple areas.
- ✓ Improved distribution of spent fuel in the pools.
- ✓ Characterisation of fuel with a view to dry storage.
- ✓ Optimisation of the positions occupied by waste in the pool.
- ✓ Operational experience in the management of spent fuel.

Operations to replace the initial frames, or *re-racking,* have been conducted in all the pools of those power plants in operation since the 1990s as modifications to the design of the plants, in accordance with Article 25 of the RINR. The application for these modifications was accompanied by the corresponding safety study, with the analysis and proposal of the modifications associated with said operation, as detailed in previous National Reports. Over the period considered in this Report, the Vandellós II re-racking application was assessed in order to extend the storage capacity of this plant.

Meanwhile, during the period covered by this Report, the new ITS facilities at Almaraz and Garoña were licensed. The Trillo ITS licence was also modified for the use of the ENUN 32P casks manufactured by Equipos Nucleares (ENSA). This same process is being followed for the licensing of the Cofrentes ITS, currently in progress.

Spent fuel storage casks likewise require authorisation of the design, as established in Article 80 of the RINR, prior to usage thereof at a storage facility. Furthermore, if the cask itself or one of the components of the storage system fulfils transport functions (as in the case of the dual-purpose casks at the Trillo, Santa María de Garoña and Almaraz nuclear power plants, and that planned for Cofrentes, as well as the casks to transport the MPC capsule, for the storage systems at the José Cabrera and Ascó power plants, respectively), approval of the design is processed as a B(U) type transport package model, in accordance with the transport regulations, following presentation of the corresponding safety study.

In all cases, the safety studies are assessed by the CSN prior to the granting of authorisation by the MITERD, in accordance with the functions attributed to the CSN by the law creating this body, and also the provisions of the RINR.

Subsection 9.1 contains additional details of the assessments providing the basis for the authorisations of spent fuel management facilities.

Article 9. Operation of facilities

Article 9. Operation of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

i) the licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary;

iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;

iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;

v) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;

vi) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;

vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

9.1. Operational authorisation: limits and conditions. Operational experience

9.1.1. Introduction

The spent fuel storage pools of all power plants currently in operation were assessed and authorised within the licensing process of the power plants themselves. As a result, the design requirements and operational limits and conditions set out in the safety assessments and in the environmental assessments form part of the operational authorisations granted to the licensees following conclusion of the commissioning programme (pre-nuclear testing and nuclear testing programme), demonstrating that the facility as built complies with the design and safety requirements.

Aside from the pools, and as indicated over the course of the previous articles, there are five individualised temporary storage facilities authorised for dry storage of spent fuel (Trillo, José Cabrera, Ascó, Almaraz and Santa María de Garoña, the last of these without fuel), and oth-

ers at Cofrentes in the licensing phase. In all cases the authorisations were based on the execution of a series of safety assessments. For those that are in operation, a pre-operational test programme was implemented before authorisation for commissioning was granted.

Meanwhile, the procedures of nuclear power plants provide for analyses of internal and external operational experience, which could prompt the execution of improvement actions in terms of both design aspects and operational procedures. The reports analysed include those issued by INPO/WANO, US-NRC and suppliers.

The spent fuel operations at nuclear power plants are performed in accordance with the Technical Functional Specifications (ETF) and the Radioactive Waste and Spent Fuel Management Plan (PGRRCG), both of which are mandatory documents.

The ETF establish the Operational Limit Conditions, the applicability, the necessary actions and the surveillance requirements needed in order to comply with the limit conditions. They also contain the limit values for those variables that affect safety, the actuation limits of the automatic protection systems, the minimum functional conditions, the programme of revisions, calibration and inspections or periodic testing of various systems and components, and their operational control. In order to develop and detail the surveillance requirements of the Technical Functional Specifications, surveillance procedures are drawn up, to be implemented by the various departments involved in operation of the power plant.

The PGRRCG plan of a facility is intended to set out the criteria and methods ensuring that the management of radioactive waste and spent fuel generated at the facilities is safe and is optimised, taking into consideration advances in regulations and technology, and bearing in mind the following:

- ✓ The origin of radioactive waste and the spent fuel record.
- ✓ The current situation at the facility, in terms of the generation, management and, where applicable, transfer of radioactive waste and spent fuel to other subsequent management stages.
- ✓ Interdependencies between the different radioactive waste and spent fuel management stages.
- ✓ The study of alternative management processes and systems, and possible improvements to them.
- ✓ Justification of the suitability of the management conducted or the desirability of implementing improvements.
- ✓ Planning of the implementation of the improvements identified. The PGRRCG is the reference document for the management of waste and spent fuel generated at nuclear facilities, both during operation and in the dismantling and decommissioning phase.

In particular, the licensee of the facility will need to keep the inventory of waste and spent fuel updated, minimise generation, recycle and re-purpose the waste generated as far as technically and economically possible, and condition the final waste for handover to the authorised manager, in other words any waste that cannot be treated in any other way under the technical or economic conditions at the time, and where reusable parts cannot be recovered.

The PGRRCG for each facility must consider the set of radiological and other risks associated with radioactive waste and spent fuel so as to define comprehensive solutions, and must take into account the functioning of liquid and gaseous radioactive waste treatment systems.

9.1.2. Renewal of the licence of the Almaraz and Vandellós II Nuclear Power Plants. Periodic Safety Review (RPS) of the pools

Both the Regulation on nuclear safety at nuclear facilities (RSNIN) and CSN Instruction IS-26, on basic nuclear safety requirements applicable to nuclear facilities, require an RPS to be executed at least every 10 years in order to conduct an overall evaluation of the performance of the facility, by means of a systematic analysis of all nuclear safety and radiation protection aspects.

In May 2017 the Nuclear Safety Council (CSN) issued Revision 2 of Safety Guide 1.10, establishing the objectives, scope, content, presentation deadlines and documentation format for Periodic Safety Reviews of nuclear power plants in operation, in fulfilment of Instruction IS-26. This new review incorporates the recommendations and guidelines provided by the document "*Atomic Energy Agency's (IAEA) Safety Standards Series, Specific Safety Guide No. SSG-25, Periodic Safety Review for Nuclear Power Plants (SSG-25)*", issued by the IAEA in March 2013.

During the period covered by this Report, the RPS of the Almaraz and Vandellós II nuclear power plants were presented, in line with the requirements established in the RSNIN, IS-26 and the Guide. The corresponding process is expanded on below.

Order ITC/1588/2010, of 7 June 2010, granting the renewal of operational authorisation of the Almaraz Nuclear Power Plant, units I and II, amended by Order ETU/531/2017, and Order ITC/2149/2010, of 21 July 2010, granting the renewal of the operational authorisation of the Vandellós II Nuclear Power Plant, amended by Order ETU/530/2017, establish the support documentation and applicable deadlines for the issuance of new operational authorisations upon expiry of those in force.

In accordance with the above, in order to be able to apply for a new operational authorisation, the licensees were required to submit the following documents:

(a) Integrated Assessment and Ageing Management Plan;

(b) Proposed supplement to the Safety Study, including studies and analyses justifying the ageing management of structures, systems and components of the power plant during the long term operational period;

(c) Proposed review of Technical Functional Specifications, including the changes required in order to maintain safe operating conditions during long-term operation;

(d) Study of the radiological impact associated with long-term operation; and

(e) Proposed review of the Radioactive Waste Management Plan corresponding to long-term operation.

In addition, prior to 31 March 2019 the licensees were required to submit the following supplementary documentation:

(i) the most recent revisions of the documents referred to in condition 3 of the annex to the Order (official operational documents);

(ii) a Periodic Safety Review of the power plant, the contents of which must comply with the provisions of Nuclear Safety Council Safety Guide 1.10, "Periodic safety reviews of nuclear power plants";

(iii) a revision of the Probabilistic Safety Study;

(iv) an Analysis of ageing undergone by components, systems and safety structures at the power plant;

(v) an Analysis of experience built up in operations during the period of validity of the authorisation that is to be renewed; and

(vi) an update to documents (a) to (e) indicated in the above paragraph."

In accordance with the above, the Almaraz and Vandellós II Nuclear Power Plants undertook their respective Periodic Safety Reviews (RPS), which they presented in March 2019. As the previous RPS cover the period up until 30 December 2008, the period analysed by the Almaraz and Vandellós II RPS ran from 1 January 2009 up until 30 June 2018.

The objectives of the RPS comprised the following, by means of a comprehensive safety review:

1. Confirm the suitability and effectiveness of the programmes and of the Structures, Systems and Components (ESC) of the power plant in order to maintain safe operation until the next RPS or, where applicable, until the end of commercial operation, should this occur prior to the next RPS.
2. Verify the degree of compliance with the most recent applicable national and international regulations and good practice in the field of safety.
3. Identify the actions required so as to resolve any deviation in terms of compliance with the licence specifications found as a result of the review.
4. Draw up an action plan based on the results (strengths/weaknesses) to maintain or enhance safety at the power plant, ensuring that this remains at a high level until the next RPS or, where applicable, up until the end of commercial operation, should this occur prior to the next RPS.
5. Identify the improvements required in the official operational documentation, including the licensing specifications, up until the next RPS or, where applicable, until the end of commercial operations should this occur prior to the next RPS.

These objectives were achieved by means of a review of 15 Safety Factors, with the results subsequently being analysed in the RPS so as to identify improvements that would maintain and/or enhance the levels of safety at the plant until the next RPS.

The term "Safety Factor" is used to describe an important area for plant safety. The review of the Safety Factors therefore comprised a full analysis of all important safety aspects for safe operation.

The Safety Factors analysed cover: the design of the power plant; the safety analyses; the operation and operational experience of the plant; the organisation and human factors; and protection of the environment, workers and the public. The 15 Safety Factors analysed are:

✓ Connected with the power plant:

1. Design of the plant
2. Current conditions of ESCs of major relevance for safety
3. Environmental and seismic qualification of equipment
4. Ageing

✓ Connected with the safety analysis:

5. Deterministic safety analysis
6. Probabilistic safety analysis
7. Hazard analysis

- ✓ Connected with functioning and operational experience:
  - 8. Internal operational experience (safety performance)
  - 9. External operational experience.
- ✓ Connected with the organisation and human factors:
  - 10. Organisation, management system and safety culture
  - 11. Procedures
  - 12. Human factors
  - 13. Emergency Plans
- ✓ Connected with the impact on the environment:
  - 14. Environmental radiological surveillance
- ✓ Connected with radiation protection of workers and the public
  - 15. Radiation Protection of workers and the public.

The scope of each Safety Factor is defined by the objectives established in GS-1.10 Rev.2.

In the case of the Almaraz Nuclear Power Plant, not all activities within the scope of a Safety Factor are the responsibility of one single Organisational Unit. As a result, and in order to facilitate a definition of the scope of the analyses to be conducted and to standardise the scope of the Safety Factors with operational practice at the power plant, the Safety Factors have been divided into one or more Sub-factors, with responsibility being assigned to just one Organisational Unit.

In particular, Safety Factor 1, "Plant design", is in turn subdivided into six sub-factors, with sub-factor 1.6 corresponding to "Spent Fuel Storage". The analysis of this sub-factor covers the following processes and programmes:

- ✓ Spent Fuel Storage Strategy.
- ✓ Individualised Temporary Storage.
- ✓ Spent Fuel Status and Inspection Plans.
- ✓ Status of Spent Fuel Facilities.

The Results during the Period of Analysis include a summary of the status of spent fuel facilities, including significant design modifications for spent fuel and special waste management. The results of activities associated with other processes reviewing the status of the plant ESC were also gathered and analysed (Maintenance Rule, Life Management, In-Service Inspection, Equipment Reliability, etc.). An assessment of chemical radiochemical surveillance and control activities applied to the pool water was also included, indicating whether any notable incidents had occurred. An analysis was likewise conducted of systems connected with the spent fuel pool structures and cooling, and also the fuel handling systems.

In the case of the Vandellós II Nuclear Power Plant, a series of processes, programmes and/or subsections applicable thereto were established for each of the Safety Factors, with the development thereof thus providing a response to the objectives defined in CSN guide GS-01.10 for this Safety Factor.

Safety Factor 1, "Plant Design", includes the subsection "Spent Fuel Storage Strategy". The results for the period analysed include an analysis of the status and evolution of spent fuel storage, including spent fuel and special waste characteristics. A description has been given of the actions performed during the period with regard to spent fuel management, along with the in-

spection and characterisation programmes established and the forecasts to avoid saturation of the pool over future cycles. In this regard, one improvement proposal that was identified was the project to construct an Individualised Temporary Storage (ITS) facility. This ITS would be needed prior to the commencement of cycle 28, on the assumption that the *re-racking* will first have been successfully completed in order to increase the storage capacity of the pool

9.1.3. Re-racking of the Vandellós II pool

The spent fuel pool at the Vandellós II Nuclear Power Plant currently has capacity to accommodate 1594 fuel elements. Taking into account the forecast operational cycle programme, this capacity needs to be increased in the short term, and as a result a project began in 2018 to increase storage capacity by replacing some of the current pool racks (6 boraflex racks) with replacement boronated steel racks with greater capacity. This modification will serve to increase pool capacity by 208 positions, from the current 1594 to a total of 1802.

According to CSN Safety Instruction IS-21, on requirements applicable to modifications at nuclear power plants, in March 2019 the CSN and the Directorate-General for Energy Policy and Mines (DGPEM) of the MITERD was sent an application for authorisation of the stated modification, enclosing the required documentation, including the corresponding proposed changes to the official operational documents affected.

Once this authorisation has been obtained, the modification will be implemented in accordance with the scheduled programme, with plans ultimately to complete the modification and so have the intended increased storage capacity in place before fresh fuel is received, scheduled for reloading in May 2021.

9.1.4. Relicensing of ITS facilities of the Trillo and Santa María de Garoña nuclear power plants

The Individualised Temporary Storage facility at the Trillo Nuclear Power Plant was initially planned for a capacity to house 80 casks of the ENSA-DPT type, each loaded with 21 SIEMENS/KWU type I spent fuel elements, with all the project calculations being performed for this capacity, including radiological and ITS heat dissipation calculations.

The ITS was subsequently validated to house a total of 32 ENSA-DPT casks each loaded with 21 SIEMENS/KWU type I, type II and type III spent fuel elements.

In order to be able to store a greater number of casks in the ITS facility up to the full capacity of 80 casks for which it was initially designed, the ITS was relicensed to allow in addition to the 32 ENSA-DPT casks indicated in the above paragraph, a variable number of new ENSA UNIVERSAL (ENUN 32P) casks up to a total of 80 casks, thereby modifying the operational conditions of the Trillo Nuclear Power Plant, which in accordance with the requirements of CSN Instruction IS-21 necessitated application for a modification authorisation from the MITERD, as this in principle represented a deviation from the "*conditions, standards and criteria set out in the authorisations, the official operational documents and the specific instructions of the Nuclear Safety Council"* (subsection 3.1.1 of IS-21).

Subsection 6.1.1 of IS-21 establishes the documentation that must be enclosed with the application to be submitted to the MITERD for modifications requiring authorisation, as in the case of the use of new ENUN 32P casks for the loading of spent fuel elements and storage in the ITS, as indicated above.

Specifically, in accordance with subsection 6.1.1 of IS-21, the application submitted to the MITERD in November 2017 enclosed the following documentation:

- ✓ Technical description, identifying the reasons for the application.
- ✓ Safety analysis conducted, necessarily including the applicable regulations.
- ✓ Identification of the documents that would be affected by the modification, including the proposed text for the safety study and the technical functional specifications, where applicable.
- ✓ Identification of the pre-commissioning tests, where applicable.
- ✓ Specific quality plan, if because of the scope or complexity this was drawn up.

The increase in the capacity of the ITS facility was authorised by means of a Decision of the DGPEM issued on 30 November 2018, following a report by the CSN.

With regard to the ITS facility at the Santa María de Garoña Nuclear Power Plant, the licensee submitted the first commissioning application for this ITS in April 2016. Following an assessment by the CSN, a new revision of the application was submitted in June 2017, incorporating its comments, focused mainly on the calculation of radiological impact, the human factor aspects and protection against major fires in the area. This was followed by further comments by the CSN connected with the authoring of the Safety Study and the Technical Functional Specifications applicable to the ITS, the casks and their contents. The MITERD ultimately issued decommissioning authorisation for the ITS on 7 August 2018, following a report by the CSN.

The ITS lies within the area under the operator's control, with a modification having been made to the layout of the perimeter fencing to contain this.

The arrangement comprises five manufactured casks of the ENUN 52B type, along with equipment for the loading of the casks, which will be used to store spent fuel of models GE-6 and GE-7, to be deposited in the ITS facility in late 2020 or early 2021.

In any event, in parallel with the application for decommissioning of the power plant, the Design Modification which would allow the ITS facility to accommodate the remaining tasks required to offload all the fuel elements currently stored in the spent fuel pool is also being developed.

9.1.5. Licensing of the Cofrentes Nuclear Power Plant ITS

The ITS will comprise an outdoor facility located to the north of the power plant site within the area under control of the licensee, the main components being two seismic slabs each with a capacity to accommodate up to 12 casks in a vertical position.

In order to be able to begin the construction of the ITS, authorisation had to be obtained from the MITERD for execution and assembly, following a favourable assessment by the CSN of the corresponding application, and a favourable Environmental Impact Study Statement:

- ✓ The Directorate-General for Biodiversity and Environmental Quality of the MITERD issued its Decision on 12 June 2019, formulating the Environmental Impact Statement on the Individualised Temporary Storage (ITS) project for the Cofrentes Nuclear Power Plant.
- ✓ For its part the Directorate-General for Energy Policy and Mines of the MITERD issued authorisation on 18 June 2019 for execution and assembly of the modification for the implementation of the ITS at the Nuclear Power Plant.

The commissioning thereof will require a commissioning authorisation, which by the date when this report was finalised remained pending a report by the CSN.

9.2. Procedures for operations, maintenance, radiological surveillance, inspection and tests

Nuclear power plants have procedures in place governing the execution of the various activities connected with operation, maintenance, radiological surveillance and inspections of the structures, systems and equipment comprising the spent fuel storage facilities.

The facilities have detailed inventories in place as to the fuel elements arranged in the spent fuel pool, with the following information regarding each of the elements stored:

- ✓ Identification and technical characteristics (manufacturer, model and type).
- ✓ History of burnup and burnup value attained.
- ✓ Isotopic balance of the element.
- ✓ Storage position.
- ✓ Physical status of the element, existence of rod faults and inspections applied to the element.
- ✓ Defective rods extracted from fuel elements.

This information is updated at the end of each operational cycle, with the requirements of the relevant ETFs and the PGRRCG Annual Report being fulfilled.

The monthly operational report sent each month to the CSN contains information as to the status of pool storage and spent fuel casks and any possible changes with regard to the previous report, indicating the list of existing elements, the cumulative burnup, and the reactor discharge date.

The spent fuel storage systems are also subject to surveillance, ensuring that:

- ✓ the spent fuel temporarily held in wet or dry storage remains at all times in sub-critical conditions according to the ETF;
- ✓ the storage systems in question have an appropriate residual heat extraction rate, that exposure to radiation and to radioactive substances during spent fuel handling operations and during the corresponding temporary storage phase (pool or cask) remains as low as reasonably achievable (ALARA) and at all times below the regulatory limits (MPR);
- ✓ the radiation surveillance systems fulfil their design specification function.

The ITS facilities for the dry storage of spent fuel elements derived from spent fuel pools are designed to house fuel elements once they have suffered a period of decay and cooling in the pools. In order for them to function correctly, the plants in question have developed various operational, surveillance, maintenance and testing procedures, including in particular the procedure for the loading and handling of the casks, the sealing of the casks, transfer and offloading, along with procedures dealing with abnormal events, failures and/or malfunctions in the handling systems or equipment and the storage system.

9.3. Engineering and technical support services

Nuclear power plants have engineering and technical support services available to facilitate fulfilment and verification of safety criteria in the spent fuel storage areas, within the scope described in their Functional Regulations.

The contracts established with the suppliers and/or manufacturers of nuclear fuel provide for technical support in connection with the fuel elements supplied, including conveyance of the characteristics and design of the elements, their operational limits for the fuel warranty and the drawings and data that the nuclear power plant in turn requires as a consequence of the contract established between the plant and the companies responsible for irradiated fuel services (Enresa, irradiated fuel transport, storage, etc.).

9.4. Notification of incidents

The ETFs of the nuclear power plants establish the conditions under which special reports are to be drawn up whenever safety-relevant incidents could occur in the spent fuel storage facilities.

Notifiable events are notified to the CSN and to the competent governmental authorities by means of the formats set out in CSN IS-10, establishing the criteria for the notification of events to the Council on the part of nuclear power plants, Revision 1. The Special Reports will be sent to the CSN, as established in the ETF.

Meanwhile, the CSN is entrusted with the inspection and control of the functioning of nuclear power plants, being entitled to conduct inspections with regard to nuclear safety and radiation protection.

9.5. Programmes to compile operational experience

Since 2008, following various incidents/events occurring at Spanish nuclear power plants in 2007 and 2008, the corresponding licensees gave a commitment to conduct an overall analysis of the situation at each plant so as to identify possible improvements and to reinforce the dedication of resources in the required areas, including analysis of operational experience.

Likewise, as indicated in Article 9.1 of this Report on licensing for the operation of a spent fuel management facility, nuclear power plants conduct procedural analyses of internal and external operational experience, which in some cases prompts the execution of improvement actions which could affect operational procedures or design. The documentation under analysis includes, without being confined to:

- ✓ Experiences communicated by the competent bodies in the field, namely:
  - ⇨ For nuclear power plants originally designed in the USA, reports on significant events: *INPO Event Report (IER)* issued by the INPO, (Institute for Nuclear Power Operations) and the equivalent reports issued by WANO (World Association of Nuclear Operators).
  - ⇨ For the German-designed nuclear power plants, the operational experience notifications (*Weiterleitungsnachricht*) issued by the Nuclear Safety Society (GRS).
- ✓ Written recommendations from the suppliers, to be understood as the supplier technical bulletins (SAL, SR, RICS-IL, *Technical Bulletin,* etc.), as well as notifications of deficiencies in safety equipment: all notifications regarding 10 CFR 21 of the US NRC

for American-designed power plants, and service and experience reports of the KWU for power plants of German origin.

Lastly, the owners of nuclear power plants conduct continuous assessment of the nuclear safety of the facility by issuing periodic reports which must be sent to the CSN, in fulfilment of the conditions of the operational authorisation. These periodic reports refer to a wide range of disciplines, and include both internal and external operational experience, periodically supervised by the CSN through the inspection and control of these actions on a biennial basis.

9.6. Decommissioning

As established in the Regulation on nuclear and radioactive facilities approved by Royal Decree 1836/1999, licensees must prepare and where necessary update the decommissioning plans for a radioactive facility or a nuclear facility with regard to the management of radioactive waste, using information obtained during the operational life of the facility. These plans are examined by the regulatory body.

Article 10. Disposal of spent fuel

Article 10. Disposal of spent fuel

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

There is a broad consensus at the international level as to the option of disposal of spent fuel and high level waste in deep geological repositories. Spain has since 1985 been working on the study into different deep disposal options, pursuing four basic operational approaches:

- ✓ The Site Search Plan (PBE), undertaken between 1986 and 1996. This Plan reached the conclusion that the subsoil of Spanish territory contains abundant granite, clay, and to a lesser extent saline formations that could potentially accommodate a disposal facility, verifying the existence of a wide range of geographical locations which could in principle be valid. This work resulted in the Inventory of Favourable Formations to house the deep geological repository (DGR).
- ✓ Generation of conceptual designs for a disposal facility in each of the lithological formations indicated, aiming for the maximum convergence among the designs.
- ✓ Development of exercises to assess the safety of these conceptual designs, integrating the knowledge obtained in the work and projects undertaken on the basis of successive Enresa R&D plans, highlighting that geological storage is capable of fulfilling the safety and quality criteria applicable to this type of facility.
- ✓ The generic design was also produced, along with the associated safety assessments for the basic and conceptual designs of the aforementioned facility, adapted to a granite-type and clay-type host medium.

The knowledge acquired through these experiences is actively maintained at Enresa by means of a multidisciplinary group to review and update all this documentation. These advances are held to constitute a sound basis for the launch of the forthcoming stages for the selection of the site and the implementation of the DGR.

It is in this spirit that Enresa has fulfilled the request set out in the Sixth GRWP to use these results to produce the following reports for consideration by the MITERD, as part of the information process for the authorities:

- ✓ Irradiated fuel and high level waste management options.
- ✓ Feasibility of new technologies: separation and transmutation.
- ✓ Generic basic projects:
  - ⇨ Storage in granite formations.
  - ⇨ Storage in clay formations.
- ✓ Experiences of decision-making regarding spent fuel and high level waste management in certain countries of the OECD.

Meanwhile, other sections of this Report indicate how Spain requested that the International Atomic Energy Agency conduct a combined IRRS-ARTEMIS peer review mission, likewise in accordance with the requirements included in Article 15 of Royal Decree 102/2014, of 21 February 2014, for the safe and responsible management of spent nuclear fuel and radioactive waste. This mission was conducted between 15 and 26 October 2018, and represented an in-depth review exercise with regard to the regulatory context and national framework for the management of radioactive waste and spent fuel in the country. The conclusions of the mission issued in October 2018 indicated the need to resume the DGR projects, with recommendations along three avenues:

- ✓ The Government should supplement the current legal regulatory framework by developing regulations and a plan to achieve the DGR, clarifying the parties' functions and responsibilities.
- ✓ The CSN and other competent authorities should, in collaboration with Enresa and other relevant stakeholders, develop a plan for legal commitments, issuance of licences and regulatory holding points
- ✓ Enresa should adopt a proactive approach in establishing the technical basis for the DGR, in particular the process for selection of the site, and definition of the key milestones, on the basis of a proposed timeline.

