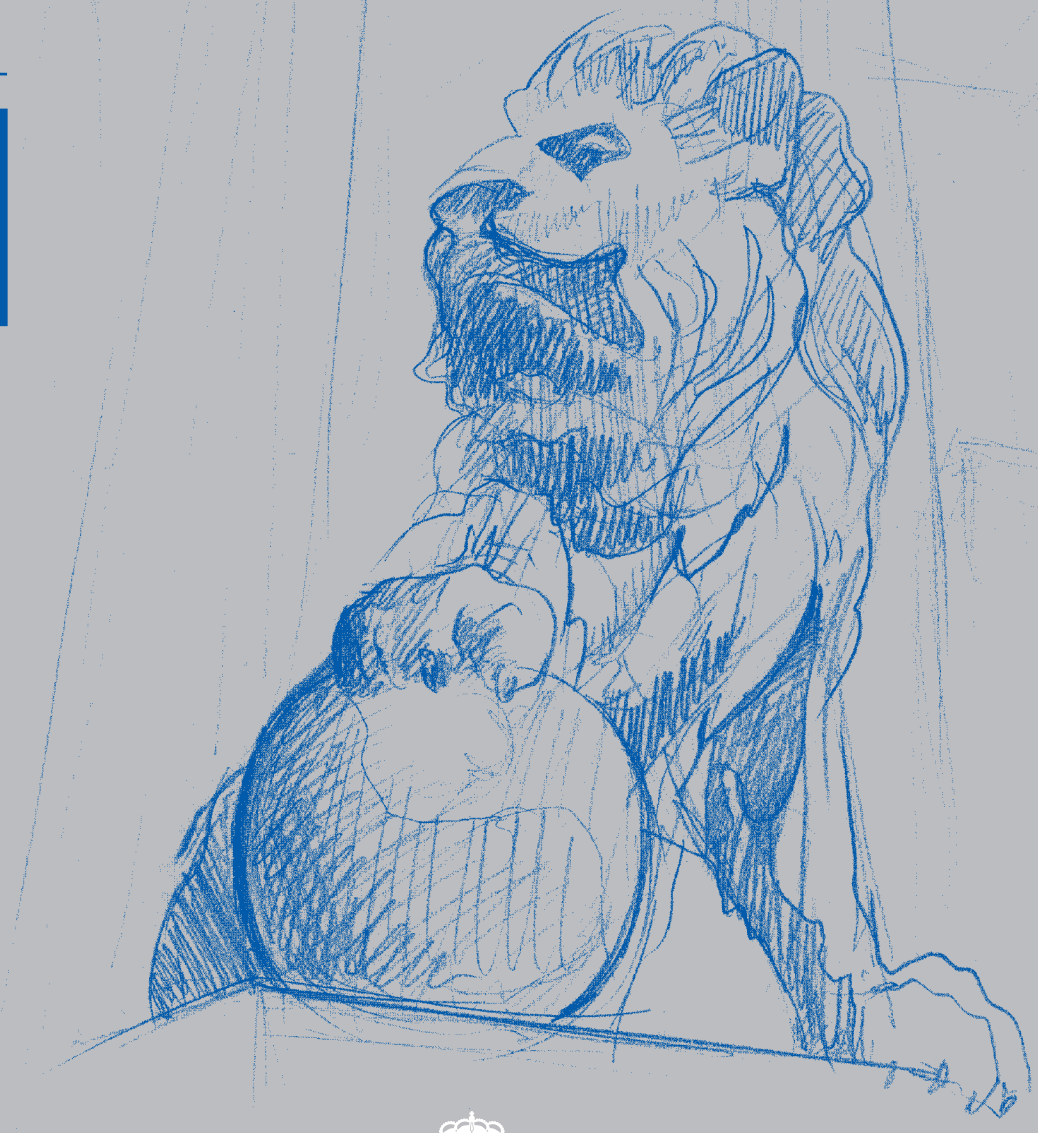
Nuclear Safety Council Report to the Parliament

2021

Summary Report

CSN



CSN CONSEJO DE SEGURIDAD NUCLEAR

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Summary Report

This report complies with article 11 of Law 15/1980, which establishes that the Nuclear Safety Council shall submit an annual report on the performance of its activities to both chambers of the Spanish Parliament and to the Parliaments of the Autonomous Communities in whose territory nuclear facilities are located.

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TABLE OF CONTENTS

ÍNDICE (continuación)

PRESENTATION

As is the case every year, in compliance with our institutional duty, we are pleased to be able to present the Congress of Deputies and the Senate with the Annual Report of the Spanish Nuclear Safety Council (CSN) for the year 2021, a year that unfortunately has continued to be marked by the Covid-19 pandemic.

As such, during this year we continued to work with 85% of the workforce in telecommuting mode until October 2021, when a plan was established to return to on-site work, which has allowed us to establish a flexible work model that can be adapted to the healthcare circumstances at any given time. Teamwork and collaboration between CSN departments and professionals have undoubtedly been key to fulfilling our functions and competencies.

With regard to the **strategic-organisational area of the CSN**, I would like to highlight the progress of the modernisation of the regulatory body started in 2020. In this way, progress was made in digital transformation with the start-up at the beginning of the year of the CSN's new electronic headquarters, which facilitates access to the services provided to the public as well as to the organisations and entities professionally linked to the regulator, in compliance with the provisions of the CSN's plan for adaptation to electronic administration.

This year marked a decade since the fatal Fukushima-Daiichi accident, an event that coincided with the *assessment* of the Council's *safety culture.* This is a key project for the CSN, with the majority participation of the staff, aimed at guaranteeing the proper functioning and independence of the regulatory body, as established in the guidelines of the International Atomic Energy Agency (IAEA).

There is no doubt that another of the indisputable pillars for the modernisation of the CSN personnel is training. Thus, in 2021, a *training plan*was implemented *based on*

SAT (Systematic Approach Training)methodology , which follows IAEA guidelines on training for regulatory bodies and is aimed at all CSN professionals.

This year we also launched a *Strategic Grants Plan 2021-2023* covering several areas: from collaboration with Spanish public universities for the financing of chairs in nuclear safety and radiation protection, to the implementation of R&D projects, to training, information and dissemination activities to different private non-profit institutions and public or private groups. Twenty-five new positions for the CSN's technical staff were created with the aim of rejuvenating our workforce.

Finally, in awareness of the importance of *effective equality between men and women* as a key value of any organisation, in 2021 the first steps were taken to draw up a *gender balance plan* for the CSN, with the creation of the Equality Commission and adherence to the global initiative of the IAEA and the NEA (Nuclear Energy Agency) for the promotion of gender balance in the field of international nuclear safety and radiation protection regulatory bodies.

In the field of **nuclear safety,** it was marked by the correct operation of the nuclear power plants currently operating in Spain. In 2021, we reported favourably on the *requests for renewal of the operating permits* from the Cofrentes nuclear power plant (Valencia) and the Ascó nuclear power plant (Tarragona). In addition, in May 2021 the commissioning of the *individualised temporary storage facility (ITS) at the Cofrentes nuclear power plant* for the dry storage of spent fuel with a HI-STAR 150 model casks received a favourable report.

In the area of **radiation protection,** 2021 marks the first licensing of an X Ray blood irradiator in Spain, and for the first molecular precision radiotherapy system guided by magnetic resonance.

Undoubtedly, these two facts will improve healthcare services, with a clear benefit for patients.

In addition, this year the monitoring and control of the decommissioning of the José Cabrera nuclear power plant (Guadalajara) continued normally, with the radiological quality of the environment remaining within the range of the natural radiological background. Finally, in the field of radiological protection, we should highlight the new network of automatic stations (REA) for radiological monitoring, with a total of 185 stations for emergency management that continuously monitor radioactivity in the atmosphere.

As for the **institutional positioning of the Council**, 2021 has been distinguished by an intense effort to carry out all activities, ensuring that at no time were they affected by the pandemic. Relations with Parliament have remained unchanged, and the required information and responses to periodic resolutions have been sent.

In relation to the autonomous communities, joint commissions have continued to be held with those communities that have signed agreements for the assignment of functions. Agreements have also been negotiated and signed between several autonomous communities and the CSN.

I also wish to highlight the strong relationship that has been maintained with other institutions, sector organisations and associations, as well as the hosting of local information committees linked to city councils located in areas surrounding nuclear power plants. Likewise, and in order to strengthen ties, a conference was held with the participation of the Association of Municipalities in Areas of Nuclear Power Plants and Radioactive Waste

Storage (AMAC) and the mayors of the municipalities affected by the nuclear facilities.

In 2021 the **international activity of the CSN** was carried out normally, despite the health situation, although most of the meetings were held remotely, with in-person attendance partially recovering in the main forums such as the IAEA General Conference, WENRA and HERCA (Western European Regulators Association and the Heads of the European Radiological Protection Competent Authorities). In the field of multilateral relations, in the European Union the ENSREG (European Nuclear Safety Regulators Group) Plenary reviewed the progress made on the second Topical Peer Review (TPR) under the Nuclear Safety Directive.

Mention should be made of the CSN's participation in the verification mission by the European Commission within the framework of *Article 35* of the EURATOM Treaty to check the radioactivity control mechanisms in the marine environment off the coast of Galicia and the monitoring of the environmental radioactivity control facilities and of the radioactivity of the discharges at the Santa María de Garoña nuclear power plant (Burgos).

Regarding international conventions, the organisational meeting of the Convention on Nuclear Safety was held in 2021, where it was agreed for the first time to jointly hold the 8th and 9th review meeting in 2023. With respect to bilateral relations, the signing of a Memorandum of Understanding with the Portuguese Environment Agency to strengthen cooperation between Spain and Portugal in the areas of radiological protection and nuclear safety is particularly noteworthy. The agreement provides for a bilateral commitment to undertake various actions in training fields as well as the exchange of operational and regulatory experience and the promotion of R&D between the two institutions.

I would not like to end this section without mentioning the work of the Ibero-American Forum of Radiological and Nuclear Regulatory Bodies, the annual presidency of which was assumed by the CSN in 2021.

As you know, access to **information, communication and transparency** are included in Spanish Law 15/1980 dated April 22, 1980, establishing the Nuclear Safety Council. Beyond strict compliance with the law, at the Council we are committed to improving public information and transparency. As a result, in 2021 we increased our news frequency by 22%, publishing 172 news items. Aware of the importance of social networks in connecting with citizens, we have increased our positioning within them. To provide some details, the CSN's Twitter account achieved 8,424 followers, and we opened a LinkedIn profile in order to disseminate the regulator's activity and establish a technical community among the Council's workers registered in this social network and other national and international professionals interested in the areas of work of our organisation. Regarding consultations, in 2021 a total of 1,542 inquiries were received through the communications mailbox.

After a year and a half of forced closure due to the health crisis, visits to the CSN Information Centre resumed in October 2021. In addition, the company resumed its participation in some congresses and fairs, such as the 46th Meeting of the Spanish Nuclear Society held in October in Granada. However, in order to encourage the CSN's participation in new types of events, we developed a virtual display that we had the opportunity to use for the first time at the 7th Joint Congress of the Spanish Society of Medical Physics and the Spanish Society of Radiological Protection.

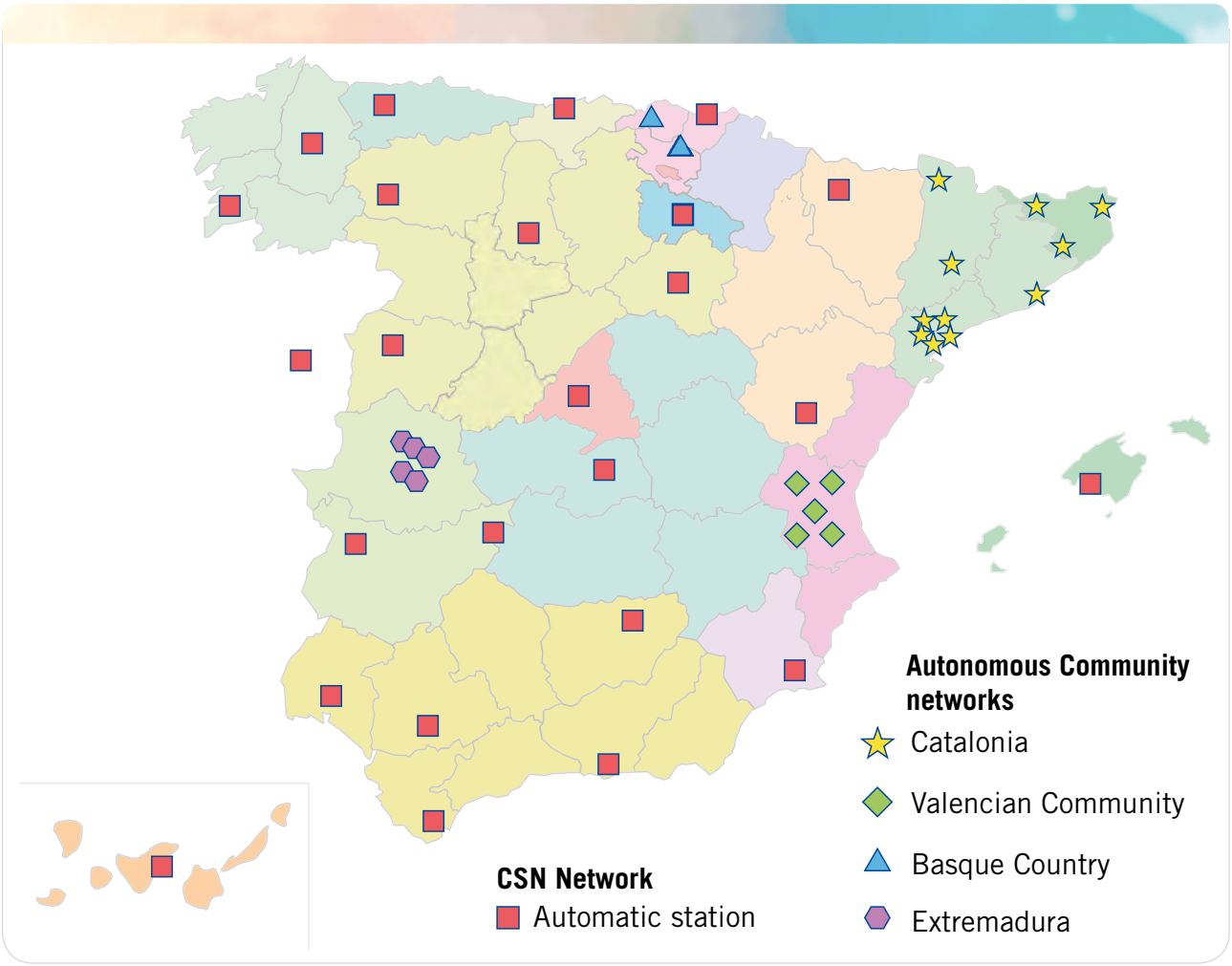
In short, we are seeing the end of another year with the conviction that our society is facing unprecedented changes occurring at breakneck speed. For this reason, the adaptability of equipment, people and technologies will be essential to fulfil the CSN's mission of ensuring nuclear safety and radiation protection of the population and the environment in an increasingly challenging context. We are in the process of adaptation.

Juan Carlos Lentijo Lentijo
President of the CSN

HIGHLIGHTS OF THE YEAR 2021

MONOGRAPH ON THE CSN AUTOMATIC STATIONS NETWORK

One of the functions assigned by the Spanish legislation that established the CSN is the radiological surveillance of the national territory. Since 1990, the CSN has had a Network of Automatic Stations (REA, Red de Estaciones Automáticas) which are part of the Environmental Radiological Surveillance Network (REVIRA, Red de Vigilancia Radiológica Ambiental); they serve to fulfil this function. Initially, the REA consisted of 25 stations that were complemented by the automatic networks of the Autonomous Communities of the Basque Country, Catalonia, Valencia and Extremadura.



After almost 20 years of continuous surveillance, a working group was created in 2009 to address the modernisation of the network, taking into account the state of the art of such equipment. The results of this working group were used to design the new network. In July 2018, the contract for the supply of 15 portable dose rate measurement stations was thus granted. These stations can be used to perform radiological characterisation of any part of the national territory where a radioactive incident has taken place. In September 2018, the contract was granted for the supply, installation and commissioning of a network of fixed automatic radiological monitoring stations for CSN emergencies. This network is composed of 185 stations. The project had a duration of 3 years, with its implementation starting in 2019.

In 2019, 44 stations were installed, 71 were installed in 2020 and the remaining 70 stations were completed in 2021. The stations are located at the sites of the stations that made up the former REA, at sites within the emergency planning area of the Spanish nuclear power plants and in important population centres.

Both the fixed and portable stations send their data to 2 CSN servers located at the CSN headquarters and at the headquarters of the Military Emergency Unit, which is where the CSN has the backup emergency room.

The values measured by the network are available on the CSN website, and in compliance with international agreements, the data are also sent to the European Union and the International Atomic Energy Agency.

Current layout of REA fixed stations

MONOGRAPH ON THE DECOMMISSIONING OF JOSÉ CABRERA NPP

The José Cabrera nuclear power plant, better known as Zorita, was the first to start operating in Spain in 1969. This plant ceased operation in 2006 after nearly 40 years of commercial operation, and on February 1, 2010 the Ministry of Industry, Tourism and Trade (currently MITERD) granted ENRESA the authorisation to carry out its decommissioning, following a favourable report from the CSN plenary meeting on November 4, 2009.

The selected dismantling strategy — one of total, immediate dismantling — was started once the spent nuclear fuel had been disposed of in the **facility's Individualised Temporary Storage (ITS)**. Since then, regulatory activity has adapted to the dynamism of decommissioning, through a system of assessments and inspections that respond to the control and supervision of the activities carried out.

The year 2021 has seen significant progress in the dismantling of the plant, which has now entered its final phase, with the material from the containment building having been demolished and removed.

During this period, the CSN carried out various assessments and inspections of aspects as diverse as the construction of an electrical substation at the site to serve the photovoltaic solar plants planned for the surrounding area, the spent fuel handling capacity of the ITS, the facility's environmental, groundwater and effluent radiological surveillance programmes, low and intermediate level radioactive waste management, emergency planning, the physical protection of the ITS and the worker training programme, among others.

To conclude the decommissioning, the final phase remains to be addressed, which will consist mainly of the implementation of the Site Restoration Plan (SRP). The purpose of this SRP is to demonstrate compliance with the radiological criteria established for total, partial or restricted use of the site, and to propose the means for establishing and maintaining the legal institutional controls that guarantee compliance with these criteria.

Zorita will, in the near future, thereby become the first Spanish nuclear power plant to be completely decommissioned.

November 2020

March 2022

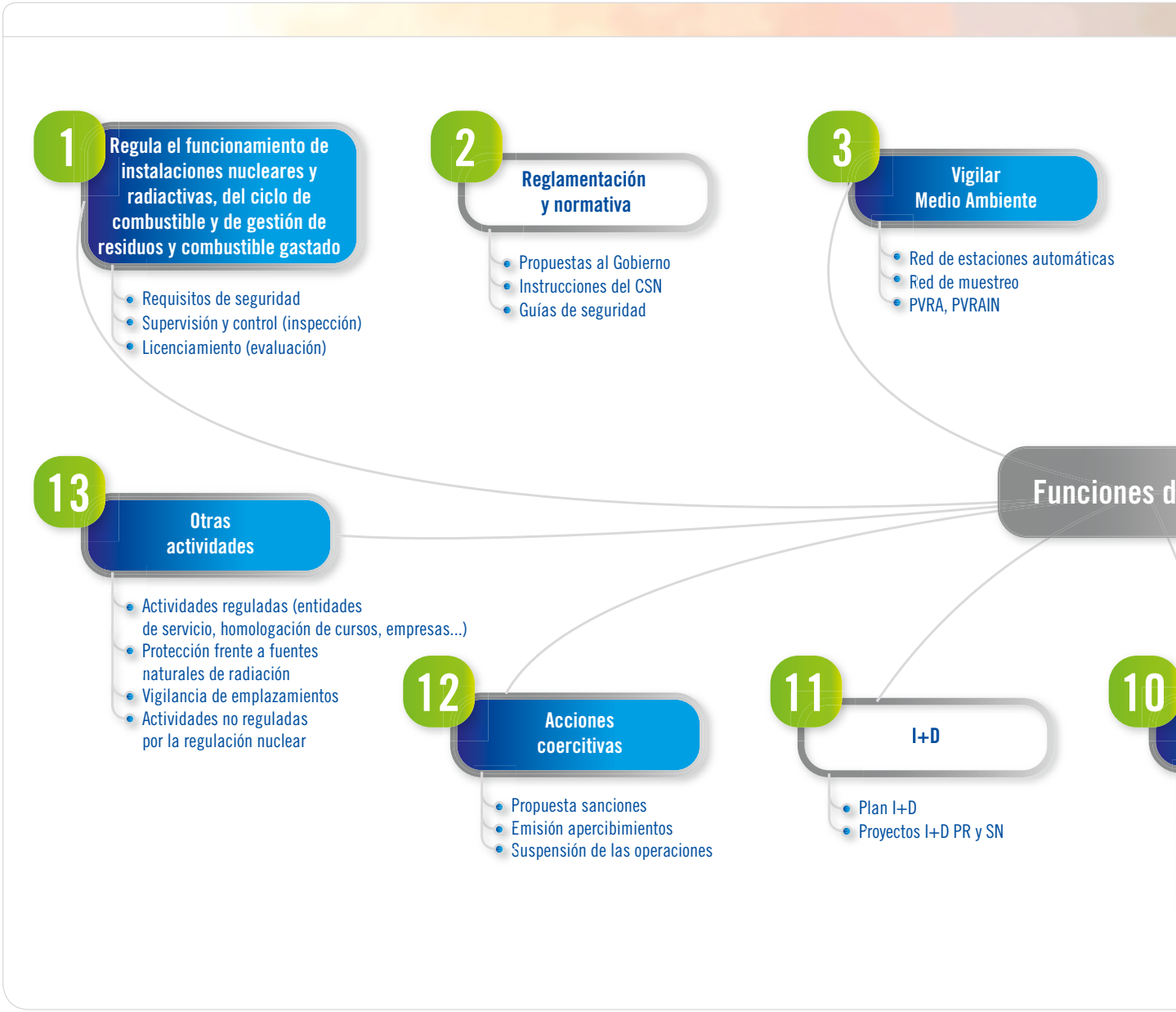
1. THE NUCLEAR SAFETY COUNCIL. LEGAL FRAMEWORK AND FUNCTIONS

The Nuclear Safety Council (CSN, Consejo de Seguridad Nuclear) is a a public entity, independent from the government and with assets and legal status of its ownn. It was created by Law 15/1980 dated 22 April, which established the Nuclear Safety Council is the only competent authority for nuclear safety and radiation protection in Spain.

In accordance with the provisions of the aforementioned Law, the CSN Statute was approved by the Government by Spanish Royal Decree 1440/2010, dated November 5.

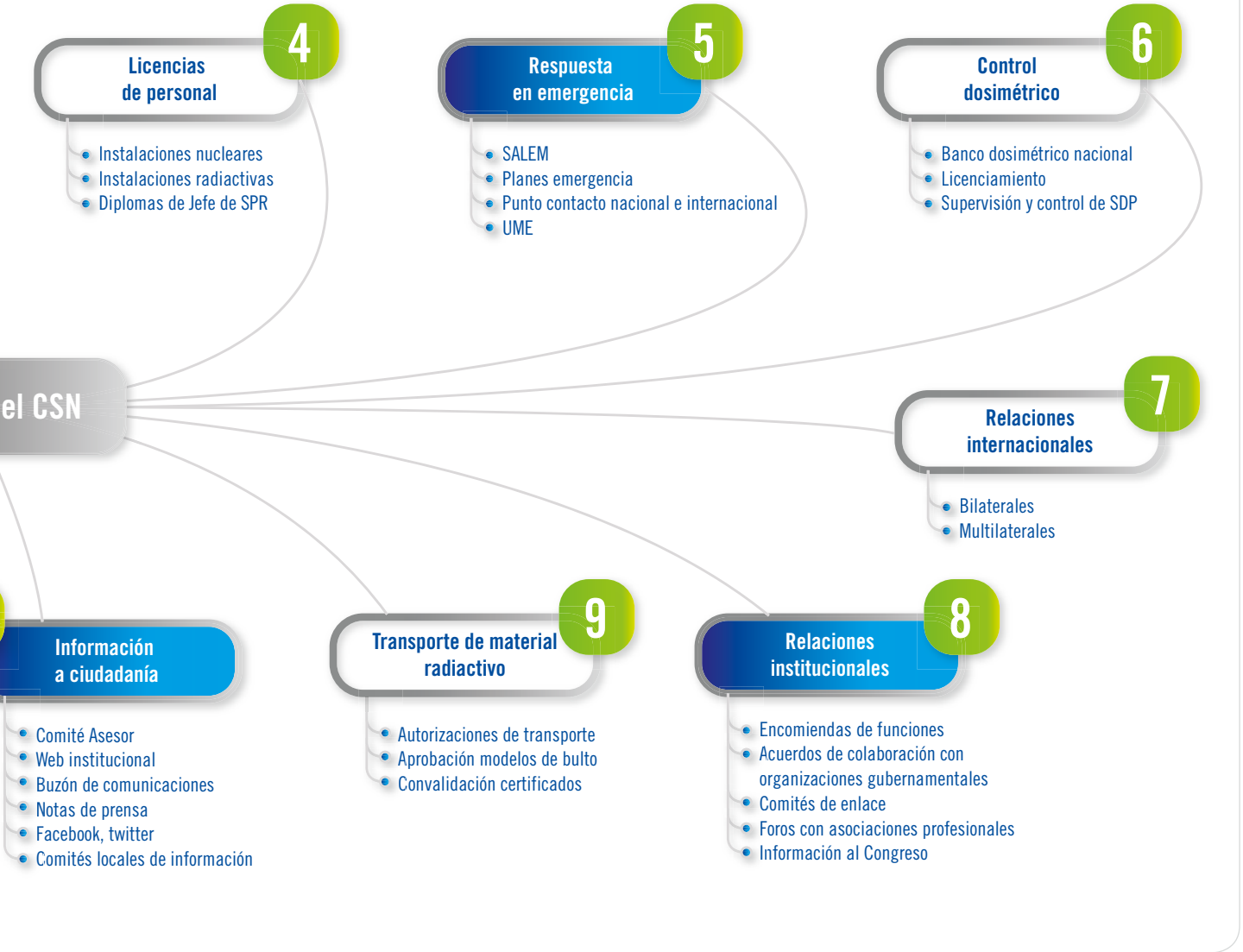
The CSN is responsible for the exercise of all the functions established in article 2 of Law 15/1980 and in Heading

Figure 1.1. Summary of the functions of the CSN



I of the Statute, as well as for the performance of those others that, in the area of nuclear safety, radiological protection and physical Security are attributed to it by law, regulation or by virtue of international treaties. Safety is the fundamental objective of the CSN, although it has other, subordinate objectives: credibility and trust, effectiveness and efficiency, transparency and neutrality, and independence.

In accordance with this legal and competence framework, the CSN assumes the following functions:



Article 11 of Law 15/1980 establishes that the CSN shall submit an annual report on the development of their activities to both chambers of the Spanish Parliament and to the autonomous parliaments of the autonomous regions in whose territories nuclear facilities are located. This report complies with this provision.

1.1. The Board of the Council

As of December 31, 2021, the Plenary of the CSN was made up of the following persons:

Figure 1.1.1. Members of the Board

Josep Maria Serena i Sender
(President)
March 29, 2019

Javier Dies Llovera
(Director)
October 16, 2015

Francisco Miguel Castejón Magaña
(Director)
March 29, 2019

Elvira Romera Gutiérrez
(Board member)
March 29, 2019

María del Pilar Lucio Carrasco
(Board member)
March 29, 2019

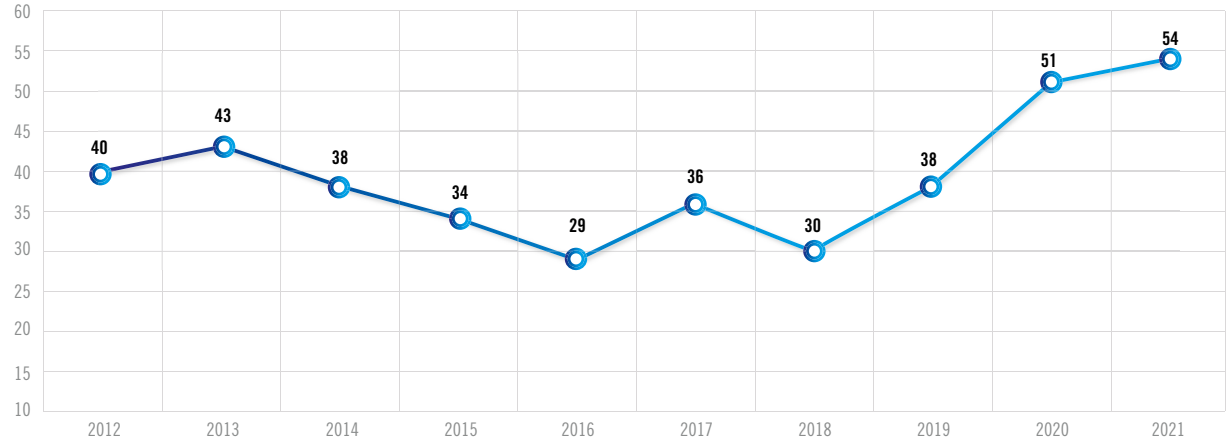
On October 17, 2021, Board Member Mr. Dies completed the term of office for the period for which he was appointed, continuing in the exercise of his functions in accordance with the provisions of Article 7 of Law 15/1980, dated April 22, 1980. (As of the date of publication of this report, it should be pointed out that there have been modifications in the composition of the CSN Plenary, as follows: the appointment of Mr. Juan Carlos Lentijo Lentijo as President of the CSN following the resignation of Mr. Josep María Serena at his own request and the renewal of the term of office of Board Member Mr. Dies for a new 6-year period. It should also be pointed out that Spanish Royal Decree 399/2022, dated May 24, 2022, has been published in the 124th Official Spanish State Bulletin, dated May 25, 2022, whereby Mr. Pablo Martín González is appointed Secretary General of the Nuclear Safety Council, following the resignation, at his own request, of Mr. Manuel Rodríguez Martí.)

In 2021, the CSN Plenary held 54 sessions, during which 506 agreements were adopted. Of the 506 agreements reached, 34% relate to nuclear facilities; 26% to radioactive facilities; 37% of the agreements dealt with cross-cutting issues (standards, personnel agreements and others) and the remaining 3% were distributed between transport agreements (1.5%) and those reached on radiation protection and dosimetry services (1.5%).

The minutes of the Plenary sessions and the judgements that support its resolutions are available for general consultation on the CSN institutional website (www.csn.es).

Graph 1.1.1 shows the evolution of the number of meetings held by the Plenary since 2012.

Graph 1.1.1. Evolution of the number of meetings held by the Plenary since 2012



As can be seen, the progressive upward trend in the number of plenary sessions in 2020 was maintained in 2021. This increase is a consequence of the implementation, in general terms, of a weekly frequency for the Plenary meetings and of the increase in the number of weekly meetings convened, mainly to prepare the activities planned for the analysis and decision-making regarding the renewal of the operating permits of the Cofrentes and Ascó nuclear power plants, units I and III.

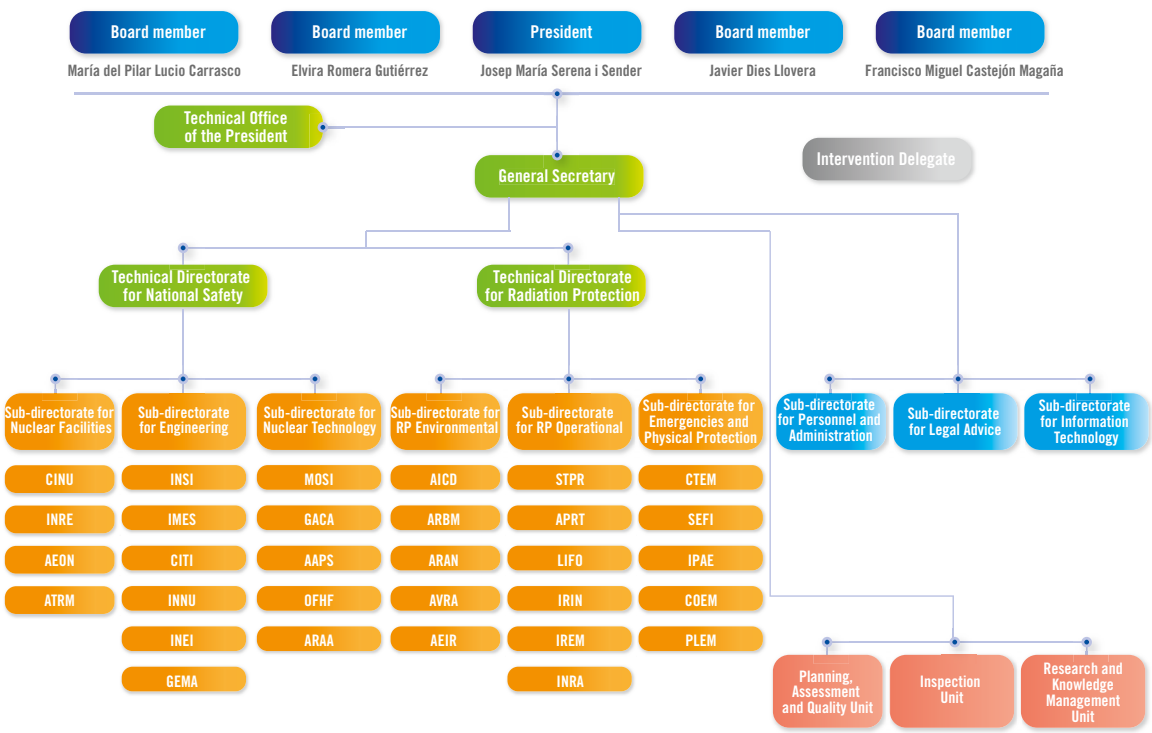
1.2. Organisational structure of the CSN

In accordance with the CSN's legal framework, the highest governing bodies are the Plenary and the Presidency. The Plenary is assisted by a General Secretariat, whose incumbent in 2021 was Manuel Rodríguez Martí, appointed by Royal Decree 280/2017 of March 17.

The CSN management bodies, under the direction of the Presidency and the Plenary, are the Secretariat General, the Technical Directorate of Nuclear Safety, the Technical Directorate of Radiation Protection, the Directorate of the Technical Cabinet of the Presidency and the Sub-Directorates.

The following figure illustrates the organisational structure of the CSN, effective as of December 31, 2021

Figure 1.2.1. Organigram of the CSN



Sub-directorate for Nuclear Facilities
CINU: Nuclear Facility Coordinator
INRE: Resident Inspection Coordinator and Support
AEON: Operational and Regulatory Experience Area
ATMR: Radioactive Material Transport Area

Sub-directorate for Engineering
NSI: Systems Engineering Area
IMES: Mechanical and Structural Engineering Area
CITI: Earth Sciences Area
INNU: Core Engineering Area
INEI: Electrical Systems, Instrumentation and Control Area (Sub-Directorate of Engineering)
GEMA: Life & Maintenance Management Area

Sub-directorate for Nuclear Technology
MOSI: Modelling and Simulation Area
GACA: Quality Assurance Area
AAPS: Probabilistic Safety Analysis
OFHF: Organisation, Human Factors and Training Area
ARAA: High Activity Waste Area

Sub-Directorate for RP Environmental
AICD: Cycle Facilities and Decommissioning Area
ARBM: Low and Medium Activity Waste Area
ARAN: Natural Radiation Area
AVRA; Environmental Radiological Surveillance Area.
AEIR: Radiological Impact Assessment Area

Sub-Directorate for RP Operational
STPR: Radiation Protection Technical Services Area
APRT: Radiological Protection of Workers Area
UFO: Licensing and Training Area
IRIN: Industrial Radioactive Facilities Area
IREM: Radioactive Facilities and Medical Exposures Area
INRA: Radioactive Facilities Inspection Area

Sub-Directorate for Emergencies and Physical Protection
CTEM: Emergency Technical Coordinator (Emergency Sub-Directorate)
SEFI: Physical Safety Area
IPAE: Area of Intervention and Preparation of Emergency Responders
COEM: Emergency Operations Coordination Area
PLEM: Emergency Planning Area

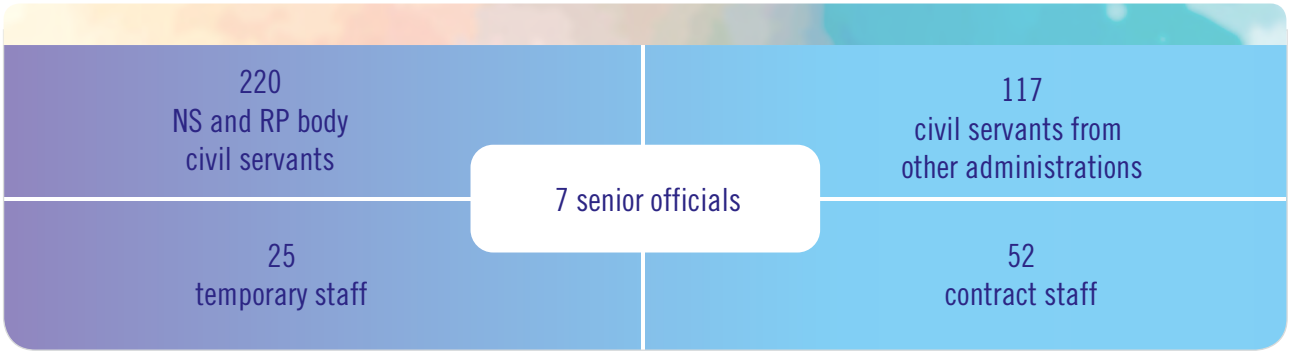
1.3. Resources and means

1.3.1. Human resources

As of December 31, 2021, the total number of personnel in the CSN was 421, as detailed in table 1.3.1.1.

In 2021, Royal Decree 973/2021, dated November 8, provided for the termination of Ms. María Fernanda Sánchez Ojanguren, via resignation, as Technical Director of Radiation Protection. Likewise, by Royal Decree 1092/2021, of December 7, Mr. Rafael Cid Campo was removed as Technical Director of Nuclear Safety, being succeeded in that position by Mr. Juan Carlos Lentijo who was appointed by Royal Decree 1093/2021, dated December 7.

Figure 1.3.1.1. CSN staff as of December 31, 2021



Graph 1.3.1.1 shows the evolution of the CSN workforce between 2012 and 2021. After a continuous decrease in the workforce since 2016, there has been a positive rebound in 2020 and 2021 due, on the one hand, to the recruitment in 2020 of new officials (functionaries) into the Upper Echelon of the Nuclear Safety and Radiological Protection Corps arising from the resolution of the free selective process offered in the 2019 Public Employment Offer, and on the other hand, to the reduction in the number of retirements initially planned for the current year.

The number of women at the CSN represents 51.07 % of the total staff, and men represent the remaining 48.93%. The average age of the organisation's staff is 53.

Graph 1.3.1.1. Distribution of the workforce by job position in the 2013-2021 period

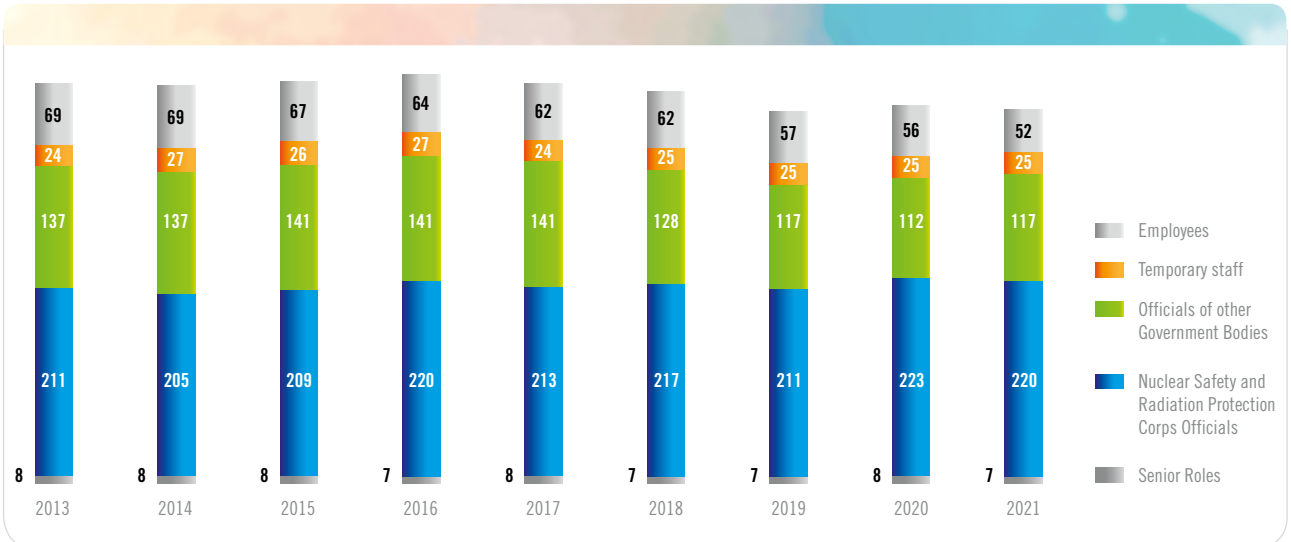
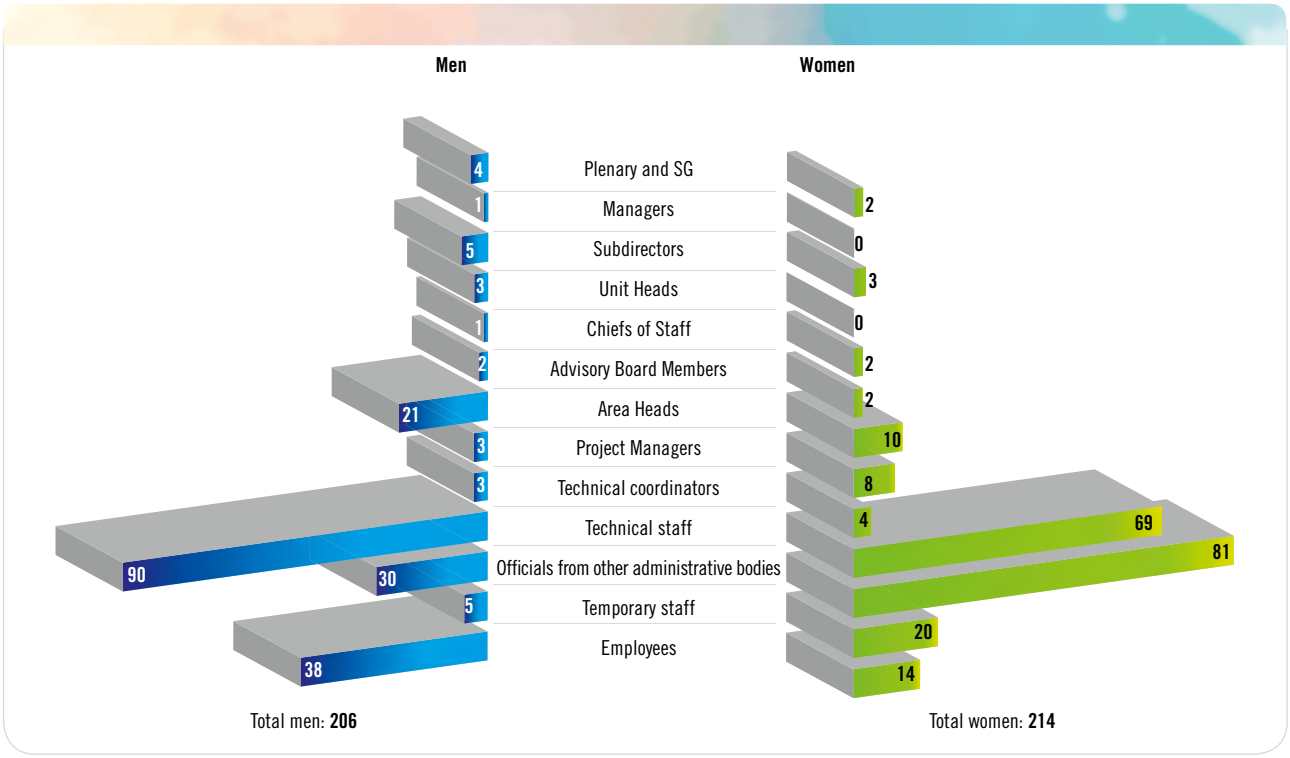


Figure 1.3.1.2. Distribution of the CSN workforce by job position and gender



1.3.2. Economic resources

In economic and financial matters, the CSN is governed by the provisions of General Budgetary Law 47/2003, dated November 26, as a state administrative public sector entity subject to the Public Accounting system and the Accounting Instruction for the Spanish State Institutional Administration.

This year, 2021, shows a positive result of 2,199 thousand euros, compared to 4,360 thousand euros in the previous year.

Table 1.3.2.1 below summarises the expenses and revenues for the year 2021.

Table 1.3.2.1. Summary income statement for the year 2021

SUMMARY INCOME STATEMENT FOR THE YEAR 2021 INITIAL BUDGET 46,998 THOUSAND EUROS			
EXPENSES		**INCOME**	
PURPOSE	**PERCENTAGE**	**PURPOSE**	**PERCENTAGE**
STAFF remuneration, social security, social security costs	61.53%	Fees for services rendered	98.75%
External supplies and services. Corporate work, consumables and communications	27.68%	Current transfers and subsidies, financial income and other management income.	1.04%
Other (depreciations, subsidies, grants, scholarships, transfers, etc.)	9.69%		
POSITIVE RESULT of 3,494 thousand euros			

At its meeting held on May 19, 2021, the Plenary of the CSN approved the Strategic Subsidies Plan for the period 2021-2023, with the objective of having an instrument for the planning and execution of its policy for subsidies. Table 1.3.2.2 shows the amounts invested by the CSN in the four open grant lines in 2021. The table also provides information on the amounts invested in the last five years.

Table 1.3.2.2. Amounts invested by the CSN in the four open grant lines in the year 2021

SCHOLARSHIPS	2017	2018	2019	2020	2021
Scholarships	107,978.07	2,316.75		10,436.28	165,260.10
Research and Training Chairs in NS and RP	280,000.00	280,000.00	280,000.00		210,000.00
Grants for training, information and outreach activities					37,109.99
Subsidies for R&D&I projects					899,999.99

1.3.3. IT resources

The most relevant activities carried out in relation to information technologies (IT) are related to the aspects summarised in table 1.3.3.1.

Table 1.3.3.1. Relevant activities in information technology

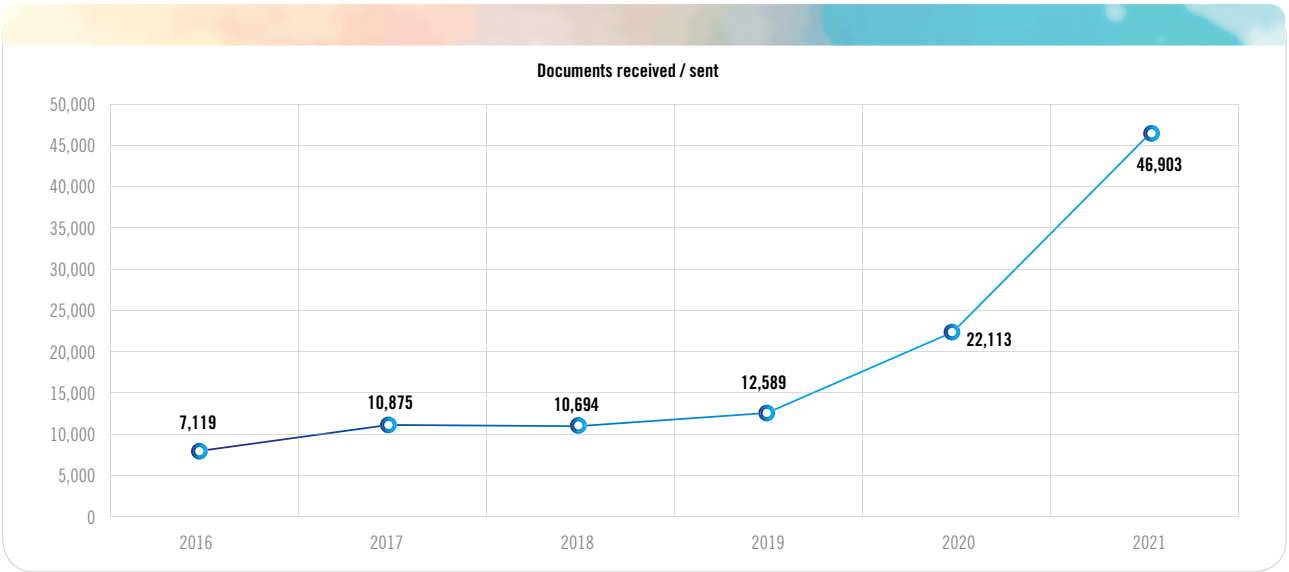
Implementation of telecommuting systems.
Continuation of the CSN Digital Transformation Plan (TDC) and Cybersecurity.
Continue the implementation of e-Administration under the CSN ICT Action Plan as per Law 39/2015 dated October 1 concerning the Common Administrative Procedure.
Improve CSN management systems through workflow automation techniques, the use of telematic techniques, electronic signature based on digital certification and signature keys and improvement of document systems.
Improving the technological infrastructure, security and quality of service, such as renewing the WIFI platform, expanding a second VPN and using a two-factor identification system for VPN access.
Maintain and improve the institutional website as a tool for communication with the public, as well as for supporting the CSN's regulatory activities.
Continue to incorporate improvements in the Operational Analysis Group's IT tools.
Develop INUC's project and resource management module linked to the hours worked on the various projects and tasks by technical staff.
Maintain the continuous improvement of the Information Security Management System (ISMS) application to ensure the availability, integrity, traceability and confidentiality of the agency's information assets against external and internal threats.

Table 1.3.3.1. Relevant information technology activities (continued)

Improve Salem's work tools in relation to its emergency management processes.
Continue the adjustment of the CSN to Spanish Royal Decree 3/2010, dated 8 January, regulating the National Safety Framework in the field of Electronic Administration.
Completion of the Register of Facilities with Natural Radiation (RIRNA) application on facilities to which Title VII of the RPSRI applies.
Carry out the activities necessary to comply with the General Data Protection Regulation.
Promote, improve and guarantee the operability and security of the telematic services available at the electronic headquarters as per Law 39/2015 and Law 40/2015 concerning administrations and citizens.
Maintain and improve the contingency backup infrastructure for the CSN's essential computer services and emergency response services.
Implementation and reinforcement of the IT and electronic needs associated with the CSN Business Continuity Plan.
Continue the incorporation of the CSN into the necessary intermediation platforms (if there is demand) for the fulfilment of the CSN's functions (Social Security debt consultation, AEAT debt consultation, identity verification and qualification consultation).
Develop the new application "Radioactive Facilities (IRA)" incorporating blockchain technology.
Modify the HSISC module within the SISC application for "Inspection Findings Management" and incorporate the "Inspection Findings Crosscutting Components" module. (2020-2021).
Continue to improve the network space and management of R&D related documentation including the corresponding software application.

The growing implementation of e-government is shown in graph 1.3.3.1. In 2021 there was a 100% increase compared to 2020 in relation to inputs/outputs through the new e-Office 2.0.