The Action Plan developed on the basis of the ARTEMIS mission identifies the main actions, milestones and owners required in response to the recommendations made by the team of experts. The Plan, which is being updated in line with the draft Seventh GRWP, includes the generation of an anticipated roadmap, regulatory and operational proposals, and the technical programme for the DGR:

- ✓ Phase 1: Initiation (2020-2025)
- ✓ Phase 2: Site (2025-2055)
  - ⇨ 2.1 Identification and evaluation of candidate sites, and selection (2025-2035)
  - ⇨ 2.2 Characterisation of the site
  - ⇨ 2.2.1 Application for prior authorisation (2035-2050)
  - ⇨ 2.2.2 Application for construction authorisation (2050-2055)

- ✓ Phase 3: Storage (2055-2093)
  - ⇨ 3.1 Construction (2055-2073)
  - ⇨ 3.2 Operation (2073-2088)
  - ⇨ 3.3 Decommissioning and closure (2088-2093)
- ✓ Phase 4: Post-closure (radiological control and surveillance).

In parallel, technological research and development are seen as being of huge importance to achieve fulfilment. Multi-annual R&D plans in support of waste management have been implemented for this purpose. In the case of SF/HLW, the Enresa R&D plans have gradually evolved in accordance with this management programme. These plans have served to acquire technical knowledge and to build up national working teams for the development of the temporary storage and disposal option, participating in international research projects and demonstration projects at foreign laboratories.

Section H.

Safe management of radioactive waste

Section H. Safe management of radioactive waste

Article 11. General safety requirements

Article 11. General safety requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management, individuals, society and the environment are adequately protected against radiological and other hazards. In so doing, each Contracting Party shall take the appropriate steps to:

i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;

ii) ensure that the generation of radioactive waste is kept to the minimum practicable;

iii) take into account interdependencies among the different steps in radioactive waste management;

iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;

vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;

vii) aim to avoid imposing undue burdens on future generations.

11.1. Measures to ensure maintenance of subcritical conditions and heat dissipation

The regulations governing waste management in Spain include various measures to ensure maintenance of subcritical conditions and heat dissipation. CSN Instruction IS-26, on basic nuclear safety requirements applicable to nuclear facilities, establishes that the licensee of the nuclear facility must analyse at least whether a series of fundamental safety functions are applicable to it: control of reactivity, extraction of the residual heat, and confinement and shielding of the radioactive material. More specifically, for temporary spent fuel (SF) and high level waste (HLW) storage facilities, CSN Instruction IS-29 likewise lists the safety functions that such facilities must incorporate during their life cycle, both in normal operation and under abnormal or accident conditions. These are as follows: control of sub-criticality, confinement, extraction of residual heat, protection against radiation by using appropriate shielding thicknesses and materials, and recovery capacity.

At the El Cabril Disposal Facility, provision has likewise been made for limitations on the content of fissionable materials, as part of the acceptance criteria that must be fulfilled by waste packages for disposal.

11.2. Measures adopted to ensure that the generation of radioactive waste is kept as low as possible

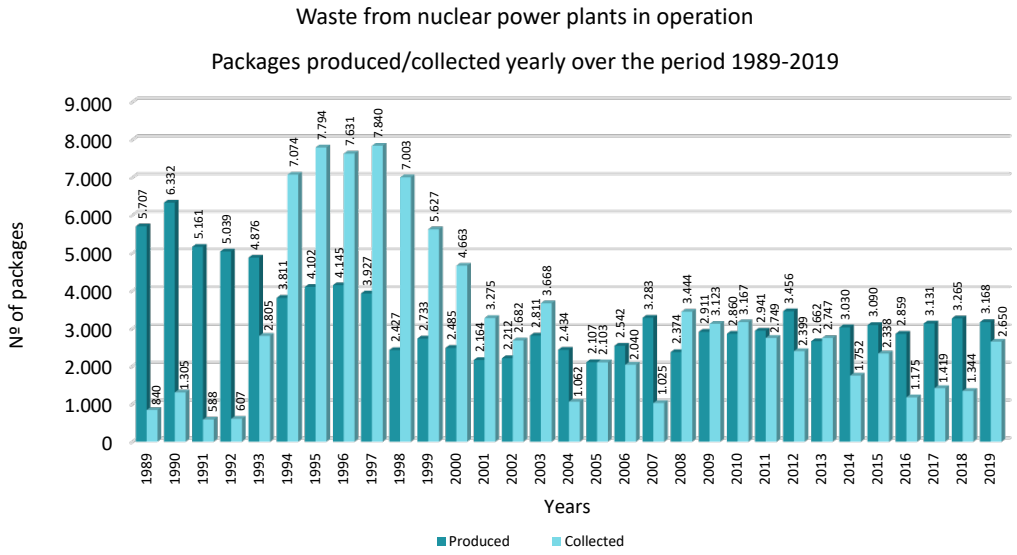
The principle of minimisation of waste production is established in Spanish law, in Article 38 of Nuclear Energy Law 25/1964 (LEN), which requires producers to adopt appropriate measures so that the quantity and activity of waste produced is as low as possible, in accordance with the scientific practice in existence at the time in question. Waste minimisation is also, according to Directive 2011/70/Euratom, establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, one of the principles which must govern waste management, and as such this general principle is reproduced in Article 3 of Royal Decree 102/2014, completing the transposition of the Directive.

The CSN has promoted the implementation of this principle, requiring that Enresa make optimal use of its disposal capacities at the El Cabril Disposal Facility. Among other measures, Enresa has worked with the nuclear power plants to determine and implement a project to reduce volume at such facilities. There has been a successful reduction in annual production figures from 1,430 m^3 registered in 1999 to approximately 800 m^3 currently generated at all the nuclear power plants in operation. These figures are very close to the minimum levels that could technically be expected, and no notable reductions are therefore expected in the future.

The same circumstance applies to radioactive facilities as a whole, where joint efforts have similarly been made by Enresa and the owners to reduce the quantities of radioactive waste generated. Over the period 1992 to 2003, the annual volume of waste collected was reduced by half, from 140 m^3 to approximately 70 m^3. From mid-2003 onwards, as a result of the publication of Order ECO/1449, of the Ministry of Economy[15], there was a notable reduction in the generation of waste at this category of producer. The current generation values are of the order of 15 m^3 per year.

[15] *Ministerial Order ECO/1449/2003 (Official State Gazette 134 of 05/06/2003) establishes the unconditional exemption values for category 2 and 3 radioactive facilities.*

Table 9: Packages produced at nuclear power plants in operation and collected annually over the period 1989-2019



Meanwhile, the licensees of nuclear facilities undertake declassification projects implementing the requirements of CSN Instruction IS-31, and criteria for the radiological control of waste materials generated at nuclear facilities.

In the case of power plants in operation, the Nuclear Industry Forum and the CSN have developed a methodology which applies to the declassification of four streams of materials: scrap metal, resins, activated carbon, and timber. Enresa applies the same methodology to its dismantling projects in progress, with the amounts of declassified materials generated by 31/12/2019 being 17,742 tonnes (86% earth and the remaining 14% other streams, essentially rubble and scrap) within the José Cabrera project.

11.3. Measures adopted to take into account interdependencies among the different stages of radioactive waste management

Article 4.7 of this Report refers to the consideration given to interdependencies among the different stages of radioactive waste and spent fuel management as a fundamental element in Spain's legal and regulatory framework, referring to the status given to this principle under Spanish law.

The consideration given to interdependencies shapes the process of licensing nuclear facilities. For nuclear power plants, the licensee is required to draw up and apply what is known as the Process Control Programme (PCP) and the operation of waste conditioning and treatment systems for the generation of packages compatible with the existing management channels for disposal.

With regard to category 2 and 3 radioactive facilities for medical, industrial or research purposes, Ministerial Order ECO/1449/2003 specifies the different aspects that must be taken into account in the management of radioactive waste from such facilities.

The CSN has called on Enresa to draw up an acceptance methodology for waste at the El Cabril Disposal Facility, along with a set of technical and administrative procedures. These will be required to develop practical implementation both as to the aspect of the relationship between Enresa and waste producers, and also regarding those activities that are the sole responsibility of Enresa in the acceptance of the different types of waste.

The criteria for the acceptance of LILW waste were established in accordance with the Ministerial Order of 9 October 1992. The current operational authorisation of the El Cabril Disposal Facility, granted by Ministerial Order on 5 October 2001, determines that the criteria for the acceptance of waste at said facility form part of the official operational documents. These acceptance criteria were subsequently developed.

Enresa has established a methodology for the acceptance of LILW and VLLW at the El Cabril facilities, taking into account different levels and interrelationships for disposal.

Radioactive waste producers at nuclear facilities are responsible for the conditioning of the packages so as to comply with the acceptance criteria. Enresa is required to verify that the packages comply with the aforementioned requirements, by means of a prior process. A surveillance system has also been established, based on documented and field controls of waste production, inspections upon handover to Enresa, together with scheduled verification tests applied to the actual packages received.

With regard to the CSN requirement that Enresa draw up specific acceptance processes covering the generation by producers of disposal units for direct disposal in the vaults at El Cabril, during the period covered by this Seventh National Report, Enresa produced these units for a set of LILW generated in the project for the decommissioning of the José Cabrera Nuclear Power Plant. Such processes were previously conducted solely on the Enresa premises at the El Cabril Disposal Facility.

11.4. Measures to provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards

Article 38 of the LGN demands that the licensees of nuclear and radioactive facilities take appropriate steps in all stages of spent nuclear fuel and radioactive waste management in order properly to protect people, property and the environment against radiological risks, in both the present and the future.

Furthermore, Royal Decree 102/2014, on the safe and responsible management of spent fuel and radioactive waste, completes the legislative, regulatory and organisational framework in accordance with Council Directive 2011/70/Euratom. Article 12.3 of the aforementioned legal provision indicates that during the process of granting authorisations for radioactive waste management facilities, a demonstration or Safety Study is required for the different phases of the life-cycle of the facility, as established in the RINR. It is furthermore indicated that the safe-

ty demonstration will be proportional to the complexity of the operations and the magnitude of the associated risks, in accordance with the Instructions, circulars and guides of the Nuclear Safety Council.

At present, the regulatory framework highlights the importance both of mechanisms for the direct protection of people and the environment, and those regarding deferred safety, since in radioactive waste management the remaining radiological risk for people and the environment will require monitoring for lengthy periods.

During the licensing and control of the El Cabril Disposal Facility, the safety criteria and principles issued in this regard by such international bodies as the International Commission on Radiological Protection and the International Atomic Energy Agency were deemed directly applicable, with the specific safety requirements established in the original regulations of the countries housing the facilities taken as a reference were also incorporated.

11.5. Measures for the consideration of biological, chemical and other risks that could be associated with radioactive waste management

Biological, chemical and other risks associated with radioactive waste management are governed by means of limitations on the content of substances present in radioactive waste disposed at the El Cabril Disposal Facility.

In this regard, one fundamental element in the prevention of such risks corresponds to the acceptance criteria at said storage facility, including among other restrictions those regarding the limitation on the presence of substances the main potential risk from which is not derived from radioactivity, and those liable to generate exothermic chemical reactions. Responsibility for a declaration of the presence of toxic, chemical or biological substances in radioactive waste lies with the producers, who must minimise the generation thereof, and identify such elements in order to allow Enresa to inventory the amount at the facility. Enresa works in cooperation with waste producers in order to address specific aspects of this issue.

The environmental impact statement process to which nuclear facilities are subject as part of the authorisation and licensing process is another preventive measure addressing the issue of biological and chemical risk.

11.6. Measures to avoid repercussions on future generations greater than those permitted for the present generation

The CSN has since 1985 stipulated that the basic objective of radioactive waste disposal facilities, from the perspective of nuclear safety and radiation protection, is to ensure that radioactive waste is isolated from humanity and the environment, such that potential releases of nuclides do not give rise to unacceptable exposure by people to radiation, both for present and future generations.

The radiological criteria established by the CSN determine that any doses that might be received by individuals in the future as a consequence of the storage of radioactive waste will be less than or equal to those currently guaranteeing an acceptable radiological impact for members of the public as a consequence of the functioning of the authorised facilities.

Royal Decree 102/2014, on the safe and responsible management of spent fuel and radioactive waste, establishes that the object of said legislation is to regulate the safe and responsible management of radioactive waste and spent fuel so as to avoid imposing undue burdens on future generations.

The need to use passive safety systems with components the functionality of which is guaranteed by means of physical processes not dependent on external energy sources is likewise stipulated.

Passive safety characteristics provide the basis for the design of the El Cabril Disposal Facility, which is the only radioactive waste disposal facility in Spain. The disposal system, which is of the near-surface type in concrete vaults or directly on the ground, is based on interposed engineering and natural barriers providing safe containment and isolation of LILW and VLLW. Other containment technologies are also applied, including chemical barriers, by immobilising the waste within a solid, stable and long-lasting matrix, to slow down the migration of radionuclides without preventing the movement of water. The El Cabril Disposal Facility has a seepage control network which is required to verify the functioning of these barriers for a minimum of three hundred years after the closure of the facility.

11.7. Measures to avoid imposing undue burdens on future generations

The Spanish regulatory framework establishes, by means of Nuclear Energy Law 25/1964, the Sixth Additional Provision of Electrical Sector Law 54/1997, and Royal Decree 102/2014, on the responsible and safe management of spent nuclear fuel and radioactive waste, the specific measures for this purpose connected with the assignment of responsibilities, provision of funds to finance the activities set out in the GRWP, and provisions with regard to requirements for institutional control.

The legislation establishes the responsibilities of the different agents involved in spent fuel management: the Ministry for Ecological Transition and Demographic Challenge (MITERD), the regulatory body (CSN), producers and Enresa, as detailed, among others, in Articles 20 and 21 of this Report.

Specifically, Royal Decree 102/2014 also includes the mandatory requirement that the cost of radioactive waste management be borne by those that generated said materials, so as not to impose an inappropriate burden on future generations.

With regard to this subsection, the legal framework provides for the creation, application and management and guarantee mechanisms of the economic Fund established to finance GRWP activities, including spent fuel management, the details of which may be found in the Annex D. By means of the provisions of this Fund, the generator benefiting from those applications giving rise to radioactive waste pays the associated costs up until disposal.

Nuclear Energy Law 25/1964 also establishes that the State will assume ownership of spent fuel once disposal takes place, and will likewise handle any surveillance that might be required following the decommissioning of a nuclear facility, once the time period established in the corresponding authorisation has passed.

The El Cabril Disposal Facility is designed in accordance with a passive safety concept, which functions throughout its operational life and during its closure phase. Passive safety refers to the fact that after decommissioning the facility will not depend on continuous, large-scale ac-

tive measures, but will instead be subject to active and passive institutional checks to underpin its safety and ensure compliance with the safety criteria specified by the regulatory authorities.

In this regard, Directive 2011/70/Euratom highlighted the ethical obligation on each Member State to avoid any undue burden on future generations with regard to radioactive waste, establishing the Community framework for this purpose in order to ensure safe and responsible management of such waste.

In line with the Directive, Royal Decree 102/2014, which completed the transposition thereof into Spanish law, has the following aim:

> *"the regulation of safe and responsible management of spent fuel and radioactive waste derived civil activities in all stages, from generation up until disposal, so as to avoid imposing undue burdens on future generations, in addition to the regulation of certain aspects regarding the financing of such activities, thereby fulfilling the Community framework".*

As a result of the above, and in accordance with Royal Decree 102/2014, the contents of the next General Radioactive Waste Plan must include

> *"concepts or plans for the period after the operational phase of a disposal facility, indicating the period of time during which the relevant controls would be maintained, alongside the resources to be employed in order to preserve knowledge as to said facility in the long term".*

With regard to nuclear fuel cycle radioactive facilities the dismantling and decommissioning of which would not be covered by the Fund for the financing of GRWP activities, before they begin operations a financial surety or bond must be provided to guarantee their future decommissioning and the management of the resulting radioactive waste.

Likewise, authorisation for the dismantling and decommissioning of facilities for the disposal of spent nuclear fuel and radioactive waste, incorporated in the regulation for the licensing of facilities a consequence of Directive 2011/70/Euratom, seeks to guarantee the long-term safety of the storage system, which will, where applicable, determine the site areas to be subject to radiological and other surveillance and control procedures, for a specified time period.

Article 12. Existing facilities and past practices

Article 12. Existing facilities and past practices

Each Contracting Party shall in due course take the appropriate steps to review:

i) the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;

ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should

be sufficient to justify the harm and the costs, including the social costs, of the intervention

Measures adopted to examine the safety of the El Cabril Disposal Facility

Upon the entry into force of the Joint Convention, the only specific facility in existence for waste management was the El Cabril Disposal Facility. Its safety is in line with all provisions of the Convention for facilities subsequent to its entry into force, with the mechanisms adopted to examine the safety of the facility described in previous Convention Reports remaining in force.

Article 13. Siting of proposed facilities

Article 13. Siting of proposed facilities

1. *Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:*

i. *to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;*

ii. *to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;*

iii. *to make information on the safety of such a facility available to members of the public;*

iv. *to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.*

2. *In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.*

13.1. Forecast of new RW facilities

The disposal of low and intermediate level and short-lived waste (LILW) in Spain is performed at the El Cabril Disposal Facility. The main disposal facility has been in operation since 1992, following the corresponding licensing by the authorities.

In the middle of the first decade of the millennium, the new forecasts as to waste requiring management because of the decommissioning of certain nuclear power plants and possible incidents at others, prompted the planning of a supplementary facility for the disposal of very low level radioactive waste (VLLW), on the same site as El Cabril, in operation since 2008.

Meanwhile, the decommissioning of the José Cabrera Nuclear Power Plant gave rise to a further series of special waste elements as a consequence of the cutting of some of the internal reactor elements. This waste, which cannot be disposed of at the El Cabril Disposal Facility, is currently held in four casks located in the ITS of the power plant, together with those housing the spent fuel.

Lastly, the strategy for the temporary management of high level waste (HLW) and special waste (SW) in combination with the plans for spent fuel remains in place.

13.1.1. Low and intermediate level waste (LILW)

The current and forecast inventory of radioactive waste generated in accordance with the scenario covered by the draft Seventh GRWP will require an increase to low and intermediate level waste management capacity, currently estimated at 52,000 m^3 of conditioned waste.

The only plans made for such an increase in LILW storage capacity are at the El Cabril Disposal Facility, bearing in mind that it has in place treatment and conditioning, temporary storage, waste quality verification and other ancillary systems. Meanwhile, since the installations available there for very low level waste would continue to operate during this period, the increase in capacity at the site itself will avoid the duplication of operating costs.

In order to avoid any impact on operational plans and to be able to continue the normal disposal of such waste, the analysis conducted by Enresa as to the capacity of the vaults currently in place has resulted in the conclusion that new vaults will need to be constructed in the year 2028. Bearing in mind the timeframes required for design, construction and licensing, Enresa began the engineering work associated with said activities in 2018.

As for VLLW, the supplementary installation for disposal of such waste has been authorised for four vaults (numbered as vaults 29, 30, 31 and 32), which will be progressively constructed in accordance with need, with an overall authorised capacity of around 130,000 m^3, which is deemed to be sufficient. The first two are now in operation:

- ✓ During 2017-2018 Section I was completed and closed, and Section II of disposal vault 29 was adapted.
- ✓ In July 2016, Enresa began the operation of vault 30, with an estimated capacity of 50,000 m^3. As indicated in previous Reports, disposal vault 30 was built on a natural depression in the terrain located immediately to the north of the previous VLLW disposal vault (vault 29). Vault 30 comprises two operational sections (I and II) to house waste, one arranged on top of the other, and with a containment dike downstream for each of them. These sections will be surrounded by berms to allow vehicles to travel around them.

During the operation of the vaults, the waste will be protected from rainwater at all times by means of a removable roof. Each of the two sections has its own leachate evacuation network, which join at the riprap dike via the combined outflow into the control deposit, located downstream of the vault. Once each disposal vault is filled, it will be closed with a final cover comprising various layers of earth, clay and gravel, along with other components, and a final layer of soil.

13.1.2. High level waste (HLW) and special waste (SW)

The Spanish strategy for high level waste and special waste, as explained in Section B, comprises centralised storage together with the provision made for spent nuclear fuel.

Nonetheless, until the CTS facility is available, the generation of a degree of special waste as a consequence of the dismantling work at the José Cabrera Nuclear Power Plant, specifically the cutting of the internal reactor elements, prompted the installation of four dry casks for storage at this power plant's ITS.

13.2. Criteria to assess all factors connected with the site and influencing safety.

a) LILW

The safety study of the El Cabril Disposal Facility took into account, among other aspects, those factors defining the acceptability of the radiological consequences of potential releases of radionuclides into the environment. These include, among others, those connected with the action of natural barriers or site characteristics that could delay or mitigate the migration of the radioisotopes.

At the time, the fundamental rule adopted established the concept of intrinsic safety which, in terms of the site, required safety in the free usage phase to be based on limitation of the inventory and the characteristics of the geological barrier. As a supplementary aspect, consideration was given to criteria for isolation against groundwater and surface water, and the control of potential discharges in the event of the release of activity in supposed failures that such a site would be required to reveal for this type of disposal facility.

The very low level waste (VLLW) storage in operation since 2008 comprises a modification to the initial design plans of the facility. In accordance with the RINR, its construction required authorisation of a modification to the existing facility. The reference establishment for this storage is the French facility for the disposal of very low level radioactive waste at Morvilliers, operated by ANDRA, the French national agency for RW management. The supporting documentation for the new storage facility includes relevant information as to the criteria to evaluate factors influencing safety.

The weighting of the site characteristics takes into account the following suitability criteria, which are periodically reviewed within the context of the facility review conducted at least every 10 years:

- Adequate lithological characteristics.
- Low and technically stable seismic activity.
- Known hydrogeology which can be modelled.
- Known hydro-geochemistry.
- Topography that is gently sloping or can be flattened, and is not susceptible to flooding.
- Appropriate geotechnical properties.
- Conservation of areas that could potentially be used to expand the facilities.
- Availability of sufficient information about the site.

- Accessibility and communication.
- Proximity to current facilities.

b) HLW and SW

The process of licensing nuclear facilities, including the CTS, takes the assessment of site characteristics into account throughout all phases. To be precise, the prior authorisation is a specific authorisation covering the acceptability and conditions of the proposed site. This can only be obtained by presenting a study characterising the site and the surroundings of the facility, including sufficient details as to those parameters which could impact on nuclear safety or radiation protection, including demographic and ecological factors, as well as activities connected with land use regulations. The scope of these studies depends on the complexity and lifespan of the facility.

13.3. Criteria to assess radiological repercussions on the environment and the surrounding population

a) LILW

As indicated in the previous points, the El Cabril facility for the disposal of LILW received its operational authorisation in 1992. The Safety Study (ES) of the site conducted at the time took into account an analysis of present and future situations, events associated with the normal evolution of the storage facility, along with more improbable occurrences, such as intrusion.

The methodology for drawing up the ES is based on the terms established on international forums such as the projects ISAM[16] and ASAM[17] promoted by the IAEA, the main elements being:

- The context of the study, identifying the timeframe, objectives, radiation and safety protection criteria, etc.
- The description of the system or description of the characteristics of its components: waste, operational practices, design of facilities, etc.
- The development and justification of the scenarios and the assessment thereof. These scenarios fulfil the two aforementioned objectives.
- Analysis of results.

When ministerial authorisation was granted to Enresa in 2006 for the construction and assembly of the specific very low level waste (VLLW) storage structures, the VLLW storage was considered to be a modification of the existing facility, and so the part concerning VLLW was incorporated within the ES study for the storage site, using the same criteria and methodology, with no change to the maximum radioactivity inventory authorised for the site. With a similar focus to the ES conducted previously for LILW, the ES for VLLW storage has two purposes:

- Formulate acceptance criteria for VLLW for disposal.
- Confirm that an acceptable level of protection for human health and the environment is achieved, both now and in the future.

[16] *Improvement of Safety Assessment Methodologies for Near Surface Disposal. Facilities.*

[17] *Application of safety assessment methodologies for near surface waste disposal facilities.*

b) HLW and SW

The process of licensing nuclear facilities, including the CTS, takes into account throughout the various phases the radiological repercussions on the environment and the surrounding population, and measures for the assessment thereof. In addition, the measures for this assessment corresponding to the favourable declaration by the CSN as to the generic design of the installation of said facility, the phase prior to licensing, were described in Section G, subsection 6.3, of the previous national Report.

13.4. Public information as to the safety of planned radioactive waste management facilities

General matters regarding public information (role of the regulatory body and other authorities, duty to inform citizens, local information committees for nuclear power plants, website, SISC, publication of planned regulations, Law 21/2013, etc.) have already been addressed in Article 20.2.8 of this Report, in addition to aspects regarding public participation in the decision-making process, as described in Annex B, subsection 3.

This describes the obligation on the CSN to provide public access to information about nuclear and radioactive facilities, and therefore covers the radioactive waste generated at all such sites, including nuclear power plants, other nuclear facilities, such as the El Cabril Disposal Facility, fuel cycle facilities and facilities employed for the use of radioisotopes in medicine, industry, research and teaching.

Article 14. Design and construction of facilities

Article 14. Design and construction of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

i) the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account;

iii) at the design stage, technical provisions for the closure of a disposal facility are prepared;

iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

Low and intermediate level waste (LILW) management facilities are located at the nuclear facilities that generate such waste themselves, or otherwise at the El Cabril Disposal Facility,

where disposal takes place. The former were assessed and authorised as a part of the licensing process of the facilities themselves, and this article therefore refers only to the El Cabril Disposal Facility.

14.1. Limitation of the possible radiological consequences on people, the environment and society

As indicated in Annex B to this Report, with regard to licensing, the construction authorisation entitles the licensee to begin construction of a facility and to apply for the operational authorisation. At new facilities, the application for this authorisation must be submitted to the competent authorities, enclosing a series of documents which include in particular the Preliminary Safety Study (EPS). The Regulation on nuclear and radioactive facilities (RINR) establishes that this documentation must also be sent to the Autonomous Region with responsibilities in the field of territorial and environmental regulations within its territory housing the facility, as it is entitled to submit arguments regarding such matters.