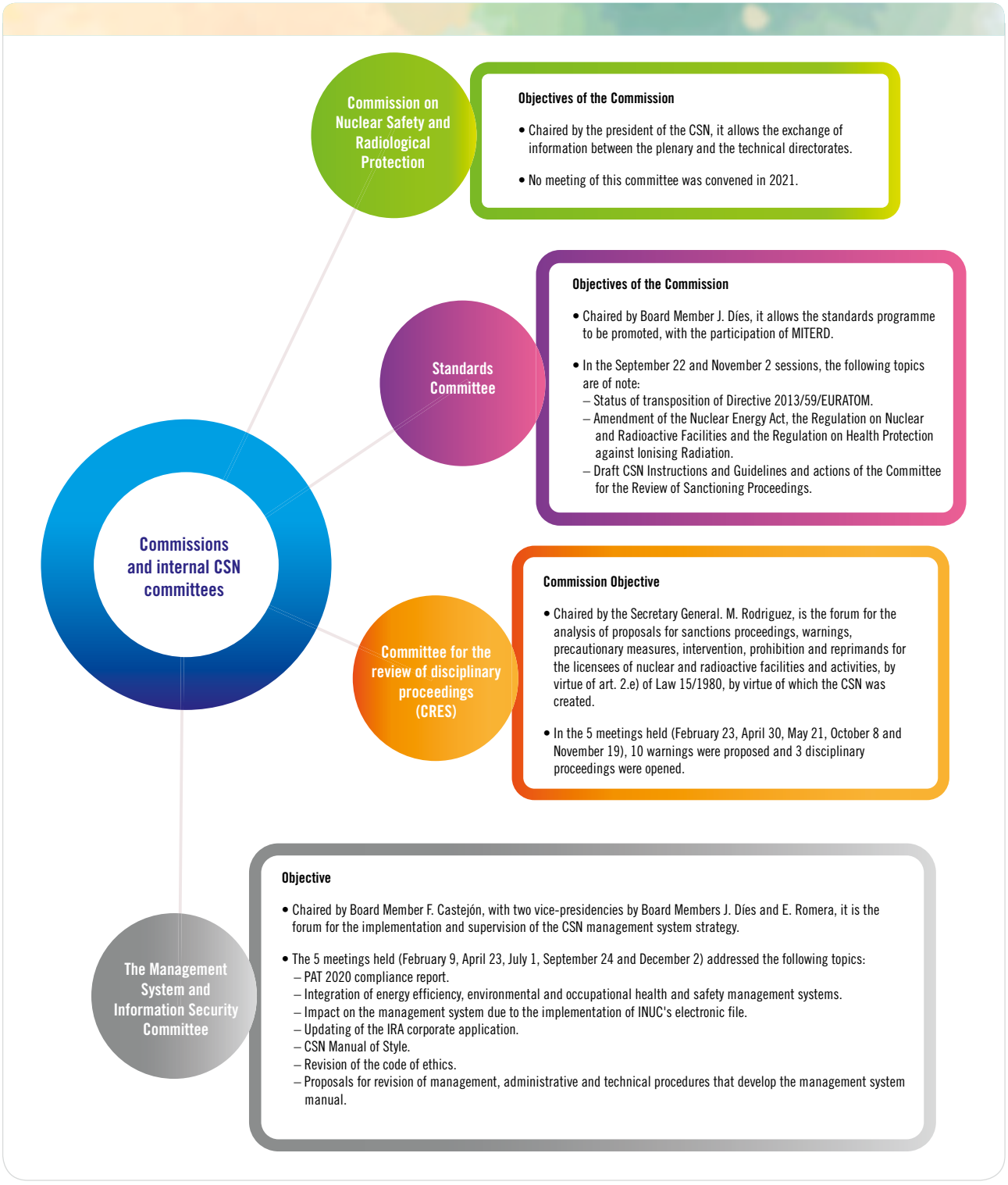
Graph 1.3.3.1. Number of documents received/sent via the electronic office



1.4. Council Commissions

Figure 1.4.1 shows the committees active in 2021 and the activities they have carried out.

Figure 1.4.1. Active commissions during 2021



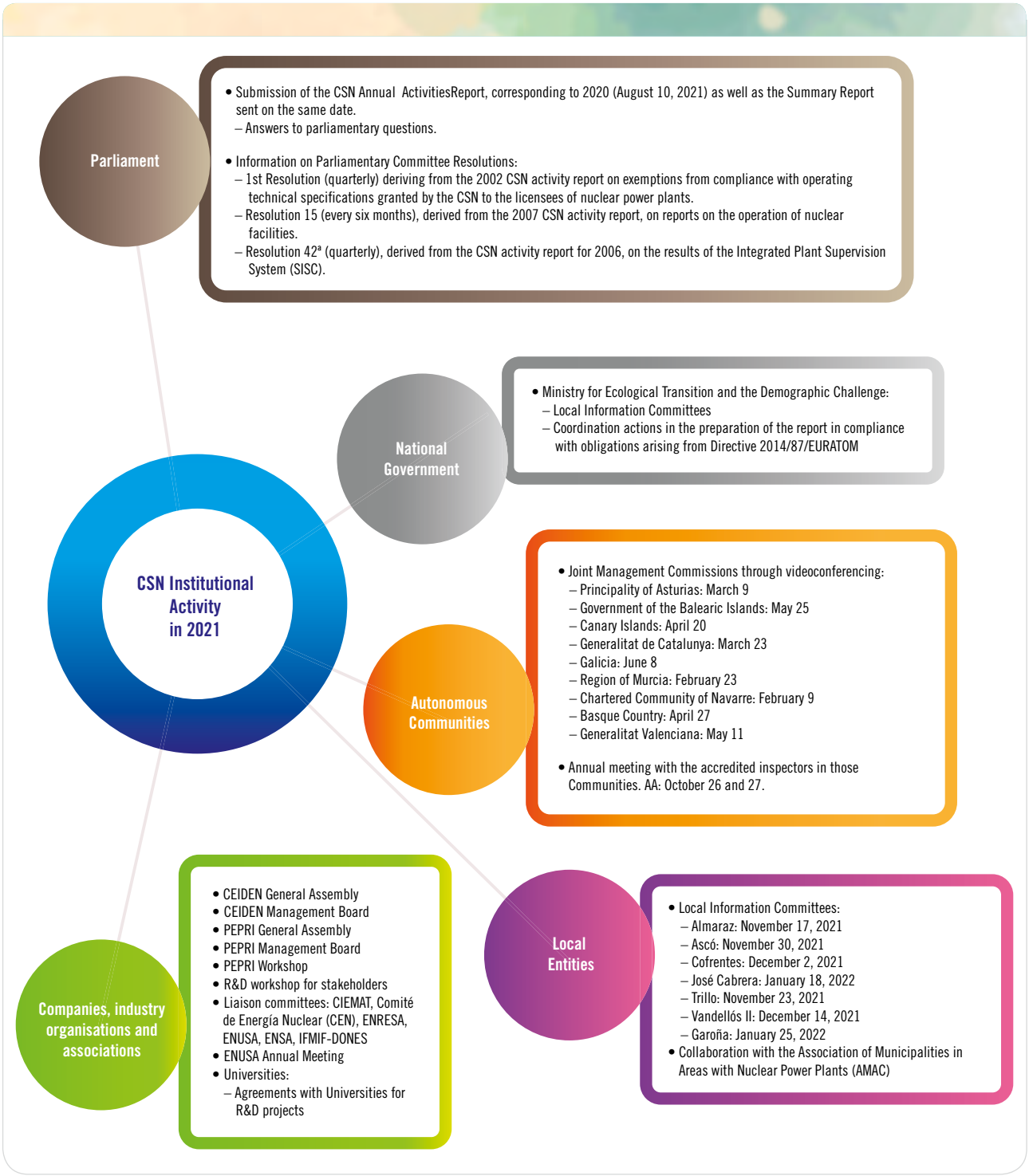
1.5. CSN Relations and institutional activity

1.5.1. Institutional relations

One of the functions of the Nuclear Safety Council is to maintain official relations with Spanish State institutions at central, regional and local level, as well as with professional organisations and non-governmental associations, the CSN's institutional relationship with the Congress of Deputies and the Senate is particularly relevant and unique.

Figure 1.5.1.1 summarises the CSN's institutional activities in this area in 2021.

Figure 1.5.1.1. Institutional relations. Activities in 2021



In 2021, the Ministry for Ecological Transition requested information from the CSN in order to respond to the sixteen initiatives detailed in table 1.5.1.1.

Table 1.5.1.1. Parliamentary questions submitted to the CSN by the Spanish Government for information

AUTHOR	PARLIAMENTARY GROUP	SUBJECT
Antón Gómez-Reino Varela	Unidas Podemos / United We Can (Congress)	Question on the presence of radioactive minerals in lithium mining projects in Galicia.
Norma Pujol i Farré	Esquerra Republicana / Republican Left of Catalonia (Congress)	Question on the Transposition of Directive 2013/59/EURATOM, the PLABEN Basic Nuclear Emergency Plan and the emergency drill in Tarragona.
Joan Baldoví	Coalició Compromís (Congress)	Question about inspections at Cofrentes.
Joan Baldoví	Coalició Compromís (Congress)	Question on possible leakage of radioactive water at the Cofrentes power plant.
Ferran Bel i Accensi	PDeCAT / Catalan European Democratic Party (Congress)	Question on nitrogen injection into the reactor (four questions were asked on this issue).
Jon Iñarritu	Bildu / Basque Country Unite (Congress)	Question on radioactive waste dumped at sea in Galicia.
Carles Mulet García	Izquierda Confederal / Confederal Left (Senate)	Question about a possible leakage of radioactive water at the Cofrentes power plant.
Juan López de Uralde Rosa Medel Roser Maestro Marisa Saavedra	Unidas Podemos / United We Can (Congress)	Question about a possible leakage of radioactive water at the Cofrentes power plant.
Ferran Bel i Accensi	PDeCAT / Catalan European Democratic Party (Congress)	Question on complaint filed by ASVAD.
Macarena Olona Choclán Luis Gestoso de Miguel Pedro Requejo Novoa Mireia Borrás Pabón Ángel López Maraver Francisco J. Contreras Peláez Mª Magdalena Nevado del Campo Ricardo Chamorro Delmo	Vox (Congreso)	Question on the types of studies and technical work included in the 23.302.424M.227.06 budget application, included in the 2022 budget.
Ismael Cortés Gómez	Unidas Podemos / United We Can (Congress)	Question on radiological exposure at Vandellós II.
Josep Lluís Cleries i González	Junts per Catalunya / Together for Catalonia (Senate)	Question on the accident at the Ascó power plant (two questions were asked on this issue but were withdrawn by the senator himself).

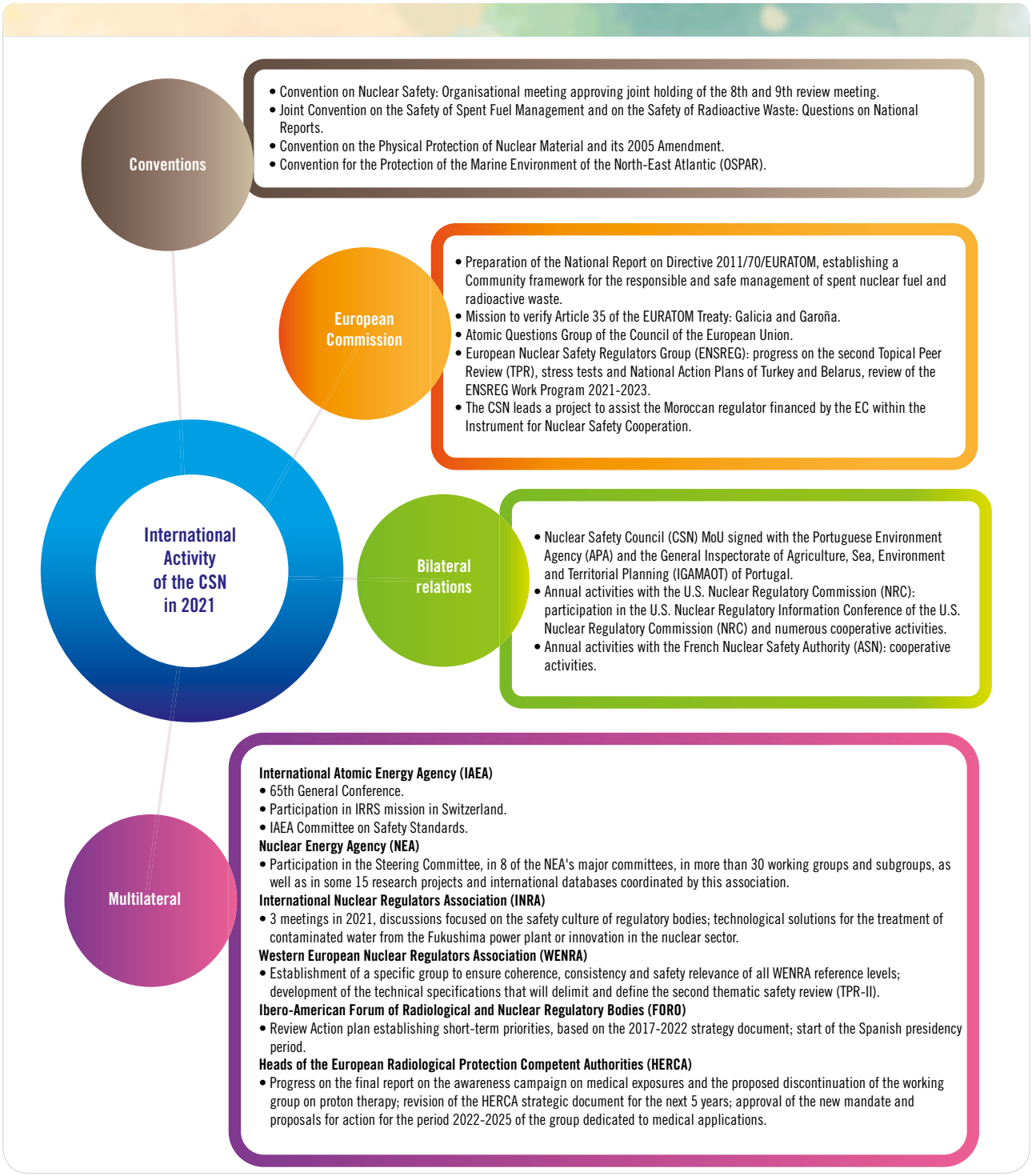
In addition, three requests for data, reports or documents were received in 2021:

AUTHOR	PARLIAMENTARY GROUP	SUBJECT
Antón Gómez-Reino Varela	Unidas Podemos / United We Can (Congress)	Report on the inclusion of LCT pegmatites (lithium, caesium, tantalum) in the list of naturally occurring radioactive materials (NORM) of CSN Instruction IS-33.
Macarena Olona Choclán Mireia Borrás Pabón Luis Gestoso de Miguel Ángel López Maraver Pedro Requejo Novoa Francisco J. Contreras Peláez Mª Magdalena Nevado del Campo Ricardo Chamorro Delmo	VOX (Congreso)	Information on 23.302.424M.22706 budget application in 2021.
Macarena Olona Choclán Mireia Borrás Pabón Luis Gestoso de Miguel Ángel López Maraver Pedro Requejo Novoa Francisco J. Contreras Peláez Mª Magdalena Nevado del Campo Ricardo Chamorro Delmo	VOX (Congreso)	Copy of the reports prepared by the CSN as a consequence of the occupational accident that caused the death of a worker due to carbon dioxide inhalation in an area outside the radiological zone of the Ascó nuclear power plant (Tarragona).

1.5.2. International relations

Figure 1.5.2.1 shows the activities carried out by the CSN in 2021 at the international level.

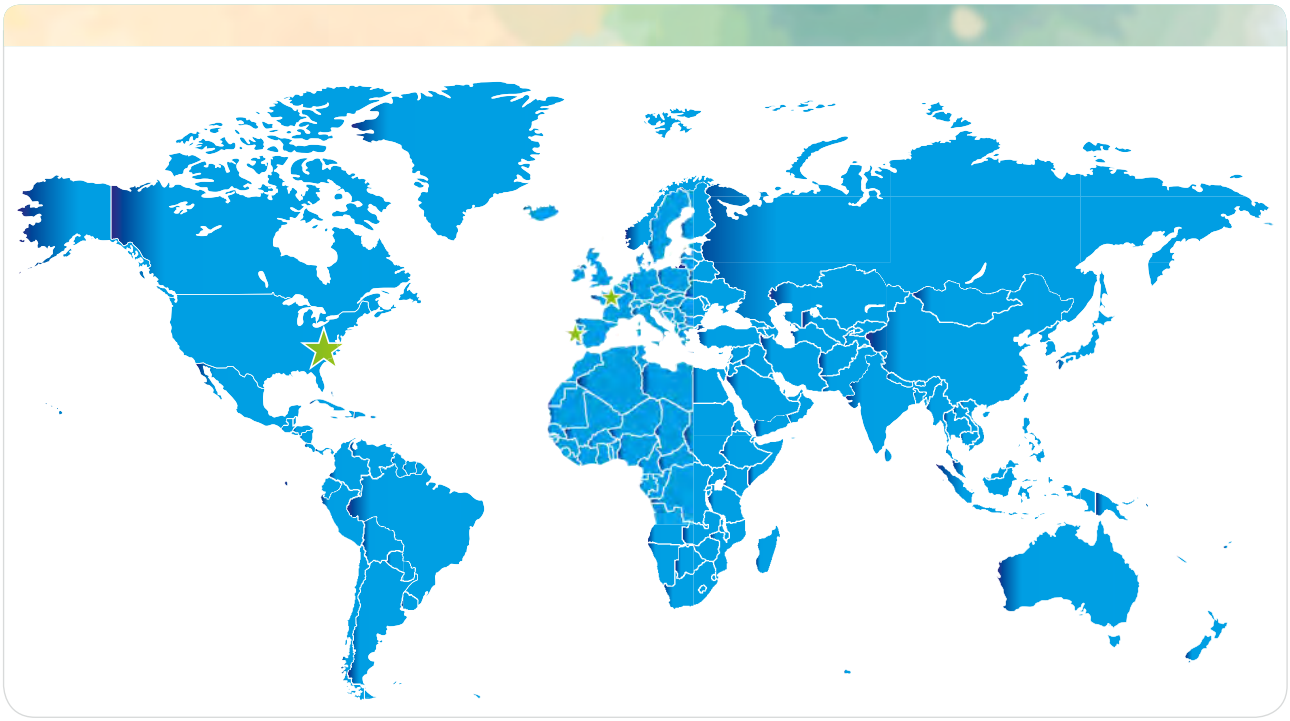
Figure 1.5.2.1. International activity of the CSN in the year 2021



In 2021, close cooperation with the regulatory agencies of the United States and France continued through numerous joint activities at institutional and technical levels. A Memorandum of Understanding (MoU) was also signed with Portugal in 2021.

Figure 1.5.2.2 shows the bilateral agreements carried out by the CSN with counterpart organisations in 2021.

Figure 1.5.2.2. Map of bilateral agreements with counterpart agencies in 2021



1.5.3. Information and public communication

Article 2) of Law 15/1980, of April 22, on the creation of the Nuclear Safety Council, establishes the obligation of the CSN to inform the public on matters within its competence to the extent and periodicity determined by the Council, without prejudice to the publication of its administrative actions under the terms established by law.

The CSN continues in its efforts to improve and strengthen both internal and external communication as demonstrated by the inclusion of one of the strategic lines of the current CSN Strategic Plan for the period 2020-2025 identified with transparency. Figure 1.5.3.1 illustrates the most relevant actions in this regard.

All the publications are available for free download in the documentation centre of the CSN institutional website:

https://www.csn.es/documents/10182/1931674/Catálogo+de+publicaciones/d494e458-5d33-d829-c98f-5e0e0e14ccbe10

Figure 1.5.3.1. Relevant communication activities in the year 2021

1.6. Advisory Committee on Information and Public Participation

The Advisory Committee for Public Information and Participation on nuclear safety and radiation protection was set up by virtue of article 15 of Law 15/1980, creating the CSN, with the mission of issuing recommendations to favour and improve transparency, access to information and public participation in matters within the competence of the CSN.

All the information on the activities of the Advisory Committee can be found on the CSN institutional website (www.csn.es). https://www.csn.es/comite-asesor

Two meetings were held in 2021, the twenty-first and twenty-second, on June 24 and November 5, 2021. Both were held via telematic means. Table 1.6.1 shows the number of participants and presentations on specific thematic areas made at the two meetings mentioned above.

Since its inception in 2011, the Advisory Committee has made 12 recommendations to the CSN. As of December 31, 2021, 1 recommendation remains open, the rest are completed.

Table 1.6.1. Summary of the monographic topics presented at each of the Advisory Committee meetings held in 2021

NUMBER	ATTENDEES	PRESENTATIONS ON SPECIFIC TOPICS			
		DSN	DPR	GTP	ADVISORY COMMITTEE EXPERTS
Meeting 21	23	"Second exercise of revision by European counterparts in the framework of the Nuclear Safety Directive (Topical Peer Review)"	"Situation in which the autonomous communities must obtain a mandatory report from the CSN"	"Result of the study on the perception of the CSN among its stakeholders"	"Reflections on the public perception analysis carried out by the CSN"
Meeting 22	25	"Santa María de Garoña spent fuel management plan"	"Licensing activities related to the decommissioning of the Santa María de Garoña NPP"	"CSN Communication Plan; current situation, update."	

2. STRATEGY AND MANAGEMENT OF RESOURCES

2.1. Strategic Plan

The current strategic plan was approved by the Plenary Meeting on June 17, 2020 and covers the period 2020-2025. The Plan presents the agency's mission and vision. It establishes two strategic goals; one focused on nuclear and radiological safety and the other focused on the achievement of sustainable development objectives.

The Strategic Plan provides for five strategic objectives. The CSN will demonstrate its performance through the following indicators:

Figure 2.1.1. CSN Strategic Plan Logo

The Strategic Plan provides for the five strategic objectives. The progress made in 2021 in relation to these objectives is presented in table 2.1.1 below:

Table 2.1.1. CSN strategic objectives and their degree of fulfilment by 2021

OBJECTIVE	ACTIVITY	FORECASTING AND COMPLIANCE	
Strategic Objective 1	Maintaining effective supervision of the activities of facility or activity licensees, focused on the aspects most relevant to safety.	Renewal of nuclear facility authorisations (NNPs and Juzbado)	Objective: To issue a report on the requests for renewal of the operating permits of the Cofrentes and Ascó nuclear power plants. Action: The Board Plenary achieved 100% of the 2021 target
		Licensing of the Retortillo uranium concentrates plant	Objective: Issue report on the application for construction authorisation in the 2020-2021 period Action: The objective was 100% met, and the report was issued (12/7/2021)
		Follow-up of ESC ageing management programmes	Objective: Monitoring inspection of the Integrated Plan for the assessment and management of the ageing of the Almaraz and Vandellós II nuclear power plants. 100% of the target for the year 2021 has been met.
		Decommissioning Licensing of Santa María de Garoña NPP	Objective: Report on the dismantling phase 1 authorisation and change of ownership of the Santa María de Garoña nuclear power plant. The target set for 2021 has not been met. It has been moved to the year 2022.
		Implementation of new REA stations	In the overall project (2019-2021), 181 stations have been installed out of the 185 planned.
		SISC Self-Assessment	Objective: Conduct the Self-Assessment: This activity has not been carried out. It has been moved to the year 2022.
		Development of standards	Develop the regulations indicated in the 2021 PAT 11% of the objectives set for 2021 have been met.
Strategic Objective 2	Increase efficiency and effectiveness in the performance of the CSN's functions and competencies	Implementation of the IRRS 2018 Mission Action Plan	It was 60% executed through the closing of 7 actions.
		Updating of management system	The objective has been 40% met.
		Implementation of safety culture self-assessment results at the CSN	85% of the projections of the 2021 PAT were executed. In December 2021, CISOT-CIEMAT issued the final report on the assessment of the safety culture of the organisation
		Improved coercive process	No concrete actions have been implemented in 2021.
		Improved R&D project selection methodology	100% of the targets foreseen in 2021 have been met.
		Annual execution of R&D budgets (chapter 6+7)	100% of the objectives foreseen in 2021 have been met by means of a competitive grant system.
		Complete the Safety Culture Action Plan	95% of the action plan of the programme for the implementation of the agency's safety culture policy has been fulfilled
Strategic Objective 3	To ensure that the CSN maintains and improves its emergency response capabilities, as well as to strengthen its security capabilities	Organisational and methodological development in relation to the CSN emergency response structure	The target was 50% met.
		Strengthening of the physical security regime	All the objectives foreseen in 2021 were met.

Table 2.1.1. CSN strategic objectives and their degree of fulfilment by 2021 (continued)

OBJECTIVE	ACTIVITY	FORECASTING AND COMPLIANCE	
Strategic Objective 4	Encourage CSN workers to increase their commitment and sense of belonging to the organisation.	Implementation of telecommuting	All targets for 2021 were met
		Approval by the CSN Plenary of the new professional career model	Progress was made in developing a new professional career model. A contract was signed with the University of Murcia to develop a performance assessment methodology that was integrated into the new model proposal. Adequate progress was made in the development of a new professional career model
		Training programme update	In 2021, the design and development of an SAT programme were completed. The objective was 100% met. The objective of full implementation of the SAT in the CSN training programme is at 50%.
		Preparation of an Equality Plan for the CSN	A joint equality commission was created. A diagnostic study of the situation at the CSN was carried out. An agency-wide survey on the perception of gender issues was carried out.
Strategic Objective 5	Improving the perception of the regulator's activity by citizens and stakeholders through rigour, truthfulness and reliability.	Promote/strengthen the establishment of collaboration agreements with national organisations	The objective was 100% completed.
		Implementation of public consultation and information procedures in the preparation of CSN regulations	The 2021 target was met.
		Compliance with Advisory Committee recommendations	The target was 90% met.

2.2. Management System

The management system is directed by the CSN's Management System and Information Security Committee.

In 2021, the Committee held five meetings, at which it discussed the submitted revisions to the management and administrative procedures that develop the management system manual, the status of implementation of the 2018 IAEA IRRS-ARTEMIS mission action plan, the internal audit plan, and the status of nonconformities and opportunities for improvement arising from the audits. It also analysed the modifications to be introduced in the annual planning of activities, as well as in their follow-up.

Likewise, the Committee analysed the proposal of activities highlighted for the year 2022 that are integrated into the Annual Work Plan (PAT, Plan Anual de Trabajo) as well as the complete proposal of the 2022 PAT that was approved by the CSN Plenary at its meeting of December 15, 2021.

Finally, the Committee conducted an analysis of the integration of various management systems: environmental and energy efficiency according to the ISO standards that develop them. The analysis concluded that it was necessary to incorporate the aforementioned management systems into the CSN's management system. The implementation plan is underway, and an external consultant has been contracted to provide advice for this purpose.

The following tables show the scorecard indicators obtained in 2021, against the established objectives.

Table 2.2.1. Nuclear and Radioactive Fuel Cycle Facilities Control Panel

INDICATOR	NAME	GLOBAL VALUES	OBJECTIVE
NI 1	Number and % (in relation to the expected annual total) of inspections carried out during the period under review	199 – (105%)	Carry out the 189 planned in the PAT.
NI 2	Number and % of the total number of inspections programmed for the year that have actually been carried out in the period under review	177 – (94%)	Carry out the 189 planned in the PAT.
NI 3	Number and % of the total number of inspections planned for the year that have been carried out in the period considered.	141 – (97%)	Carry out 146 from the base programme included in the PAT.
NI 4	Number of hours charged to the inspection of nuclear facilities, containers and manufacture of components for nuclear facilities, expressed in thousands	60,581– (121%)	Achieve a value ≥ 50,000 hours per year.
NE 2	Number and % of the total number of requests reviewed in the period considered that have met the deadlines committed to with the Administration.	38- (75%)	100% (in accordance with the deadlines established in PG.II.05*)
NE 3	Number and % of the total number of requests that have remained pending in the period considered, which exceed the deadlines committed to with the Administration.	19- (31%)	0% (in accordance with the deadlines established in PG.II.05*)

* PG .II .05 . Management procedure for the resolution of cases.

Statistical data			
NE1	Number and % (in relation to the annual forecast total) of applications approved by the Board during the period under review	64 (32%)	200
NE4	Number of requests that have remained pending during the period under review, which have exceeded their target date	15 (34%)	0%

Table 2.2.2. Scorecard of radioactive facilities, service entities, related activities and transports

INDICATOR	NAME	GLOBAL VALUES	OBJECTIVE
RI 1	Number and percentage (in relation to the annual planned total) of control inspections carried out during the period considered.	941- (93%)	Carry out the 1007 planned in the PAT.
RI 4	Degree of dedication to the inspection of radioactive facilities, service entities, approved courses, radioactive transports, NORM industries and places with radon exposure in the period considered, defined as the weighted number of inspections of each type	4,898 - (55%)	Achieve an annual value ≥ 8,850
RE 2	Number and percentage of the total number of requests that have been reviewed or filed in the period considered, that have complied with the deadlines committed to with the Administration, established in procedure PG.II.05.	290 – (87%)	100% (in accordance with the deadlines established in PG.II.05) *
RE 3	Number and percentage of the total number of requests that have remained pending in the period considered, which exceed the deadlines agreed with the Administration, established in the procedure PG .II .05	14 – (7%)	0% (in accordance with the deadlines established in PG.II.05) *

* PG .II .05 . Management procedure for the resolution of cases.

Table 2.2.2. Scorecard of radioactive facilities, service entities, related activities and transports (continued)

INDICATOR	NAME	GLOBAL VALUES	OBJECTIVE
Statistical data			
RI 2	Number and percentage of licensing inspections performed, in relation to the total annual planned.	106 - 102%	Carry out the 104 planned in the PAT.
RI 3	Total number of warnings (a) and quarterly ratio (a) / control inspections.	43-0,18%	N/A
RE 1	Number and percentage of requests approved or archived, in relation to the total number of requests foreseen for the year.	332 - 87%	To issue the 381 planned in the PAT.

Table 2.2.3. Emergency control panel

INDICATOR	NAME	GLOBAL VALUES	OBJECTIVE
ETS	Average time, expressed in minutes, of activation of all the members of the emergency drill teams	15	Achieve an annual average value ≤ 30 minutes
ETR	Average time, expressed in minutes, of activation of all members of the emergency teams in real emergencies	34	Achieve an annual average value ≤ 30 minutes
ECS	Quality of response in emergency drills during the period under review	136	Achieve an annual value ≥ 36
ECR	Quality of response in real emergencies in the period under review	85	Achieve an annual value ≥ 105

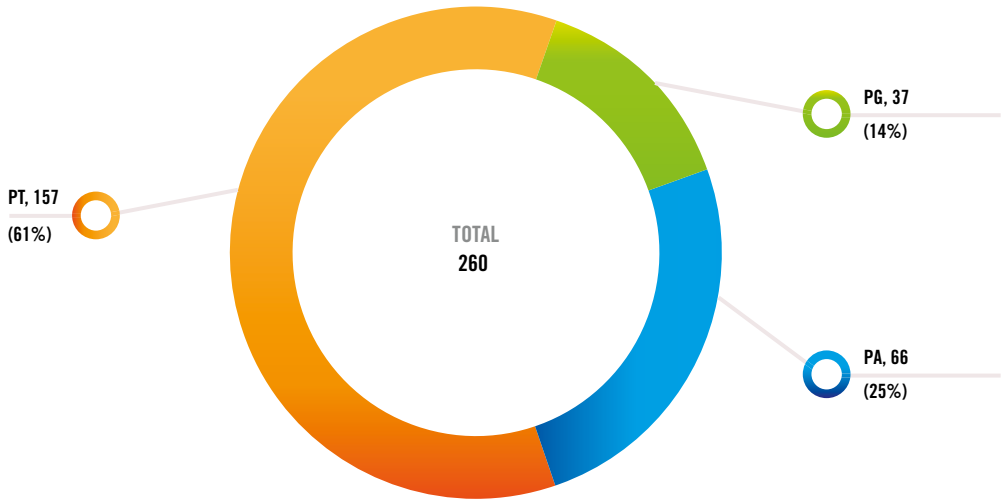
(1) In its estimation, the mean activation times and the associated statistical dispersion are considered.

2.2.1. Internal procedures and audits

The management system documentation is composed of a series of high-level documents and three different types of procedures: management (PG), administrative (PA) and technical (PT).

The CSN currently has 260 procedures, the breakdown of which can be seen in the following graph, indicating in brackets the percentage for each type.

Graph 2.2.1.1. Total number of procedures and breakdown by type



In 2021, five processes of the CSN management system were audited and audits were carried out in the Autonomous Communities of Galicia and Valencia. Table 2.2.1.2 shows the audits carried out, their references and how they were conducted.

Table 2.2.1.2. Audits performed in 2021

PROCESS	REFERENCE	TYPE (REMOTE VS FACE-TO-FACE) / MONTH
Public and Environmental Radiological Surveillance and Control	AI/2020/3	Face-to-face / April
Radioactive Facility Authorisation and Evaluation	AI/2020/2	Remote / May
Research and Development	AI/2020/6	Face-to-face / June
Nuclear Facility and Cycle Evaluation (focused on SIN, STN)	AI/2020/1	Face-to-face / November
Autonomous Community with agreements. Galicia Supervision and monitoring of radioactive facilities	AI/2021/1	Face-to-face / October
Autonomous Community with agreements. Valencia Supervision and monitoring of radioactive facilities	AI/2021/2	Face-to-face / November

2.2.2. Training Plan

In 2021, the Annual Training Plan was structured into the seven programmes and subprogrammes illustrated in the figure below 2.2.2.2 and which also shows, together with figure 2.2.2.1, the figures for the execution of the same:

Figure 2.2.2.1. Execution of annual training plan 2021

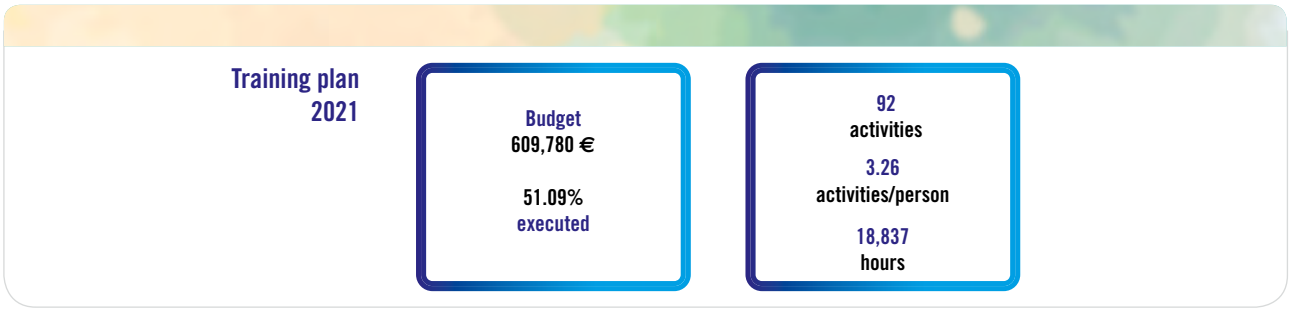
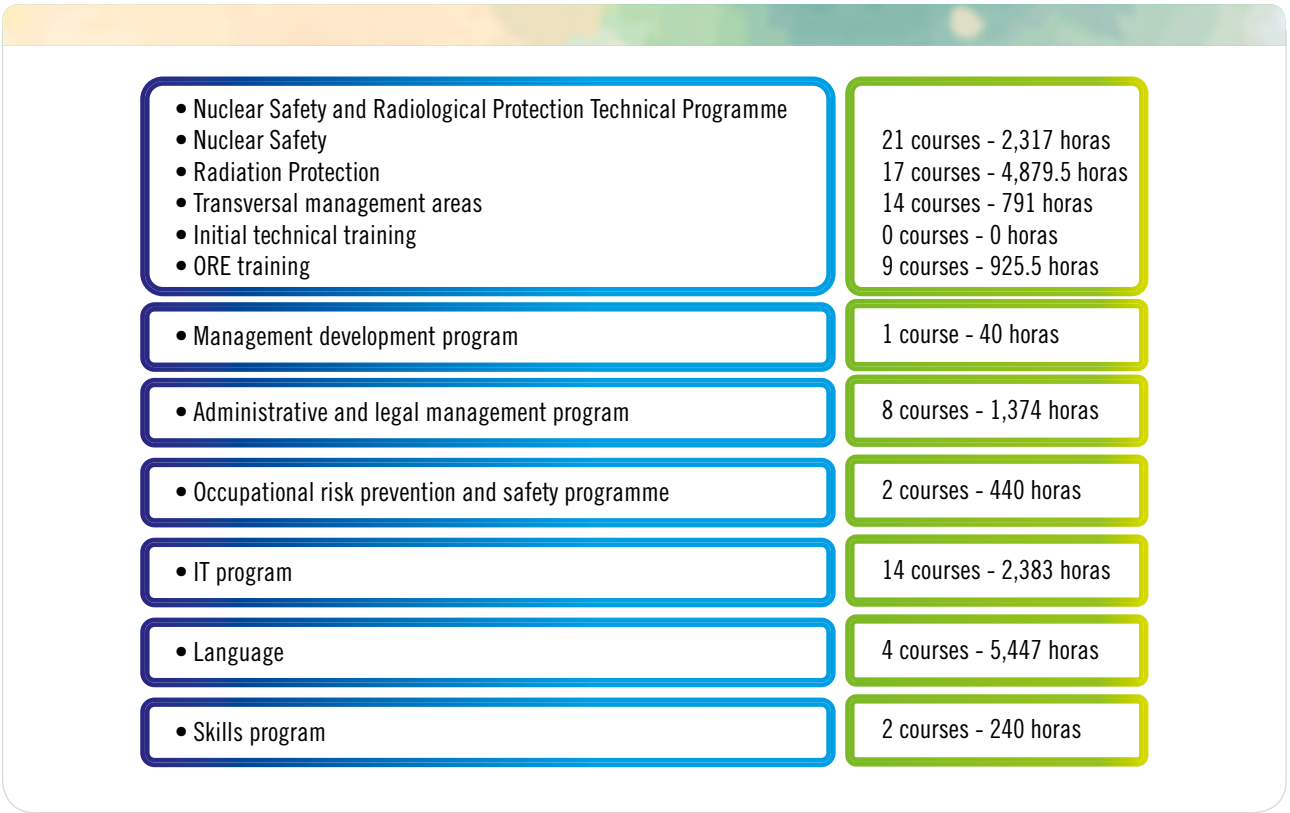


Figure 2.2.2.2. Type of courses and hours spent



In 2020, a project was initiated to develop and implement a systematic approach to training (Systematic Approach to Training-SAT) for the entire staff of the organisation, aimed at optimising the CSN's training processes. Throughout the year 2021, the development of the SAT for application to all agency personnel has been completed. In addition, advanced development of the computer tool has been carried out, which is necessary to start with the practical implementation of the annual training plans following the SAT methodology.

2.2.3. Knowledge management

Due to restrictions due to the COVID-19 pandemic, the knowledge preservation sessions were held telematically as was done last year. These sessions have been attended by staff members reaching retirement age in 2021 and staff members with key knowledge and skills who changed their positions as a result of internal career advancement processes.

As a strategy for transferring knowledge at the CSN, the actions indicated in the following table have been carried out:

Table 2.2.3.1. Actions aimed at the transfer and preservation of knowledge

ACTIVITY	ACTION
"RECOR Classroom"	Instructions for the preparation of knowledge transfer sessions for both internal and external CSN experts
Knowledge transfer sessions	Nine sessions have been held in the STN, SCN and SIN sub-directorates as a result of job changes due to merit-based competitions at the CSN
Socialisation of knowledge	Six sessions, one by MS TEAMS and five by CIRCUIT "The value of tacit knowledge" "Socialisation and Knowledge Transmission Session: NEA Databases" "Lessons learned and good practices of the Knowledge Management Project in Red Eléctrica de España — REE" "Community Presentation: Uncertainty and Sensitivity Analysis" "Leadership and Generational Change" "The usefulness of the corporate application KITE Catalogue for knowledge management in the CSN"

2.3. Research and development

The CSN R&D&i (research, development and innovation) Plan serves as an instrument for defining the strategic lines and objectives of the CSN in relation to this function, establishing the conditions applicable to the activities to be performed.

In 2021, a new R&D&i Plan was approved for the 2021-2025 period. This Plan establishes new lines of research with respect to the previous one in response to the challenges that the CSN will have to address over the coming years.

2.3.1. CSN 2021 R&D&i Plan

On May 28, 2021, the Plenary approved the regulatory bases for the granting of subsidies through a competitive bidding system, for the execution of R&D&i projects related to the Agency's functions. The plenary approved the call for these grants on June 2, 2021. As a result of this call, grants have been awarded for 15 R&D&i projects through an open call. All these projects are effective and underway as of December 31, 2021

Likewise, in 2021 the CSN Plenary approved a total of four agreements for the start-up and execution of R&D projects with national research entities. In addition, three agreements have been signed with the NEA/OECD for CSN participation in international projects.

The budget allocated to R&D&i during the 2021 tax year was 2,600,000 euros, of which 89.1% has been executed.

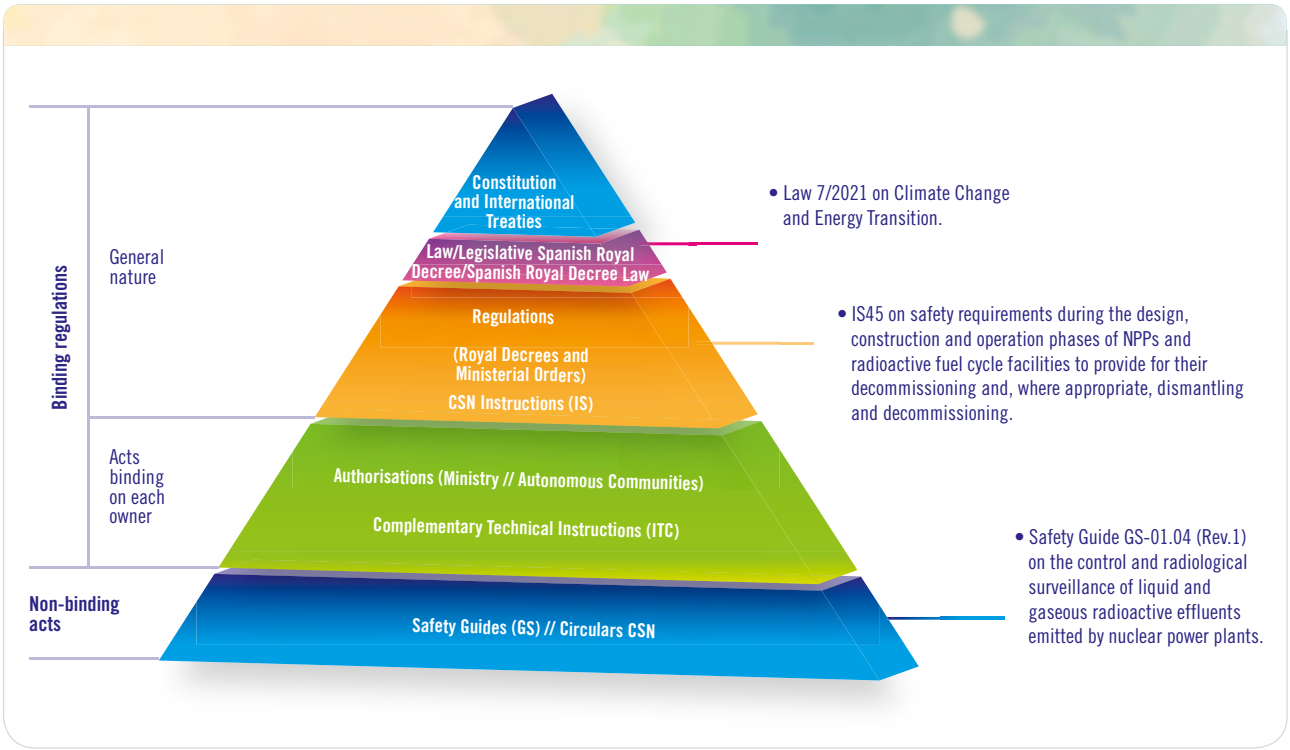
For the 2021 call for grants, a maximum total amount of €1,400,000 has been earmarked to be paid in two tax years, with €900,000 already executed in 2021, leaving a remaining total amount of €463,128.72 for 2022. Through the agreements signed by the CSN with various research entities, the intangible investment earmarked for R&D&I during the 2021 tax year amounted to €1,404,624.01.

On December 17, 2021, the annual R&D Projects Conference was held via a mixed face-to-face and telematic method. This Conference was recorded and both the recording and the papers presented are available on the CSN institutional website.

2.4. Policy and regulatory activity

In accordance with its legal framework and functions, the CSN proposes regulations to the Government concerning nuclear safety and radiation protection, both new regulations and revisions of existing ones. Likewise, it prepares and approves its own technical standards, which may be Instructions, Circulars and Guides relating to facilities and activities related to the matters within its competence; Figure 2.4.1 shows the CSN's regulatory activity in 2021.

Figure 2.4.1. Regulatory pyramid. Regulatory activity 2021



As part of the CSN's regulatory activity, in 2021, the Complementary Technical Instructions and the Technical Instructions listed in table 2.4.1.

Table 2.4.1. ITCs and ITs issued by the CSN in 2021

CSN SUPPLEMENTARY TECHNICAL INSTRUCTIONS (ITC) IN 2021		
SUBJECT	**ISSUE DATE**	**FACILITY**
Supplementary technical instruction to the authorisation of the radioactive facility for industrial radiography and gammagraphy	15-09-21	Generic Radioactive facilities for industrial radiography and gammagraphy
Supplementary Technical Instruction on the problems of non-safety related HVAC systems processing potentially contaminated air	02-08-21	Vandellós II NPP
Supplementary Technical Instruction letter of referral for renewal of the operating permit	29-09-2021	Ascó I
Supplementary Technical Instruction letter of referral for renewal of the operating permit	29-09-2021	Ascó II
Supplementary technical instruction to the design modification authorisation for putting an ITS into service in relation to authorised content	30-07-2021	Ascó I and II NPP
Proposal for modification of the Supplementary Technical Instruction (ITC) No. 4 associated with the declaration of definitive cessation of operation.	12/04/21	Santa María de Garoña NPP
Supplementary Technical Instruction letter of referral for renewal of the operating permit	25-03-2021	Cofrentes NPP
Written communication from the Secretary General for the cancellation of the complementary technical instructions issued by the CSN after the intrusion at the Cofrentes NPP in 2011	26/01/21	Nuclear Power Plants (NPPs), Generic
CSN TECHNICAL INSTRUCTIONS (IT) IN 2021		
SUBJECT	**ISSUE DATE**	**FACILITY**
Technical Instruction on corrective actions derived from the reactive inspection in relation to SN 03/2020 (inspection report CSN/AIN/JUZ/21/286)	15-12-2021	Juzbado fuel element factory
Technical instruction on root cause analysis of occurring events	31-05-2021	Trillo NPP
Technical instruction on the environmental conditions of room SD207 of the auxiliary feedwater turbo pump in case of an accident	08-04-2021	Almaraz NPP

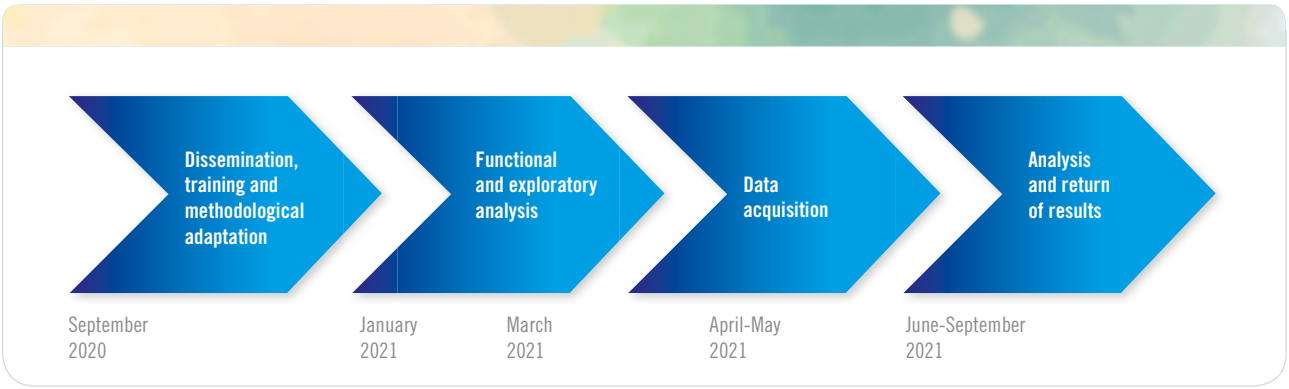
2.5. Organisational safety culture

The CSN recognises the importance of the safety culture, not only in the facilities it regulates but also in its own organisation, as demonstrated by the establishment in the Strategic Plan for the period 2020-2025 of a Strategic Objective (reference: OE.2.3.) which states the following:

…Conducting a safety culture self-assessment in the 2020-2021 period. Subsequently, an analysis will be carried out on the results to incorporate the lessons learned from the self-assessment of the safety culture in the agency.

The CSN contracted the Centre for Socio-Technical Research (CISOT)- CIEMAT to carry out the assessment project, which began in September 2020 and ended in 2021. This project has been structured in four stages:

Figure 2.5.1. Stages of a safety culture assessment project



On September 9, 2021, CISOT-CIEMAT made a presentation on the results of the safety culture assessment study and proposed a series of recommendations, among which it was suggested that an external consulting firm be hired to accompany the CSN in the preparation of the action plan and implementation of the recommendations made by CISOT.

In October a presentation in hybrid format was given by the CISOT body to all CSN personnel concerning the results of the safety culture assessment of the organisation. CISOT-CIEMAT issued the final report of the safety culture assessment of the organisation in December 2021, formally submitting it to the CSN.

3. OVERVIEW OF NUCLEAR SAFETY AND RADIATION PROTECTION 2021

Overall, all nuclear and radioactive facilities operated safely throughout 2021. Likewise, the CSN has guaranteed that all the operating conditions of the facilities, practices and activities under its responsibility have been normal.

The environmental quality around the facilities has been maintained in acceptable radiological conditions, as can be seen from the results of the environmental radiological surveillance programmes, and there is no risk to the population or the environment.

The overall assessment of the operation of the authorised facilities is carried out through analysis of the results provided by the Integrated Plant Supervision System (SISC), as well as the rest of the supervision and monitoring processes established by the CSN for the different facilities (nuclear and radioactive) and for the transport of radioactive material.

One of the mechanisms used in the situation analysis is the follow-up of operating incidents and reported events, especially those classified as above zero on the IAEA's International Nuclear and Radiological Event Scale (INES Scale). There are other mechanisms for performing evolution studies and identifying trends, such as the results of the dosimetry of exposed workers, the relevant modifications requested and the warnings and sanctions proposed by the CSN.

The figure below summarises the main data on the licensing, supervision and monitoring activities carried out by the CSN in 2021. These activities are detailed in the following sections.

Figure 3.1. Summary of licensing, supervision and monitoring activities in 2021

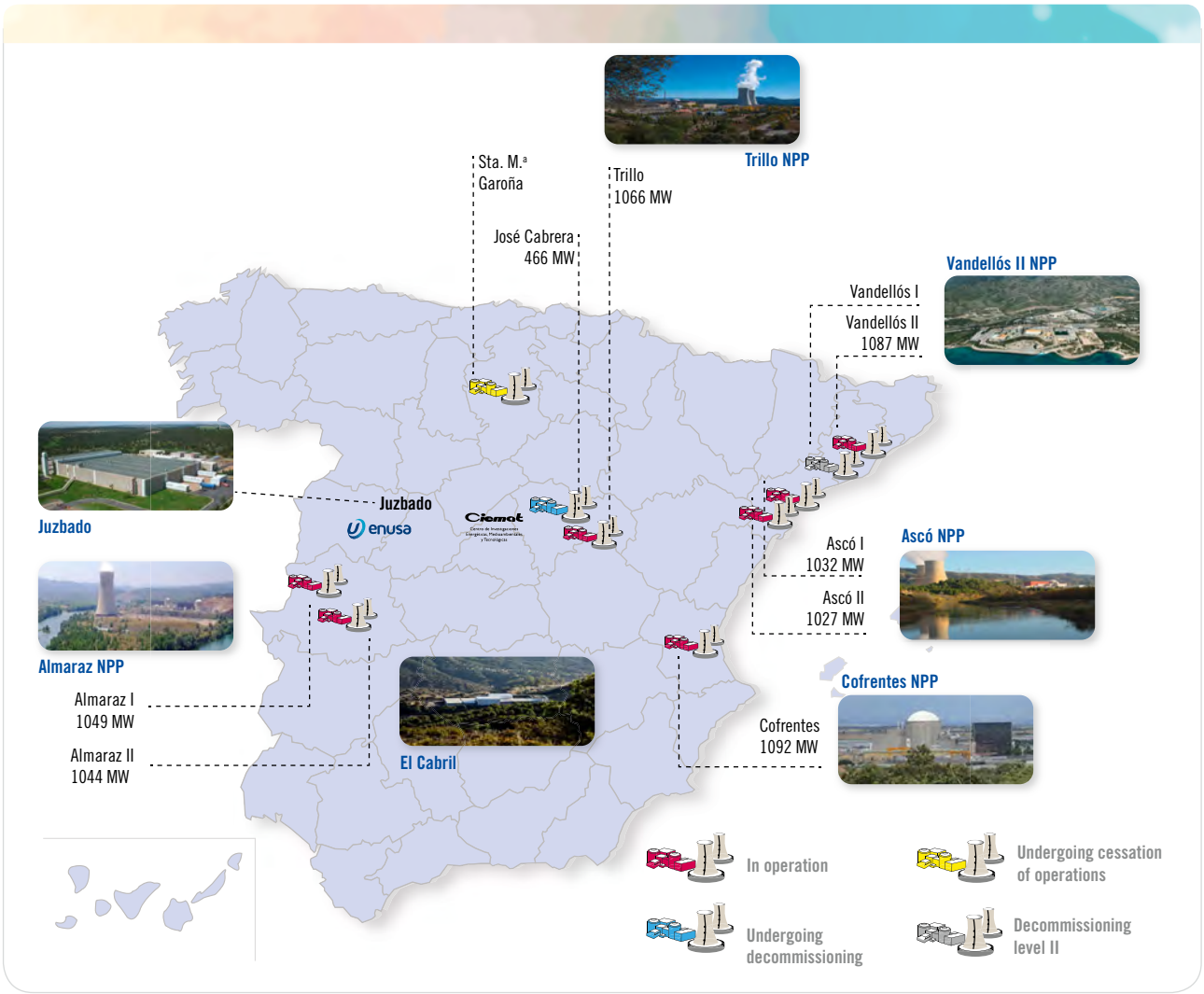
	LICENSING	INSPECTIONS	EVENTS	WARNINGS	PROPOSED SANCTION
NPPs in operation	55	125	34	9	—
Garoña NPP	4	14	2	1	—
NPPs undergoing decommissioning	3	13	—	—	—
Juzbado	2	18	—	—	1
Transport	13	65	6	2	—
Radioactive facilities	306	1,270	16	45	2
Service entities	Licensing	Inspections		Warnings	
SPR/UTPR/SDPR/SDP/ ERX	45	29		6	

4. MONITORING AND CONTROL OF FACILITIES AND ACTIVITIES

4.1. Operating nuclear power plants

Figure 4.1.1 shows the location of the nuclear facilities present in Spain: nuclear power plants in operation, undergoing decommissioning and other nuclear facilities. The following sections summarise the characteristics and activities of each of them in 2021.