According to Article 12 of the RINR, the El Cabril Disposal Facility obtained its construction authorisation by Ministerial Order on 31 October 1989. The construction of the new supplementary facility for VLLW at the El Cabril Disposal Facility, which began operations in 2008, was addressed as a design modification (MD) of the existing facility, and was executed under the aegis of the same safety criteria.

The general safety objectives defined in the design and construction of the El Cabril Disposal Facility were as follows:

- ✓ Immediate protection during the operational phase, with deferred protection during the surveillance and control and free usage phases, for both people and the environment.
- ✓ Allow free usage of the site within a reasonable timeframe, in other words allowing the land to be used for any purpose, without limitations caused by the storage facility.

Fulfilment of these objectives requires the application of the following basic criteria:

- ✓ Isolation of the stored radioactivity from the environment (or biosphere) throughout the operational and the surveillance and control phases, thanks to the suitability of the site and the elements of the facility.
- ✓ Limitation of the activity of the radionuclides present in the storage units, such that the radiological impact would be acceptable under any foreseeable circumstances, and the residual activity would be compatible with free usage of the site.

The operational authorisation currently in force, including the design modification of the facility for the disposal of VLLW at the El Cabril Disposal Facility, authorises Enresa to arrange disposal units within the corresponding disposal vaults, without the intention of subsequent recovery, provided that they comply with the acceptance criteria, following which these vaults may then be definitively sealed over. Prior to execution of said closure, a favourable opinion must be issued by the CSN.

14.2. Technical Provisions for the Commissioning of Radioactive Waste Management Facilities

According to the regulations in force, an application for authorisation to construct any nuclear or radioactive facility must include the technological, economic and funding provisions for the corresponding process of dismantling and decommissioning, within the documentation to be submitted. All the aforementioned aspects are defined in the RIRN, which assigns to the CSN the capacity to define the scope, content and development of the required documentation.

In the specific case of nuclear power plants, when operations end the owners are obliged to perform preparatory activities allowing transfer of licensee status to Enresa, so that it can begin dismantling activities.

14.3. Technical Provisions for the Closure of the Radioactive Waste Disposal Facility

As stated in the Fifth National Report, the RINR establishes that the authorisation for dismantling and closure will, at the time in question, be the document entitling Enresa, as the licensee of the facilities for the disposal of spent nuclear fuel and radioactive waste, to begin the final engineering and other tasks required to guarantee the long-term safety of the storage system. Activities to dismantle any ancillary installations thus determined are likewise covered, ultimately allowing the limitation of those areas that must be subject to control and radiological surveillance, or any other monitoring, for a specified duration, along with the release of the remaining areas of the site from such control. The process of dismantling and closure will end with a closure declaration issued by the MITERD, following a report by the CSN.

The systems for the closure of the El Cabril Disposal Facility and those required to remain operational during the surveillance and control phase of the facility are included in the Preliminary Safety Study submitted to obtain the construction authorisation.

At the end of the operational phase of the site, decommissioning activities will be performed in order to prepare the site for the next phase. Works will need to be completed on the storage facility and annexes (covering, water networks), evacuation and disassembly of operational installations (constructions and equipment) that are not required, along with the installation of all elements needed for the surveillance and control phase and that had not been installed.

The seepage control network, which operates during the operational phase and will remain in service during the surveillance and control phase, with minimal maintenance, is designed to identify and easily locate any possible anomaly in any of the disposal vaults. To this end, the network pipelines have been installed in underground reinforced concrete galleries which can be visited and which run longitudinally beneath the vaults, designed with sufficient dimensions and incline to ensure drainage by gravity as far as the final control tank. Enresa will retain ownership of the land, thereby avoiding any deterioration as a consequence of uncontrolled human action, and ensuring surveillance and maintenance of the covering, the water seepage control network and surveillance devices.

Prior to commencement of the surveillance and control period a specific Environmental Radiological Surveillance Programme will be drawn up, and must be approved by the authorities before closure is then performed. This Programme will be based on the experience acquired, the examinations performed and the resources employed during the operational period.

14.4. Technologies used for Radioactive Waste management

Nuclear power plants

The incorporation and development within Spanish regulations of the concept of "reference power plant" guarantees the incorporation of consolidated and proven technology, without precluding the inclusion of innovations. The existing radioactive waste management facilities at nuclear power plants in Spain were designed and built as part of the plant in accordance with the standards applied at the reference power plants, originating in the United States and in Germany.

The same applies to the dry storage of special waste at the José Cabrera Nuclear Power Plant in metal-concrete casks, the safety and reliability of which has been proven by international experience.

The El Cabril Disposal Facility

At the time, the conceptual design of the disposal site was based on the experience acquired in those countries that had this type of facility in place, and on the basis of establishing objectives and basic technical safety options. Following these considerations, the surface disposal model was selected, with the adoption of engineering barriers, developing a concept modelled on the French storage sites.

The auxiliary facility for VLLW, vault 30, commissioned in 2016, takes its design reference from the prior facility built and operated by Enresa since 2008, vault 29. The latter took into account at the time those facilities in operation in other countries, mainly the TFA facility in Movilliers, operated by ANDRA, the French radioactive waste management agency.

Article 15. Assessment of safety of facilities

Article 15. Assessment of safety of facilities.

Each Contracting Party shall take the appropriate steps to ensure that:

i) before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

ii) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;

iii) before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

15.1. Measures adopted prior to the construction of low and intermediate level waste management facilities

Low and intermediate waste management facilities in Spain are the temporary storage and treatment plants located at nuclear power plants, at the Juzbado fuel element factory, and at the CIEMAT nuclear facility. There are also systems for the treatment, conditioning and temporary storage of waste at the El Cabril Disposal Facility, both for management of the waste produced at the site, together with any waste received from other external producers.

Radioactive facilities where ionising radiation applications are performed for medical, industrial and research purposes, also have appropriate infrastructure in place for the temporary storage of the waste they generate until this is handed over to Enresa.

The documents that the holder of the prior authorisation must present in support of the construction authorisation include a Preliminary Safety Study, or EPS (Article 17(e) of the RINR).

The EPS contains a description of the site and its surrounding area, with current data as to those parameters with an impact on radiation protection and safety, including demographic, ecological, land and water use factors, along with any additional data that could help establish a better understanding of the site and potentially impact on surveillance and verification plans for the aforementioned representative parameters.

The EPS also contains a description of the proposed facility, which will include the criteria followed in the design of those components or systems on which the safety of the facility would depend, together with an analysis of foreseeable accidents and their consequences. The systems available for the low and intermediate level waste management expected to be generated form part of the aforementioned documentation.

In addition, prior to authorisation for construction of the facility, an analytical radiological study will be conducted, along with a theoretical estimate of its potential radiological impact on the population and the environment. The results of this study will be included in the EPS documentation and serve as the basis for preparation of the Pre-operational Radiological Environmental Surveillance Programme (PVRAP), serving to establish the reference or radiological background level for the area under surveillance.

Annex B to this Report includes detailed information as to the process of authorising facilities, including a systematic safety assessment and environmental assessment, in accordance with the risk raised by the facility, and covering its operational life.

It should be pointed out that the CSN is in the process of revising the RINR, one of the aims pursued being the development of a process for the authorisation of nuclear radioactive waste management facilities, to compile the experience acquired with the existing regulations and specifically to incorporate those safety and radiation protection aspects deemed necessary, and for which regulations have not yet been established. In addition, with regard to facilities for the processing (treatment and conditioning) of radioactive waste, the CSN is drawing up an Action Plan for the standardisation of safety criteria in member countries of the WENRA.

15.2. Measures adopted prior to the construction of facilities for the disposal of low and intermediate level radioactive waste

In Spain a facility for the disposal of low and intermediate level radioactive waste has been in operation since 1992, along with another for the disposal of very low level radioactive waste, since 2008, both located at the El Cabril Disposal Facility. This is a nuclear facility, and so before it was constructed it was subject to the regime of authorisations and safety assessments indicated in Section E of this report.

The information regarding the measures adopted prior to the construction of facilities for the disposal of waste remains unchanged, and therefore corresponds to that included in the successive National Reports regarding this Joint Convention, with a systematic safety assessment and environmental assessment being conducted for the post-closure period, the results being evaluated in accordance with the criteria established by the regulatory body.

Furthermore, Royal Decree 102/2014, on the safe and responsible management of spent nuclear fuel and radioactive waste, modified the RINR by establishing that, once operations have ended at the radioactive waste disposal facilities, the licensee must apply for a dismantling and closure authorisation, to be followed by a closure declaration by the regulatory authorities. The authorisation for dismantling and closure entitles the licensee to perform the final engineering and other works required to guarantee the long-term safety of the storage system, and any established activities to dismantle auxiliary facilities, serving to define those areas that need to remain under radiological surveillance and control or some other control for a specified time period, and the release of the remaining areas of the site from control.

As established in Royal Decree 102/2014, a CSN Instruction will serve to regulate all safety and protection aspects during closure and the subsequent control and surveillance stage, which must include the scope and content of the safety study or demonstration at each stage.

As already mentioned, the RINR is in the process of being revised, one of the aims pursued being the development of the process of authorisation for nuclear facilities for the disposal of radioactive waste, so as to compile the experience acquired with the existing regulations and specifically to incorporate those radiation protection and safety aspects deemed necessary for which regulations have not yet been established.

In general, and in connection with Article 15 of the Joint Convention, Article 12.3 of the aforementioned Royal Decree indicates that during the process of granting authorisations for radioactive management facilities, a Safety Study (ES) or demonstration is required for the different phases of the life-cycle of the facility, as established in the RINR. It is furthermore indicated that the safety demonstration will be proportional to the complexity of the operations and the magnitude of the associated risks, in accordance with the Instructions, circulars and guides of the Nuclear Safety Council.

As part of the regulatory documentation in the process of authorisation for construction authorisation for operation of El Cabril, the licensee presented the competent authorities with the EPS and the ES, with the corresponding analyses and safety demonstration, taking into account the possible future evolution of the disposal system, bearing in mind mechanisms for the release and migration of radioactivity, channels for exposure by members of the public, and an analysis of radiological consequences on the human intrusion scenarios which were postulated. With regard to long-term safety assessment studies, consideration was given from the outset of the licensing process to international references as to the methodological approach to be adopted in such assessments. In particular, prior to the authorisation for construction of the facility the safety analyses of the post-closure phase of the disposal system were conducted, and

progressively consolidated and fine-tuned during the licensing process associated with authorisation for operation. The study considered the safety objectives and criteria of the French standard RFS-I.2 applicable to the demonstration of safety in surface radioactive waste disposal facilities.

The CSN safety guide designated as GSG-09.04: *Long-term safety assessment of surface disposal facilities for low and intermediate level radioactive waste*, likewise establishes the concept of defence in depth, through a system of multiple barriers for the confinement of radioactive waste: waste conditioning matrix, disposal vaults and geological medium. The events and scenarios analysed in the safety demonstration must be based on the current situation of the disposal system and consider potential future developments, to which end an initial list must be drawn up of the Features, Events and Processes (FEP) that could affect performance and long-term safety of the facility. The safety demonstration must include criteria for the screening of FEP, and must document and justify the process for the selection or exclusion of each of them.

15.3. Measures adopted prior to the operation of low and intermediate level radioactive waste management facilities

The information regarding the measures adopted prior to the operation of waste management facilities remains unchanged, and was reflected in greater detail in previous National Reports regarding this Joint Convention.

Royal Decree 102/201, on the safe and responsible management of spent fuel and radioactive waste, completed the legislative, regulatory and organisational framework in accordance with Council Directive 2011/70/Euratom.

In the case of radioactive waste management facilities associated with radioactive facilities other than those involved in the nuclear fuel cycle, functional authorisation is required and the application for this must enclose a Descriptive Report, including among other aspects the solid, liquid and gaseous radioactive waste management systems. In this case the application will also include a Safety Study, comprising an analysis and evaluation of any risks that might result from the normal functioning of the facility or could be caused by any incident. Sufficient data will be included to allow the competent authorities to conduct an analysis of the risks of the facility, independently of the presentation made by the applicant.

Article 1.6. Operation of facilities

Article 16. Operation of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

i) the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

ii) operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;

iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;

iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;

v) procedures for characterization and segregation of radioactive waste are applied;

vi) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;

vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;

viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body;

ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

16.1. Waste management at nuclear and radioactive facilities other than El Cabril

16.1.1. Operational authorisation: limits and conditions

Operational experience

The Regulation on nuclear and radioactive facilities (RINR) approved by Royal Decree 1836/1999, establishes the documentation that is to accompany the application for operational authorisation, distinguishing between radioactive facilities and nuclear facilities, as explained in previous Reports and as detailed in Annex B.

The licensee must submit a series of reports and documentation for the regulatory control of its activities as established by the RINR and by the limits and conditions defined in the annex to the operational authorisation. These reports are different in the case of nuclear and other radioactive facilities.

The management of radioactive waste at nuclear power plants is performed in accordance with the Technical Functional Specifications (ETF) and the Radioactive Waste and Spent Fuel Management Plan (PGRRCG), both of which are mandatory documents.

According to Article 20 of the RINR, all Spanish nuclear facilities must have a PGRRCG in place. In this regard, the Nuclear Safety Council (CSN) established its Safety Guide 9.3 regard-

ing the content and criteria for the generation of the radioactive waste management plans of nuclear facilities (PGRRCG) by the licensees of nuclear facilities, and in its technical instructions demanded in 2009 that all nuclear power plants adapt the radioactive waste and spent fuel management plan in accordance with the contents of the aforementioned Guide.

The ETF meanwhile establish the Operational Limit Conditions, applicability, the necessary actions and surveillance requirements needed in order to comply with the limit conditions. They also contain the limit values for those variables that affect safety, the actuation limits of the automatic protection systems, the minimum functional conditions, the programme of revisions, calibration and inspections or periodic testing of various systems and components, and their operational control.

In order to develop and detail the surveillance requirements of the Technical Functional Specifications, surveillance procedures are drawn up, to be implemented by the various departments involved in operation of the power plant.

The procedures of nuclear power plants include provision for analyses of internal and external operational experience, which could give rise to the execution of improvement actions with regard to both design aspects and operational procedures. The reports analysed include those issued by INPO/WANO, US-NRC and suppliers.

In connection with the decommissioning of the Santa María de Garoña Nuclear Power Plant, once the definitive cessation of operations was declared, the plant began to adapt the facility to the new situation, with an orderly deactivation of those systems that were not required, while simultaneously presenting the MITERD with a proposal for the revision of various official operational documents, reducing the number of systems required to be operable.

Likewise, Enresa has since mid-2019 begun to prepare the application for authorisation for the decommissioning of the Santa María de Garoña Nuclear Power Plant, Phase 1, and the corresponding transfer of licensee status regarding the power plant, which will be presented for approval in 2020.

A two-phase decommissioning process has been proposed for this power plant: Phase 1, comprising the dismantling of the turbine building equipment, along with the evacuation of all other fuel elements which remain stored in the irradiated fuel pool, and transfer thereof to the ITS, and Phase 2, which will comprise the dismantling of the rest of the power plant, with all of the fuel in dry storage.

16.1.2. Procedures for operations, maintenance, radiological surveillance, inspection and tests

Nuclear power plants have procedures in place to govern the execution of the various activities connected with operation, maintenance, radiological surveillance and inspections of the structures, systems and equipment comprising the management of waste at nuclear and radioactive facilities.

The PGRRCG is intended to set out the criteria and methods ensuring that the management of radioactive waste and spent fuel generated at the facilities is safe and is optimised, taking into consideration advances in regulations and technology, and bearing in mind the following:

- ✓ The existing situation at each facility in terms of the production, management and, where applicable, evacuation of waste.
- ✓ Identification of the source of the waste and the spent fuel record.

- ✓ The study of alternative management processes and systems, and of improvements to them.
- ✓ Justification of the suitability of current management or the need to implement improvements.
- ✓ Planning of studies for the implementation of the improvements identified

The PGRRCG is the reference document for the management of radioactive waste generated at nuclear facilities, in both the operational and the dismantling and decommissioning phases, and must contain the required information to allow an analysis of existing management processes. It applies to the management of radioactive waste of whatever level of radioactivity, as well as waste materials with a radioactive content making them eligible for declassification, what is known as a special waste and spent fuel. This likewise corresponds to the objective of improving the management of waste and spent fuel generated at each facility.

The monthly operational report sent to the CSN provides information on the storage status of solid low and intermediate level radioactive waste, and any possible changes with regard to the previous report, indicating the list of packages generated and removed from storage.

16.1.3. Engineering and technical support services

All nuclear facilities are organised in a similar manner, with a support organisation not located at the plant and performing support functions, and the operational personnel per se, who perform functions directly connected with activities at the plant. This support organisation in many cases includes sections with responsibilities associated with fuel and radioactive waste management.

Nuclear power plants also have engineering and technical support services available to facilitate fulfilment and verification of safety criteria in the spent fuel storage areas, within the scope described in their Functional Regulations.

The context of the Periodic Safety Reviews includes a programme for the assessment and improvement of safety in terms of organisation and human factors.

The CSN has been conducting actions to verify that the processes employed by the licensees to maintain the allocation, skills and motivation of in-house and contractor human resources guarantee in all cases the maintenance and improvement of safety at nuclear facilities.

16.1.4 Notification of incidents

Previous Reports indicated the demands of the RINR with regard to the information to be provided by the licensee to the responsible authorities, concerning any event that might constitute an alteration in the normal functioning of the facility, or could affect nuclear safety or radiation protection.

Meanwhile, Law 15/1980, creating the Nuclear Safety Council, and the RINR itself, establish the obligation for workers at nuclear and radioactive facilities to notify any event that could affect the safe functioning of the facilities, protecting them against possible reprisals.

In order to provide guidance to the licensees of nuclear power plants as to the events requiring notification in this regard, on 30 July 2014 the CSN revised its Safety Instruction IS-10, establishing the criteria for notification of events to be provided by nuclear power plants to the

Council. Said Instruction establishes the notification criteria and sets out the notifiable events, establishing a deadline for notification of each of these to be served on the regulatory body.

On a supplementary basis, and in accordance with the RINR, nuclear facilities have an established Internal Emergency Plan, developing on the measures established by the licensee and the assignment of responsibilities in order to deal with accident conditions, so as to mitigate consequences, protect personnel at the facility, and serve immediate notice of the event on the competent bodies, including the initial assessment of the circumstances and consequences of the situation.

16.1.5. Programmes to compile operational experience

Since 2008, following various incidents/events occurring at Spanish nuclear power plants in 2007 and 2008, the licensees gave a commitment to conduct an overall analysis of the situation at each plant so as to identify possible improvements and to reinforce the dedication of resources in the required areas, including analysis of operational experience.

Likewise, as indicated in Article 9.1 of this Report on licensing for the operation of a spent fuel management facility, nuclear power plants conduct procedural analyses of internal and external operational experience, which in some cases prompts the execution of improvement actions which could affect operational procedures or design. The documentation under analysis includes, without being confined to:

- ✓ Experiences communicated by the competent bodies in the field, namely:
  - ⇨ For nuclear power plants originally designed in the USA, the reports of significant events, *INPO Event Report (IER*) issued by the INPO (*Institute for Nuclear Power Operations*) or their equivalents issued by the WANO, (*World Association of Nuclear Operators)*.
  - ⇨ *For the German-designed nuclear power plants, the operational experience notifications (Weiterleitungsnachricht*) issued by the Nuclear Safety Society (GRS).
- ✓ Written recommendations from the suppliers, to be understood as the supplier technical bulletins (SAL, SR, RICS-IL, *Technical Bulletin*, etc.), in addition to notifications of defects in safety equipment: all notifications regarding 10 CFR 21 of the US NRC for American-designed power plants, and service and experience reports of the KWU for power plants of German origin.

Lastly, the owners of nuclear power plants conduct continuous assessment of the nuclear safety of the facility by issuing periodic reports which must be sent to the CSN, in fulfilment of the conditions of the operational authorisation. These periodic reports refer to a wide range of disciplines, and include both internal and external operational experience, periodically supervised by the CSN through the inspection and control of these actions on a biennial basis.

16.2. Management of radioactive waste at the El Cabril Disposal Facility

16.2.1. Operational authorisation: limits and conditions. Operational experience.

The El Cabril Disposal Facility obtained its first provisional operational permit by Ministerial Order on 9 October 1992. The current operational authorisation, approved by Ministerial Order on 5 October 2001, is valid until the volume available for disposal in the existing vaults is filled. Meanwhile, a decision of the Directorate-General for Energy Policy and Mines, of 21 July 2008, authorised a modification to the design of the facility, as a result of which the 28 original vaults are used to house low and intermediate level short-lived radioactive waste (LILW), and the four subsequent vaults, numbered from 29 to 32, would be used to receive very low level radioactive waste (VLLW), with two of these already being in operation.

For the continuous assessment of safety at the El Cabril facility, Enresa undertakes what are known as Periodic Safety Reviews on a regular basis every 10 years. The first of these Reviews was presented in December 2003, corresponding to the operational period from 1992 to 2001. The second was presented in November 2012, covering the following 10 years, the period 2002-2011.

The scope and content of the Periodic Safety Review correspond to the requirements of the Supplementary Technical Instruction for the authorisation of operations, including the thematic areas indicated below:

- ✓ Experience in the operation of the facility;
- ✓ Experience regarding radiation protection aspects;
- ✓ Experience regarding methodology for the acceptance and quality of waste packages;
- ✓ Experience in the study of parameters impacting on the long-term safety of the facility;
- ✓ Experience in the assessment of the long-term safety of the facility;
- ✓ Changes in regulations and standards; and
- ✓ Programmes for assessment and improvements at the facility.

As indicated in greater detail in previous Reports, the operational authorisation is granted in accordance with the mandatory updated documents listed in the RINR in force at the time in question (Safety Study, Functional Specifications, etc.), alongside the acceptance criteria for the storage units. The limits and conditions regarding nuclear safety and radiation protection established that operation of the facility will be performed in accordance with the corresponding review of these documents.

The Functional Specifications describe the general functional conditions of the El Cabril Disposal Facility. One part of these conditions corresponds to the limit values for certain parameters referring to the radiological capacity of disposal, permissible characteristics for waste at the facility for inclusion in the disposal units, the properties of these units and the conditions imposed on effluent discharges during the operational phase. The following are likewise indicated:

- ✓ The actions to be taken in any circumstances that are in breach of any limit conditions or value.

- ✓ The functional conditions and surveillance requirements (reviews, inspections, calibrations, etc.), to which those systems, equipment and components that are vital for safety and radiation protection are subjected.

Each of the individual treatment and conditioning activities is described in a number of documents referred to as Operational Instructions, which set out all activities within the scope of the Instruction, initial conditions and conditions during operation of the system, operational requirements and limits, actions in response to anomalies, alarms and actuation modes for each of the systems at the facility, connected both with waste management and with ancillary systems.

The data obtained from operational and maintenance experience provide the basis for the organisations involved in the design of the facility and in these activities to stage periodic meetings at which improvement plans are established. These activities are governed by a procedure entitled "*Design modifications procedure*", establishing each of the aspects involved in this process.

16.2.2. Procedures for operations, maintenance, radiological surveillance, inspection and tests

The operational authorisation of the El Cabril Disposal Facility from October 2001 allows the MITERD to demand the adoption of the relevant corrective actions in the light of the experience acquired in operation of the facility, the results of other assessments and analyses in progress, and the outcome of inspections and audits. Over the period between 1 January 2017 and 31 December 2019, the CSN conducted 11 inspections of the El Cabril Disposal Facility.

Meanwhile, this authorisation and the aforementioned design modification authorisation establish the obligation to send the CSN reports during the first quarter of each calendar year concerning the following aspects, among others: design modifications implemented or in the process of implementation, results of the environmental radiological surveillance programme and dosimetric controls of personnel, and measures taken to analyse the applicability of new national nuclear safety and radiation protection requirements and any standards issued in this regard in countries with storage facilities that have a similar design. In this last case, aspects connected with testing and trials helping to improve knowledge of the long-term behaviour of radioactive waste are considered to be relevant.

The design modifications undertaken during the period 2017-19 include in particular the following:

- ✓ Closure of Section I and adaptation of Section II of vault 29 for VLLW, in order to continue the operational activities of the vault once the volume available in Section I is filled.
- ✓ Remodelling of the Active Laboratory Control Room for Waste Quality Verification at the El Cabril Disposal Facility, entailing the technological updating of supervision and control systems and a remodelling of the physical space occupied.
- ✓ Improvements to the water supply system at the El Cabril Disposal Facility for the water treatment plant and the fire protection system, entailing the installation of electrical aeration systems and of a new electrical power line, alongside the repair of the existing ducting.

16.2.3. Engineering and technical support services

In accordance with the provisions of the RINR, the Functional Regulation contains information with regard to the list of jobs with nuclear responsibility, the organisation and functions of the personnel assigned to the facility, defining the basic training and skills development programmes.

Operational organisation is based on various organisational units dependent on Site Management, with the Manager currently answering to the Technical Division of Enresa, as indicated in the organisational chart included in Annex G to this Report. In turn, head office provides general technical support for the facility, via the Safety and Licensing Departments of the Technical and Engineering Directorate for LILW at the Engineering Directorate and the Logistics Department of the Operations Directorate. Furthermore, the Project Engineering Practice contracted by the LILW Engineering Department provides support for the execution and review both of the design and the technical validity of the modifications, in accordance with the requirements established by the Enresa Project Manager.

16.2.4. Characterisation and segregation of waste

Enresa has in place a methodology for the acceptance of primary packages from nuclear facilities, compliance with which forms part of the Technical Functional Specifications of the El Cabril Disposal Facility.