Figure 4.1.1. Nuclear facilities



4.1.1. Nuclear power plant operating permits

Table 4.1.1.1 summarises the operating data of the nuclear power plants for the year 2021.

Table 4.1.1.1. Summary of nuclear power plant operating data for 2021.

	ALMARAZ	ASCÓ	VANDELLÓS II	TRILLO	GAROÑA	COFRENTES
Authorisation in force	23-07-20 23-07-20	27-09-21 27-09-21	27-07-20	03-11-14	Desde 06-07-13 cese de explotación	20-03-21
Period of validity (years)	01/11/2027 31/10/2028	01/10/2030 01/10/2031	10	10	N/A	9,6 años
Net production (GWh)	7695,619 7527.138	7025,054 8526,781	7835,373	7408,208	–	8068,741
Load factor (%)	87,12 85.57	81,25 98,73	85,85	84,91	–	87.70
Operating factor (%)	89,04 88,17	83,71 99,33	88,55	86,47		90,03
Hours connected to the network	8760,0 7723.5	7332,64 8701,18	7756,57	7574	–	7886,783
Refuelling outages	UII 13-03/24-04 UI 21-11//9-1-22	16-10/01-12 —	15-05/23-06	18-05/23-06	N/A	12/11 - 14/12

Table 4.1.1.2. End of design lifetime and definitive shutdown dates

END OF LIFE AND END OF OPERATION DATES (Full monograph 1565)		
REACTOR	DESIGN LIFE END DATE	OPERATION END DATE
ALMARAZ I	May 1, 2021	November 1, 2027
ALMARAZ II	October 8, 2023	October 31, 2028
ASCÓ I	August 29, 2023	October 2, 2030
ASCÓ II	October 23, 2025	October 2, 2031
COFRENTES	October 14, 2024	November 30, 2030
VANDELLÓS II	December 12, 2027	February 2035 (*)
TRILLO	May 23, 2028	May 2035

It should be noted that all the Spanish plants in operation have finished or will finish the 40-year period of their design life in the near future, and this therefore means that the corresponding operating permit renewal processes shall include the documentation of the analyses that justify the Long-Term Operation (LTO).

In 2018, the licensees of Cofrentes NPP and Ascó I and II submitted the documentation associated with the LTO and the base documents for their corresponding PSR. The PSR base documents, which define the scope and methodology of the process, were favourably appraised by the CSN Plenary in July 2019. The assessment of the documents associated with

the LTO and the rest of the documentation submitted was completed in 2021.

The MITERD granted both the Cofrentes NPP (March 17) and the Ascó I and II NPPs (September 27) renewal of their operating permits for the requested period in 2021, subject to the limits and conditions regarding nuclear safety and radiation protection resulting from the assessments carried out by the CSN.

4.1.2. General aspects of supervision and control of the CSN. Operational Experience

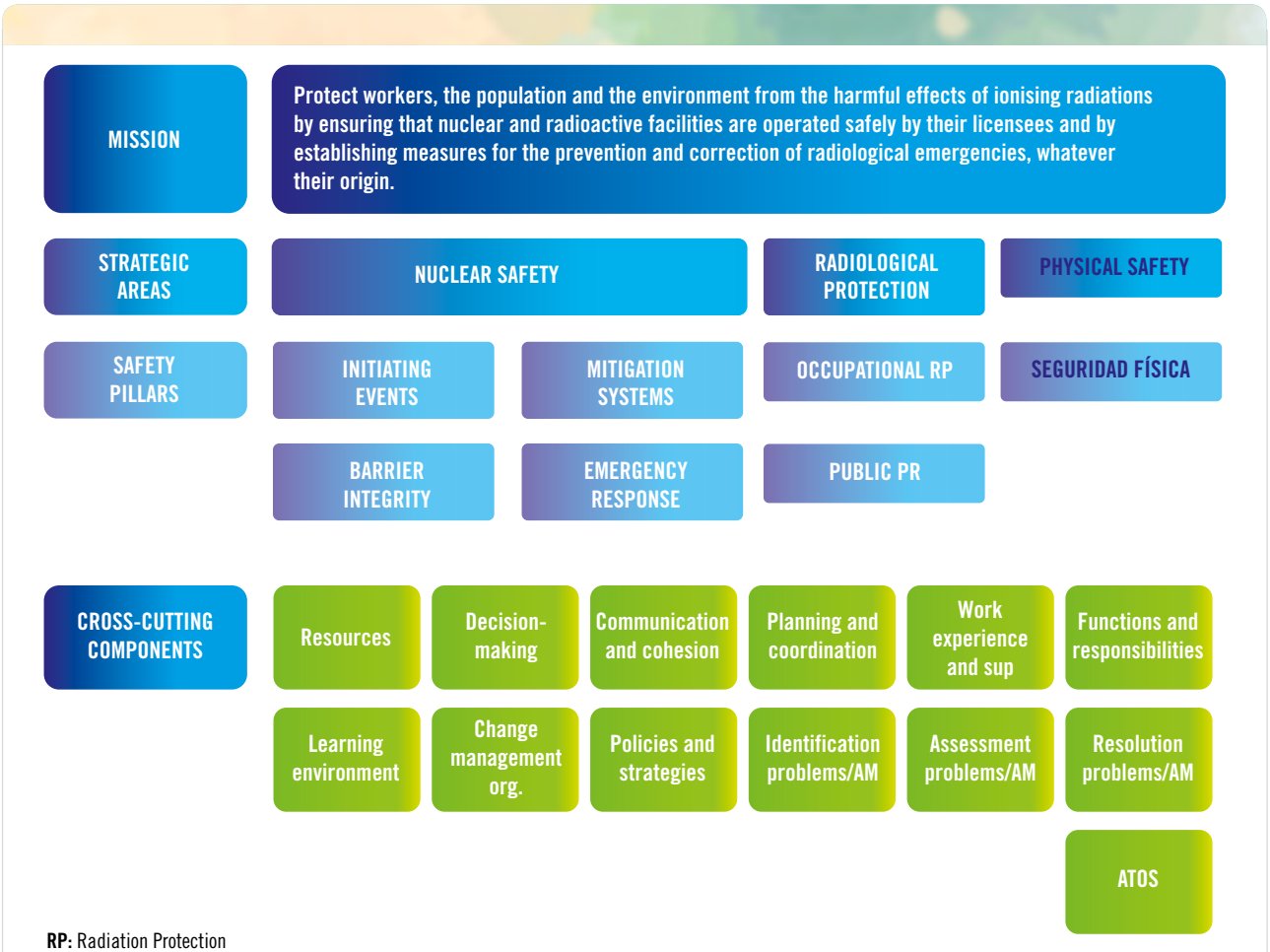
On an annual basis, the CSN carries out an overall assessment of the operation of the nuclear power plants, fundamentally considering the results of the SISC, the events reported, the radiological impact assessment, the dosimetry of the workers, the requests for licensing and the requests for relevant modifications, the warnings and penalties and the operating incidents.

4.1.2.1. Integrated Nuclear Power Plant Supervision System (SISC)

The SISC is based on the continuous monitoring of a set of performance indicators and on an inspection programme called Basic Inspection Plan (BIP), which allows focusing supervision on the most relevant aspects for safety, according to Probabilistic Safety Assessment (PSA).

SISC oversight is structured into three "strategic areas" (Nuclear Safety, Radiation Protection and Physical Protection) and seven "safety pillars", as illustrated in the figure below:

Figure 4.1.2.1.1. Scheme of operation of the SISC



RP: Radiation Protection
ATOS: Safety-oriented work environment
AM: Area for improvement

In 2014 the CSN Plenary approved a new specific supervision and monitoring system for the Santa María de Garoña plant (Garoña Supervision System (SSG)), adapted to the cessation of operation declared in 2013.

The SSG is focused on nuclear safety, radiation protection and the physical security of the spent fuel storage pool. Its strategic areas coincide with those of the SISC and are based on the same security pillars as the SISC. However, the Basic Inspection Plan (BIP) has been adjusted to the plant's operating situation and only the SISC performance indicators related to radiation protection of workers and the public and emergency preparedness are applied. The BIP is complemented by other planned inspections and the results of possible reactive inspections.

Unlike the SISC, the SSG does not code findings, but rather simplifies the process by identifying "minor deviations", "findings" and "significant findings", given the lower complexity of the phenomenology associated with the spent fuel pool.

From the SISC results on the operation of nuclear power plants in operation in the year 2021, the following can be highlighted:

- In 2021, with the gradual return to normal execution of inspection programmes and with a development in the number of inspections similar to that prior to the pandemic, the number of inspection findings has also reached similar values.

- In 2021, 147 findings were categorised as green and one (1) finding as white.

- At the end of 2021 all performance indicators were green (Table 4.1.2.1.2)

- The plants were at the normal status known as Licensee Response (LR) under the SISC action matrix, with the application of standard programmes for inspection and correction of deficiencies, except for Unit II of the Almaraz nuclear power plant which in the second quarter went to Regulatory Response (RR) status due to a white finding related to risk analysis in the field of fire protection, since the risk calculation derived from a fire in the EL-11 area of the said Unit II did not consider all the hazards, having omitting that posed by the route of a cable which affects 'safe stop' ability and therefore affects the quantification of the risk of fire through the PSA in the said fire area.

- No significant cross-cutting components (CCCs) have been declared in 2021.

As regards the Santa María de Garoña nuclear power plant, an inspection finding relating to the movement of a crane with a critical load suspended over the spent fuel storage pool has been categorised as significant.

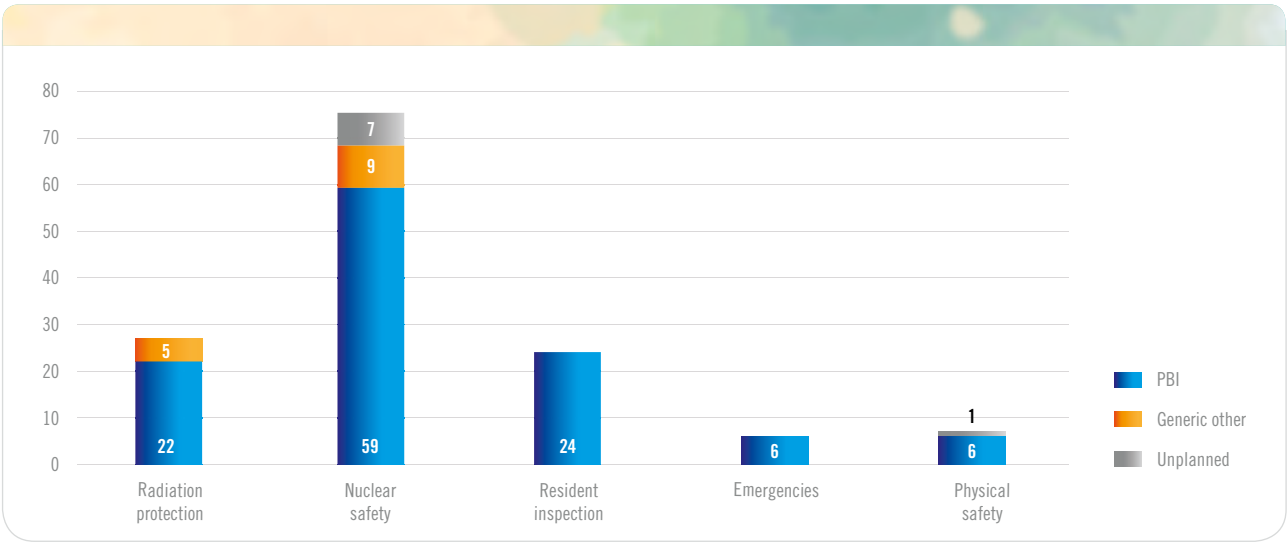
In 2021, a total of 139 inspections were performed at the seven operating nuclear reactors (SISC) and the Santa María de Garoña plant (SSG), including the security pillar, of which 131 were planned (117 of the BIP and another 14 planned non-BIP or generic type) and 8 were unplanned.

Table 4.1.2.1.1. Breakdown of inspections performed by CSN units

	TOTAL	BIP	OTHER PLANNED AND GENERIC	UNPLANNED
Radiation protection	27	22	5	0
Nuclear safety	75	59	9	7
Resident inspection	24	24	0	0
Emergencies	6	6	0	0
Physical.security	7	6	0	1
Total	139	117	14	8

Graph 4.1.2.1.1 shows the number of inspections carried out in 2021 for each operating plant, including Santa María de Garoña.

Graph 4.1.2.1.1. Inspections at operating nuclear power plants, including Santa María de Garoña in 2021



The following table shows the SISC performance indicators for the four quarters of 2021.

Table 4.1.2.1.2. Operation indicators. SISC 2021

	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
Almaraz I	Green	Green	Green	Green
Almaraz II	Green	Green	Green	Green
Ascó I	Green	Green	Green	Green
Ascó II	Green	Green	Green	Green
Cofrentes	Green	Green	Green	Green
Trillo	Green	Green	Green	Green
Vandellós II	Green	Green	Green	Green

Together with the performance indicators and the findings in each plant, the result is their position (status and analysis) in the action matrix, as shown in the following table:

Table 4.1.2.1.3. Status in the action matrix. SISC 2021

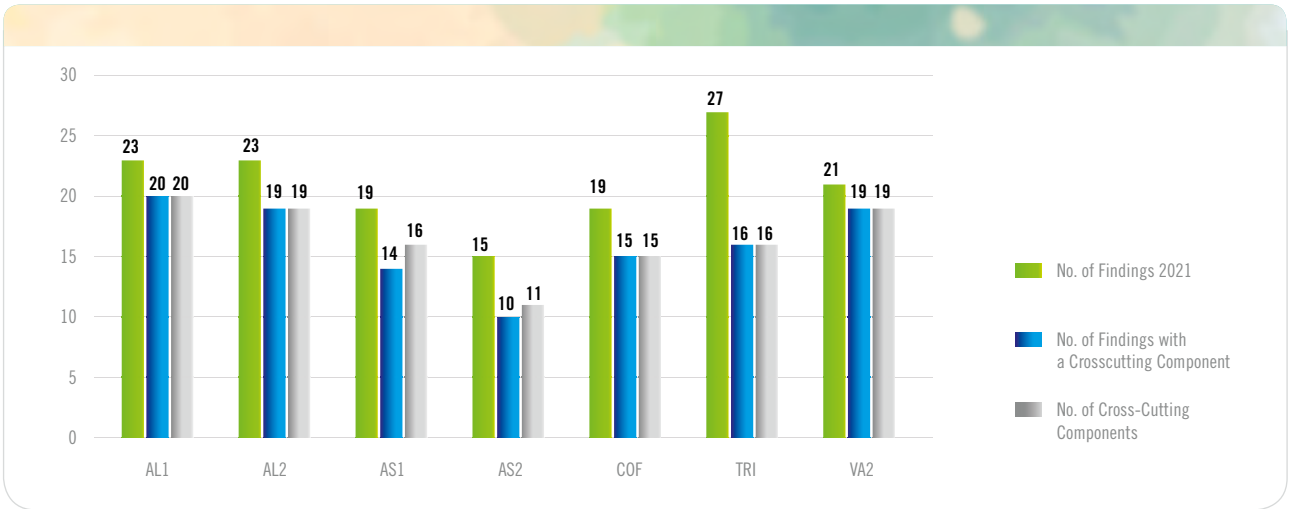
	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
Almaraz I	LR	LR	LR	LR
Almaraz II	LR	RR	RR	RR
Ascó I	LR	LR	LR	LR
Ascó II	LR	LR	LR	LR
Cofrentes	LR	LR	LR	LR
Trillo	RR	LR	LR	LR
Vandellós II	LR	LR	LR	LR

LR: licensee response.
RR: regulatory response.

The results of the SISC are published quarterly on the CSN institutional website, where additional information on the supervision and monitoring system is also available (https://www.csn.es/sisc/index.do)

Since 2017, the SISC has been completed with the monitoring of the Safety Culture of nuclear power plants, which consists of two parts: the crosscutting components and the Action Matrix. The results of the crosscutting components in 2021 are represented in the graph below.

Graph 4.1.2.1.2. Total number of findings and crosscutting components in 2021, for each nuclear reactor

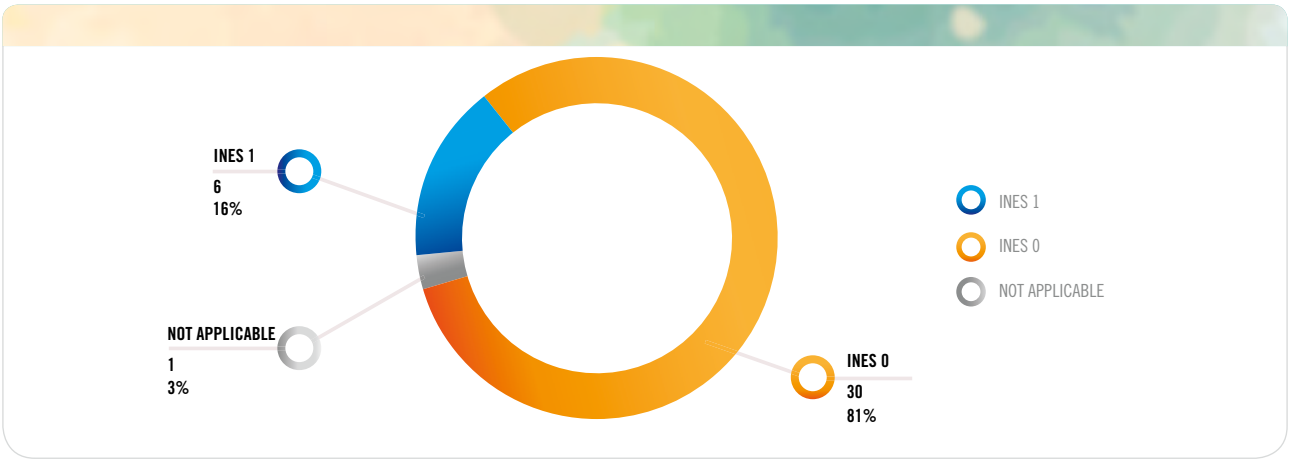


4.1.2.2. Reported events, proposals for disciplinary proceedings and warnings

In 2021 the licensees of operating nuclear power plants reported a total of 37 events, in accordance with the provisions of CSN Instruction IS-10 on event reporting criteria.

Of this total, 30 were classified as level 0 on the International Nuclear Event Scale (INES), and five (5) as level 1. The event reported by Ascó I regarding the occupational accident due to discharge and inhalation of CO2, to which the INES scale does not apply, has also been accounted for (1). The INES report for one of the events reported by Vandellós II was issued in 2022, when all the event data were available.

Graph 4.1.2.2.1. INES classification of events reported to the CSN in 2021



In 2021, the CSN issued 9 warnings and did not propose any sanctioning proceedings to the Ministry of Ecological Transition and Demographic Challenge (MITERD) regarding operating NPPs.

Table 4.1.2.2.1 summarises the relevant information on the causes that have given rise to these enforcement actions.

4.1.3. Generic issues and operational experience monitoring and analysis

A generic issue is any problem relating to safety that may affect several facilities and that entails special monitoring on the part of the CSN. Follow-up by the CSN may include dispatch of generic instructions or letters to the plants requesting analysis of the applicability of new requirements, performance of inspections and assessment of specialist areas or the inclusion of analyses in the Operating Experience (OE) reports of the plants, among other possible actions.

In 2021, no new generic matter has been opened, nor has any analysis of international operating experience been required. The CSN continues with the pilot project for the implementation of the continuous monitoring system for the new standards issued by the country of origin of the facilities. In 2021, the new regulations analysis reports for 2020 were evaluated.

Table 4.1.2.2.1 information on warnings and sanction proposals to NPP

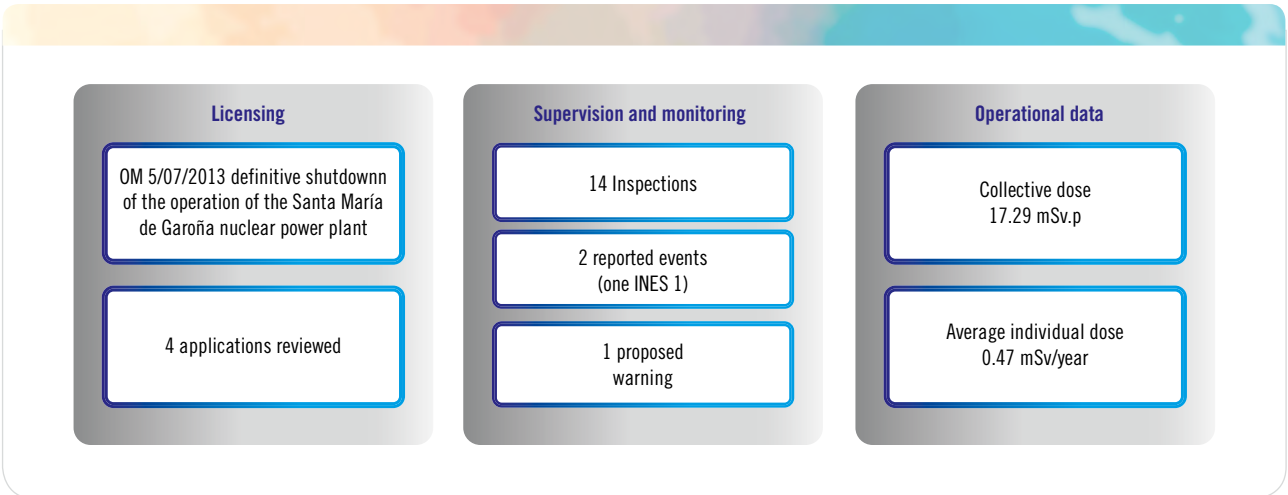
WARNINGS	
NUCLEAR POWER PLANT	
Almaraz NPP	Warning for non-compliance with article 3.2.2 of Council Instruction IS-30 on fire protection
Almaraz NPP	Warning for non-compliance with section A1 of point 5 of Council Instruction IS-10, relating to criteria for reporting events to the CSN by the nuclear power plants. Fraudulent documentation of Yokogawa recorders
Ascó NPP	Warning for non-compliance with condition 3 of the operating permits for units I and II
Trillo NPP	Warning for non-compliance with administrative rule 6.2.2.h of the FTS, on criteria to prevent shift personnel from working excessive working hours
Trillo NPP	Warning for non-compliance with Article 6.2. of Instruction IS-20 of January 28, 2009 of the Nuclear Safety Council, which establishes the safety requirements relating to spent fuel storage casks.
Trillo NPP	Warning for non-compliance with Article 9 of Council Instruction IS-21 on requirements applicable to modifications at nuclear power plants
Vandellós II NPP	Warning for non-compliance with article five of CSN Instruction IS-21 on requirements applicable to modifications at nuclear power plants and with article 4.4 of CSN Instruction IS-10 on nuclear power plant event notification criteria. Actions associated with the RCS pressure drop transient below the OTFs limit
Vandellós II NPP	Warning for non-compliance with article 7.2 of CSN Instruction IS-21 on requirements applicable to modifications at nuclear power plants
Santa María de Garoña NPP	Warning for non-compliance with the Technical Specification at Shutdown (TSS) 3/7/15

4.1.4. Specific aspects of each nuclear power plant

The most significant milestones in 2021 regarding the status of the operating nuclear power plants (including Santa María de Garoña) are graphically summarised below.