The initial operational permit for the El Cabril Disposal Facility, issued in October 1992, established that the criteria for the acceptance of waste at the facility must, given their status as an official operational document, be approved by the regulatory authorities. These criteria, with minor modifications made over time, remained in force up until December 2004, and were applied to primary packages.

As indicated in previous National Reports, in December 2004 the regulatory authorities approved the design modification allowing cask CE-2a to be used for the management of certain historical and non-conforming primary packages (in breach of quality objectives in terms of mechanical strength, confinement, or resistance of thermal cycles). This serves to:

- ✓ Increase the activity limit per primary package.
- ✓ Increase the acceptable dose rate limit per primary package.
- ✓ Optimise certain conditioning lines in walled packages.

Enresa was subsequently authorised to use other formats of disposal unit specifically proposed for the more efficient resolution of operational issues, requiring reference to the authorisation for 400 and 480 litre storage units of distinctive characteristics the arrangement of which in the vaults employees metal racks with an identical geometry to the aforementioned CE-2a cask, and more recently the design and licensing of a disposal unit CE-2b, specifically designed in order better to fulfil the needs associated with solid waste management, essentially metal and heavy waste, generated in dismantling activities.

Waste management at the El Cabril Disposal Facility is designed to allow the identification, monitoring and control of all waste packages at the facility, and constantly to update the inventory of activity disposed of in the vaults, allowing this to be checked at all times against the currently authorised inventory or the reference inventory.

Enresa is authorised to conduct the necessary tests and trials on LILW intended for characterisation and acceptance. The acceptance process controls are essentially process audits, production controls alongside technical verification trials, destructive and non-destructive tests, performed essentially at the laboratory of the El Cabril Disposal Facility. These trials have the following purposes:

- ✓ Check the activity values against those declared by the producer and perform monitoring of scale factors for radionuclides that are difficult to measure.
- ✓ Confirm fulfilment of the package properties associated with the generation methodology.
- ✓ Ascertain significant chemical aspects for the safety of storage (compatibility with the cask, corrosion, etc.).
- ✓ Examine compliance with regard to the quality objectives for conditioned waste.

Meanwhile, since October 2008 Enresa has operated a specific installation at the El Cabril Disposal Facility for the disposal of very low level radioactive waste, which may be defined as solid or solidified material, mainly chemically inert or previously stabilised, and which is contaminated and/or activated, with a radioactive content of an average activity that is below certain authorised limits. As previously indicated, this waste forms a subset of low and intermediate level waste.

16.2.5. Notification of incidents

The El Cabril Facility has a regulatory Internal Emergency Plan in place. Emergency situations are classified in three categories, none of them including the release of radioactive material in a quantity that would require the adoption of protective measures outside the site. There is therefore no defined Emergency level more serious than the site emergency level.

In addition to organisation under normal conditions, the Internal Emergency Plan also covers activities and organisation for operation of the facility in emergency situations requiring special action. The baseline for emergency organisation is the operational organisation itself, although the necessary mechanisms have been established to ensure the location of these individuals at all times in accordance with an internal procedure. In all cases provision is made for communication with the CSN.

Meanwhile, as with other nuclear facilities, the El Cabril Disposal Facility is subject to notification of events through application of the regulations in force.

16.2.6. Programmes to compile operational experience

Periodic meetings are held in order to compile the operational experience of the El Cabril Disposal Facility, at which the organisations involved in the design of the facility and in operational and maintenance activities establish the improvement plans.

The data obtained from operational and maintenance experience feed into this activity. Enresa also regularly participates on various international forums with the aim of gathering operational experience at other analogous and similarly designed facilities.

The implementation of improvements and modifications is governed by the procedure entitled "Design modifications procedure", establishing each of the aspects involved in this process.

16.2.7. Closure plans

Technical aspects for the future closure and decommissioning of the El Cabril facility are developed in Articles 14.3 and 17.2.

As indicated in 16.2.1, the operational permit granted to the El Cabril facility by Ministerial Order on 5 October 2001 establishes that this covers its operations up until the moment when the physical capacity of the vaults authorised for LILW and VLLW has been filled, and at 31/12/2019 the aforementioned facility had reached 78% and 39% of total authorised capacity, respectively.

With regard to the estimated date of closure, the successive reviews of the GRWP have progressively updated the estimates in terms of use of the existing remaining capacity, which is expected to be dependent on technical and technological factors associated with the amounts and characteristics of the waste to be generated, as well as external factors, essentially decisions with regard to the operational life of nuclear power plants and their decommissioning.

Article 17. Institutional measures after closure

Article 17. Institutional measures after closure

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

i) records of the location, design and inventory of that facility required by the regulatory body are preserved;

ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and

iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

According to the terms of Article 38 bis of Nuclear Energy Law 25/1964, of 25 April 1964, the management of radioactive waste, including spent nuclear fuel, is considered an essential public service owned exclusively by the State, management thereof being entrusted to Enresa in accordance with the General Radioactive Waste Plan approved by the Government.

The State will ultimately also be transferred ownership of the spent fuel and radioactive waste once disposal has occurred, along with responsibility for any surveillance that might be required following the decommissioning of a nuclear facility, once the time period established in the corresponding decommissioning declaration has expired.

17.1. Safekeeping of documents

As licensee of the facilities for the disposal of radioactive waste, Enresa is, according to Royal Decree 102/2014, responsible for permanent maintenance of the archive of the inventory of waste held at the radioactive waste disposal facilities. Article 9.3(e) specifies, among the functions entrusted to Enresa, the task of compiling and managing the National Inventory of Spent

Nuclear Fuel and Radioactive Waste. This Inventory will include spent nuclear fuel and radioactive waste disposed following the closure of the facility where it is held.

17.2. Closure of the radioactive waste disposal facilities

Article 12 of the RINR establishes the need for authorisation to be held for the dismantling and closure of spent nuclear fuel and radioactive waste disposal facilities.

The process of dismantling and closure of disposal facilities will end with a closure declaration which will ultimately serve to define any areas which must be subject to subsequent control and radiological or other surveillance, for a specified time period, and the release from control of all other areas of the site.

In Spain, all facilities where radioactive waste has been stabilised and conditioned to remain on the same site correspond to radioactive facilities involved in the first part of the nuclear fuel cycle (mining tailings and process tailings from former uranium concentrate factories). The current situation of these facilities is the same as declared in the previous National Report.

17.3. Institutional controls and future provisions

According to the RINR, the process of dismantling and closure of facilities for the disposal of spent nuclear fuel and radioactive waste ends with the closure declaration. This declaration is required to define those areas that must following closure remain subject to control and radiological or other surveillance, as well as the time period during which they must remain under such control.

Likewise, the future Seventh GRWP must, once it is approved and as established in the aforementioned Royal Decree 102/2014, provide for the conceptual structure and planning schedule for the post-operational period of a disposal facility, indicating the estimated time period during which the relevant controls must be maintained, alongside the resources to be employed in order to preserve long-term knowledge of the facility in question.

17.4. Provisions for possible remedial intervention

Possible remedial intervention at definitive spent nuclear fuel or radioactive waste storage facilities must be provided for in any closure declarations granted. For the reasons set out above, it would seem foreseeable that the practical execution of such remedial actions or measures would be assigned in the closure declarations to those bodies or organisations given responsibility for the long-term control of said disposal facilities.

Section I.

Cross-border movements

Section I. Cross-border movements

Article 27. Transboundary movement

Article 27. Transboundary movement

1. *Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments. In so doing:*
   - i) *a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorised and takes place only with the prior notification and consent of the State of destination;*
   - ii) *transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilised;*
   - iii) *a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;*
   - iv) *a Contracting Party which is a State of origin shall authorise a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;*
   - v) *a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.*
2. *A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.*
3. *Nothing in this Convention prejudices or affects:*
   - i) *the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;*

ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;

iii) the right of a Contracting Party to export its spent fuel for reprocessing;

iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin

27.1. Regulatory development

As already described in previous National Reports, Council Directive 2006/117/Euratom, of 20 November 2006, established the Community framework for the supervision and control of transboundary shipments of radioactive waste and spent fuel. Said Directive was transposed into the Spanish legal system by means of Royal Decree 243/2009, of 27 February 2009, governing the supervision and control of transfers of radioactive waste and spent nuclear fuel between Member States, or from or to outside the Community.

The Royal Decree likewise establishes the format for the uniform document defined in Commission Decision 2008/312/Euratom, of 5 March 2008, which must be completed for a transfer request.

Royal Decree 243/2009 does not apply to transfers of disused sources to a manufacturer or supplier of radioactive sources or a recognised facility, to transfers of radioactive material recovered through reprocessing in order to be used, or to transboundary transfers of waste containing only natural radioactive material and not resulting from operational practices, in accordance with the definition provided by Royal Decree 783/2001, of 6 July 2001.

The authorisations covered by this Royal Decree do not replace any of the specific national requirements applicable to such transfers, for example those regarding specific authorisations for transport, physical protection, civil protection, etc. Royal Decree 243/2009 was partially modified by the second final provision of Royal Decree 102/2014, of 21 February 2014, for the safe and responsible management of spent nuclear fuel and radioactive waste.

Meanwhile, Royal Decree 102/2014 establishes that radioactive waste generated in Spain will be disposed of in the country unless, at the time of transfer, an agreement taking into account the criteria established by the Commission in accordance with Article 16.2 of Directive 2006/117/Euratom has taken effect between the Spanish State and another Member State or a third country, and where the object is the use of a disposal facility in one of the countries. This requirement will not apply to the repatriation of disused sealed sources sent to a supplier or manufacturer, and the transfer of spent nuclear fuel from research reactors to a country supplying or manufacturing research reactor fuel, taking into account the applicable international agreements.

If this case arises, prior to the definitive transfer for disposal of radioactive waste to a country that is not a Member State of the European Union, the natural or legal person responsible for the waste shall serve notice of the circumstance on the Directorate-General for Energy Policy and Mines of the MITERD, in order for it to inform the European Commission of the contents of said agreement, and to adopt reasonable measures in order to ensure that:

- ✓ the destination country has an agreement in force with the European Atomic Energy Committee covering the management of spent nuclear fuel and radioactive waste, or is party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.
- ✓ the destination country has disposal and management programmes in place for radioactive waste the objectives of which represent a high level of safety and are equivalent to those established by Directive 2011/70/Euratom, establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.
- ✓ the disposal facility in the destination country has been authorised to receive the transfer of radioactive waste, is operational prior to the transfer, and is managed in accordance with the requirements established in the radioactive waste disposal and management programme of said destination country.

Meanwhile, as indicated in previous reports, Spain has included in its internal regulations the updates and amendments at the international level with reference to the transport of dangerous goods by air, sea, rail and road, and specifically those regarding:

- ✓ the 2019 European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Likewise, on 19 July 2019 the Spanish Official State Gazette published the amendment of errata in the "Amended text of Annexes A and B to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) with the Amendments adopted during the 100th, 101st, 102nd, 103rd and 104th sessions of the Working Party on the transport of dangerous goods of the United Nations Economic Commission for Europe (UNECE)"

Royal Decree 97/2014, of 14 February 2014, regulating operations for the transport of dangerous goods by road within Spanish territory, repealing Royal Decree 551/2006, of 5 May 2006, regulating operations for the transport of dangerous goods by road within Spanish territory.

- ✓ Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) 2019. The amendments made to this edition of the RID were published in the Official State Gazette of 18 June 2019.
- ✓ 2018 amendments to the International Maritime Dangerous Goods Code (IMDG Code), published in the Official State Gazette of 25 April 2019.
- ✓ Technical Instructions for the Safe Transport of Dangerous Goods by Air, 2019-2020 edition (ICAO document 9284/AN/905), published in the Official State Gazette of 28 December 2019.

27.2. Experience in Spain

Since June 2017 the following procedures have been conducted with regard to transboundary shipments within the scope of application of Directive 2006/117/Euratom:

- ✓ 2017. Shipment from France to a Spanish nuclear power plant of radioactive waste derived from the decontamination of primary circuit pump motors.
- ✓ 2018. Transfer of samples of irradiated fuel channels from a Spanish nuclear power plant to the Studsvik Nuclear AB Research Centre in Sweden, for metallographic analysis.

- ✓ 2019. Transfer from Belgium to a Spanish nuclear power plant of radioactive waste resulting from operations for the cleaning of the motor of a primary circuit pump. Three different procedures of these same characteristics were conducted.

Section J.

Disused sealed sources

Section J. Disused sealed sources

Article 28. Disused sealed sources

Article 28. Disused sealed sources

1. *Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.*
2. *A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.*

28.1. Steps to ensure that possession, remanufacturing or disposal take place in a safe manner

Obligation of administrative authorisation for the possession or remanufacturing of radioactive sources

Nuclear Energy Law 25/1964, of 29 April 1964 (LEN) establishes in Article 31 that radioactive materials may not be used or stored within national territory by persons who are not explicitly authorised for this, and indicates that the same requirements will be imposed for the transfer or resale thereof.

This legal requirement is developed in the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, of 3 December 1999. Article 36 of this standard establishes that radioactive facilities for scientific, medical, agricultural, commercial or industrial purposes will require functional authorisation, a decommissioning declaration and, where applicable, authorisation for any modification or change of licensee.

Article 34 of the aforementioned Regulation establishes that radioactive facilities will be understood as facilities of any class containing a source of ionising radiation, in addition to premises, laboratories, factories and installations that produce, use, possess, process, handle or store radioactive materials.

These requirements apply irrespective of whether the radioactive sources or materials are new or are spent or in disuse.

As a result, possession or remanufacturing of any radioactive source or material in Spain requires that an administrative authorisation be obtained. In the licensing process that the licensee must follow to obtain this authorisation, the CSN must issue a mandatory report on nuclear safety and radiation protection, having first verified that the licensee will perform all the operations in compliance with the applicable radiation protection and safety standards and requirements. The corresponding authorisations, which are issued by the MITERD or by the competent bodies of the Autonomous Regions in those cases where these powers have been transferred, are accompanied by the applicable limits and conditions regarding radiation protection and safety for this purpose, as established by the CSN.

The documentation that the licensees are required to present to obtain these authorisations includes a document on provisions for the decommissioning of the facility, which must contain information as to the provisions for the management of disused sources in safe conditions, including the economic provision made for this purpose.

Importing of radioactive sources

Spain does not have facilities for the manufacturing or production of sealed radioactive sources, and all sources are therefore imported from other countries. Article 74 of the RINR indicates that the importing, exporting and intra-EU movement of radioactive materials shall be performed in accordance with the international commitments to which Spain has signed up in this regard.

In the event that the sources are derived from a member country of the European Union, a regime applies for the notification of transfers of sources to the authorities in the recipient country and their acceptance, as established in Regulation 1493/1993/Euratom, on shipments of radioactive substances between Member States.

In the case of sources the origin or destination of which is a country outside the European Union, the Code of Conduct on the Technological and Physical Safety of Sources of Radiation applies, and more specifically the supplementary guide to this regarding Import and Export of Radioactive Sources. This guide establishes a regime of prior consent on the part of the regulatory body in the importing country for the shipment of any source of category one, and also prior notification of the effective date of shipment. For sources of category two, all that is required is prior notification of the effective date of shipment. In Spain, the CSN has been designated as the point of contact for notifications derived from application of the aforementioned Regulation and the guide.

Marketing of radioactive sources

In accordance with the aforementioned Article 74 of the RINR, the marketing of radioactive sources requires authorisation from the DGPEM, following a report by the CSN. In any event, those marketing companies which, as a result of their activities, need to have access to an authorised radioactive facility, may apply for one single authorisation. CSN Instruction IS-28, on the technical functional specifications that must be fulfilled by radioactive facilities, establishes the obligation for marketing companies to have established the relevant agreements with the manufacturer or supplier of origin in order to return disused radioactive sources that they collect from their clients. Where this is not possible, they must transfer the sources to an authorised company for management as radioactive waste.

Control and inspection function of the CSN at authorised facilities

As the sole body with responsibility in Spain for the field of nuclear safety and radiation protection, in accordance with Law 15/1980, of 22 April 1980, creating the CSN, it is responsible for the task of control and inspection of authorised nuclear and radioactive facilities.

In fulfilling said functions, wherever the CSN encounters situations of disused radioactive equipment or sources, it calls on the licensees to remove them via the channels established in the regulations, and supervises the performance of these actions.

In 2014 the CSN established a Protocol systematically grouping all resources and tools that the CSN and Spanish regulations have available to detect entities with problems of viability, whether because of economic difficulties or for any other reason, to establish the risk in each specific situation and take timely action. Previously, in 2013 the CSN had issued an Instruction to all licensees of encapsulated radioactive sources in order to require action in the event that they had any viability problems, and if they were not capable of adequately maintaining control of the sources, the requirement to transfer them to a reliable entity: another authorised licensee, the supplier, or Empresa Nacional de Residuos Radiactivos (Enresa). The Protocol was applied in a pilot phase during the years 2015 and 2016, and formally implemented in 2017.

Specificities regarding the management of high-activity sealed sources

In December 2003 the Council of the European Union approved Directive 122/2003/Euratom on the control of high-activity sealed radioactive sources and orphan sources. This Directive, repealed by Directive 2013/59/Euratom, was transposed into Spanish national regulations by means of Royal Decree 229/2006, of 24 February 2006, on the control of high-activity encapsulated radioactive sources and orphan sources, the provisions of which regarding orphan sources were repealed by Royal Decree 451/2020, while those regarding high-activity encapsulated sources will remain in force up until the approval of the new RINR.

This Royal Decree 229/2006 includes specific requirements regarding the control of high-activity encapsulated sources and the management of disused sources. Article 5 of said Royal Decree indicates that before the authorisation procedure is completed prior to the commissioning of the radioactive facility the authorisation of which includes a high-activity source, the possessing parties must arrange with the supplier the relevant agreements for the return thereof once it is disused, and establish a financial guarantee to cover its safe management at that time, even in the event of insolvency, cessation of operations, or any other contingency that might arise.

Article 7 of the same legislation establishes the obligation on those possessing sources to maintain an inventory sheet of each of the sources for which they are responsible, recording their location and transfers, a copy of which must be sent to the CSN and MITERD. A copy of this sheet must also specifically be sent in the event of any change in the location or, where relevant, the habitual storage of the source, along with the requirement for notification served immediately, and upon closure of the inventory sheet of a specific source, as to the identity of the new possessing parties or the recognised installation to which it has been transferred.

As an additional measure, this article requires that the Nuclear Safety Council maintain an updated nationwide inventory of authorised possessors and the sources that they possess. To this end, the virtual office of the CSN houses an application used by the licensees of facilities to upload the inventory sheets of high-activity encapsulated sources, assisting them in the task of reporting data and allowing the CSN to perform counts, statistics, etc. regarding such data.

Article 8 of this standard establishes that the possessor shall return all disused sources to the supplier, and must to this end arrange the relevant agreements with said party in advance, or transfer the source to another authorised possessor or a recognised facility, without unjustified delay once it is no longer in use. Lastly, this standard includes requirements regarding the identification and marking of sources and training of personnel.

Disposal planned for disused radioactive sources

With regard to the disposal of disused radioactive sources, the provisions adopted in Spain vary depending on the different situations that might arise.

In the case of radioactive sources for which the licensee has obtained authorisation as a radioactive facility, CSN Instruction IS-28, on the technical functional specifications to be fulfilled by radioactive facilities, establishes that the licensee will return all disused sources to the supplier, to which end it must arrange the relevant agreements with said party in advance, or transfer possession thereof to another authorised licensee. If the above alternatives are not possible, the sources shall be transferred to an authorised entity for management as radioactive waste.

Likewise, the aforementioned Royal Decree 229/2006, on the control of high-activity encapsulated radioactive sources and orphan sources, requires that before the authorisation procedure is completed prior to the commissioning of the radioactive facility the authorisation for which includes a high-activity encapsulated source, the possessor must:

a) Arrange the relevant agreements with the supplier for the return of the disused source.

b) Establish a financial guarantee to cover the safe management of the source once it becomes disused, even in the event of insolvency, cessation of operations, or any other contingency that the supplier of this type of source might undergo.

As indicated, there are situations in which the licensee of a facility authorised for the possession and use of radioactive sources cannot return them to the supplier at the end of their useful life (for example, because the supplier is no longer in operation). In such cases the limits and conditions of the authorisations establish that the licensee must contact Enresa, in order for it to remove and manage the source as radioactive waste. In such cases it is Enresa that, on the basis of the regulations governing its activity, is responsible for the management of radioactive sources and for the disposal thereof in accordance with the applicable regulations. Those sources that, because of their radiological characteristics, would comply with the acceptance criteria of the El Cabril Disposal Facility, would be disposed of in the vaults there. Meanwhile, for those that would not comply, they would be temporarily stored at said site until the Centralised Temporary Storage facility is available.

Management of orphan sources

In the case of orphan radioactive sources, in other words those outside the regulatory control system, either because they were never included or because they have been abandoned, lost, misplaced, stolen or transferred in some other way without due authorisation, the actions to be taken are as established in Royal Decree 451/2020, of 10 March 2020, on the control and recovery of orphan radioactive sources. The purpose of such actions will be the collection of the material by Enresa. This collection will require specific authorisation by the MITERD, following a report by the CSN, in accordance with the provisions of Article 74 of the RINR and Article 13 of the aforementioned Royal Decree 451/2020.

One special case within the set of orphan sources applies to those detected at facilities intended for the recovery, storage or manipulation of metal materials for recycling. The actions for the safe management of such sources are set out in Royal Decree 451/2020, and in the Collaboration Protocol on Radiological Surveillance of Metallic Materials, signed by the companies of the sector, the MITERD, the CSN, Enresa, and trade union organisations. Adhesion to said Protocol is voluntary in nature, although many of the commitments acquired by adhering to it have become mandatory, following the approval of Royal Decree 451/2020. In any event, the aforementioned Royal Decree establishes that the actions to be taken by the facilities subscribing to the Protocol will be followed by implementing the corresponding framework.

Both the Protocol and Royal Decree 451/2020 establish an obligation on the licensees of the aforementioned facilities to have in place a radiological surveillance and control system. In the event of the detection of radioactive material, authorised radiological protection technicians must be notified, to identify the radioactive isotope and its activity, and maintain the material in a safe situation until it is collected by Enresa.

As for covering the costs of management of such orphan sources, the Protocol establishes that if the radioactive source is of Spanish origin, it will be managed as radioactive waste by Enresa, which will bear the costs. If the source detected in the metallic materials is of foreign origin, the cost derived from management will be borne by the adhering companies, without prejudice to the fact that they may, where applicable, pass these costs on to the supplier or shipper of the scrap.

For companies not adhering to the Protocol, the costs of management of orphan sources will be borne as established in Royal Decree 451/2020. This establishes that the costs will be borne by the last possessor of the source, if this party can be identified, and if not, the costs will be borne by the operator or, in default thereof, the licensee of the facility where the source was detected, without prejudice to those circumstances in which the costs may be charged to the Fund for the financing of GRWP activities (such as, for example, the management of radioactive lightning conductor heads).

One other special case applies to consignments of Ra-226 needles for medical use, which were used in Spain prior to the development of the regulations governing authorisations for the possession and use of radioactive sources and materials. These sources have not been used for many years now, and have been subject to specific campaigns for recovery, collection and management by Enresa. The costs of such management have been borne by the Enresa fund, at no charge to the possessors. The corresponding collection and removal campaign is now considered to be complete, following several years with no new cases emerging.

Management in safe conditions in all cases

The possession, usage, transfer and disposal of radioactive sources in safe conditions in all cases referred to in the above paragraphs is guaranteed, since the various entities involved in these processes are obliged to comply with the provisions of the Regulation on health protection against ionising radiation, approved by Royal Decree 783/2001, of 6 July 2001. This Spanish standard includes radiological safety and protection requirements equivalent to those set out in the international standards governing radiological protection and the safety of sources of radiation of the International Atomic Energy Agency (IAEA) and EU Directive 96/29/Euratom. Directive 96/29/Euratom was repealed by Directive 2013/59/Euratom, and the aforementioned Royal Decree 783/2001 will be repealed by a Royal Decree currently being prepared, which will improve the new Regulation on health protection against risks derived from exposure to ionising radiation.

In April 2004 Spain informed the Director General of the IAEA of its commitment to apply the Code of Conduct for Technological Safety and Physical Safety of Sources of Radiation, which in fact constitutes a reinforcement of the measures to maintain effective control over sources of radiation from manufacture up until disposal at an authorised facility. These measures are set out in the national regulations governing safety, radiation protection, management of radioactive waste, transport and control of radioactive sources.

Spain likewise informed the Director General of the IAEA in 2017 of its commitment to apply the Guidance on the import and export of radioactive sources published by said Agency as a development of the aforementioned Code of Conduct, having designated a national point of contact for the exchange of applications for consent for transfers of sources, and notifications of shipments thereof.

Lastly, Spain informed the Agency in June 2019 of its adherence to the Guidance on the management of disused radioactive sources, registering its intention to continue acting in accordance with this Guidance, and to use it as supplementary information in the application of the aforementioned IAEA Code of Conduct.

It should likewise be noted that, by virtue of Royal Decree 1308/2011, on the physical protection of nuclear facilities and materials and radioactive sources, a system of physical protection has been established, which: a) provides protection against robbery, theft or other unlawful appropriation of nuclear materials with radioactive sources during their usage, storage and transport; b) guarantees the application of appropriate measures to locate and, where applicable, to recover lost or stolen nuclear material or radioactive sources; c) protects against sabotage or any other unlawful action that may have radiological consequences or threaten or alter the normal functioning of facilities; and d) mitigates the radiological consequences of an act of sabotage.

With regard to radioactive sources, said Royal Decree establishes a classification based on the activity and hazardousness of a series of radionuclides, and for those attaining a certain category, imposes a series of requirements; essentially that those using them must hold a permit to be issued by the MITERD, following a favourable report by both the CSN and the Ministry of the Interior. This permit will be based on confirmation that the applicant has in place an appropriate physical safety system in terms both of material resources and also organisation and operational and safekeeping protocols for radioactive materials.

Lastly, CSN Instruction IS-41, approving the requirements for the physical protection of radioactive sources, develops the requirements of the aforementioned Royal Decree 1308/2011, aligning Spanish regulations in this field with Nuclear Security Series No. 11 Security of *Radioactive Sources* of the IAEA. The standard establishes the basic functions of the radioactive source physical protection system (dissuasion, detection, delay and response), the organisation and management of safety and the contents of the Physical Protection Plan, an official document describing the system and which each facility must draw up and submit for approval by the executive that granted the operational authorisation.

28.2. Readmission of disused sealed sources into Spanish territory

As previously mentioned, Spain currently does not have any facilities for the manufacture or production of sealed radioactive sources. However, the Spanish regulations do not contain any provisions that would prevent the readmission of radioactive sources exported by potential Spanish manufacturers.

Authorisation for Spanish licensees to import sealed radioactive sources from other countries requires that they comply with the provisions of this article, accepting the return of sources once they are no longer in use to authorised suppliers or manufacturers within their national territory.

Section K.

General efforts to improve safety

Section K. General efforts to improve safety

K1. Measures adopted in connection with the challenges and suggestions identified at the Sixth Joint Convention Review Meeting

During the period covered by this Report, Spain continued to work on those challenges and suggestions identified at the sixth Convention review meeting, as summarised in Section A.2.

K2. Possible areas for improvement and planned activities to improve safety

This Seventh National Report sets out the situation in Spain with regard to the management of spent fuel and radioactive waste within the context of the safety requirements established in the Joint Convention. In the light of the information provided in the treatment of each article and the appraisal of compliance, it may be asserted that in general the Spanish system continues to comply with the requirements of the Convention.

Nonetheless, bearing in mind the inherent nature of safe management of radioactive waste and spent fuel, efforts continue to improve the legal and regulatory framework, along with other areas that have been identified, as indicated below, where progress is expected to be achieved in the short and medium term:

K2.1. Regulatory development regarding the safe management of spent fuel and radioactive waste

As indicated throughout this Report, those aspects where efforts will be maintained in order to continue completing the legal and regulatory framework regarding the long-term management of spent fuel and radioactive waste are:

- ✓ Complete the transposition into national legislation of Council Directive 2013/59/Euratom, of 5 December 2013, laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, essentially through

the approval of a new Regulation on health protection against risks derived from ionising radiation and a new Regulation on nuclear and radioactive facilities.

K2.2. Licensing and construction of a Centralised Temporary Storage (CTS) facility

As indicated in Section B.4 of this Report, the basic strategy set out in the draft Seventh GRWP for the management of spent fuel generated by Spanish power plants, and any radioactive waste which, because of its characteristics, cannot be handled by the El Cabril Disposal Facility, continues to be temporary storage at a CTS facility, until the disposal facility becomes available. Nonetheless, as already indicated, this option will need to be confirmed by the Government through the approval of the Plan, which is currently being processed. If this is the case, the priority objective over the coming years would comprise the commissioning of a Centralised Temporary Storage (CTS) facility in 2028, with plans for a Cask Holding Facility (CHF) to begin operation in 2026 (see Article 6 of this Report).

K2.3. Expansion of capacity at the El Cabril Disposal Facility

As indicated in section B5 and in Article 13, the plan is over the coming years to license an expansion of capacity at the El Cabril Disposal Facility for the disposal of LILW.

K2.4. Approval of a Seventh General Radioactive Waste Plan (GRWP)

As indicated in Section B.1, on 10 March 2020 Enresa submitted a GRWP proposal to the Secretary of State for Energy at the MITERD, thereby initiating the processing of a draft Seventh GRWP, which will need to be approved by the Government once the process has been completed, in accordance with the procedures established in the sectoral and environmental regulations.

K2.5. Implementation of the Action Plans resulting from the combined IRRS-ARTEMIS mission

Implementation of the actions identified in the Action Plan resulting from the IRRS part of the mission is currently under development, the aim being to complete the great majority of these actions and to achieve a satisfactory degree of progress in the remainder, with a view to the follow-up mission initially scheduled for autumn 2021. Likewise, following completion of the mission, the short-term initiatives set out in the Action Plan proposed as a result of the ARTEMIS part have already begun, and are summarised in Section K.4. Implementation of both plans and fulfilment of the different actions and milestones are seen as a challenge, given the efforts that will be required to conduct this process, which must necessarily be combined with the routine activities performed by the national bodies involved.

K2.6. Retain, maintain and improve technical knowledge and professional resources, both at the CSN and the organisations of the owners, through a systematic analysis of skill and ability needs. Improve the management of human resources at the CSN, aligning personnel with the needs of each unit, in both the short and long term

The CSN has highly qualified technical personnel, capable of fulfilling the functions entrusted to it with the utmost guarantees. However, in line with the aspects identified by the combined IRRS-ARTEMIS mission inspection team, the regulatory body has a workforce with an average age of 53, hence the challenge that was identified as to the implementation of a plan to maintain the existing skills in the short and medium term. A review of the organisation's training programme was also found to be advisable, to ensure that it is based on an analysis of the skills and abilities that will be needed over the coming years.

As for the owners, the CSN will need to continue to ensure that they fulfil appropriate requirements with regard to the qualifications of their personnel, so as to guarantee the safe operation of the facilities.

K3. Information on the Strengths of the national Radioactive Waste and Apent Fuel Management System in Spain within the context of the Joint Convention

In the light of the Report, it may be asserted that Spain has in place the necessary infrastructure for the management of spent fuel and radioactive waste, from the institutional, administrative, technical and economic/financial perspectives, having furthermore established the relevant mechanisms to guarantee rights of access to information on the part of citizens, and social participation.

Likewise, the legal and regulatory framework for the management of spent fuel and waste management, integrated within the general framework governing nuclear energy in Spain, is an extensive framework developed in accordance with the evolution of international regulatory requirements. This framework clearly establishes the responsibilities of the different actors, and the distribution of functions among the authorities responsible for this sphere. Although these functions are exercised separately and independently, they are integrated within a shared administrative framework in a coordinated manner.

As indicated throughout the Report, the combined IRRS-ARTEMIS peer review mission conducted an in-depth review of this framework and of the radioactive waste and spent nuclear fuel management and programmes, in accordance with the safety standards of the IAEA and international good practice.

The team of international experts conducting the mission noted as one well-functioning area the fact that Spain has developed a strategy for the safe management of spent fuel and radioactive waste generated within the country, both at present and in the future, including waste de-

rived from the decommissioning of existing facilities, deeming the proposed strategy to be worthy of merit and consistent with international safety standards

In addition, the team identified good practice at Enresa in connection with the design of the CTS facility: The design and usage of this resource as part of a spent fuel management strategy in Spain could make a significant contribution to the need to promote nuclear and radiological safety at an international level. This facility, which has been designed in accordance with best international practices, should provide the required flexibility so as to ensure continuous management of spent fuel and waste in the event of occurrences that would lead to an unavailability of storage capacity at those sites with a reactor, in addition to the possibility of researching the behaviour of the fuel as a phase prior to deep geological repository storage.

K4. Plans and timeframe of peer review missions or their follow-up missions, and measures adopted by Spain to publish the results reports

At the request of the Spanish Government, an international team made up of high-level safety experts held meetings with representatives of the Nuclear Safety Council (CSN), the regulatory body in Spain, representatives of the former Ministry for Ecological Transition (MITECO) and representatives of Empresa Nacional de Residuos Radioactivos (Enresa) between 15 and 26 October 2018, in order to conduct a combined mission of the Integrated Regulatory Review Service (IRS) and of the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS).

This combined peer review mission was intended to review the Spanish regulatory framework in the field of nuclear and radiological safety (IRRS), and to offer the opinions and advice of independent experts in the field of radioactive waste and spent fuel management, decommissioning and remediation (ARTEMIS).

With regard to the latter, the ARTEMIS team of experts reviewed the following areas: Framework and national policy for the management of radioactive waste and spent fuel; National strategy for the management of radioactive waste and spent fuel; Inventory of spent fuel and radioactive waste; Concepts, plans and technical solutions for the management of radioactive waste and spent fuel; Safety cases and evaluation of the safety of radioactive waste and spent fuel management facilities and activities; Estimates of the cost and financing of the management of radioactive waste and spent fuel; Skills for the management of radioactive waste and spent fuel - experience, training and abilities.

The results of the mission were set out in the resulting report which is available to the public on the website of the MITERD and CSN, and also on the website of the IAEA.

In summary, the resulting report on the ARTEMIS mission formulated five recommendations and two suggestions, as well as one good practice and one well-functioning area as referred to in Section K.3.

With regard to the recommendations, the first of these refers to the need to update the GRWP. The second calls on the Government to ensure that the delay to the CTS has no negative impact on the safe management of SF. The third recommendation refers to embarking on the actions required to advance the implementation of the DGR programme, addressing the three organisations involved (MITERD, CSN and Enresa). The fourth recommendation calls on the

Government periodically to review the funding mechanisms for radioactive waste management and the decommissioning of nuclear facilities. Lastly, the fifth recommendation calls on Enresa to assess the adequacy of the funds dedicated to R&D in order to support the development of the DGR programme.

Meanwhile, the suggestions addressing Enresa are connected with ensuring sufficient capacity for the disposal of radioactive waste, and access to mechanisms ensuring the transfer of knowledge within its professional context.

These suggestions and recommendations have been taken into account in order to embark on improvement actions in the field of radioactive waste management, as set out in the Action Plan drawn up as a result of the mission, including and developing the aspects detailed below, alongside other content.

With regard to the first recommendation, the need to update the GRWP had already been identified in the process of self-assessment conducted by Spain before receiving the review mission. This was expressed in the presentation made to the MITERD by Enresa for a proposed Seventh GRWP, the processing of which has already begun and is expected to last two years, including the Strategic Environmental Assessment to be conducted of said Plan.

With regard to ensuring sufficient capacity for the disposal of radioactive waste, and specifically LILW, the need had already been identified to expand capacity at the El Cabril Disposal Facility. The prior studies required in this regard were conducted in 2018 and 2019, following on from which the documentation will be prepared to apply for the authorisation or licence, and the procedure for the issuance thereof will begin. The procedures established in law allowing both for regulated authorisations under the RINR, and application of an Environmental Impact Assessment, in accordance with environmental legislation, aside from other procedures.

As for the matter of maintaining spent nuclear fuel in safe conditions until the CTS is available, the necessary actions are being performed at the sites of the nuclear power plants themselves to manage these materials, as recounted throughout this Report.

Three further recommendations referred to the completion of the actions required to make progress in making the DGR a reality. A working party was set up for this purpose, comprising representatives of the three organisations concerned, so as to review the existing legislation, identify shortcomings, and draw up legislative proposals and initiatives to be implemented.

Meanwhile, the recommendation to review the funding mechanism was put into practice in the form of an increase in the levy paid to Enresa by nuclear power plants in operation, via Royal Decree 750/2019.

Lastly, the suggestions resulting from the mission and addressing Enresa were taken into account in designing strategies to maintain knowledge and ensure an appropriate budgetary allocation to R&D projects for the DGR programme.

Meanwhile, during the period covered by this Report there were various technical peer support missions by the WANO (World Association of Nuclear Operators) at the operator level at Almaraz (January 2020), Ascó (September 2019), Cofrentes (April 2018), Trillo (October 2017) and Vandellós II (September 2018), the corresponding follow-up missions at Cofrentes (May 2020) and Vandellós II (June 2020), as well as corporate missions at the ANAV (Asociación Nuclear Ascó Vandellós, May 2017) and Iberdrola/Cofrentes (November 2018). An OSRAT mission was also conducted at Almaraz in February 2018, with follow-up in November 2019.

K5. Information on improving openness and transparency in the implementation of the Convention obligations

In order to achieve greater transparency and public openness with regard to the implementation of the Joint Convention obligations, the Ministry for Ecological Transition and Demographic Challenge has been using its website to publish all the National Reports generated in accordance with Article 32 of the Convention, in addition to the questions and comments received in the corresponding review process. The National Report can likewise be accessed by the public via the website of the CSN and of the IAEA. Similarly, both the National Report and the Rapporteur reports to the Plenary and the summary report on the review meetings are referred to the corresponding Committees for Ecological Transition and Demographic Challenge at the Lower and Upper Houses of Parliament.

Section L.

Annexes

Section L. Annexes

Annex A.
Internal legislative regulations in the field of nuclear energy and radioactive waste

1. Provisions with the status of legislation

✓ Nuclear Energy Law (Law 25/1964, of 29 April 1964; LEN; Official State Gazette of 04/05/1964). This law has been amended by:

- ⇨ Law 25/1968, of 20 June 1968, amending Articles 9 and 16 of Law 25/1964.
- ⇨ Law 15/1980, of 22 April 1980, on the creation of the Nuclear Safety Council.
- ⇨ Electrical Sector Law 54/1997, of 27 November 1997 (Article 2.9).
- ⇨ Law 62/2003, of 30 December 2003, on taxation, administrative and social measures (addition of Article 2.12 bis and First Additional Provision).
- ⇨ Law 24/2005, of 18 November 2005, on reforms for the promotion of productivity (Articles 28-30, 84).
- ⇨ Law 33/2007, of 7 November 2007, reforming Law 15/1980 (Articles 1, 2.12 bis, 36-38 43, 44 bis and Chapter XIV).
- ⇨ Law 11/2009, of 26 October 2009, regulating Listed Public Limited Liability Real Estate Investment Companies (Article 38 bis).
- ⇨ Law 12/2011, of 27 May 2011, on civil liability from nuclear damage or damage caused by radioactive materials (Articles 2 and 28) (repealing Chapter VII (except Article 45) and Chapters VIII, IX and X once it takes effect).

✓ Law to create the Nuclear Safety Council (Law 15/1980, of 22 April 1980; Official State Gazette of 25/04/1980). This law has been amended by:

- ⇨ Hydrocarbons Sector Law 34/1998, of 7 October 1998.
- ⇨ Law 14/1999, of 4 May 1999, on public prices and levies for services provided by the CSN.
- ⇨ Law 62/2003, of 30 December 2003, on taxation, administrative and social measures.
- ⇨ Law 24/2005, of 18 November 2005, on reforms to promote productivity.
- ⇨ Law 33/2007, 7 November 2007, reforming Law 15/1980.

✓ Law on public prices and levies for services provided by the Nuclear Safety Council (Law 14/1999, of 4 May 1999; Official State Gazette of 05/05/1999). Amended by:

- ⇨ Law 30/2005, of 29 December 2005, on the General State Budget for the year 2006 (Official State Gazette of 30/12/2005).

✓ Electrical Sector Law (Law 54/1997, of 27 November 1997; Official State Gazette of 28/11/1997 and 31/12/2001). This Law has been amended with regard to nuclear energy by:

- ⇨ Law 24/2005, of 18 November 2005, on reforms to promote productivity (Seventh Additional Provision).
- ⇨ Law 11/2009, of 26 October 2009, regulating Listed Public Limited Liability Real Estate Investment Companies (Sixth Additional Provision, and repeal of Sixth Additional Provision bis).
- ⇨ Sustainable Economy Law 2/2011, of 4 March 2011, amending subsection 9.4 of the Sixth Additional Provision of Law 54/1997, governing the levy for the provision of services to manage radioactive waste generated by radioactive facilities and other facilities.
- ⇨ Electrical Sector Law 24/2013, of 26 December 2013, repealing Law 54/1997, except for the Sixth and Seven Additional Provisions (Official State Gazette of 27/12/2013).

✓ Environmental Assessment Law 21/2013, of 9 December 2013 (Official State Gazette of 11/12/2013). This law has been amended by:

- ⇨ Law 9/2018, 5 December 2018, amending Environmental Assessment Law 21/2013 (Official State Gazette of 06/12/2018).

✓ Law 27/2006 (Aarhus Law), of 18 July 2006, regulating rights of access to information for public participation and access to justice regarding the environment (Official State Gazette of 19/07/2006). This law has been amended by:

- ⇨ Royal Legislative Decree 1/2008, of 11 January 2008, approving the recast text of the Law on the environmental impact assessment of projects.

✓ Law 12/2006, of 27 December 2006, on supplementary taxation measures of the Budget of the Autonomous Region of Andalusia (Official State Gazette of 16/01/2007).

✓ Law 12/2011, of 27 May 2011, on civil liability from nuclear damage or damage caused by radioactive materials (Official State Gazette of 28/05/2011). Not yet in force.

✓ Law 15/2012, of 27 December 2012, on taxation measures for energy sustainability (Official State Gazette of 28/12/2012), amended by:

- ⇨ Law 16/2013, of 29 October 2013, establishing certain measures with regard to environmental taxation and adopting other taxation and financial measures (Official State Gazette of 30/10/2013).

2. Provisions with the status of regulations

✓ Regulation on nuclear and radioactive facilities (Royal Decree 1836/1999, of 3 December 1999; Official State Gazette of 31/12/1999). This Regulation has been amended by:

- ⇨ Royal Decree 35/2008, of 18 January 2008, modifying the Regulation on nuclear and radioactive facilities.
- ⇨ Royal Decree 1308/2011, of 26 September 2011, on the physical protection of nuclear materials and facilities, and of radioactive sources (Official State Gazette of 07/10/2011).
- ⇨ Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste.

✓ Regulation on health protection against ionising radiation. (Royal Decree 783/2001, of 6 July 2001; Official State Gazette of 26/06/2001). This Regulation has been amended by:

- ⇨ Royal Decree 1439/2010, of 5 November 2010, amending the Regulation on health protection against ionising radiation, approved by Royal Decree 783/2001, of 6 July 2001 (Official State Gazette of 18/11/2010).

✓ Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste (Official State Gazette of 08/03/2014).

✓ Royal Decree 1440/2010, of 5 November 2010, approving the Bylaws of the Nuclear Safety Council (Official State Gazette of 22/11/2010).

✓ Royal Decree 229/2006, of 24 February 2006, on the control of high-activity encapsulated radioactive sources and orphan sources (Official State Gazette of 28/02/2006). This R.D. has been amended by:

- ⇨ Royal Decree 1308/2011, of 26 September 2011, on the physical protection of nuclear materials and facilities, and of radioactive sources (Official State Gazette of 07/10/2011).

✓ Royal Decree 775/2006, of 23 June 2006, creating the Interministerial Committee for the establishment of the criteria to be fulfilled by the site of the centralised temporary storage facility for spent nuclear fuel and high level waste, and the associated technology centre (Official State Gazette of 05/07/2006).

✓ Royal Decree 413/1997, of 21 March 1997, on Radiological Protection of external workers with a risk of exposure to ionising radiation because of operations in a controlled zone (Official State Gazette of 16/04/1997).

✓ Royal Decree 1132/1990, of 14 September 1990, establishing fundamental measures for the radiological protection of persons subject to medical examinations and treatments (Official State Gazette of 18/09/1990). This R.D. has been amended by:

- ⇨ Royal Decree 220/1997, of 14 February 1997, governing academic qualifications for hospital radiophysics specialists (Official State Gazette of 01/03/1997).
- ⇨ Royal Decree 1976/1999, of 23 December 1999, establishing criteria for quality in radiodiagnosis (Official State Gazette of 29/12/1999).

✓ Royal Decree 815/2001, 13 July 2001, on the justification of the use of ionising radiation for the radiological protection of persons in cases of medical exposure (Official State Gazette of 14/07/2001).

✓ Royal Decree 1085/2009, of 3 July 2009, approving the Regulation on the installation and usage of x-ray devices for medical diagnosis purposes (Official State Gazette of 18/07/2009).

- ✓ Royal Decree 1308/2011, of 26 September 2011, on the physical protection of nuclear materials and facilities, and of radioactive sources (Official State Gazette of 07/10/2011). This R.D. has been amended by:
  - ⇨ Royal Decree 1086/2015, of 4 December 2015, amending Royal Decree 1308/2011, of 26 September 2011, on the physical protection of nuclear facilities and materials and radioactive sources (Official State Gazette of 18/12/2015).
- ✓ Royal Decree 1464/1999, of 17 September 1999, on activities in the first part of the nuclear fuel cycle (Official State Gazette of 05/10/1999).
- ✓ Royal Decree 1546/2004, of 25 June 2004, approving the Basic Nuclear Emergency Plan (PLABEN); (Official State Gazette of 14/07/2004). This R.D. has been amended by:
  - ⇨ Royal Decree 1428/2009, of 11 September 2009 (Official State Gazette of 12/09/2009).
  - ⇨ Royal Decree 1276/2011, of 16 September 2011 (Official State Gazette of 17/09/2011).
  - ⇨ Royal Decree 734/2019, of 20 December 2019 (Official State Gazette of 03/01/2020).
- ✓ Basic Guidance for Planning of Civil Protection against Radiological Risk (DBRR), approved by Royal Decree 1546/2010.
  - ⇨ Royal Decree 1276/2011, of 16 September 2011 (Official State Gazette of 17/09/2011).
  - ⇨ Royal Decree 734/2019, of 20 December 2019 (Official State Gazette of 03/01/2020).
- ✓ Royal Decree 1054/2015, of 20 November 2015, approving the National Civil Protection Plan to address Radiological Risk.
- ✓ Regulation of cover for nuclear risks. (Decree 2177/1967, of 22 July 1967; Official State Gazette of 18/09/1967). This Regulation has been amended by:
  - ⇨ Decree 742/1968, of 28 March 1968, amending Article 66 of the Regulation.
  - ⇨ And this will be partially repealed following the entry into force of Law 12/2011, of 27 May 2011, on civil liability from nuclear damage or damage caused by radioactive materials (Official State Gazette of 28/05/2011).
- ✓ Royal Decree 110/2015, of 20 February 2015, on waste electrical and electronic equipment. (Official State Gazette of 21/02/2015).
- ✓ Royal Decree 1428/1986, of 13 June 1986, on radioactive lightning conductors (Official State Gazette of 11/07/1986). This R.D. has been amended by:
  - ⇨ Royal Decree 903/1987, of 10 July 1987 (Official State Gazette of 11/07/1987).
- ✓ Royal Decree 243/2009, of 27 February 2009, regulating the surveillance and control of transfers of radioactive waste and spent nuclear fuel between Member States or from or to outside the Community (Official State Gazette of 02/04/2009). This R.D. has been amended by:
  - ⇨ Royal Decree 102/2014, of 21 February 2014, for the responsible and safe management of spent nuclear fuel and radioactive waste.
- ✓ Royal Decree 97/2014, of 14 February 2014, governing operations for the transport of dangerous goods by road within Spanish territory (Official State Gazette of 27/02/2014).

- ✓ Royal Decree 412/2001, of 20 April 2001, governing various aspects connected with the transport of dangerous goods by rail (Official State Gazette of 08/05/2001), amended by Ministerial Order of 01/02/2007.
- ✓ Royal Decree 1749/1984, of 1 August 1984, approving the National Regulation for the transport of dangerous goods by air (Official State Gazette of 02/10/1984), amended by Ministerial Order of 28/12/1990 and by Ministerial Order FOM/456/2014, of 13 March 2014.
- ✓ Royal Decree 145/1989, of 20 January 1989, approving the National Regulation on the admission, handling and storage of dangerous goods at ports (Official State Gazette of 13/02/1989).

3. Council Instructions

- ✓ Nuclear Safety Council Instruction IS-01, of 31 May 2001, defining the format and content of the individual radiological monitoring document (radiological ID card) governed by Royal Decree 413/1997 (Official State Gazette of 06/08/2001).
- ✓ Nuclear Safety Council Instruction IS-02, Revision 1, on the documentation of reloading activities at light water nuclear power plants (Official State Gazette of 16/09/2004).
- ✓ Nuclear Safety Council Instruction IS-03, of 06 November 2002, on qualifications to obtain recognition as an expert in protection against ionising radiation (Official State Gazette of 12/12/2002).
- ✓ Nuclear Safety Council Instruction IS-04, of 05 February 2003, governing the transfers, archiving and safekeeping of documents corresponding to the radiation protection of workers, the public and the environment, prior to the transfer of licensing of practices at nuclear power plants conducted for the purpose of dismantling and decommissioning (Official State Gazette of 28/02/2003).
- ✓ Nuclear Safety Council Instruction IS-05, of 26 February 2003, defining the exemption values for nuclides as established in Tables A and B of Annex I to Royal Decree 1836/1999 (Official State Gazette of 10/04/2003).
- ✓ Nuclear Safety Council Instruction IS-06, of 09 April 2003, defining basic and specific training programmes in the field of radiation protection governed by Royal Decree 443/1997, of 21 March 1997, within the scope of nuclear facilities and radioactive facilities of the fuel cycle (Official State Gazette of 03/06/2003). On 28 October 2004 the CSN sent an information circular to all external companies to clarify certain aspects of the practical application of this Instruction.
- ✓ Nuclear Safety Council Instruction IS-07, of 22 June 2005, on fields of application of radioactive facility personnel licences (Official State Gazette of 20/07/2005).
- ✓ Nuclear Safety Council Instruction IS-08, of 27 July 2005, on the criteria applied by the Nuclear Safety Council to demand that licensees of nuclear and radioactive facilities provide specific consultancy regarding radiation protection (Official State Gazette of 05/10/2005).
- ✓ Nuclear Safety Council Instruction IS-09, of 14 June 2006, establishing the criteria with which physical protection systems, services and procedures must comply for nuclear facilities and materials (Official State Gazette of 07/07/2006).