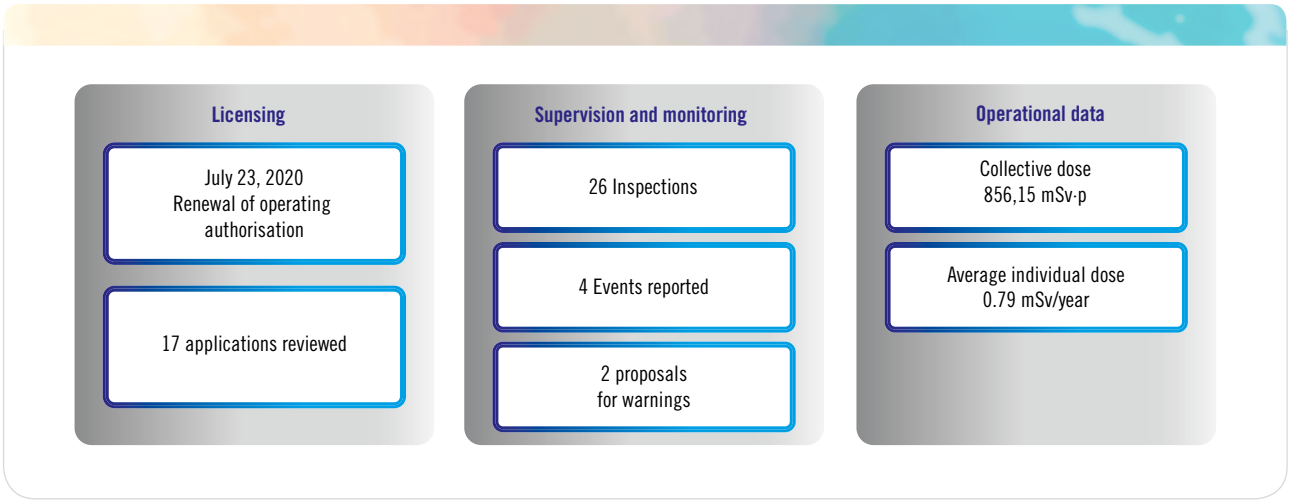
4.1.4.1. Santa María de Garoña Nuclear Power Plant

Figure 4.1.4.1.1. Relevant activities of Santa María de Garoña NPP. 2021



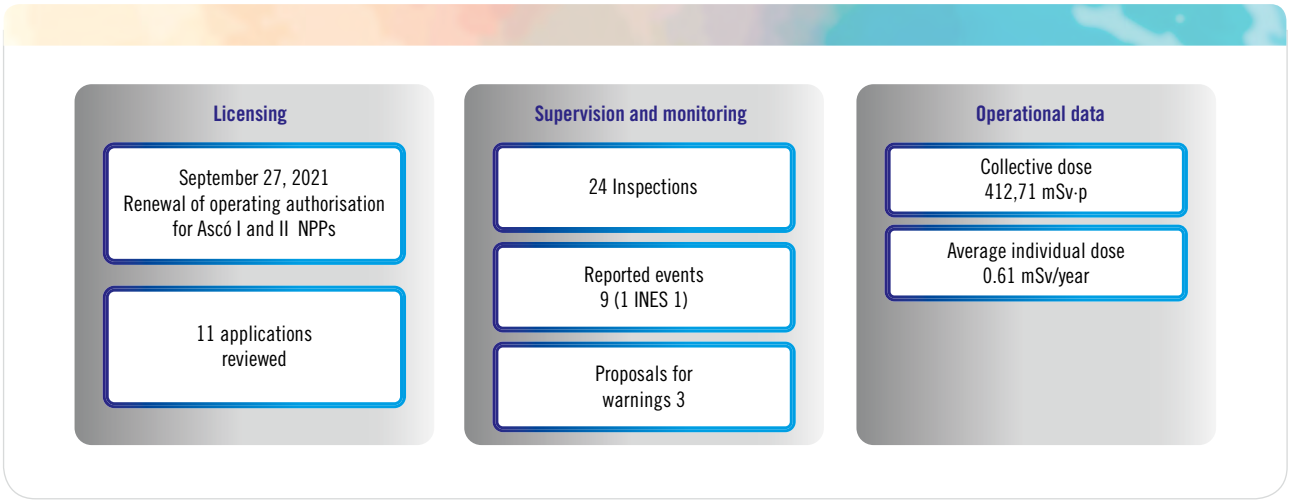
4.1.4.2 Almaraz Nuclear Power Plant

Figure 4.1.4.2.1. Relevant activities of CN Almaraz. 2021



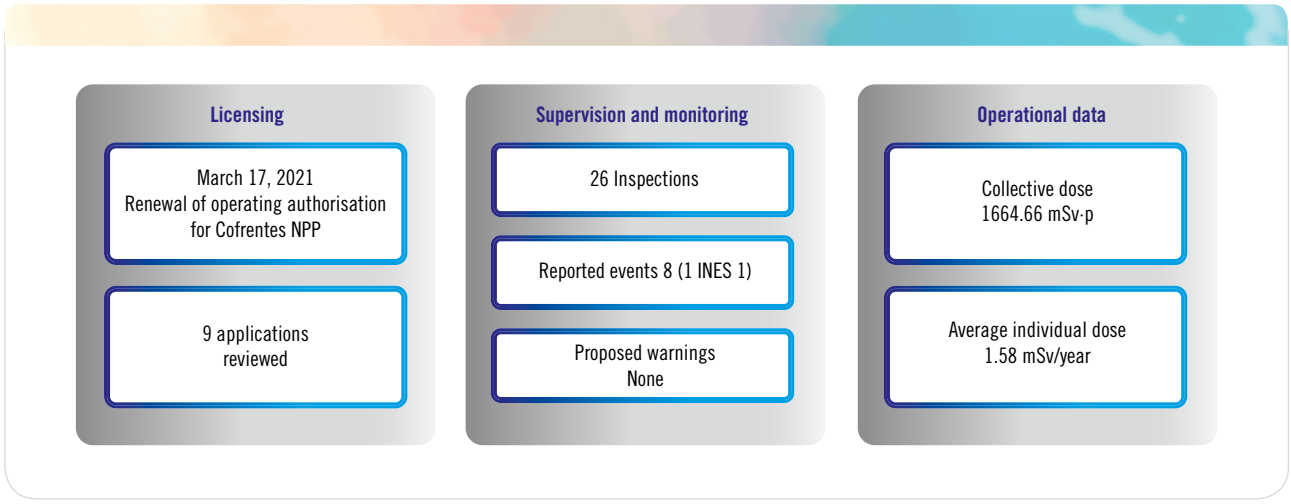
4.1.4.3. Ascó Nuclear Power Plant

Figure 4.1.4.3.1. Relevant activities of Ascó NPP. 2021



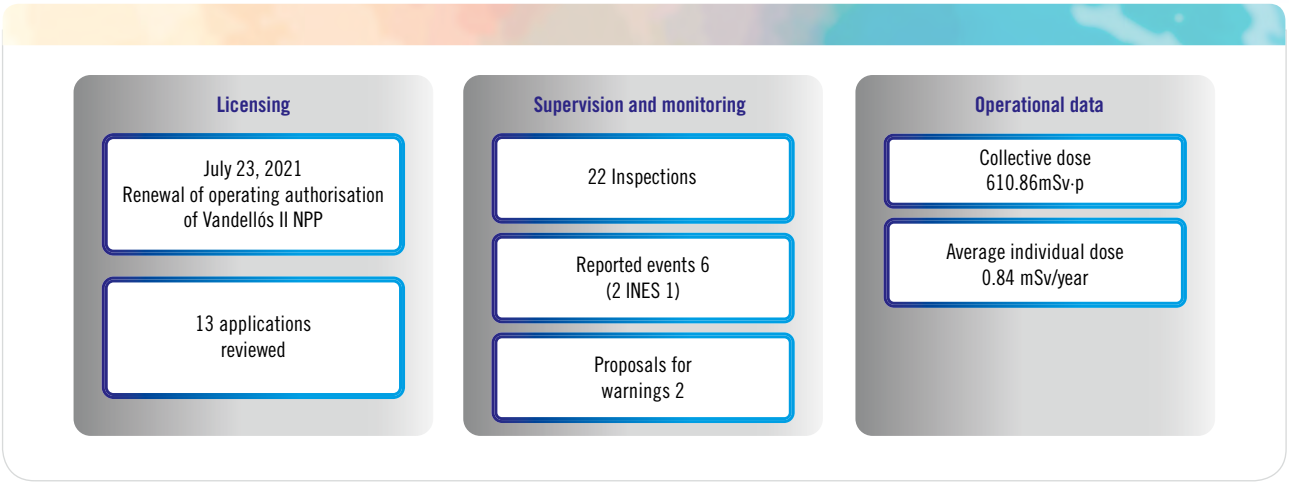
4.1.4.4. Cofrentes nuclear power plant

Figure 4.1.4.4.1. Relevant activities of Cofrentes NPP. 2021



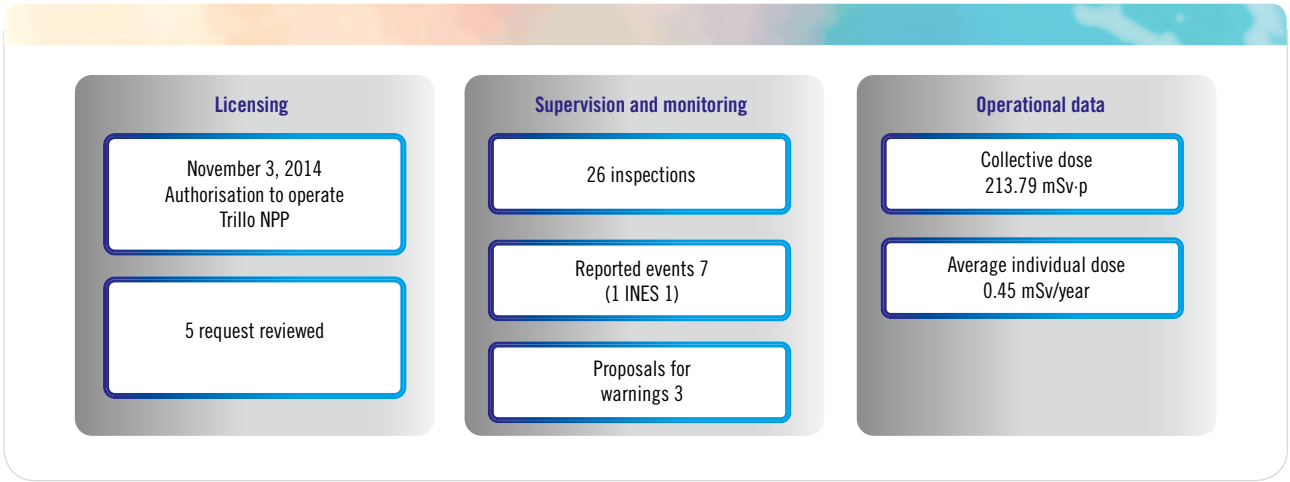
4.1.4.5. Vandellós II nuclear power plant

Figure 4.1.4.5.1. Relevant activities of Vandellós II NPP. 2021



4.1.4.6. Trillo Nuclear Centre

Figure 4.1.4.6.1. Relevant activities of Trillo NPP. 2021



4.2. Nuclear power plants in decommissioning phase

There are currently two nuclear power plants in Spain undergoing decommissioning, with varying degrees of progress: the Vandellós I NPP, located in Tarragona, and the José Cabrera NPP, in Guadalajara.

In addition, in May 2020, ENRESA applied to the MITERD for authorisation to undertake phase 1 of the dismantling of the Santa María de Garoña NPP, located in the province of Burgos, which has been closed since 2013.

Table 4.2.1 shows a summary of the nuclear power plants in the process of decommissioning, location, licensing milestones, etc.

The activities carried out at each of the facilities took place in 2021 within the required safety limits and conditions and without radiological impact to the public and the environment.

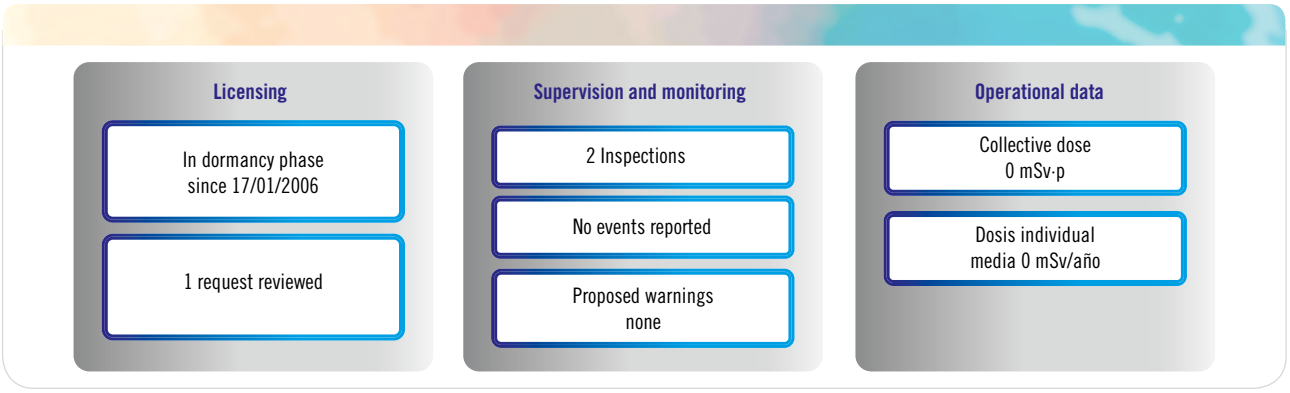
Table 4.2.1. Overview of characteristics of nuclear power plants in the decommissioning phase

PROGRAMME	FACILITY (LOCATION)	LICENSING MILESTONES	STATUS	EXECUTION
Vandellós 1 Nuclear Power Plant Decommissioning Project	Vandellós 1 (Vandellós Tarragona)	Start of operation Feb-1972 Declaration of termination July 1990 Dismantling Jan-98 Dormancy January 2005	Dormancy (dismantled to level 2)	1998-2004
Decommissioning project on the José Cabrera Nuclear Power Plant	José Cabrera (Zorita de los Canes - Guadalajara)	Start of operation Oct. 1968 Declaration of termination April 2006 Dismantling Feb. 2010	Execution of the Decommissioning and Dismantling Plan	Decommissioning Plan 97.5% executed as of December 31, 2021

The most significant milestones regarding the status of the nuclear power plants in the decommissioning phase in 2021 are summarised graphically below.

4.2.1. Vandellós I Nuclear Power Plant

Figure 4.2.1.1. Relevant activities of Vandellós I NPP 2021



4.2.2. José Cabrera Nuclear Power Plant

Figure 4.2.2.1. Relevant activities of Jose Cabrera NPP 2021

4.2.3. Santa María de Garoña Nuclear Power Plant

The start of activities of phase 1 of the dismantling of the Santa María de Garoña NPP requires the granting of four authorisations:

- Authorisation for the transfer of ownership of the facility from Nuclenor to ENRESA.
- Phase 1 decommissioning authorisation.
- Physical Protection Authorisation and approval of the Physical Protection Plan.
- Authorisation of ENRESA's Radiological Protection Service, which will perform its functions during the dismantling of the plant.

During 2021 the assessments associated with the requests for authorisation of the transfer of title from Nuclenor to ENRESA, authorisation of phase 1 of dismantling and authorisation of physical protection, for which the MITERD requested the corresponding mandatory reports issued by the CSN in June 2020, have continued.

Likewise, in July 2021, the assessments of the request for authorisation of ENRESA's Radiological Protection Service, which will perform its functions during the execution of the plant's decommissioning activities, were initiated, as well as the actions required for the granting of the diploma of Head of the Radiological Protection Service to the person proposed by ENRESA to take charge of said service.

4.3. Fuel cycle facilities, radioactive waste storage and CIEMAT facilities

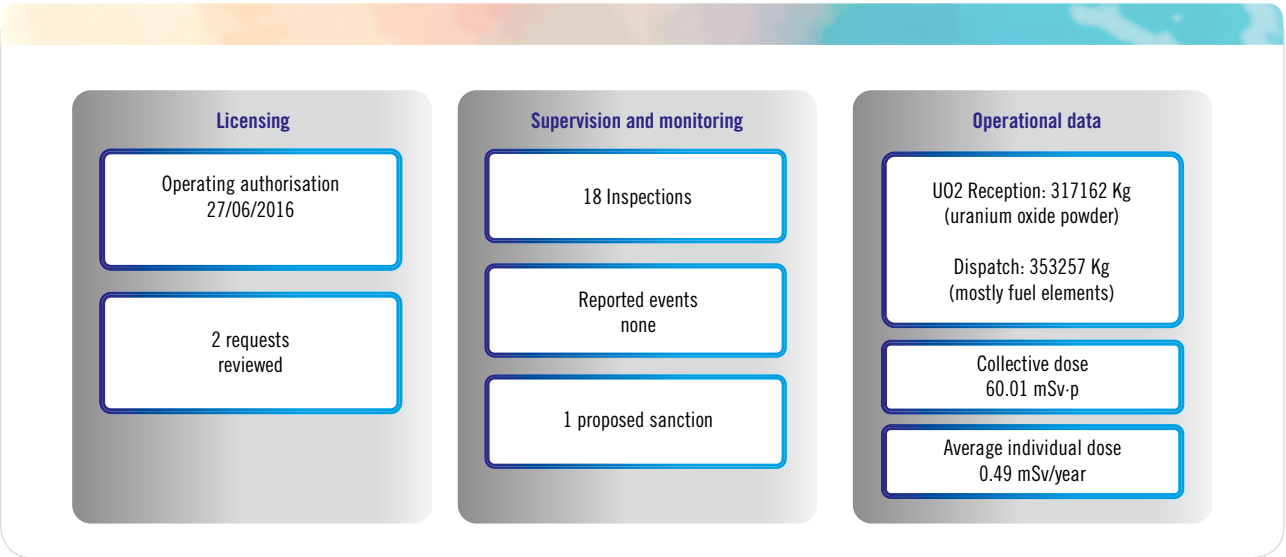
4.3.1. Juzbado Fuel assembly Factory

The Juzbado nuclear facility produces fuel elements of uranium oxide and a mixture of uranium oxide and gadolinium oxide, with a maximum u-235 enrichment of 5% by weight, for use in pressurised light water and boiling light water nuclear reactors.

4.3.2. Centralised Temporary Storage (CTS)

In 2021 there was no change with respect to this project. The authorisation process was interrupted in July 2018, following the communication by the Secretary of State for Energy of the Ministry of Ecological Transition, requesting the CSN to suspend the issuance of the mandatory and binding report on said ATC (CTS) construction authorisation.

Figure 4.3.1.1. Relevant activities regarding Juzbado fuel assembly plant 2021

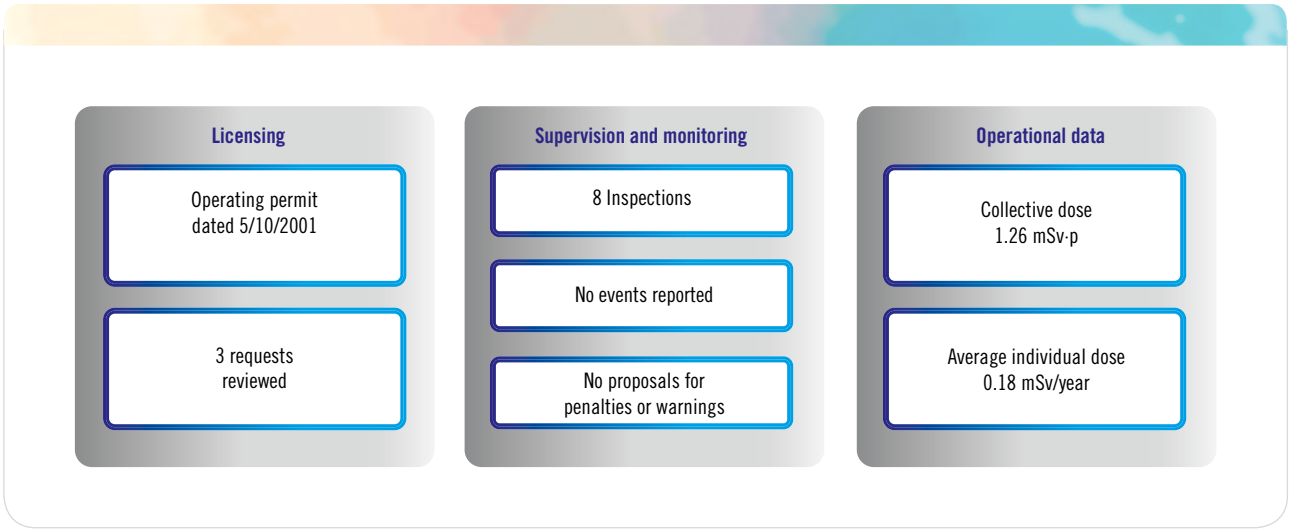


4.3.3. El Cabril Radioactive Waste Disposal

The El Cabril Disposal Facility (CA) is a nuclear facility for the disposal of low and intermediate level waste (LILW) and very low level waste (VLLW). Operation began in 1992 and it has been authorised since October 5, 2001.

Figure 4.3.3.1 shows the most relevant activities related to the El Cabril radioactive waste disposal facility in 2021

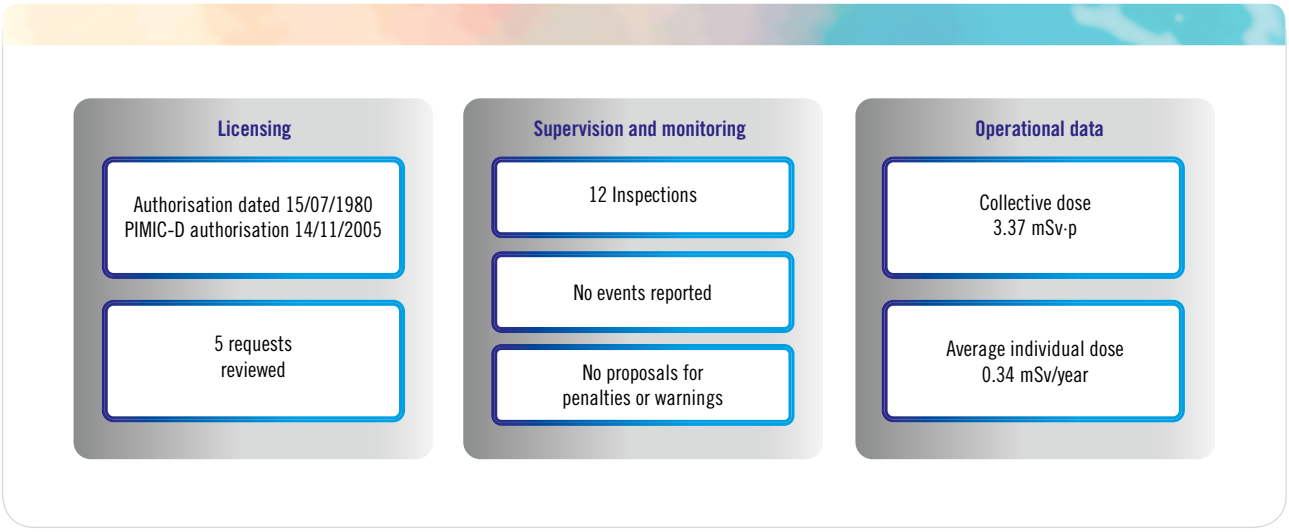
Figure 4.3.3.1. Activities relevant to the El Cabril Storage Facility. 2021



The 29th very low level waste (VLLW) cell of the East platform still does not store waste in accordance with the requirements of the CSN's Supplementary Technical Instruction (ITC) of July 22, 2020. The "Integral action plan for cell 29 of the East Platform", required of ENRESA in the aforementioned ITC, is being applied to the cell. The CSN continues to supervise the implementation of the actions of the Integral Plan, which were scheduled to be completed in 2021. The return to operation of cell 29 will require a favourable appraisal from the CSN.

4.3.4. Research Centre for Energy, Environment and Technology (CIEMAT)

Figure 4.3.4.1. Relevant CIEMAT activities. 2021



4.3.5. Uranium concentrate mills plants and uranium mining facilities

Table 4.3.5.1 summarises the total descriptive overview of all the facilities under this heading.

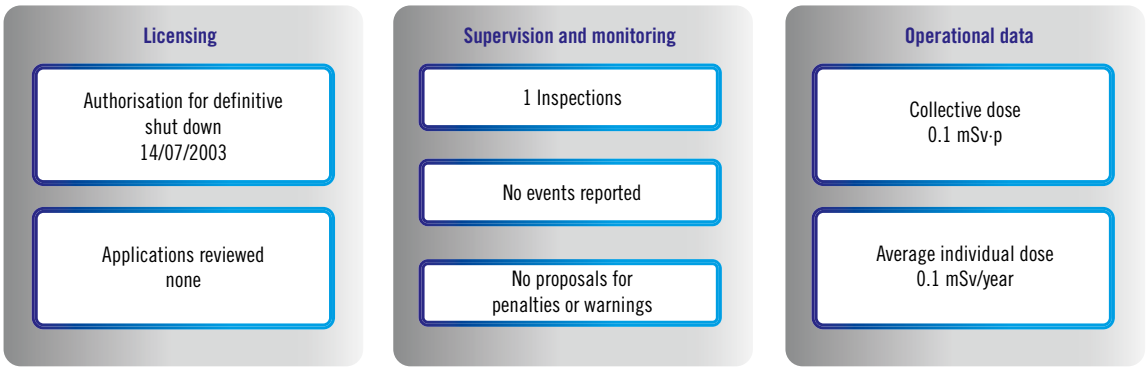
Table 4.3.5.1. Descriptive overview of uranium mining and concentrate mills plants

FACILITY		SITUATION	DESCRIPTION 2021
Saelices Mining Centre	Elefante Plant	Dismantled and restored (in compliance period since 2005)	Decommissioning and restoration plan, which includes several environmental radiological surveillance programmes, radiological protection of workers, physical protection, effluent and solid waste control. Quercus Plant: 1 inspection; Collective dose: 0.1 mSv.p and Average individual dose: 0.1 mSv/year
	Quercus Plant	Shutdown(dismantling and decommissioning permit requested in 2015) In 2019 the CSN required Enusa to submit a new revised proposal for the documentation In 2021 Enusa submitted the new proposal to the CSN, which is currently being evaluated.	The mining operations are being restored and a groundwater and structural stability monitoring plan is being implemented. In October 2021, there was a follow-up inspection of the facility's activities
	Mining facilities	Restored in 2008	
FUA- Andújar uranium concentrate factory		Dismantled and restored (in compliance period since 2015)	Operational diverse environmental radiological surveillance programmes, radiological protection of workers, physical protection, effluent and solid waste control. Two inspections in 2021.
Old mines in Valdemascaño and Casillas de Flores (Salamanca)		Dismantled and restored (in compliance period since 2008)	The radiological surveillance programmes approved by the CSN in 2010 and 2012 are operational.
LOBO-G (Uranium La Haba mineral plant, Badajoz)		Closed in 2004 (sterile, stabilised in enclosure)	2 inspections
Retortillo (Radioactive Facility: 1st category of the fuel cycle for manufacturing U concentrates)		Prior Authorisation dated 17/09/2015 Renewal of PA December 2020 Applications reviewed: 1 (Plenary reports denial of construction permit application)	Inspections: none Events Reported: none Proposed enforcement actions: none

4.3.5.1. Quercus Plant

Figure 4.3.5.1.1 summarises the most relevant activities carried out at the Quercus plant in 2021

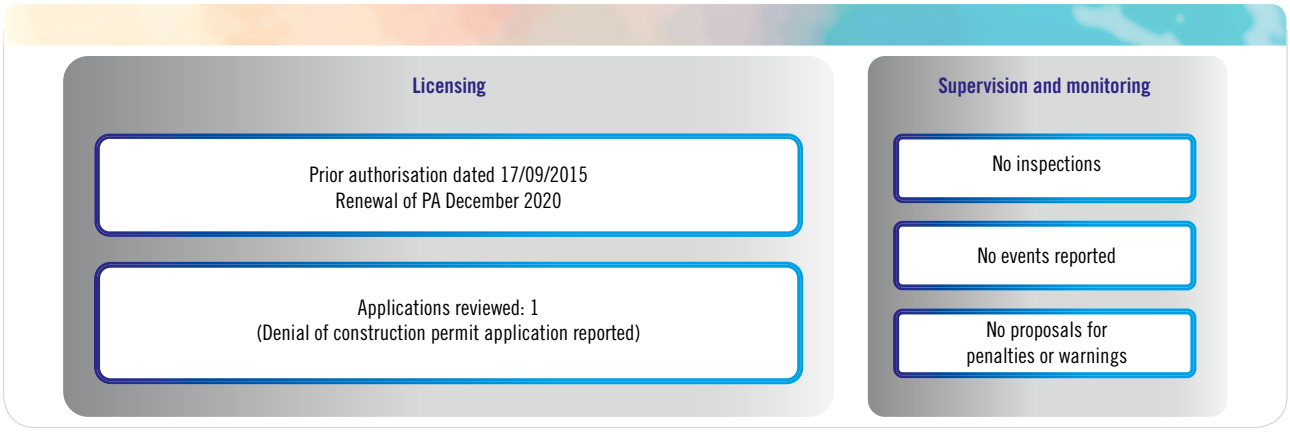
Figure 4.3.5.1.1. Activities most relevant to the Quercus Plant. 2021



4.3.5.2. Retortillo Plant

Figure 4.3.5.2.1 summarises the most relevant activities carried out as regards the licensing of the Retortillo plant in 2021.