- ✓ Nuclear Safety Council Instruction IS-10, Revision 1, of 30 July 2014, on criteria for notification of events at nuclear power plant (Official State Gazette of 19/09/2014).
- ✓ Nuclear Safety Council Instruction IS-11, Revision 1, of 30 January 2019, on licensing of nuclear power plant operational personnel (Official State Gazette of 15/02/2019).
- ✓ Nuclear Safety Council Instruction IS-12, of 28 February 2007, defining the qualifications and training requirements for non-licensed in-company and external personnel within the context of nuclear power plants (Official State Gazette of 11/05/2007).
- ✓ Nuclear Safety Council Instruction IS-13, of 21 March 2007, on radiological criteria for the release of nuclear facility sites (Official State Gazette of 07/05/2007).
- ✓ Nuclear Safety Council Instruction IS-14, of 24 October 2007, on the CSN Resident Inspection at nuclear power plant (Official State Gazette of 08/11/2007).
- ✓ Nuclear Safety Council Instruction IS-15, Revision 1 of 5 May 2016, on requirements for the supervision of the efficacy of maintenance at nuclear power plants (Official State Gazette of 16/06/2016).
- ✓ Nuclear Safety Council Instruction IS-16, of 23 January 2008, governing the time periods required for the archiving of documents and records of radioactive facilities (Official State Gazette of 12/02/2008).
- ✓ Nuclear Safety Council Instruction IS-17, of 30 January 2008, on the approval of training courses or programmes for personnel managing the functioning of or operating equipment at x-ray facilities for medical diagnosis purposes, and accreditation of personnel of such facilities (Official State Gazette of 19/02/2008).
- ✓ Nuclear Safety Council Instruction IS-18, of 2 April 2008, on the criteria applied by the Nuclear Safety Council to demand that licensees of radioactive facilities notify radiological incidents and events (Official State Gazette of 16/04/2008).
- ✓ Nuclear Safety Council Instruction IS-19, of 22 October 2008, on the requirements of the management system of nuclear facilities (Official State Gazette of 08/11/2008).
- ✓ Nuclear Safety Council Instruction IS-20, of 28 January 2009, establishing safety requirements regarding spent fuel storage casks (Official State Gazette of 18/02/2009).
- ✓ Nuclear Safety Council Instruction IS-21, of 28 January 2009, on requirements applicable to modifications at nuclear power plants (Official State Gazette of 19/02/2009).
- ✓ Nuclear Safety Council Instruction IS-22, Revision 1, of 15 November 2017, on safety requirements for the management of ageing and long-term operation of nuclear power plant (Official State Gazette of 30/11/2017).
- ✓ Nuclear Safety Council Instruction IS-23, of 4 November 2009, on the in-service inspection of nuclear power plants (Official State Gazette of 24/11/2009).
- ✓ Nuclear Safety Council Instruction IS-24, of 19 May 2010, governing the archiving and storage periods of documents and records of nuclear facilities (Official State Gazette of 01/06/2010).
- ✓ Nuclear Safety Council Instruction IS-25, of 9 June 2010, on the criteria and requirements for the execution of probabilistic safety analyses and their applications at nuclear power plants (Official State Gazette of 24/06/2010).
- ✓ Nuclear Safety Council Instruction IS-26, of 16 June 2010, on basic nuclear safety requirements applicable to nuclear facilities (Official State Gazette of 08/07/2010).

- ✓ Nuclear Safety Council Instruction IS-27, Revision 1, of 14 June 2017, on general nuclear power plant design criteria (Official State Gazette of 03/07/2017).
- ✓ Nuclear Safety Council Instruction IS-28, of 22 September 2010, on Technical Functional Specifications to be fulfilled by category two and three radioactive facilities (Official State Gazette of 11/10/2010).
- ✓ Nuclear Safety Council Instruction IS-29, of 13 October 2010, on safety criteria at temporary spent fuel and high level radioactive waste storage facilities (Official State Gazette of 02/11/2010).
- ✓ Nuclear Safety Council Instruction IS-30, Revision 2, of 16 November 2016, on requirements of the fire protection programme at nuclear power plants (Official State Gazette of 30/11/2016).
- ✓ Nuclear Safety Council Instruction IS-31, of 26 July 2011, on criteria for the radiological control of waste matter generated at nuclear facilities (Official State Gazette of 17/09/2011).
- ✓ Nuclear Safety Council Instruction IS-32, of 16 November 2011, on Technical Functional Specifications of nuclear power plants (Official State Gazette of 05/12/2011).
- ✓ Nuclear Safety Council Instruction IS-33, of 21 December 2011, on radiological criteria for protection against exposure to natural radiation (Official State Gazette of 26/01/2012).
- ✓ Nuclear Safety Council Instruction IS-34, of 18 January 2012, on criteria with regard to radiological protection measures, communication of non-conformities, availability of personnel and resources for emergencies and supervision of loading in the transport of radioactive material (Official State Gazette of 04/02/2012).
- ✓ Nuclear Safety Council Instruction IS-35, of 4 December 2013, with regard to the handling of design modifications for radioactive material transport packages with an approval certificate of Spanish origin, and physical or operational modifications made by the sender of a package with regard to the packaging used (Official State Gazette of 04/01/2014).
- ✓ Nuclear Safety Council Instruction IS-36, of 21 January 2015, on operational emergency procedures and management of severe accidents at nuclear power plants (Official State Gazette of 17/02/2015).
- ✓ Nuclear Safety Council Instruction IS-37, of 21 January 2015, on the analysis of design specification accidents at nuclear power plants (Official State Gazette of 26/02/2015).
- ✓ Nuclear Safety Council Instruction IS-38, of 10 June 2015, on training for persons involved in the transport of radioactive material by road (Official State Gazette of 06/07/2015).
- ✓ Nuclear Safety Council Instruction IS-39, of 10 June 2015, with regard to the control and monitoring of the manufacturing of packaging for the transport of radioactive material (Official State Gazette of 06/07/2015).
- ✓ Nuclear Safety Council Instruction IS-40, of 26 April 2016, on documentation that must be submitted in support of the application for authorisation for the marketing or servicing of apparatus, equipment and accessories incorporating radioactive material or generating ionising radiation (Official State Gazette of 13/05/2016).

- ✓ Nuclear Safety Council Instruction IS-41, of 26 July 2016, approving physical protection requirements for radioactive sources (Official State Gazette of 16/09/2016).
- ✓ Nuclear Safety Council Instruction IS-43, of 20 March 2019, establishing criteria for notification of events concerning physical safety on the part of nuclear power plants (Official State Gazette of 04/04/2019). Correction of errata (Official State Gazette of 01/07/2019).

Annex B.
Process for the licensing of nuclear and radioactive facilities

In accordance with Article 28 of Nuclear Energy Law 25/1980, of 29 April 1980, nuclear and radioactive facilities will be subject to a regime of authorisations issued by the Ministry for Ecological Transition and Demographic Challenge (MITERD), following a mandatory report by the Nuclear Safety Council (CSN).

Said licensing process, for both nuclear and radioactive facilities, is governed by the Regulation on nuclear and radioactive facilities (RINR), approved by Royal Decree 1836/1999, of 3 December 1999.

According to the RINR, such authorisations will be granted by the MITERD, to which applications must be submitted together with the documentation required in each case. The MITERD will send a copy of each application and the corresponding documentation to the Nuclear Safety Council, for it to issue the mandatory report.

The CSN reports are mandatory, and also binding if they are negative or refuse the granting of authorisation, and also with regard to any conditions they might impose, in the event of a positive decision.

The MITERD will also, and where applicable, send a copy of all the documentation to those Autonomous Regions with responsibilities in the field of regulation of territory and the environment and the territory of which contains the facility or the planning zone established in the basic regulations for nuclear and radiological emergency planning, in order to allow them to raise any arguments within a period of one month.

Once it has received the CSN report, and following any opinions, reports and arguments that might apply, the MITERD will issue the corresponding decision.

The RINR furthermore clarifies that those executive functions attributed in the Regulation to the MITERD with regard to category two and three radioactive facilities will be understood to be attributed to the Autonomous Regions, if said functions have been transferred to them.

1. System for licensing of nuclear facilities

The RINR defines nuclear facilities as:

1. Nuclear power plants
2. Nuclear reactors
3. Factories using nuclear fuel to produce nuclear substances and those where nuclear substances are treated
4. Facilities storing nuclear substances
5. Devices and facilities using nuclear fusion or fission reactions to generate energy or for the purpose of the production or development of new sources of energy.

According to the RINR, nuclear facilities require various administrative authorisations in order to function, namely the following, depending on the case in question: prior or site authorisation, construction authorisation, operational authorisation, modification authorisation and decommissioning authorisation, ending in a decommissioning declaration or dismantling and closure authorisation, ending in a closure declaration. The procedure for the granting of each of these authorisations is governed by the Regulation itself, and is set out in the summary below.

The granting of authorisations set out below is the responsibility of the head of the MITERD, although these powers have been delegated to the Secretary of State for Energy, except for modification authorisation, which may be granted by the Director-General for Energy Policy and Mines.

Prior authorisation

Prior or site authorisation is official recognition of the intended purpose and the suitability of the chosen site. Once it is obtained, the licensee may begin work on the preliminary infrastructure authorised, and apply for the construction authorisation for the facility.

The prior authorisation application must be accompanied by the following documents:

a) Declaration of the needs intended to be fulfilled, justification of the facility and of the chosen site.

b) Descriptive memorandum of the fundamental elements comprising the facility, together with the corresponding basic information.

c) Preliminary construction project, including the phases and deadlines for execution and the prior economic study as to the financial investments and forecast costs.

d) Characterisation study of the site and the area of influence of the facility.

e) Planned organisation to supervise the project and guarantee quality during construction.

f) Description of preliminary works and activities for the infrastructure that is to be implemented.

In the process of examining this application, an information and public participation period is opened, as described in detail in item 3 of this Annex.

Construction authorisation

This empowers the licensee to begin construction of the facility and to apply for operational authorisation.

This application will be accompanied by the following documentation:

a) General project for the facility,

b) Acquisitions programme,

c) Budget, funding, execution deadline and technical collaboration regime,

d) Economic study, updating that presented with the prior application,

e) Preliminary Safety Study, which must in turn include:

1. Description of the site and surrounding area,

2. Description of the facility,
3. Analysis of foreseeable accidents and their consequences,
4. Analytical radiological study,
5. Update of the organisation planned by the applicant to supervise development of the project and guarantee quality during construction,
6. Planned organisation for the future operation of the facility and preliminary operational personnel training programme,
7. Pre-operational environmental radiological surveillance programme,
8. Construction quality assurance programme.

f) Technological, economic and financing provisions for dismantling and decommissioning

g) Administrative concessions and authorisations to be granted by other Ministries and Public Authorities, or accredited documentation that the applications have been filed, with all necessary requirements.

During the construction and assembly of a nuclear facility, and before the fuel is loaded or nuclear substances are admitted at the facility, the holder of the authorisation is obliged to draw up a pre-nuclear testing programme in accreditation of the proper performance of the equipment or elements comprising the facility, with regard both to nuclear safety and radiation protection, and also the applicable industrial and technical standards.

The pre-nuclear testing programme will be proposed by the holder of the authorisation, and must be approved by the Directorate-General for Energy Policy and Mines, following a report by the CSN.

The results of the pre-nuclear testing will be presented to the Directorate-General for Energy Policy and Mines and to the CSN for analysis before the operational authorisation may be granted.

Operational authorisation

This authorisation empowers the holder to load the nuclear fuel or to introduce nuclear substances into the facility, to conduct the nuclear testing programme, and to operate the facility under the conditions established in the authorisation. This will first be granted on a provisional basis, up until the satisfactory completion of the nuclear tests.

In order to obtain operational authorisation, the licensee must present the following documents:

a) Safety Study: this must contain sufficient information in order to conduct an analysis of the facility from the perspective of nuclear safety and radiation protection, in addition to a risk analysis based on the functioning of the facility, both under its normal regime and under accident conditions. This must refer to the following issues:

1. Supplementary data obtained during construction as to the site and its characteristics,
2. Description of the facility and the processes that will take place there,
3. Analysis of foreseeable accidents and their consequences,

4. Analytical radiological study of the facility,
5. Operational environmental radiological surveillance programme

b) Functional Regulation: This must contain the following information:
   1. List of jobs with nuclear responsibility,
   2. Organisation and functioning of personnel, and description of the implemented safety management system,
   3. Operational standards under normal regime and other accident conditions.

c) Technical Functional Specifications (ETF): These will contain the limit values of those variables affecting safety and the minimal functional conditions.

d) Internal emergency plan: Detailing the measures established by the licensee and assigning responsibilities to deal with accident conditions.

e) Nuclear testing programme: Describing these tests, their object, the specific techniques and the expected results.

f) Quality assurance manual: Establishing the scope and content of the quality programme applicable to safety-related systems, structures and components.

g) Radiation protection manual: Including the radiation protection standards of the facility.

h) Radioactive waste and spent fuel management plan: Including a system for the possible declassification of waste materials with radioactive content.

i) Final economic study: Analysing fulfilment of the economic and financial provisions and stating the total and actual cost of the facility.

j) Provisions for dismantling and decommissioning: Setting out the disposal planned for the waste generated, and including the cost study and economic and financial provisions to guarantee decommissioning.

Once the nuclear testing programme has been completed, the licensee of the authorisation must send the Directorate-General for Energy Policy and Mines and the CSN the results of the programme and the proposal for modifications to the ETF, if in light of the tasks performed this would be advisable.

The CSN will send a report to the MITERD as to the outcome of the tests and any modifications that might need to be incorporated, in addition to the conditions for operational authorisation for the established period. The MITERD will then issue operational authorisation for the corresponding period.

Modification authorisation

The RINR establishes that modifications to the design of the operational conditions affecting nuclear safety or radiation protection of a facility, and any tests applied to it, must first be analysed by the licensee in order to verify whether the criteria, standards and conditions providing the basis for the authorisation are still fulfilled. If the conclusion reached by the licensee is that the aforementioned requirements are still guaranteed, it may implement the modifications, providing the competent regulatory authorities with periodic information. If, meanwhile, the modification to the design represents a change in the criteria, standards and conditions serving as the basis for the operational authorisation, the licensee will be required to apply for a modifi-

cation authorisation, which it must obtain before the modification becomes operational, or the tests are performed. Irrespective of the aforementioned authorisation, if in the judgment of the regulatory authorities the modification is a large-scale change or entails significant construction or assembly works, the licensee must apply for authorisation to execute and assemble the modification, said authorisation necessarily being obtained before assembly or construction activities begin this type of modification.

The modification authorisation application must be accompanied by the following documentation:

a) Technical description of the modification,

b) Safety analysis,

c) Identification of the documents that would be affected by the modification,

d) Identification of any tests required prior to restarting operations.

An application for authorisation for execution and assembly of the modification must, where this is required, be accompanied by the following documentation:

a) General description of the modification, identifying the reasons behind it.

b) Regulations to be applied in the design, construction, assembly and testing of the modification.

c) Basic design of the modification.

d) Planned organisation and quality assurance programme for execution of the project.

e) Identification of the scope and content of the analyses required in order to demonstrate the compatibility of the modification with the remainder of the facility and to ensure that it maintains its safety levels.

f) Destination of the equipment to be replaced.

g) Acquisition plan and budget in the case of major modifications.

Decommissioning authorisation

Once the operational authorisation has expired, this authorisation entitles the licensee to begin activities for decontamination, disassembly of equipment, demolition of structures and removal of materials, in order ultimately to allow the site to be released in full or with restrictions. The dismantling process will end with the decommissioning declaration.

The decommissioning authorisation application will be accompanied by the following documentation:

a) Safety Study,

b) Functional Regulation,

c) Technical specifications applicable during the dismantling phase,

d) Quality assurance manual,

e) Radiological protection manual,

f) Internal emergency plan,

g) Radioactive waste and spent fuel management plan,

h) Site remediation plan,

i) Economic study of the decommissioning process and financial provisions to address this,

j) Declassifiable materials control plan.

The decommissioning authorisation will include the general approach to this process, and if it is conducted in different phases, will govern only those activities planned for the phase to be immediately executed.

Once the decommissioning activities have been completed and compliance with the site remediation plan provisions has been verified, along with all other technical conditions established in the decommissioning programme, the MITERD will issue the decommissioning declaration, following a report by the CSN. This declaration will release the licensee of a facility from responsibility as the operator thereof and will, in the case of the restricted release of the site, define any usage limitations that would apply, and the party responsible for maintaining these and overseeing compliance.

Said Ministry will, prior to the decommissioning declaration, inform the corresponding Autonomous Regions with powers regarding the regulation of territory and the environment within whose territory the facility is located, to allow them to formulate arguments within a period of one month.

Authorisation for dismantling and closure (for spent nuclear fuel and radioactive waste disposal facilities)

At facilities for the disposal of spent nuclear fuel and radioactive waste, this entitles the licensee to begin the final engineering and other works required so as to guarantee the long-term safety of the storage system, and activities to dismantle any ancillary installations so determined, ultimately allowing definition of those areas that might, where applicable, need to remain subject to control and radiological or other types of surveillance for a specified time period, and the release of the remaining areas of the site from control. The process of dismantling enclosure will end with a closure declaration issued by the MITERD, following a report by the Nuclear Safety Council.

2. System for licensing of radioactive facilities

In accordance with the RINR, radioactive facilities are understood as:

- ✓ Facilities of any class containing the source of ionising radiation.
- ✓ Devices producing ionising radiation and functioning at a voltage of more than 5 kV.
- ✓ Premises, laboratories, factories and facilities producing, using, possessing, treating, handling or storing radioactive materials, except for incidental storage during transport.

Radioactive facilities are divided into three categories.

- ✓ Category one radioactive facilities are those involved in the nuclear fuel cycle, industrial irradiation facilities, and other complex facilities handling very considerable inventories of radioactive substances with a significant potential radiological impact.

Nuclear fuel cycle radioactive facilities, in other words factories producing uranium, thorium and compounds thereof, or otherwise factories producing natural uranium fuel elements, will require the same authorisations as nuclear facilities. The application, processing and granting of these authorisations are conducted in accordance with the terms of subsection 1 above, with the applicable documents being adapted for the specific characteristics of these facilities.

✓ Category two or three radioactive facilities are those for scientific, medical, commercial or industrial purposes which cannot be considered as category one, and are classified in the appropriate category essentially in accordance with their radiological characteristics. This type of facility will require functional authorisation, a decommissioning declaration and, where applicable, authorisation for modification or change of licensee.

The application for the functional authorisation for such radioactive facilities with scientific, medical, commercial or industrial purposes must at least be accompanied by the following documents:

a) Descriptive memorandum of the facility.

b) Safety Study: Analysis and assessment of any risks that might result from the normal functioning of the facility or as a consequence of any accident.

c) Verification of the facility: Containing a description of the tests to which the facility is subjected.

d) Functional Regulation: Practical measures guaranteeing the safe operation of the facility.

e) List of planned personnel, organisation, responsibilities of each job.

f) Internal emergency plan: Planned measures and assignment of responsibilities in order to deal with accident conditions.

g) Provisions for decommissioning and economic provision to guarantee this.

h) Economic budget for the investment to be made.

For category one installations, the following documentation must also be enclosed:

a) Information as to the site and surrounding land

b) As part of the Functional Regulation:

⇨ Quality Assurance Manual

⇨ Radiation Protection Manual

⇨ Technical Functional Specifications

c) Physical Protection Plan

The head of the MITERD is responsible for granting functional authorisations, changes of licensee and decommissioning declarations of category one radioactive facilities, although these powers are delegated to the Secretary of State the Energy. These authorisations will include presentation of the corresponding documentation to the Autonomous Region, in order to allow it to raise any arguments within a period of one month.

The granting of all other authorisations for radioactive facilities governed by this chapter lies with the Director-General for Energy Policy and Mines.

When the licensee is in a position to begin operations at the facility, it will inform the CSN, allowing it to conduct an inspection. Once the CSN has deemed that the facility can function under safe conditions, it will inform the MITERD in order for it to issue a "commissioning notification", entitling the licensee to commence operations at the facility.

Any changes affecting the identity of the licensee of the facility, its location, the activities enabled by the authorisation granted, the category of the facility, the inclusion of particle accelerators or additional radioactive material not previously authorised, will require authorisation under the same procedure as used to grant the functional authorisation.

Any changes and modifications affecting other aspects of the design or the authorised operating conditions of the facility, will require only the explicit acceptance of the Nuclear Safety Council prior to implementation, with said body informing the MITERD.

The application for a decommissioning declaration must enclose the following documentation:

a) Technical decommissioning study

b) Economic study, including the cost of decommissioning and the financial provisions

Once the CSN has confirmed the absence of radioactive substances or equipment producing ionising radiation and the results of the analysis of contamination of the facility, it will issue a report addressed to the MITERD, which will issue the decommissioning declaration for the facility.

In accordance with the provisions of the Spanish Constitution, the various Statutes of Autonomy and the corresponding regulations, the services and functions of the MITERD with regard to category two and three radioactive facilities has been transferred to various Autonomous Regions. The following Autonomous Regions or Cities have had these powers transferred: Aragon, Asturias, Cantabria, Castile-Leon, Catalonia, Ceuta, Extremadura, Galicia, Madrid, Murcia, Balearic Islands, Canary Islands, La Rioja, Navarre, Basque Country and Valencia[18].

3. Public information and participation in the process of authorising facilities

Both the Regulation on nuclear and radioactive facilities (RINR) approved by Royal Decree 1836/1999, of 3 December 1999, and Environmental Assessment Law 21/2013, of 9 December 2013, require public information processes, the most significant of which is performed in the handling of the prior authorisation for a nuclear or fuel cycle radioactive facility. Likewise, dismantling or definitive decommissioning of nuclear power plants and reactors is also subject to an ordinary environmental impact assessment.

The process of public participation in decision-making with regard to the prior (or site) authorisation of a nuclear facility is conducted by means of two public information procedures performed within the context of two administrative procedures, for the prior authorisation under the terms of the RINR, and the project environmental assessment, in accordance with Law 21/2013, as described below.

With regard to the procedure established under nuclear regulations, once the application has been received for prior authorisation of a nuclear facility, Article 15 of the RINR makes provision for the initiation of a public information period lasting 30 days, which will begin with

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publication in the "Official State Gazette" and an announcement in the official gazette of the corresponding Autonomous Region featuring an excerpt highlighting the object and main characteristics of the facility. During said period, in order to allow any arguments and observations deemed relevant to be formulated, the public will be provided with access to the documentation that must be enclosed with the authorisation application, as provided in Article 14 of the aforementioned RINR. Said documentation comprises the following documents:

a) Declaration of the needs intended to be fulfilled, justification of the facility and of the chosen site;

b) Descriptive memorandum. This memorandum will comprise a description of the fundamental constituent elements of the facility, and must in general include basic information about it, the technology to be employed, the preliminary supply plan, and provisions for decommissioning.

c) Preliminary construction project. Execution phases and deadlines. Prior economic study regarding financial investments and planned costs.

d) Characterisation study of the site and the area of influence of the facility, including sufficient data as to those site parameters that could impact on nuclear safety or radiation protection, including those of a demographic and ecological nature, and activities connected with territorial regulations.

e) Organisation planned by the applicant to supervise the project and for quality assurance during construction.

f) Description of the preliminary infrastructure works and activities that are to be performed once the prior authorisation has been granted, and before the application for the construction authorisation.

Once the deadline has passed for arguments to be made, these are passed on to the applicants in order to allow them to be taken into consideration in the project. The appraisal of the arguments, and the response by the applicant, the responsibility of the Nuclear Safety Council, established as the sole body with responsibility for nuclear safety and radiation protection matters under the terms of Law 15/1980, of 22 April 1980, creating said Council, where the arguments in question correspond to those matters within its purview, and the corresponding Ministerial Department in all other cases, mainly the Directorate-General for Energy Policy and Mines of the MITERD.

With regard to the public information procedure established under environmental legislation, Law 21/2013 governs the procedure for the environmental impact assessment of certain projects, including those involving nuclear facilities, during both their prior authorisation and their decommissioning authorisation. As part of this procedure, Article 33 of the aforementioned law establishes a procedure under which the public are, for a period of at least 30 business days, given access to the project, the corresponding environmental impact study, and a summary of its fundamental characteristics. Although Law 21/2013 has horizontal status, for those projects subject to the RINR, certain specifically nuclear contents are required, and these must be included as part of the contents of the environmental impact study:

Subsection 1(d) of Part A of Annex VI thus establishes that with regard to the project description this shall include:

> *"a forecast of the types, quantities and composition of the waste to be produced during the phases of construction, operation and decommissioning, and any radioactive emissions and discharges that could occur during normal operation, operational incidents, and accidents, in addition to a declaration of compliance*

> *with the principle of ALARA (As Low As Reasonably Achievable) under the terms of the basic radiation protection standards for such situations".*

Subsection 7 of Part A of Annex VI likewise establishes that the following must be included, in connection with the vulnerability of the project:

> *"A description of any significant adverse effects of the project on the environment as a consequence of its vulnerability to the risk of serious accident and/or major catastrophe in connection with the project in question. To this end, the available relevant information and any obtained by means of risk assessments conducted in accordance with [...] the regulations governing the nuclear safety of nuclear facilities may be employed. Where applicable, the description must include the measures established to prevent and mitigate a significant adverse effect of such occurrences on the environment, and details as to the preparation and response proposed for such emergencies".*

Following expiry of the duration of said procedure, the substantive body will send the developer reports and arguments received for consideration by it in authoring a new version of the project and of the environmental impact study, where applicable. Subsequently, should the environmental body note that the developer has not properly taken into account the arguments received during the public information and consultation procedures, it will call on the developer to complete the necessary information. Nonetheless, as in the case of the specifically nuclear procedure, the appraisal of those arguments that might have been raised with regard to nuclear safety or radiation protection is the responsibility of the Nuclear Safety Council, as the sole authority responsible for this matter, pursuant to Law 15/1980.

In any event, the regulations which themselves govern the course of both public participation procedures ensure coordination between the two. First of all, as indicated in Article 15.2 of the RINR, "the public information procedure shall be performed jointly with that established for the environmental impact study in the corresponding specific regulations". Likewise, the Fourth Additional Revision of the RINR establishes that "the environmental impact assessment procedure established in Law 21/2013 shall be incorporated within the context of the substantive authorisation procedures governed by this Regulation". As the final outcome of said incorporation, Law 21/2013 itself establishes that the contents of the environmental impact statement must be included within the project authorisation by the substantive body.

Meanwhile, the RINR also requires that an Information Committee operate, as a collegiate body, during the construction, operation and decommissioning of nuclear power plants. This Committee has the function of informing the various bodies represented as to the course of the activities regulated by the corresponding authorisations, and of jointly addressing those matters that would be of relevance to said bodies. It is chaired by a representative of the MITERD and made up of a representative of: the licensee of the facility, the CSN, the Government Delegation, the Autonomous Region, the Directorate-General for Civil Protection and Emergencies and those municipalities included within zone 1 as defined in the corresponding External Emergency Plans for the nuclear power plants. This Committee may also include other representatives of Public Authorities, if the nature of the matters to be discussed should so require.

At the municipal level, the Association of Municipalities in Nuclear Power Plant Areas (AMAC) is in operation, acting as a public authority interlocutor for various aspects regarding nuclear power plants.

At a separate information level and in general, the CSN is attributed with functions including informing public opinion as to matters within its purview, without prejudice to the publi-

cation of its administrative actions on the legally established terms. Particular mention should also be made of the CSN Advisory Committee, created by Law 33/2007, of 7 November 2007 (reforming Law 15/1980, of 22 April 1980, creating the Nuclear Safety Council), the object of which is the issuance of recommendations to said Council in the sphere of transparency and the proposal of measures to strengthen public access to information and citizen participation in those matters within its purview. It comprises representatives of the CSN, various Ministries, Autonomous Regions, licensees of nuclear facilities, trade unions, experts, charities, municipalities and other entities.

It should lastly be stated that Spain approved and ratified the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters made at Aarhus, Denmark. Law 27/2006, of 18 July 2006, governing rights of access to information, public participation and access to justice in environmental matters, acknowledges the right of any natural or legal person to access information about the environment held by Public Authorities, and the obligation on such authorities to disseminate this information.

Annex C.
Emergency response organisation

Management of nuclear and radioactive emergencies

The management of nuclear and radioactive emergencies in Spain is governed by the national civil protection system and the requirements for the use of nuclear energy and ionising radiation.

From the perspective of Civil Protection, the general organisational principles, responsibilities, rights and duties of citizens, public authorities and licensees of practices are established with regard to emergency planning, preparedness and response. Emergency plans are likewise established for actions outside facilities if accidents occurring on site have an impact on third parties.

From the perspective of nuclear regulations, internal emergency plans must be in place at every radiological practice, with specific criteria being established with regard to levels and techniques for intervention, as well as the protection measures on which the plans are based.

In this regard, the Regulation on nuclear and radioactive facilities (RINR) requires that any nuclear or radioactive facility must, before it obtains its operational authorisation, have an Internal Emergency Plan drawn up and presented by the applicants, in accordance with the existing risks, to be approved when said authorisations are granted.

According to the RINR, both the El Cabril Disposal Facility and the Juzbado Fuel Element Plant are classified as nuclear facilities. They must therefore have an Internal Emergency Plan in place, approved by the MITERD, following the mandatory report by the CSN.

In addition, the Basic Nuclear Emergency Plan (PLABEN), approved by Royal Decree 1456/2004, first of all establishes planning and preparation for any emergency situations that could result from accidents at nuclear power plants in operation or shut down, while spent fuel is stored in their pools.

And secondly, the Basic Guidance for Civil Protection Planning in response to Radiological Risk (DBRR) approved by Royal Decree 1546/2010, contains the minimum criteria that must be followed by the various Public Authorities, and to the applicable extent the licensees of regulated nuclear and radioactive facilities, as well as the licensees of any other facilities or activities where a radiological risk might exceptionally exist. These would include facilities dedicated to the disposal of low and intermediate level radioactive waste (El Cabril) and temporary spent fuel and high-level radioactive waste storage facilities. This includes both ITS facilities, currently still covered by the PLABEN regulations, and which at some specific point will be covered by the DBRR, and also the CTS.

Likewise, the aforementioned Guidance establishes the minimum requirements that must be fulfilled by the corresponding plans in terms of fundamental principles, structure, organisation and operational and response criteria, in order to set out a minimum national model or design that would, where applicable, enable coordination and joint action by the various services and Public Authorities involved. It makes provision for a general civil protection planning struc-

ture comprising the National Plan and the Autonomous Regional Plans, including the Local Action Plans.

In accordance with all the above, Royal Decree 1054/2015 approved the National Civil Protection Plan in response to Radiological Risk. The various Special Civil Protection Plans to address Radiological Risk of the Autonomous Regions should also be included.

Organisation of the CSN for emergency situations

Given the specific nature of nuclear and radiological emergencies, the Nuclear Safety Council covers a series of functions in this sphere that go beyond the powers inherently vested in it as a nuclear regulatory body.

So as to fulfil these functions with an appropriate level of efficacy and efficiency, the CSN has an Emergency Response Organisation (ORE) in place, supplementing its ordinary operational structure. It is headed by the Chairperson of the CSN him/herself, and involves the technical and logistical units of the body in accordance with an emergency action plan (PAE) which is activated in accordance with the level of seriousness of the accident triggering the nuclear or radiological emergency.

The CSN ORE operates from an Emergency Room (SALEM) which is permanently staffed and has an emergency callout team capable of responding to an emergency situation in under an hour. The SALEM has communications and assessment tools in place to advise the directors of emergency plans as to the level of external response activated based on the most conservative evolution of the accident, the potential consequences and the population protection measures that would need to be implemented in accordance with the expected impact.

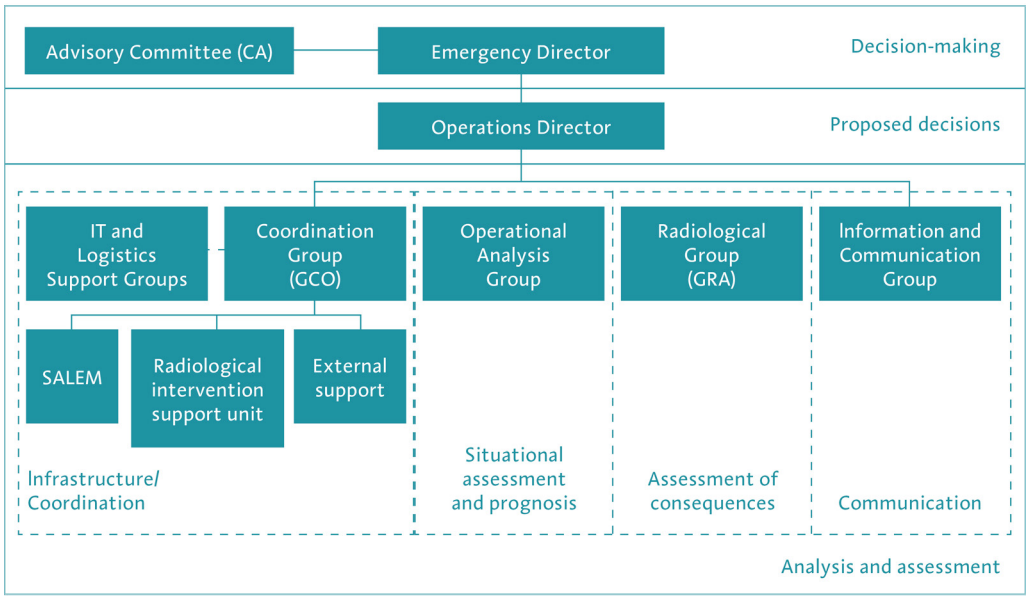
The internal capacities of the CSN to respond to an emergency are supplemented by means of agreements and collaboration contracts with public and private entities, and external human and material resource support will therefore provide emergency services under the supervision of the CSN.

The CSN Emergency Action Plan has its own training plan and is independent of the training plans of those acting in the external nuclear emergency plans of the nuclear power stations, but is coordinated with them. Furthermore, the CSN Emergency Action Plan has in place a programme of exercises and drills operating internally, nationally and internationally, serving periodically to ascertain the operability of its technical capacities and to apply the relevant improvements.

The ORE has a hierarchical structure operating under the principle of one single command, and supplements the ordinary structure of the CSN.

The ORE structure has three hierarchical levels, as follows:

- ✓ Decision-making regarding recommendations for directors of external emergency plans.
- ✓ Proposal of decisions and protection measures for the population.
- ✓ Analysis and assessment of events by the Operational Groups:
  - ⇨ The Emergency Director (DE), advised by a committee including the members of the CSN Plenary who will not fulfil the role of DE, is responsible for directing the ORE, reaching decisions and conveying CSN recommendations to those responsible for management of the applicable emergency plan, and for cooperating with



the competent authorities in information for the population. The function of DE lies with the Chairperson of the CSN.

- ⇨ The Emergency Operations Director (DOE), who is responsible for coordinating all actions of the ORE and for drawing up proposed recommendations that the DE is required to send to those responsible for management of the applicable emergency plan. The role of Emergency Operations Director is taken on by one of the two Technical Directors of the body, or one of the Sub-Directors.
- ⇨ The Operational Groups are responsible for performing any technical actions that might be required in order to prepare recommendations. These will be passed on to the DOE and to the DE, and once the recommendations have been adopted by the SALEM they will be passed on to those responsible for management of the applicable external emergency plan, who will activate and coordinate the intervention teams and prepare information to be conveyed to the population affected.

The missions of the Operational Groups of the ORE are specifically as follows:

- ✓ The mission of the Operational Analysis Group (GAO) is to analyse the causes of the accident and to forecast its possible evolution, informing the DOE as to the measures that should be taken so as to restore the emergency situation to a safe condition, bearing in mind that the responsibility for reaching decisions and adopting the relevant measures for this to occur lies with the facility.
- ✓ The mission of the Radiological Group (GRA) is to analyse the radiological situation caused by the accident, propose appropriate protection measures to the DOE in order to alleviate the radiological consequences for the population, property and the environment, and to cooperate in the practical implementation thereof.
- ✓ The mission of the Information and Communication Group (GIC) is to provide the other members of the ORE and the bodies with which the CSN has an early notification commitment with information as to the facility or location of the accident as required in order for them to undertake their functions. The GIC is also responsible for

preparing information about the emergency which, in fulfilment of the functions assigned to the CSN under international commitments, must be conveyed to the national and international media and the population.

- ✓ The mission of the Coordination Group (GCO) is to keep the infrastructure of the ORE fully operational and to ensure the flow of information between all its members and the exterior. This group coordinates the IT Support and Logistics Support Group and manages external support and the emergency callout teams.
- ✓ The IT Support Group ensures the operability of the corporate IT systems at the CSN in the event of an emergency, providing viable alternatives where applicable in order to guarantee the fulfilment of the basic functions of the ORE, while also providing technical support for the proper operability of IT and communications systems and equipment for specific use by the different operational groups of the SALEM.
- ✓ The Logistics Support Group ensures the availability of the logistical resources required for the functionality of the ORE, or provides viable alternatives to guarantee fulfilment of its basic functions, and also ensures the safety of the ORE.
- ✓ The Sub-Directorate for Emergencies and Physical Protection is assigned functions within the CSN including maintenance and operation of the SALEM, management of external support and of the emergency callout team, and the actions and responsibilities of the GCO are therefore closely connected with the functioning of said Sub-Directorate.

Within the SALEM, the ORE may operate in four Response Modes (from 0 to 3), with its structure of varying in accordance with the seriousness, complexity, duration of the emergency and the level of decision-making responsibility, adapting to different response levels in terms of the composition of resources: permanent or mode 0 (permanent response technicians); limited or mode 1 (the aforementioned + DOE); basic or mode 2 (the aforementioned + callout teams); and extended or mode 3 (which could involve all CSN personnel).

The CSN ensures that it keeps its Emergency Response Organisation trained and updated, allowing it reliably and effectively to handle all functions assigned by law to the CSN in the event of an emergency, by updating and acquiring new material resources, and signing contracts and protocols provided with access to new equipment.

Skills development and training of the ORE: Drills and exercises

The Emergency Response Organisation (ORE) of the CSN is permanently involved in conducting exercises and drills to guarantee its efficacy in the event of an emergency. Each year it supervises skills development and training activities for emergency response personnel at nuclear facilities, and in particular with reference to the low and intermediate level waste management facility and the Fuel Element Factory.

The CSN monitors the development of annual emergency drills at all nuclear facilities through activation and actuation of the ORE at the Emergency Room (SALEM). The agreements between the Military Emergency Unit (UME) and the CSN include the provision of material resources serving promptly to allow a deployment of CSN staff to establish a backup SALEM at the facilities of the UME General Staff Headquarters in Torrejón de Ardoz, Madrid. This would occur if SALEM activities were activated and the circumstances were to force an evacuation.

Actions in these drills are taken under conditions of the utmost realism, applying the existing procedures for the activation and actuation of the ORE operational groups. These drills also practise coordination between the CSN and the corresponding Provincial and National Authorities, in order to verify the general efficacy of the existing procedures.

In addition, and as a result of the staging of the CSN drill, inspection personnel normally attend the facilities in order to ascertain the operability of the Internal Emergency Plan and to monitor the drill on site, so that they can call on the facility to implement any corrective actions which might result from the observations made.

Enresa plays an active role both in the urgent phase of the drills, with simulated or real activation, in the management of hypothetical radioactive waste generated, and during the recovery phase tasks. It takes part in the debates as to the efficacy of decontamination techniques for urban and rural areas, and the CSN supervises the management of radioactive waste generated in these processes.

Participation by the CSN on the international stage

The Spanish State is a contracting party to the international conventions on Early Notification of a Nuclear Accident or Radiological Emergency, and is subject to obligations for the exchange of information in the event of a nuclear accident or radiological emergency, having signed agreements and collaboration protocols both at the governmental level and between regulators.

Among other arrangements, the CSN has bilateral agreements in place for the exchange of information in nuclear and radiological emergencies with the ASN in France, with the Portuguese Environmental Agency, with the National Civil Protection Authority and the Higher Technical Institute of Lisbon University in Portugal. CSN personnel have also taken part as observers in a number of exercises and drills conducted at European nuclear power plants in such countries as France and Belgium.

Participation by the Military Emergency Unit in nuclear and radiological emergencies

On the basis of National Defence Law 5/2005 and the Resolution of the Council of Ministers of 17 October 2005, the Military Emergency Unit (UME) was set up to provide an immediate response in situations of serious emergency. Royal Decree 1097/2011 approved the protocol for intervention by the UME, in order to specify the circumstances in which its involvement could be ordered. Said protocol indicates that the Ministry of Defence shall, by delegation of the President of the Government, order the intervention of the UME, whose actions must comply with the provisions of the legislation in force regarding civil protection, and in particular with regard to the distribution of powers between the State and the Autonomous Regions. The conclusion of its actions must be agreed by the Ministry of Defence at the proposal of the Ministry of the Interior, having granted an audience to the authorities that requested its intervention. The commencement and conclusion of its actions will be notified to the National Security Department of the President of the Government.

Royal Decree for the Regulation of the Activities of Empresa Nacional de Residuos Radiactivos S.A., S.M.E. (Enresa)

Royal Decree 102/2014, for the safe and responsible management of spent nuclear fuel and radioactive waste, assigns functions to Enresa including cooperation with the competent authorities in the event of nuclear or radiological emergencies. Both the PLABEN and the DBRR make Enresa responsible for the management of radioactive waste required during the emergency phase, under the coordination of the CSN.

Annex D.
Fund for the financing of the activities of the General Radioactive Waste Plan

The Fund to finance GRWP activities, covering activities undertaken by Enresa not only with regard to the management and disposal of radioactive waste and spent fuel, but also the dismantling and decommissioning of nuclear facilities, as well as structural and R&D costs, the taxes derived from radioactive waste or spent nuclear fuel storage activities, and budgetary allocations to municipalities affected by nuclear power plants or the aforementioned waste storage facilities, is endowed through income derived from the levies indicated below, including the financial returns generated by the funds. These levies are governed by the Sixth Additional Provision of Electrical Sector Act 54/1997, of 27 November 1997, declared to remain valid by Law 24/2013, of 26 December 2013:

1. Levy regarding the electricity tariff (tolls)

This represents the funding channel both for the costs corresponding to the management of radioactive waste and spent fuel generated at nuclear power plants which definitively ceased operations prior to 1 January 2010, and also the dismantling and decommissioning thereof, as well as those future costs corresponding to nuclear power plants or fuel element factories which, having definitively ceased operations, had not made provision during their operations, as well as any that might result from the premature cessation of operations at a facility for reasons outside the control of the licensee.

The levy also includes those amounts allocated to the part of the Fund intended to finance the costs of management of radioactive waste derived from research activities that the MITERD deems to be directly connected with the generation of nuclear electrical energy, dismantling and decommissioning operations required as a consequence of mining and the production of uranium concentrate prior to 4 July 1984, the costs derived from the reprocessing of spent fuel sent abroad prior to the entry into force of the Law establishing this, and any other costs specified by Royal Decree.

The amount to be deposited under this levy is determined by the taxable base, comprising the total amount collected as a result of application of the tolls charged on the electricity tariff, and a taxation rate established in the aforementioned Sixth Additional Provision.

2. Levy regarding nuclear power plants in operation

This represents the channel by means of which all costs incurred from 1 January 2010 onwards and corresponding to the management of radioactive waste and spent fuel generated at nuclear power plants in operation will be financed by the licensees of the nuclear power plants during

such operations, irrespective of the date when they were generated, as well as costs corresponding to dismantling and decommissioning.

The licensees of nuclear power plants will likewise finance the allocations assigned to municipalities affected by nuclear power plants or spent fuel or radioactive waste storage facilities on the terms established by the MITERD, as well as the amounts corresponding to taxes levied in connection with radioactive waste and spent fuel storage activities, irrespective of the date when they are generated.

This levy was modified in 2019 by Royal Decree 750/2019, of 27 December 2019, modifying the fixed unitary tariff regarding the levy used to finance the service provided by Empresa Nacional de Residuos Radiactivos, S.A., S.M.E., (Enresa) for nuclear power plants in operation. The Royal Decree updates the amounts contributed by nuclear power plants to the Enresa Fund in accordance with the policy of orderly and staggered closure of Spain's nuclear portfolio, reflecting the draft 2021-2030 National Integrated Energy and Climate Plan (PNIEC) currently being processed.

3. Levy regarding the Juzbado Fuel Element Factory

This covers the provision of services for the management of radioactive waste derived from the manufacturing of fuel elements, including the dismantling of the corresponding manufacturing facilities.

4. Levy regarding other facilities

Levy for the provision of services for the management of radioactive waste generated at facilities other than those indicated above, such as radioactive facilities (medicine, industry, agriculture and research), CIEMAT or other enterprises. Costs are directly imputed to all of these at the moment when the services are provided.

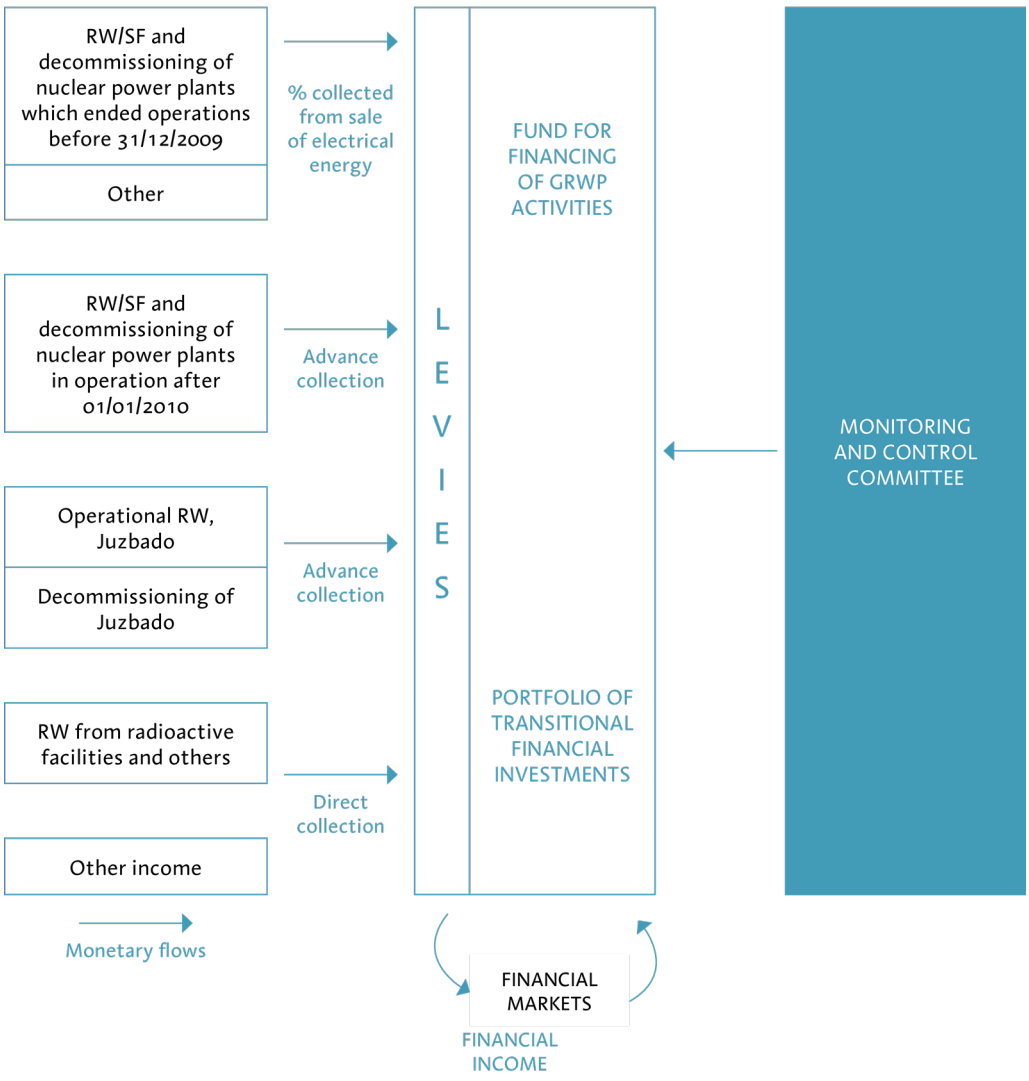
Control of the Fund

Enresa is responsible for management of the Fund, the prevailing principles being security, cost-effectiveness and liquidity. As repeatedly stated in successive National Reports, the endowments of the Fund may only be assigned to cover the cost of actions set out in the GRWP. At the end of the radioactive waste management and facility decommissioning period covered by the GRWP, the total figure deposited in the Fund via the various funding channels will be required to cover the costs incurred, resulting in a final balance of zero.

Supervision, control and rating of transitional investments made by the Fund are the responsibility of a Committee for Tracking and Control attached to the MITERD, and governed by Royal Decree 102/2014. This Committee is required to draw up twice-yearly reports covering the status of the Fund and the investments corresponding to its financial management, along with the rating attributed to fund management, setting out any observations it might deem appropriate. These reports are submitted to the MITERD, the Ministry of Science and Innovation, and the Ministry of Finance.

In addition, Royal Decree 102/2014 establishes the obligation on Enresa to present the following reports to the MITERD (which is responsible for strategic management and monitoring and control of Enresa actions and plans, both technical and economic, via the Secretary of State for Energy):

- ✓ During the first half of each year:
  - ⇨ A memorandum including technical and economic aspects regarding activities in the previous financial year.
  - ⇨ An updated economic/financial study as to the cost of the activities covered by the GRWP, including remuneration for plan management activities.
- ✓ By 30 November each year, a technical/economic justification of the annual budget corresponding to the next year, and the forecast for the three following years. In the event that on an exceptional basis it should prove necessary to cover costs not provided for in the aforementioned economic/financial study, Enresa would first be required to submit the corresponding justification.



- ✓ The month following each calendar quarter, a budgetary monitoring report.

The following diagram provides an overview of the financing system for GRWP activities and the corresponding control mechanisms:

Annex E.
Regime of civil liability for nuclear damage

International conventions and national regulatory provisions

Spain is Party to the Paris Convention and the supplementary Brussels Convention on civil liability in the field of nuclear energy (international conventions established within the context of the OECD Nuclear Energy Agency) signed in 1960 and 1963, respectively, both subsequently amended in 1964 and 1982, the most recent modification having been applied by means of the corresponding Protocols in February 2004.

Nonetheless, these Protocols have not to date taken effect, and the existing regulatory framework is therefore that established by the Conventions without Protocol, by means of Chapters VII, VIII, IX and X of Nuclear Energy Law 25/1964, 29 April 1964, and by Decree 2177/1967, approving the Regulation on coverage for nuclear risks, and the First Additional Provision of Law 17/2007, 4 July 2007, updating the amount to which liability is limited to €700M, up until the entry into force of the Law implementing the modification Protocols.

Regime currently in force regarding civil liability for nuclear damages

The framework in force governing civil liability for nuclear damages is based on the characteristics indicated below, in accordance with the commitments entered into as a Contracting Party under the aforementioned Conventions.

The liability of the operator is objective, exclusive and limited (up to an amount of €700M), and in turn is limited to a period of 10 years (immediate damages) for the categories of damages covered.

The Ministry for Ecological Transition and Demographic Challenge may establish some limit other than €700M, but no lower than €30M, in the case of the transport of nuclear substances or any other activity the risk of which would, in the judgment of the Nuclear Safety Council, not require greater cover.

The categories of damages which the Law designates as open to compensation are as follows:

I. Loss of human life, bodily injury and material damages and losses occurring as a direct or indirect result of radioactive properties or the combination thereof with toxic, explosive or other hazardous properties of nuclear fuel or radioactive waste or products found at a nuclear facility, or nuclear substances derived or originating from or sent to such a facility.

II. Any other damages and losses arising or originating in such a manner if so declared by the competent court.

III. Loss of human life, bodily injury and material damages and losses occurring as a direct or indirect result of ionising radiation emitted by any other source of radiation.