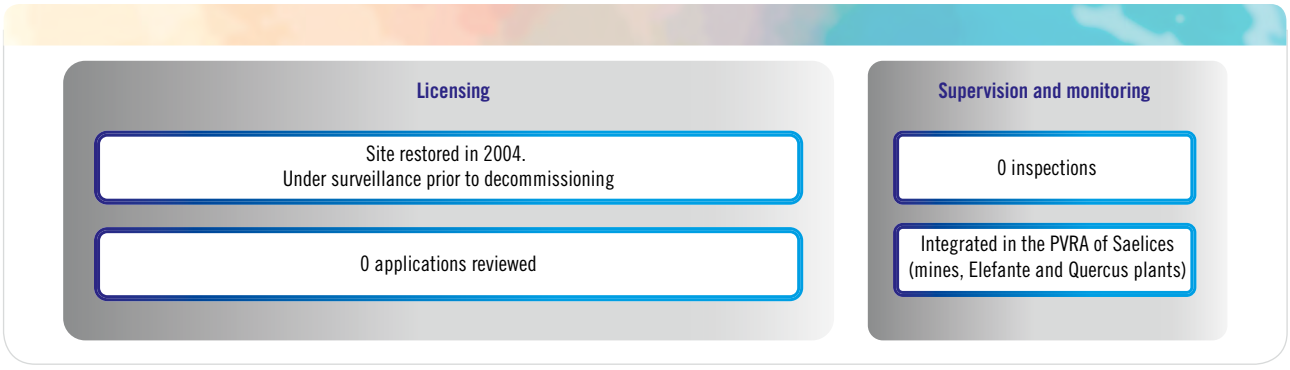
Figure 4.3.5.2.1. Activities most relevant to the Retortillo Plant. 2021



4.3.5.3. Elefante Plant

Figure 4.3.5.3.1 summarises the activities relevant to the Elefante plant in 2021.

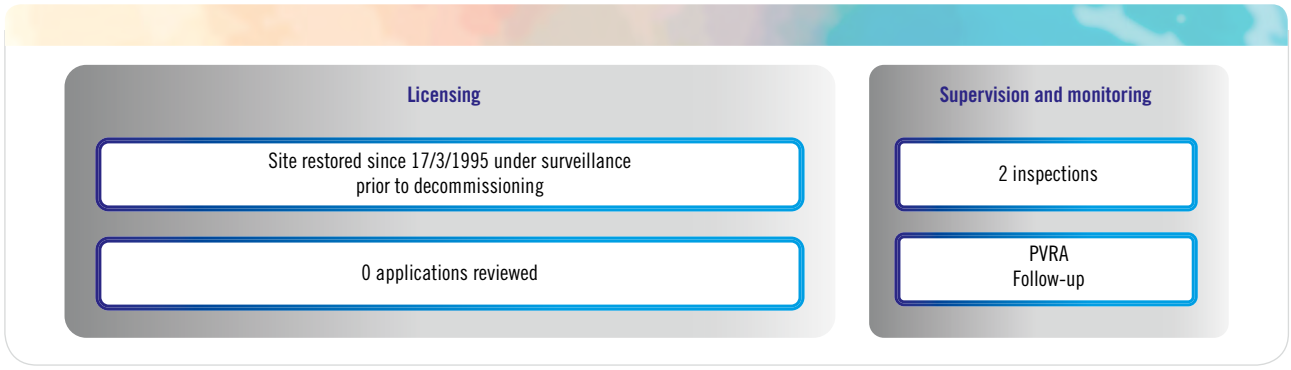
Figure 4.3.5.3.1. Activities most relevant to the Elefante Plant. 2021



4.3.5.4. Andújar Uranium Factory (Spanish acronym: FUA)

Figure 4.3.5.4.1 summarises the activities relevant to the Andújar uranium factory in 2021.

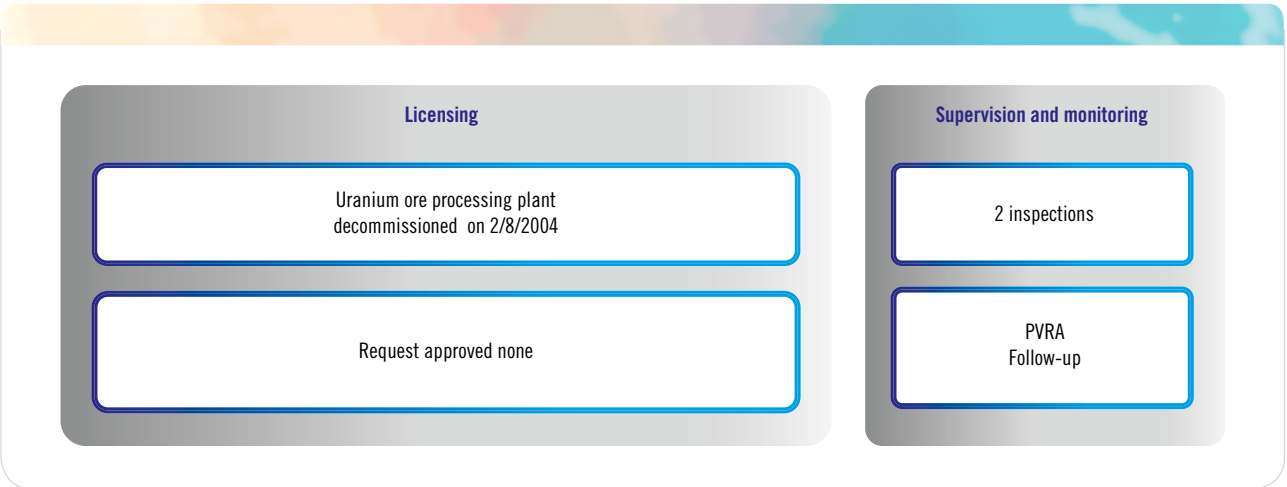
Figure 4.3.5.4.1. Activities most relevant to the Andujar Uranium Mill (FUA)



4.3.5.5. Lobo-G

Figure 4.3.5.5.1 summarises the activities relevant to the Lobo-G plant in 2021.

Figure 4.3.5.5.1. Activities most relevant to Lobo G. 2021



4.3.5.6. Retortillo site

On April 8, 2014, the Junta de Castilla y León granted Berkeley Minera España, SL (BME) a concession derived from the Retortillo-Santidad exploitation, in order to process its ore in the first-category radioactive facility Retortillo Uranium Concentrates Plant, to which it is linked.

4.3.5.7. Saelices el Chico site

In 2021, Enusa continued with the groundwater and structure stability monitoring programme to initiate the post-mining restoration phase, which was favourably appraised by the CSN on March 19, 2014.

In February 2021, ENUSA sent a new proposal for the decommissioning of the Quercus Plant, which includes the requirements requested as a result of the assessments made by the CSN.

In 2021, research and analysis continued on the project initiated in 2017 by Enusa for the construction of a pilot plant for the production of artificial 'techno-soils' within the framework of a research programme approved by the Centre for Industrial Technical Development (CDTI). The purpose of the programme is to prevent or reduce acidic water runoff from the site due to stormwater runoff.

4.3.5.8. Valdemascaño and Casillas de Flores Sites

The restoration of these sites was completed in 2007 and is currently in the compliance period, in order to verify that the restoration works are performing as planned. This period is subject to the Surveillance and Maintenance Programme (SMP), which was approved by the CSN on September 8, 2010 for the Valdemascaño mine and April 11, 2012 for the Casillas de Flores mine.

The SMP's carried out by Enusa during the compliance period were initially established with a minimum duration of three years. Following a request by the licensee to abandon work, the CSN has been extending the validity of these MMPs in both cases.

4.4. Radioactive facilities

Figure 4.4.1 shows the distribution of radioactive facilities by category and Autonomous Community at the end of 2021.

Figure 4.4.1. Distribution of radioactive facilities in Spain

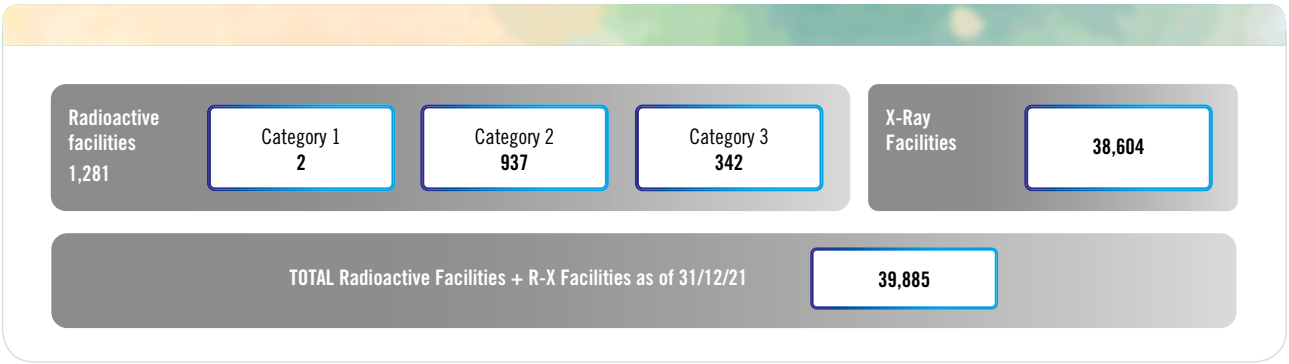
4.4.1. General aspects

As of December 31, 2021, the executive powers over 2nd and 3rd category radioactive facilities were transferred to the communities of Aragon, Asturias, Balearic Islands, Canary Islands, Cantabria, Catalonia, Castilla y Leon, Ceuta, Extremadura, Galicia, La Rioja, Madrid, Murcia, Navarra, Basque Country and Valencia, although the CSN is responsible for ensuring their operation from the point of view of occupational radiological protection of the public and environmental protection of those facilities authorised by the corresponding executive body, including X-ray facilities for medical diagnosis.

There are currently nine Autonomous Communities that have agreements with the CSN for the inspection and (in some cases) assessment of radioactive facilities: Asturias, the Balearic Islands, the Canary Islands, Catalonia, Galicia, Murcia, Navarra, the Basque Country and Valencia.

Figure 4.4.1.1 shows the number of existing radioactive facilities at the national level at the end of 2021 as a schematic.

Figure 4.4.1.1. Overall data on the number of radioactive facilities at the national level



The operation of radioactive facilities for scientific-research, medical, agricultural, commercial and industrial purposes was carried out in 2021 in accordance with the requirements established in terms of safety and radiological protection, without any undue risk situations arising.

4.4.2. Generic issues

A generic issue is defined as any problem relating to radiation protection or safety that may affect several facilities and that entails special monitoring by the CSN, which may include dispatch of instructions or circulars to all the radioactive facilities or to specific sectors to require actions, make requests or report on relevant new features.

Generic issues may also arise from the analysis of the experience of Spanish or foreign facilities, as well as from the standards issued by international or regulatory bodies in other countries. The CSN has a Panel for the Review of Operating and Regulatory Experiences in Radioactive Facilities and Incidents (PIRA) made up of CSN specialists in the field who meet periodically in order to review such experiences, determine their applicability in the Spanish context and assess the applicable actions.

It should be noted that in 2021, taking advantage of the widespread use of telematic meetings via videoconference, all assignment inspectors from the Autonomous Communities were invited to participate in the PIRA meetings.

Table 4.4.2.1 below summarises the generic actions carried out by the CSN in 2021.

Table 4.4.2.1. Generic actions carried out by the CSN in 2021

GENERIC ISSUES	SITUATION 2021	ACTIONS
Radioactive facilities with feasibility problems	16 facilities under special supervision 105 facilities that have resolved their situation	Transfer of radioactive sources to: an authorised facility, to the supplier or to ENRESA

Table 4.4.2.1. Generic actions carried out by the CSN in 2021 (continued)

GENERIC ISSUES	SITUATION 2021	ACTIONS
Application of standards concerning the physical safety of radioactive sources (Instruction IS-41, by the approving the requirements concerning the physical protection of radioactive sources)	Favourable report on the physical protection plans (PPP) of 68 facilities. 87 other PPPs under assessment	
Patient protection	The DopOES Project was completed in January 2021. "Performance of a study on the application of dose reference levels (DRLs) in medical radiodiagnostic procedures in patients, used in Spanish healthcare centres, as well as their contribution to the doses received by the population"	This project has been carried out with the support of the Ministry of Health, through a specific collaboration agreement between the CSN and the University of Málaga, financed by the CSN The data obtained have already been published by the CSN on its website
	The MARRTA Project for the development of a risk model for advanced radiotherapy practices in Radiotherapy Services continued	Implementation of the requirements for the prevention of radiotherapy accidents included in Directive 2013/59/EURATOM and in Spanish Royal Decree 601/2019 on justification and optimisation of the use of ionising radiation for the radiological protection of persons during medical exposures Members of the Forum for Radiation Protection in the Healthcare Environment, the Spanish Society of Radiation Oncology (SEOR) and the Spanish Society of Radiology, Radiotherapy and Nuclear Medicine Technicians (AETR)

4.4.3. Licensing, inspection, monitoring and control of radioactive facilities

Table 4.4.3.1 summarises the most relevant CSN activities in 2021 regarding the licensing and control of radioactive facilities.

Table 4.4.3.1. Most relevant licensing and control activities at radioactive facilities

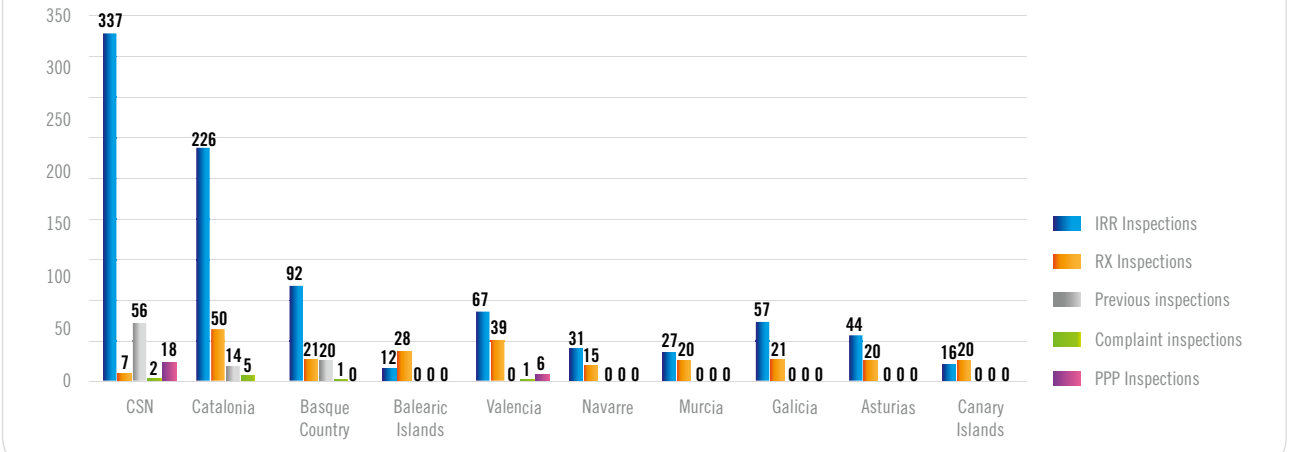
The CSN Plenary 306 decisions issued on radioactive facilities. The CSN personnel evaluated 204 of these requests and the remaining 102 requests were evaluated by the technical personnel of the respective Autonomous Communities entrusted with their functions.
1273 inspections of radioactive facilities and assessment of 1299 annual facility reports.
48 complaints about radioactive and medical radiodiagnostic facilities. By the end of the year, 40 had been resolved, with the remaining 8 in process.
16 events reported to the CSN, in accordance with Council Instruction IS-18, on criteria for the notification of radiological events and incidents at radioactive facilities. (15 classified as INES 0 and 1 classified as INES 2).
45 warnings have been issued for radioactive facilities.
The Plenary of the CSN proposed sanctioning proceedings to the executive of the Community of Madrid and to the Community of Cantabria, both for serious misconduct on the part of the licensees of the two radioactive facilities.

Table 4.4.3.2. Leading radioactive facility licensing processes by scope of application. 2021

OUTSTANDING LICENCES 2021, BY FIELD OF OPERATION	
APPLICATION	**PROCESSES**
INDUSTRIAL FACILITIES	• The high number of registrations and de-registrations of offices in gammagraphy facilities has meant reporting PPP (physical protection plan) revisions, as well as new facilities. • Modification of the radioactive research facility of the European Spallation Neutron Source Bilbao (ESS Bilbao) for the assembly and testing of components for the phased construction of a linear proton accelerator, with a final stage energy of 3 Mev.
COMMERCIAL FACILITIES	• Report for the commercialisation of equipment to be used in radiotherapy; these are self-armoured stereotactic radiosurgery systems with gyroscopic movements.
MEDICAL FACILITIES	• Modifications of radiotherapy facilities associated with the renovation of medical linear accelerators have been reported with the incorporation of new techniques such as image-guided radiotherapy (IGRT), intensity-modulated radiotherapy (IMRT), cranial (SRT) and body stereotactic radiotherapy (SBRT), volumetric modulated arc therapy (V-MAT, Rapid-Arc), Tomotherapy equipment or Cyberknife. • The first combined medical electron linear accelerator of the firm ELEKTA Unity in Spain, resulting from the merger of a medical accelerator and a magnetic resonance imaging system, has been notified of its start-up, which authorises the treatment of patients. It is located at the Carlos III Hospital, attached to the care organisation of the Hospital Universitario La Paz, in Madrid. • Regarding nuclear medicine practice, the number of requests for renewal of hybrid imaging equipment for positron emission tomography (PET-CT) or gammagraphy (SPECT-CT) with X-ray computed tomography has continued to increase. There has also been an increase in the number of requests for radioisotope procedures performed outside the facility itself (e.g. ^{90}Y in therapeutic radioembolisation procedures or ^{99}mTc or ^{125}I seeds in diagnostic procedures of tumour lesions) as well as those of radiopharmaceutical therapy(^{177}Lu).

In 2021, 1,273 inspections of radioactive facilities were carried out. Graph 4.4.3.1 shows the inspections performed by the CSN and by the Autonomous Communities with a commissioning agreement in the year 2021, distributed by type of inspection and radioactive facility.

Graph 4.4.3.1. Inspections performed by the CSN and by the Autonomous Communities with a commissioning agreement in the year 2021, distributed by type of inspection and radioactive facility



4.4.4. Coercive actions

Table 4.4.4.1 summarises the activity in relation to supervision and monitoring carried out by the CSN and the Autonomous Communities with entrustment of functions that led to coercive actions in the year 2021.

Table 4.4.4.1. Coercive actions carried out at radioactive and x-ray facilities in 2021

Warnings	CSN	30
Warnings	Basque Government	11
Warnings	Generalitat de Cataluña	4
Proposal for sanction proceedings	CSN	2

4.5. Service entities, personnel licences and other activities

Table 4.5.1 summarises the CSN's activity in 2021 in terms of this type of activity.

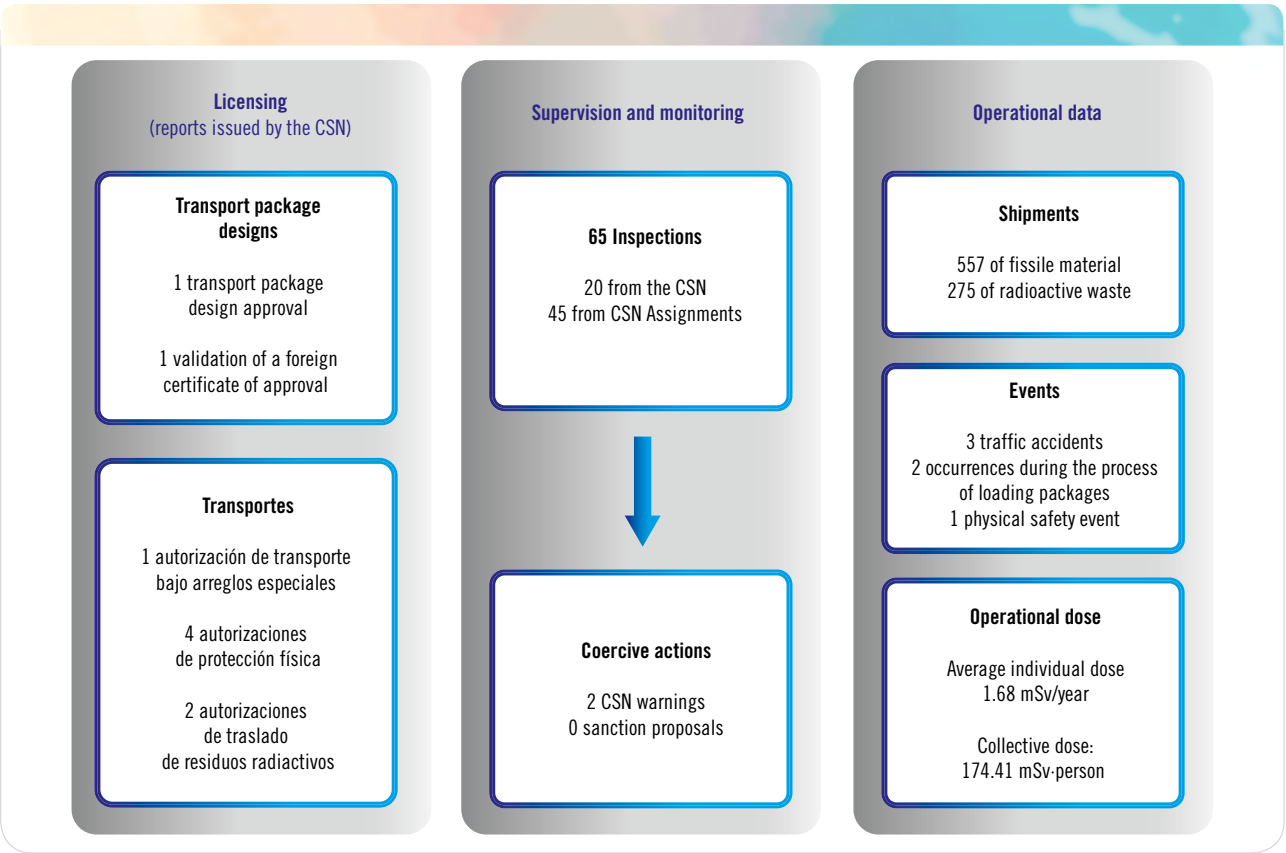
4.6. Transport of radioactive material

Figure 4.6.1 below summarises the CSN's transportation milestones in 2021, which are detailed in the sections below.

Table 4.5.1. CSN activity with respect to service entities in 2021

2021 ACTIVITY IN RELATION TO COMPANIES AND SERVICE ENTITIES		
SERVICE	**IN FORCE**	**ACTIVITY**
Radiation Protection Services (RPS)	94	• 1 new authorised service • 3 licensing inspections • 20 control inspections
Radiation Protection Units (RPTU)	43	• 1 RPTU mod report (plenary 1602) • 1 licensing inspection • 5 control inspections
Personal Dosimetry Service (PDS)	21 (external) 8 (internal)	• 2 authorisation modifications • 1 revocation of authorisation at the holder's request
External companies (contractors)	2290	• Monitoring through operational PR inspections during reloads
Medical R-X sales and support (EVAT)	367	• 13 reports of new authorisations • 13 modification reports • 1 closing report • 13 application file reports
Other Regulated Activities (ORA)	121	• 12 new entities reported • 7 authorisation modification reports
Licences and accreditations	15,673 Radioactive Facilities 174,292 R-X 267 NPPs 172 I.cycles	• Radioactive Facilities (2,023 grantings and 1 extension) • R-X (3,995 accreditations issued) • NPPs (25 grantings and 40 renewals) • Cycle facilities (5 grantings and 41 renewals)
Entities approved for Radioactive Facilities and RX courses	39 Entities IIRR courses 74 Entities RX courses	• 2 new entities approved • 14 approval modifications • 52 inspections of a total of 72 courses + 3 inspections carried out by Basque Government Commissioning.
Equipment type approval	250	• 8 reports of new approvals • 22 approval modification reports

Figure 4.6.1. CSN milestones in the area of transport in 2021



In 2021, 65 inspections were carried out specifically related to transport, 20 by the CSN itself and 45 by the commissioning of functions in the Autonomous Communities (one of them in collaboration with the CSN).

Graph 4.6.1 shows the total number of inspections carried out in 2021 by type of inspection.