For the aforementioned categories of immediate damages, the operator of the nuclear facility is obliged to arrange an insurance policy or some other financial guarantee up to an amount equivalent to the cover imposed.

For deferred damages, in other words those occurring, noted or for which the party responsible is ascertained after the period of 10 years since the occurrence of the accident has passed, the Government will adopt the relevant measures for compensation thereof.

The Law likewise establishes the priority of payment of compensation for personal damages over all others. Should the cover prove insufficient to meet the payments, the State will establish legal measures to cover the difference.

With regard to the period for claims, although specific nuclear regulations do not explicitly limit this, Civil Proceedings Law 1/2000, of 7 January 2000, establishes a period of five years as the general rule.

Regime of civil liability for nuclear damages following entry into force in Spain of the Protocols of 12 February 2004 amending the Convention on Civil Liability for Nuclear Damages (Paris Convention) and of 12 February 2004, amending the Supplementary Convention (Brussels Convention)

As already explained, in February 2004 two new amendments to the Paris and Brussels Conventions were approved, constituting an in-depth revision of some of the basic elements of the regime of nuclear civil liability, requiring a substantial modification to internal legislation in order to reflect the changes and give specific form to those stipulations which, according to the provisions of the conventions, are the responsibility of the Contracting States to determine in their national legislation. Law 12/2011, of 27 May 2011, on civil liability for nuclear damages, updated the Spanish legal system in line with the two Protocols, but this will not take effect until said Protocols themselves take effect in Spain.

The aforementioned Law 12/2011 considered the principles set out in the modified Paris and Brussels Conventions to be directly applicable, as they were published in the Official State Gazette, and form part of the domestic legal system with the status of higher-ranked laws. This Law therefore implements only those principles for which the Paris Convention grants margin to the States to specify certain aspects. As a consequence, the new regulations for civil liability in Spain will be based on the recast text of said Conventions and on the text of the aforementioned Law. The most significant modifications with regard to the regime in force are highlighted below.

Law 12/2011 includes new categories of damages not covered by the regime currently in force, such as damage to the environment, loss of profits, all remediation and prevention measures, provided that the damages are the result of the radioactive properties of nuclear substances, or when non-nuclear damages cannot be separated from nuclear damages.

The quantitative limits established in Law 12/2011 are determined by the application of the Conventions:

- ✓ The Paris Convention establishes a minimum of 700 million euros, which may be reduced to a minimum of 70 million euros for facilities that because of their low risk level would not be liable to cause major damage, and 80 million euros for the transport of nuclear materials. On the basis of the above, the Law establishes that the Ministry for Ecological Transition and Demographic Challenge may, following a report by the Nuclear Safety Council, determine an appropriate reduced amount for each situation, in accordance with the nature of the activity or facility.
- ✓ Meanwhile, the Brussels Convention establishes three bands of funding for compensation owing to nuclear accidents. The first band covers up to either a minimum of 700 million euros as established by the Paris Convention, or the amount indicated as the liability of the operator by the State. The second band covers from the amount established in the first band up to 1.2 billion euros (this band would be covered by the State Party corresponding to the facility). The third band (which would be the joint liability of all States Parties to the Brussels Convention), up to a total of 1.5 billion euros.

Law 12/2011 establishes a limit on the liability of the operator of 1.2 billion euros, thereby covering the first and second bands of responsibility under the Brussels Convention, with the State being left liable only for its proportional part of the third band thereof.

With regard to the regulation of liability in the case of accidents during the transport of nuclear materials, Law 12/2011 refers directly to the principles of the modified Paris Convention, which sets out the entire rationale regarding liability for damages occurring during such transport. Law 12/2011 makes provision only in the event of transport to or from third countries that are not signatories to the Convention, and where the operator of the facility located in Spain is liable. The Law also offers the possibility that the carrier could be considered liable in place of the operator of the facility, wherever the competent authority authorises this and the licensee of the facility so agrees. The carrier must likewise demonstrate that it has in place the financial guarantee required by said Law.

As for the period for claims, Law 12/2011 complies with the provisions of the amended Paris Convention, establishing a general period for claims to be filed of 30 years from the moment when the accident occurs in the event of death or personal injury, and 10 years for all other categories of damages. Within the general period, the Convention establishes the possibility of establishing an expiry or time-barring period of at least three years for victims to file a claim, from when the injured party learned of the damage that had occurred and the party responsible for it, or should reasonably have been aware of this. In accordance with the above, Law 12/2011 sets said period at three years. Likewise, Law 12/2011 established a regime of priority during a three-year period from the moment of the accident, during which it is believed that the bulk of the claims will be filed, with the following order applying: first, those claims involving personal injury will be addressed, with the quantification thereof referring to the scales used in law for traffic accidents, as the corresponding appraisal is deemed to be the most appropriate for the purposes of the Law. Secondly, compensation will be paid for claims resulting from environmental damage, including the costs of restoration measures, those caused by preventive measures, or any possible damages occasioned by such measures. Lastly, compensation will be paid for damage to property, loss of profits resulting from damage to property and persons, and any loss of profits directly connected with the use or enjoyment of the degraded environment. Once this initial period of three years has passed, claims will be addressed without any distinction among them. In the event that the compensation is greater than the quantitative limit es-

tablished in the Law, the State guarantees reparations for personal injury and death within national territory.

Law 12/2011 provides for various options allowing the licensee of the facility to guarantee the liability attributed, an insurance policy being the most commonly employed form. With regard to this type of guarantee, the Law allows for a modification to the Bylaws of the Insurance Compensation Consortium, allowing it to provide cover for those categories of damages the cover for which does not amount to the limits established in the Law, whether of a monetary nature or in terms of time-barring.

With regard to the claims procedure, Law 12/2011 establishes that the claims shall be filed in accordance with the standard general procedure for this type of claim, namely that established in Civil Proceedings Law 1/2000, of 7 January 2000.

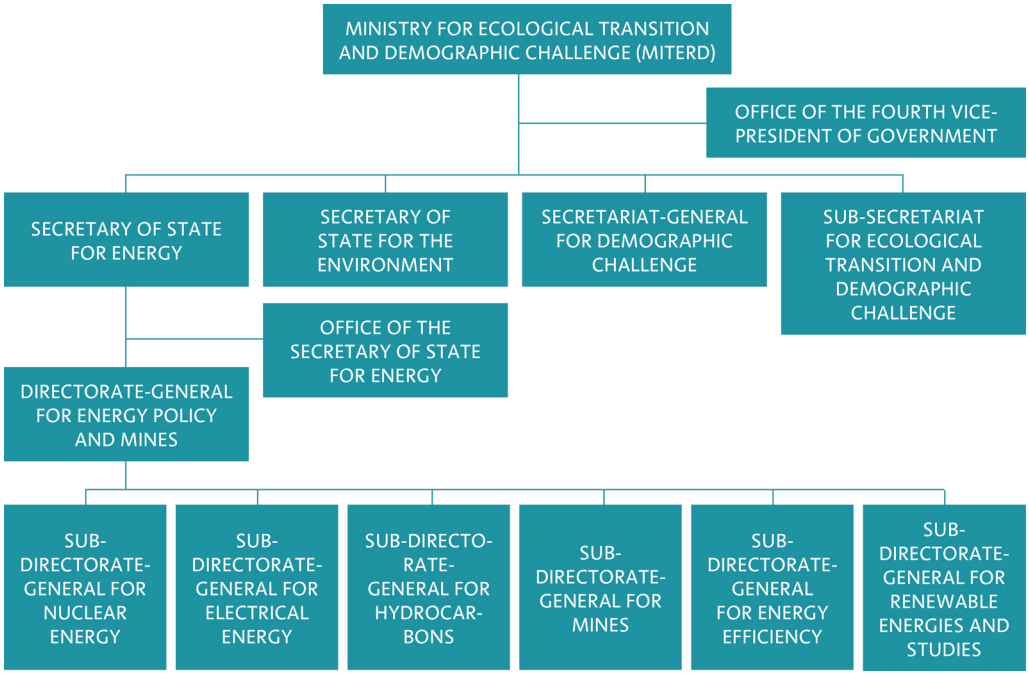
The Law likewise governs civil liability for damages occurring in accidents involving radioactive materials other than nuclear substances, not governed by the Paris Convention. The liability established is similar to that resulting from nuclear damages, of the objective and exclusive type corresponding to the licensee of the facility, limited in quantitative terms to the amounts established in the annex to the Law, classified according to the type of materials and the activity thereof. Similarly, all other specific aspects of this liability are governed in a manner similar to that caused by nuclear damage. It should nonetheless be pointed out that cover for the risk of environmental damage in accidents involving radioactive materials that are not nuclear substances must be governed by the legislation in force in the field of environmental liability (Environmental Liability Law 26/2007, of 23 October 2007). To this end, the Ministry for Ecological Transition and Demographic Challenge will, following a report by the Nuclear Safety Council, determine the minimum quantity which must be guaranteed by the operator to cover liability for such damages.

Annex F.
Synoptic Matrix

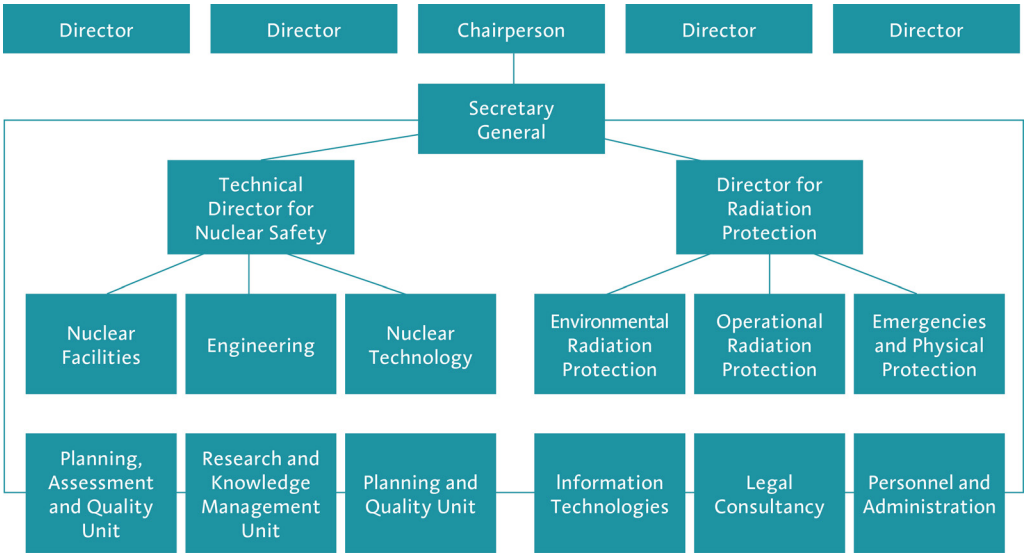
Type of responsibility		Long-term management policy	Financing	Current practices/ facilities	Planned facilities
Spentfuel		Temporary storage for 60 years at the CTS until a definitive storage facility is available.	"Polluter pays" principie. Fund for financing GRWP activities.Income derived from operation of nuclear power plants in operation and that remained operational in 2010v through payment of "levy 2". Financingof SF of nuclear power plantselosed priorto 2010 covered by "levy1" (chargedon electricity tariff).	In pools at nuclear power plants themselves. Some ITS facilities	CTS in "Villar de Cañas". Future definitive storage facility.
Nuclear fuel cycle waste	**Uranium mining tailings**	Facilities under surveillance programmes.	Financing is the responsibility of the facility licensee, or in the case of historical legacy materials, is covered by "levy 1".	Conditioning and remediation on site.	N/A
	Waste from Juzbado	Definitive disposal at the "El Cabril" LILW Disposal Facility.	"Polluter pays" principie. Fund for financing GRWP activities. Income from Juzbado through payment of of "levy 3".	Preconditioning and temporay storage at Juzbado. Transport, conditioning and definitive storage at "El Cabril" Disposal Facility.	N/A
	Operational waste from nuclear facilities	Definitive disposal at the "El Cabril" LILW Disposal Facility.	"Polluter pays" principie. Fund for financing GRWP activities. Income from opertion of nuclear power plants which remained in operation en 2010, through payment of of "levy 2"	Preconditioning and temporay storage at Juzbado. Transport, conditioning and definitive storage at "El Cabril" Disposal Facility.	N/A
	Waste resulting from reprocessing abroad of fuel from Vandellos I.	Temporary storage for 60 years at the CTS until a definitive storage facility is available.	Fund for financing GRWP activities. Income from "levy 1" (charged on electricity tariff).	Return to Spain once the CTS is available.	CTS "Villar de Cañas". Future definitive storage facility.
Waste outside the fuel cycle		Definitive disposal atthe "El LILW Disposal Facility	"Pollute r pays" principie. Fundfor financingGRWP activitie s.Income from licenseesofradioactive facilities through payment of "levy 4".	Temporary storage at radioactive facilities. Preconditioning on site. Transport, storage and definitive storage atthe "El rahril" Disoosal Facility.	N/A
Decommissioning		Decommissioning to green field status. ResultingVLLWand LILW disposed of definitively atthe "El Disposal Facility. HLWandSW temporarily stored at crs,for a pe riod of 60 years.	"Pollute r pays" principie. Fundfor financingGRWP activitie s.Income from operation of nuclear powerplants which remainedin operationin 2010, through payment of "levy 2". Financing of dismantling and decommissioning of nuclear power plantselosed before 2010 covered by "levy1" (chargedon the e lectricity tariff).	"Immediate" decommissioning strategy for ali light water reactors. "Deferred" strategy for nd ll l.	N/A
Disused sealed sources		Returnto supplier. If not possible, definitive disposal at the "El Disposal Facility. If acceptance eriteria ere not fulfilled, te mporary storage at "El untilthe CTS is available. Followed by definitive storage once thisis available.	Cost borne bythe license e ofthe facility.	Returnto supplier. If not possible, definitive disposal at the "El Disposal Facility. If acceptance eriteria are not fulfilled, te mporary storage at "El untilthe crsis available.	crs in "Villar de Cañas". Future definitive storage facility.

Annex G.
Organisational charts of the bodies and institutions involved in radioactive waste and spent fuel management

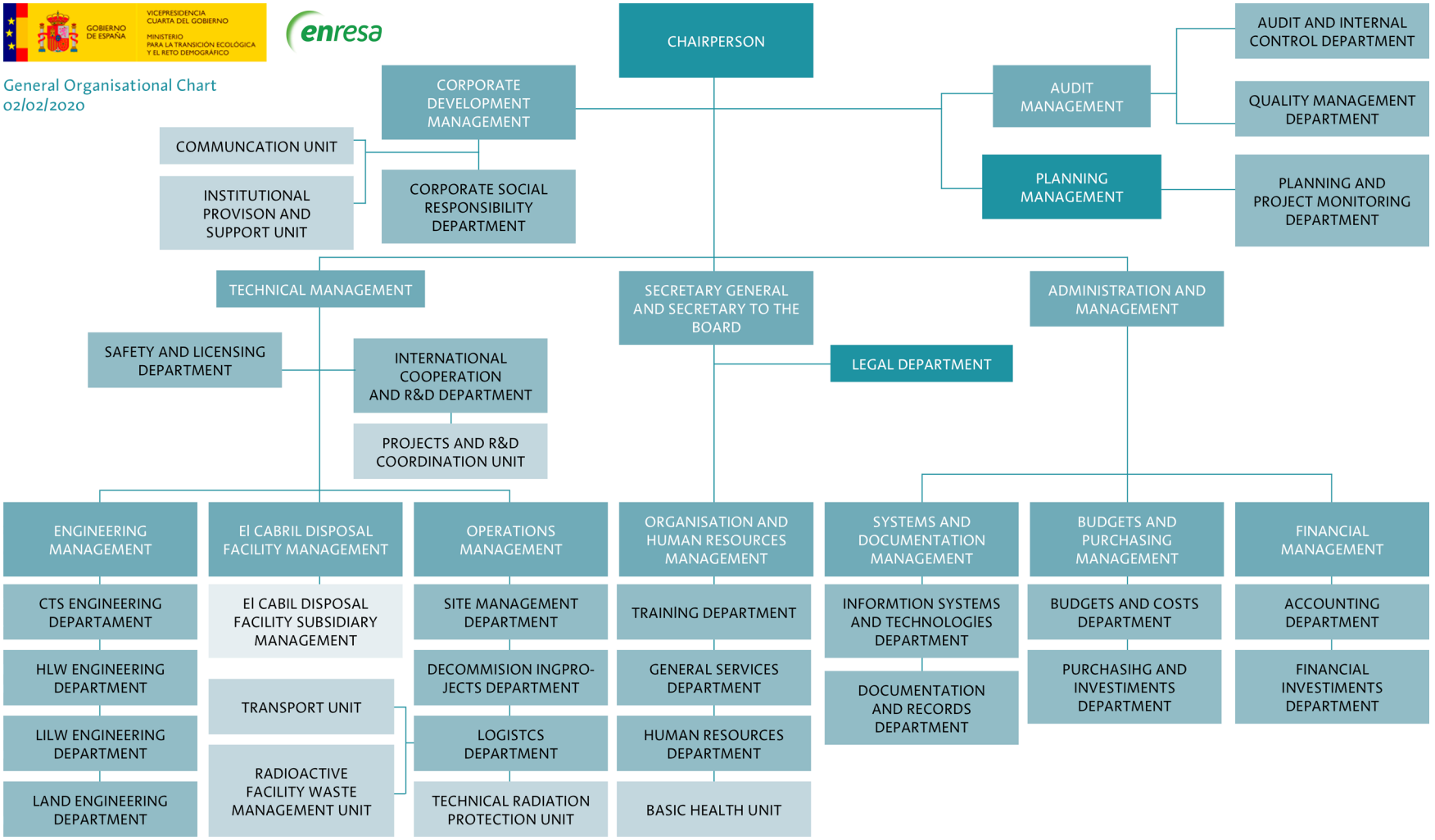
1. Ministry for Ecological Transition and Demographic Challenge (MITERD)



2. Nuclear Safety Council



3. Enresa.


GOBIERNO DE ESPAÑA
VICEPRESIDENCIA CUARTA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO
enresa
General Organisational Chart
02/02/2020
CHAIRPERSON
CORPORATE DEVELOPMENT MANAGEMENT
COMMUNCATION UNIT
INSTITUTIONAL PROVISON AND SUPPORT UNIT
CORPORATE SOCIAL RESPONSIBILITY DEPARTMENT
AUDIT MANAGEMENT
AUDIT AND INTERNAL CONTROL DEPARTMENT
QUALITY MANAGEMENT DEPARTMENT
PLANNING MANAGEMENT
PLANNING AND PROJECT MONITORING DEPARTMENT
TECHNICAL MANAGEMENT
SECRETARY GENERAL AND SECRETARY TO THE BOARD
ADMINISTRATION AND MANAGEMENT
SAFETY AND LICENSING DEPARTMENT
INTERNATIONAL COOPERATION AND R&D DEPARTMENT
PROJECTS AND R&D COORDINATION UNIT
LEGAL DEPARTMENT
ENGINEERING MANAGEMENT
El CABRIL DISPOSAL FACILITY MANAGEMENT
OPERATIONS MANAGEMENT
ORGANISATION AND HUMAN RESOURCES MANAGEMENT
SYSTEMS AND DOCUMENTATION MANAGEMENT
BUDGETS AND PURCHASING MANAGEMENT
FINANCIAL MANAGEMENT
CTS ENGINEERING DEPARTAMENT
HLW ENGINEERING DEPARTMENT
LILW ENGINEERING DEPARTMENT
LAND ENGINEERING DEPARTMENT
El CABIL DISPOSAL FACILITY SUBSIDIARY MANAGEMENT
TRANSPORT UNIT
RADIOACTIVE FACILITY WASTE MANAGEMENT UNIT
SITE MANAGEMENT DEPARTMENT
DECOMMISION INGPRO-JECTS DEPARTMENT
LOGISTCS DEPARTMENT
TECHNICAL RADIATION PROTECTION UNIT
TRAINING DEPARTMENT
GENERAL SERVICES DEPARTMENT
HUMAN RESOURCES DEPARTMENT
BASIC HEALTH UNIT
INFORMTION SYSTEMS AND TECHNOLOGIES DEPARTMENT
DOCUMENTATION AND RECORDS DEPARTMENT
BUDGETS AND COSTS DEPARTMENT
PURCHASIHG AND INVESTIMENTS DEPARTMENT
ACCOUNTING DEPARTMENT
FINANCIAL INVESTIMENTS DEPARTMENT

Annex H.
Acronyms and abbreviations used

DGR	Deep Geological Repository
CTS	Centralised Temporary Storage
ALARA	As Low As Reasonably Achievable
B.O.E.	Official State Gazette (Boletín Oficial del Estado)
BWR	Boiling Water Reactor
CAE	Emergeny Support Centre (Centro de Apoyo a Emergencias)
CAGE	Alternative Emergency Management Centre (Centro Alternativo de Gestión de Emergencias)
CN	Nuclear Power Plant (Central Nuclear)
EC	European Commission
CEN	Nuclear Energy Committee (Comité de Energía Nuclear)
CFR	US Code of Federal Regulations
SF	Spent Fuel
CIEMAT	Centre for Energy-Related, Environmental and Technological Research (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas)
CSN	Nuclear Safety Council (Consejo de Seguridad Nuclear)
DBRR	Basic Civil Protection Guidance to address Radiological Risk (Directriz Básica de Protección Civil frente al Riesgo Radiológic)
DGPC	Directorate-General for Civil Protection (Dirección General de Protección Civil)
DGPEM	Directorate-General for Energy Policy and Mines (Dirección General de Política Energética y Minas)
ECURIE	European Community Urgent Radiological Information Exchange
USA	United States of America
EIA	Environmental Impact Assessment
Enresa	Empresa Nacional de Residuos Radiactivos, S.A.
ENUSA	ENUSA Industrias Avanzadas, S.A.
EPS	Preliminary Safety Study (Estudio Preliminar de Seguridad)
ES	Safety Study (Estudio de Seguridad)
ETF	Technical Functional Specifications (Especificaciones Técnicas de Funcionamiento)
EURATOM	European Atomic Energy Community
FUA	Andujar Uranium Plant (Fábrica de Uranio de Andujar)

GS	Safety guide (Guía de Seguridad)
HERCA	Heads of the European Radiological Protection Competent Authorities
R+D	Research and Development
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IR	Radioactive Facility (Instalación Radiactiva)
INEX	International Nuclear Emergency Exercise
INPO	Institute of Nuclear Operations (Instituto de Operaciones Nucleares)
IOP	Operational Instructions (Instrucciones de Operación)
IRRS	Integrated Regulatory Review Service
ISO	International Organization for Standardization
JEN	Nuclear Energy Board (Junta de Energía Nuclear)
KWU	Kraftwerk Union A.G.
LEN	Nuclear Energy Law (Ley sobre Energía Nuclear)
MCDE	External Dose Calculation manual (Manual de Cálculo de Dosis al Exterior)
MAPAMA	Spanish Ministry of Agriculture and Fisheries, Food and the Environment
MITYC/MINETUR/MINETAD/MITECO/MITERD	now the Spanish Ministry for Ecological Transition and Demographic Challenge
OECD-NEA	Nuclear Energy Agency of the OECD
NRC	United States Nuclear Regulatory Commission
NUREG	NRC technical publication
O.M.	Ministerial Order (Orden Ministerial)
OECD	Organisation for Economic Cooperation and Development
OIEA	Organismo Internacional de Energía Atómica (IAEA in Spanish)
ORE	Emergency Response Organisation (Organización de Respuesta a Emergencias)
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PACG	Spent Fuel Storage Pool (Piscina de Almacenamiento de Combustible Gastado)
PCD	Design Change Package (Paquete de Cambio de Diseño)
PCP	Process Control Programme
PEI	External Emergency Plan (Plan de Emergencia Exterior)
PEN	National Energy Plan (Plan Energético Nacional)
PERR	State Civil Protection Plan to address Radiological Risk (Plan Estatal de Protección Civil ante el Riesgo Radiológico)
GRWP	General Radioactive Waste Programme
PGRRCG	Radioactive Waste and Spent Fuel Management Plan (Plan de Gestión de Residuos Radiactivos y del Combustible Gastado)

PIMIC	Integrated CIEMAT Installations Improvement Plan (Plan Integrado para la Mejora de las Instalaciones del CIEMAT)
PLABEN	Basic Nuclear Emergency Plan (Plan Básico de Emergencia Nuclear)
PLAGERR	Radioactive Waste Management Plan (Plan de Gestión de Residuos Radiactivos)
PNIEC	2021-2030 National Integrated Energy and Climate Plan (Plan Nacional Integrado de Energía y Clima)
PVRA	Environmental Radiological Surveillance Programme (Programa de Vigilancia Radiológica Ambiental)
PWR	Pressurised Water Reactor
R.D.	Royal Decree (Real Decreto)
R.G.	NRC Regulatory Guide
HLW	High Level Waste
VLLW	Very Low Level Waste
LILW	Low and Intermediate Level Waste
SW	Special Waste
RINR	Regulation on Nuclear and Radioactive Facilities (Reglamento sobre Instalaciones Nucleares y Radiactivas)
RPS	Periodic Safety Review (Revisión Periódica de Seguridad)
RPSRI	Regulation on Health Protection Against Ionising Radiation (Reglamento sobre Protección Sanitaria contra Radiaciones Ionizantes)
RW	Radioactive Waste
SACOP	Operational Coordination Room (Sala de Coordinación Operativa)
SALEM	CSN Emergencies Room (Sala de Emergencias)
SEMA	Secretary of State for the Environment (Secretaría de Estado de Medioambiente)
SEPI	Sociedad Española de Participaciones Industriales [Spanish state-owned industrial holding company]
SGEN	Sub-Directorate-General for Nuclear Energy (Subdirección General de Energía Nuclear)
UKAEA	United Kingdom Atomic Energy Authority
UPC	Universidad Politécnica de Cataluña
USNRC	United States Nuclear Regulatory Commission
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association