Graph 4.6.1. Types of transportation inspections in 2021

4.7. Activities in facilities not regulated by nuclear legislation

In June 2010, the CSN, the Ministries of the Interior, then the Ministry of Public Works and MITECO, the State Tax Administration Agency (AEAT) and ENRESA jointly signed the *Protocol for action in the event of detection of inadvertent movement or illicit trafficking of radioactive material in ports of general interest* (Algeciras, Valencia, Barcelona, Bilbao, Vigo, Tarragona and Santa Cruz de Tenerife), constituting the reference framework for the radiological surveillance of goods entering Spain by sea. This protocol is often referred to as the Megaport Protocol. Since the signing of the protocol, an increase in detections has been observed, with a maximum of 9 detections in 2017 and a significant drop in detections in 2020 (one), reflecting the decrease in imports due to the decrease in industrial activity caused by the COVID-19 pandemic. This trend changes in the number of detections in 2021 (five) due to the return to industrial activity.

As a result of the application of the *Collaboration Protocol on the Radiological Surveillance of Metallic Materials* signed in 1999, in 2021 the CSN was informed of the detection of radioactivity in metallic materials on 72 occasions, totalling 2,135 detections since 1998.

A list of all the facilities that are members of the collaboration protocol on the radiological surveillance of metallic materials can be found at the following web address https://sedeaplicaciones.minetur.gob.es/ivr//Instalaciones/ConsultaPublicaIVR.aspx

In 2021 the CSN reported 25 authorisations for the transfer to ENRESA of various radioactive materials and sources, 2 of which were carried out by the Basque Government and another 2 by Catalonia. In 20 of these transfers, the requesting entity was not authorised as a radioactive facility.

Figure 4.7.1 summarises the CSN's activity in 2021 in relation to these non-regulated activities.

Figure 4.7.1. Summary of activities carried out at facilities not regulated by nuclear legislation

5. RADIOLOGICAL PROTECTION OF EXPOSED WORKERS, THE PUBLIC AND THE ENVIRONMENT

5.1. Radiological protection of workers

In 1985 the CSN created the National Dosimetric Bank, as the database in which the dosimetric records of exposed workers at nuclear and radioactive facilities are centralised.

Figure 5.1.1 summarises information on the types of records available in the National Dosimetric Bank (BDN) at the end of 2021.

Figure 5.1.1. Data contained in BDN. 2021

Summary of dosimetry data for 2021

In 2021, the number of dosimetrically controlled workers who properly replaced their dosimeters was 120,534, corresponding to a collective dose of 16,412.76 mSv.person, a value that represents 19% of the total collective dose that would be obtained by including the allocations due to administrative doses (85,870.76 mSv.person).

If only workers with significant doses are considered and cases of potential exceedance of the annual dose limit are excluded, the average individual dose in this group of workers was 0.71 mSv/year.

Figure 5.1.2 shows the number of workers and their percentage, reflecting those with dose values similar to environmental background values, those receiving doses lower than 1 mSv, 6 mSv and 20 mSv

Figure 5.1.2. Number of workers and percentage of workers as a function of the dose received

In 2021, 5 cases of potential exceedance of the annual dose limit established in the legislation were recorded, all at radioactive facilities. In all cases a process of analysis and investigation has been initiated by the CSN, which has already been completed in three of the reported cases. In one of them, it has been concluded that the dose recorded in the dosimeter was not received by the worker and, in the other two cases, it has been confirmed that the dose limit was exceeded.

Graph 5.1.1 shows the average individual dose per sector. It should be noted that the transport activity is the one with the highest average individual dose (1.68 mSv/year).

Table 5.1.1. shows the dose received by workers in each of the sectors considered.

Graph 5.1.1. Average individual dose per sectors

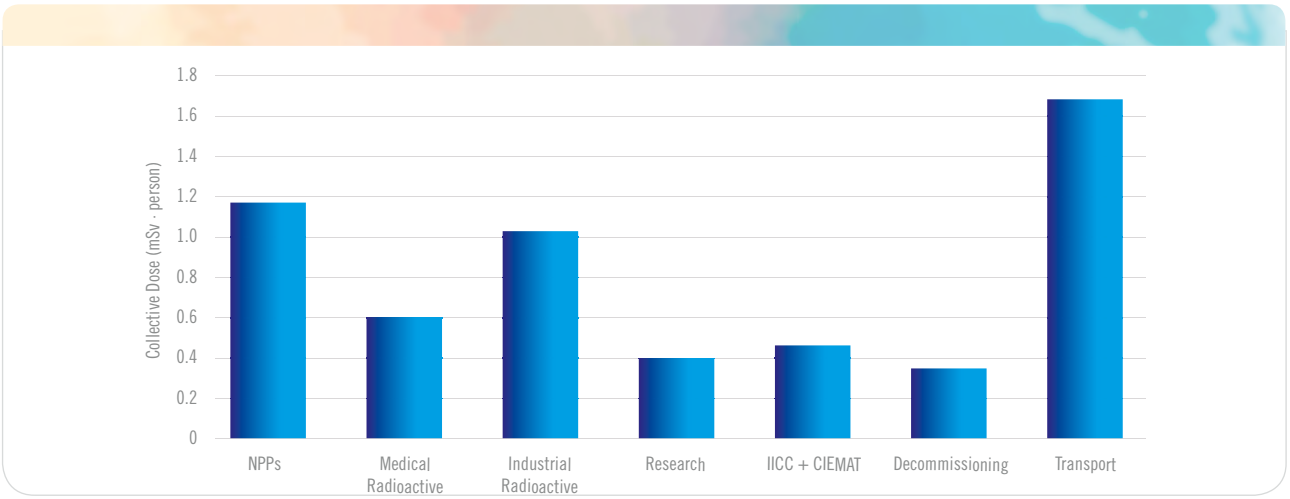


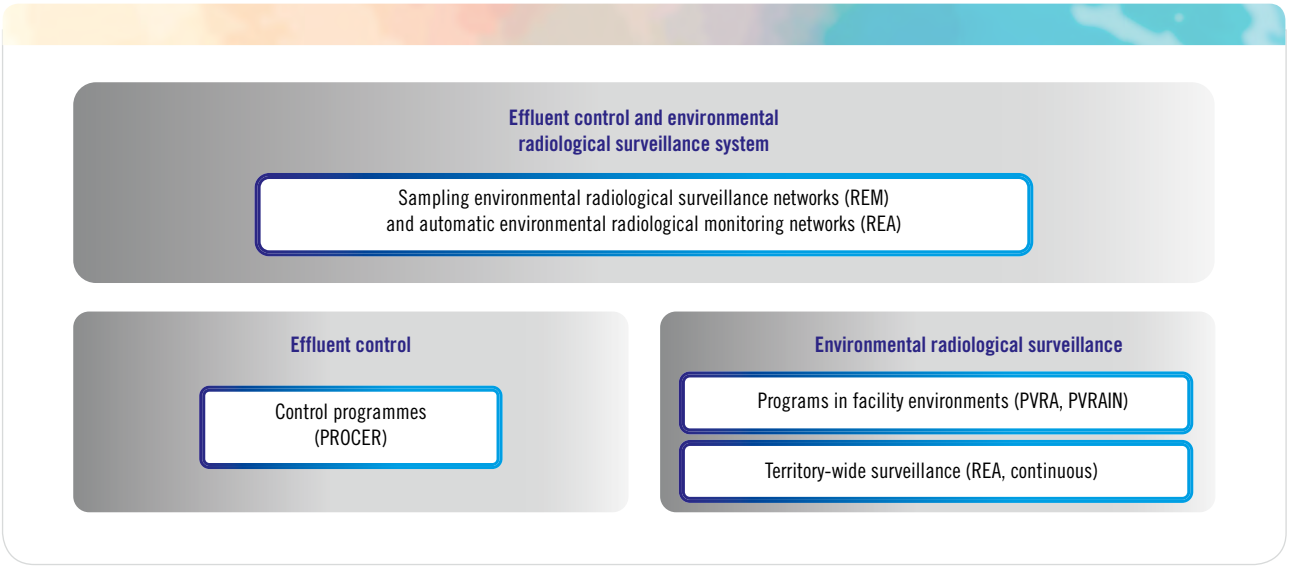
Table 5.1.1. Dose received by workers in each of the sectors covered

FACILITIES	NUMBER OF WORKERS	COLLECTIVE DOSE mSv · person	AVERAGE INDIVIDUAL DOSE mSv/year
Nuclear power plants	8,652	3,775	1.17
Fuel cycle facilities, waste disposal facilities and research centres (CIEMAT)	1,094	65	0.46
Radioactive facilities			
Medical	96,336	10,633	0.60
Industrial	7,564	1,476	1.03
Others	7,120	279	0.40
Facilities in the dismantling and decommissioning phase	215	9	0.35
Transport	176	174	1.68

5.2. Control of releases and environmental radiological surveillance

Figure 5.2.1 outlines the most important activities related to effluent control and environmental radiological monitoring.

Figure 5.2.1. Highlights of activities related to effluent control and environmental radiological surveillance



In 2021 the effective doses due to liquid and gaseous radioactive effluents discharged from nuclear facilities, estimated with realistic criteria for members of the public, in no case exceeded 1.0% of the authorised limit (0.1 mSv in 12 consecutive months).

Regarding the environmental radiological surveillance plans (ERSP), the results for 2020 are presented below, since it is not possible to have the results for 2021 at the time of issuing this report, due to the time required for the processing and analysis of the samples.

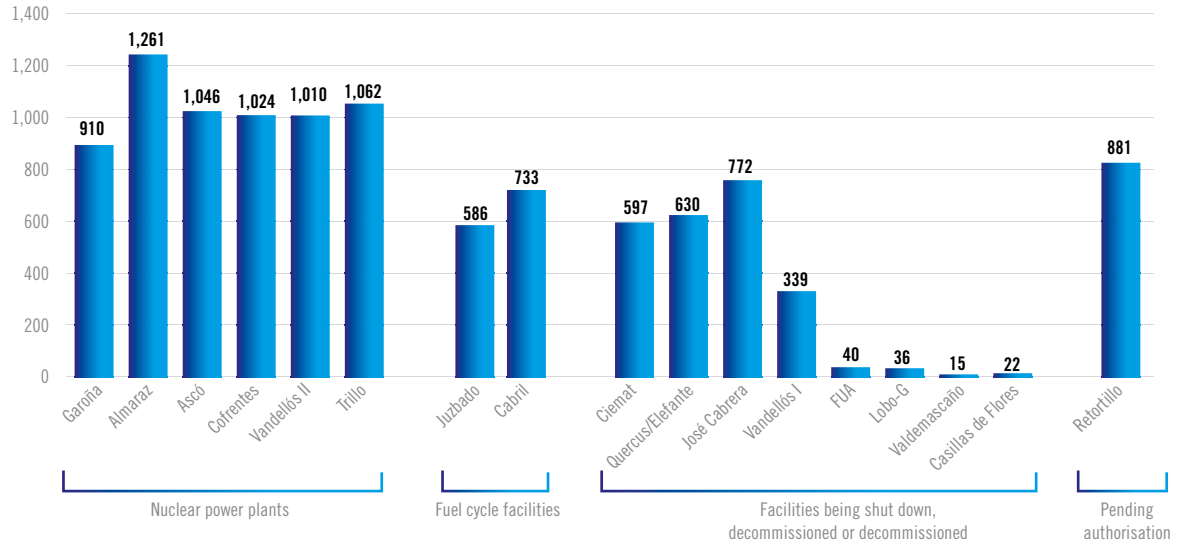
The results of the ERSPs for the 2020 campaign were similar to those of previous years and allow the conclusion to be drawn that the environmental quality around the facilities remains at acceptable radiological conditions, with no risk to human health as a result of their operation or of the dismantling and decommissioning activities carried out.

The CSN carries out independent environmental radiological surveillance programmes (ERSPs), the volume of samples and determinations of which represents around 5% of those performed by the licensees themselves. The results of these programmes for the 2020 campaign did not show any significant changes from those obtained in the corresponding programmes of the licensees.

By visiting the CSN website and selecting "Environmental values. REM and ERSP": https://www.csn.es/kprGisWeb/consultaMa- paPuntos2.htm, the data on environmental radiological monitoring in Spain can be accessed.

Graph 5.2.1 below summarises the ERSP data for the 2020 campaign.

Graph 5.2.1. No. of samples of the PVRA of the 2020 campaign



In addition to surveillance around the facilities, the CSN carries out nationwide environmental surveillance by means of a surveillance network, known as REVIRA, in collaboration with other institutions. This network comprises automatic stations for the continuous measurement of atmospheric radioactivity (REA), and sampling stations where samples are collected for subsequent analysis (NSS).

The measurements recorded in 2021, both in the surveillance network managed by the CSN and in the regional networks, were in accordance with the environmental radiological background values, indicating the absence of radiological risk for the population and the environment.

In 2021, no event involving radioactive contamination occurred inside or outside Spain that required the specific monitoring of the national network of sampling stations, and the development of the sampling and analysis programmes was maintained following their usual scope and without incidents in their operation.

It should be noted that in 2021, the only notable event that required more exhaustive monitoring of the results of these surveillance networks occurred in the months of February-March and was due to atmospheric phenomena involving the arrival in Spain of Saharan dust. The monitoring of the results obtained in the high-flow air samplers of the high-sensitivity monitoring network was especially intensified, and the detection of caesium-137 activity at trace level was detected in some stations, concluding in any case that the inhalation of the radioactive material transported by the cloud to Southern Europe, including Spain, was not significant from the point of view of radiological protection. Otherwise, the sampling and analysis programmes have continued with their usual scope and without any incidents in their operation.

EURATOM Article 35 Verification Missions

The European Commission carries out verifications of radiological monitoring systems in air, water, soil and food in all Member States of the European Union on the basis of Article 35 of the EURATOM Treaty which states that:

Each Member State shall establish the necessary facilities to carry out continuous monitoring of the levels of radioactivity in air, water, soil and foodstuffs to ensure compliance with the basic standards. The Commission shall have the right of access to these facilities to verify their operation and effectiveness.

The table below shows the history of the 35 EURATOM Treaty verification missions carried out in Spain by the EC.

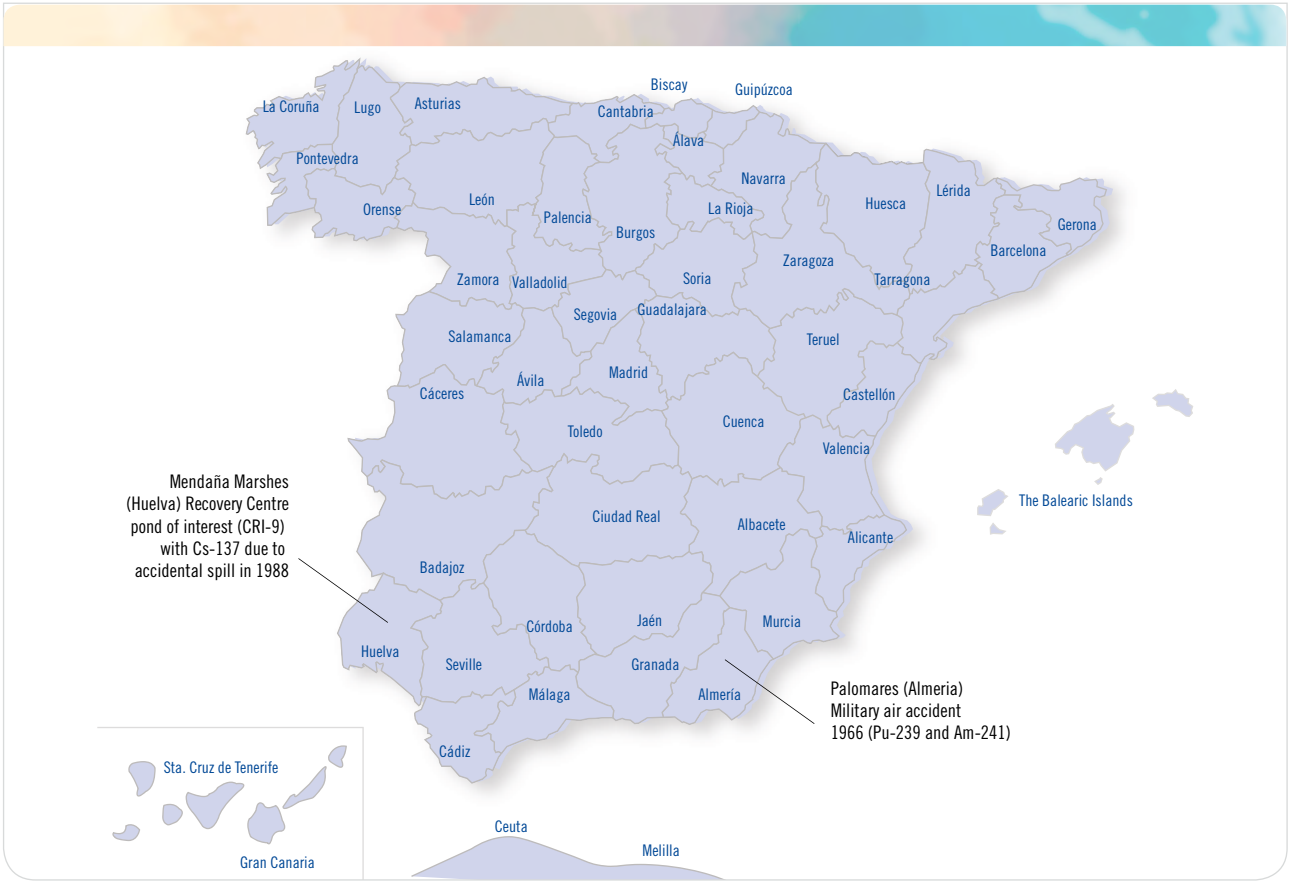
Table 5.2.1. History of EURATOM Article 35 verification missions to Spain

YEAR	FACILITY	LABORATORIES	OTHERS
2004	Trillo NPP (Guadalajara)	Environmental Measures (Burgos) CIEMAT URAyVR (Madrid)	SALEM-CSN (Madrid)
2007	Cofrentes NPP (Valencia)	University of Valencia Polytechnic University of Valencia	REM stations (Cedex and CSN) REA Stations (CSN) RAR Stations (Civil Protection)
2008	CN Ascó		
2009	Fosfoyesos (Huelva) CRI-9 (Huelva)	University of Huelva University of Seville Citius (Seville) CIEMAT URAyVR (Madrid) Geocisa (Madrid)	
2010	Palomares (Almería)	Ciemat (Almería)	
2012	Quercus and Elefante (Salamanca) Valdemascaño mine (Salamanca) Andujar Uranium Mill (Jaén) La Virgen Mine (Jaén)	University of Salamanca ENUSA Juzbado (Salamanca) ENUSA Saelices (Salamanca) University of Granada University of Seville	REM Stations (CSN) REA Stations (CSN) RAR Stations (Civil Protection)
2018	Almaraz NPP (Cáceres)	University of Cáceres	Alert Centre (Extremadura Community) RAE and RARE Stations (Extremadura Region) REM Stations (CSN) REA Stations (CSN)
2019	Palomares (Almería)	Ciemat-RARE (Madrid) Ciemat URAyVR (Madrid)	
2021	Santa María de Garoña NPP (Burgos)	Environmental Measures (Burgos)	RAR Stations (Civil Protection) REA Stations (CSN)
2021	Marine environment of the Cantabrian Sea and Galician coasts	Cedex (Madrid)	

5.2.1. Site-specific surveillance

Although this type of site is dealt with in section 5.3 of this report, this section singles out the Palomares and CRI-9 sites where the contamination is the result of accidents and for which the CSN has established specific surveillance programmes in the areas indicated in figure 5.2.1.1, where there is residual contamination due to different reasons, which are described below.

Figure 5.2.1.1. Areas with specific surveillance programmes



Environmental radiological surveillance in the Palomares area

In 1986 the CSN was assigned the task of monitoring the surveillance plans in the Palomares area, with CIEMAT being responsible for the technical execution of the Environmental Radiological Surveillance Programme (ERSP), with the obligation to report periodically to the CSN on the results obtained. The current Palomares ERSP was approved in 2012 and includes the collection and analysis of samples of air, rainwater or dry deposition, soils, animal food, crops, and different types of water, indicator organisms and sediments.

In 2021 CIEMAT provided the CSN with the annual report corresponding to the 2020 results, which show that the residual contamination of Palomares remains within the range of values of previous campaigns.

In 2021 the CSN continued to supervise and control the results of the Palomares ERSP. The programme includes the measurement of americium-241 by gamma spectrometry and plutonium-239+240 by alpha spectrometry, thus recovering these plutonium analyses which, during the 2018 and 2019 campaigns, could not be performed due to unavailability of this equipment because of some refurbishment works in the laboratory. This technique achieves lower detection levels that have allowed the detection of plutonium activity in many of the samples in which americium-241 was not detected with the gamma spectrometry technique. Plutonium-239+240 activity was detected above the LID in most of the air, rainwater and indicator organism samples, and was also detected in 5 crop samples out of 22 samples measured, also at values below the LID. In no case were the reference levels considered by international organisations (derived from an annual dose value of 0.1 mSv/year) exceeded.

Inert waste recovery centre at the Mendaña Marshes, CRI-9

Pond No. 9 of the Inerts Recovery Centre (CRI-9) in the Mendaña Marshes (Huelva) was contaminated when a source of caesium-137 melted in one of the furnaces of the ACERINOX steel plant in Los Barrios (Algeciras-Cádiz) in 1998. NORM waste generated by the Fertiberia company, which was closed in 2010, is deposited at this facility. In the process of restoring the area, fill materials manufactured by EGMASA (Empresa Pública de Medio Ambiente de la Junta de Andalucía) were used, using inert waste (slag and fumes) from the steel mill (more information in section 5.3 of this report).

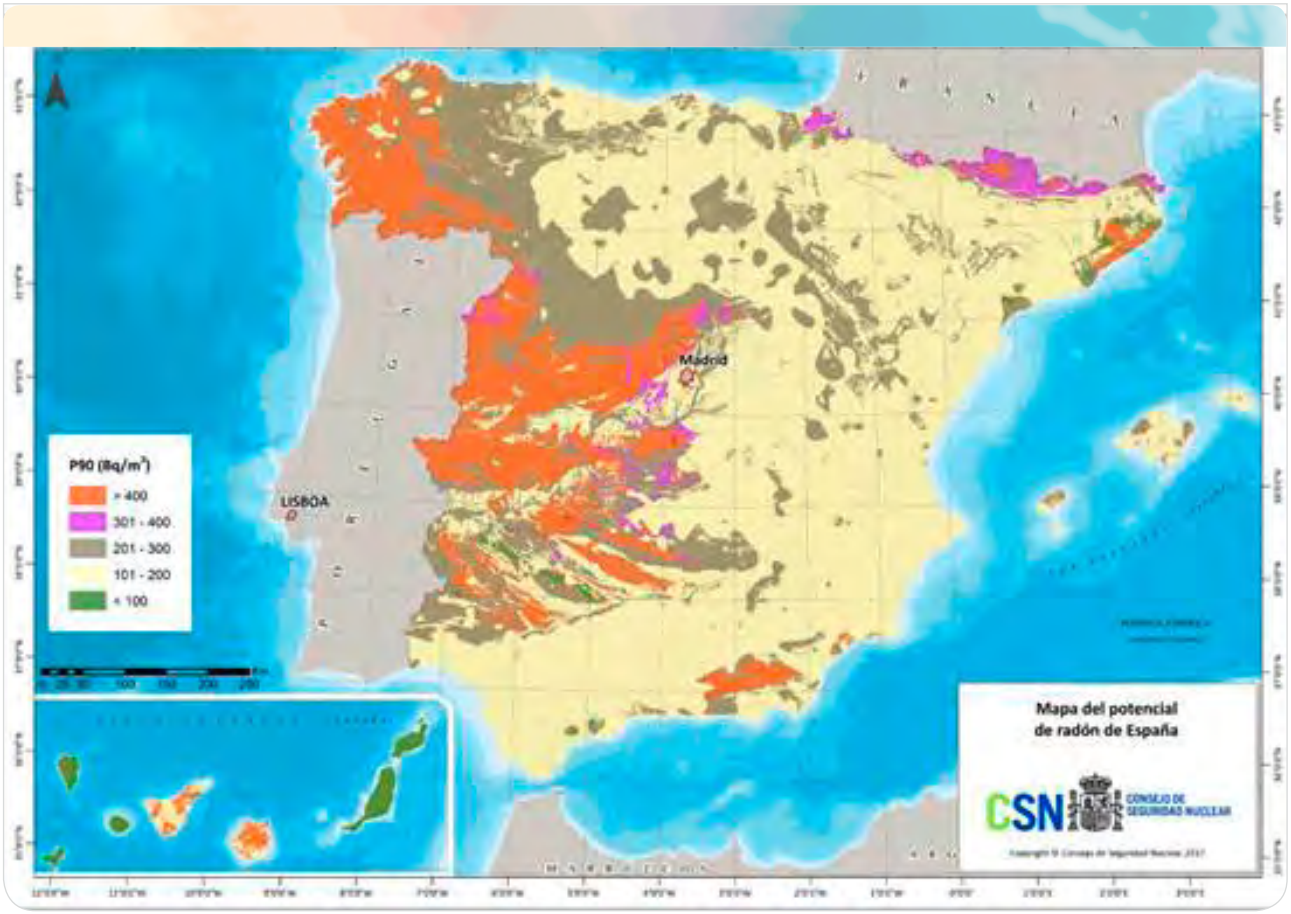
By Resolution of the Directorate General of Energy Policy and Mines of January 15, 2001, the permanence of the radioactive material in the area was authorised by spreading a layer of clay over the contaminated spill fronts and establishing a ERSP to verify the limitation of the radiological impact on the environment.

Each year the CSN analyses and evaluates the ERSP results report, in addition to supervising and controlling its execution. As part of the supervision and monitoring processes, the CSN carries out an annual inspection of the development of the ERSP.

5.3. Protection against natural sources of radiation

The maps of natural gamma radiation (MARNA) (https://www.csn.es/mapa-de-radiacion-gamma-natural-en-espana-marna) and radon potential (https://www.csn.es/mapa-del-potencial-de-radon-en-espana), developed by the CSN, make it possible to visualise, respectively, the existing levels in Spain of exposure to gamma radiation emitted by the Earth's crust and to radon gas (see figure 5.3.1). This last map is the basis for the zoning by municipality established by the Technical Building Code (Basic Document HS, section HS 6 "Protection against Radon Exposure") in order to determine which types of construction solutions against radon shall be incorporated in buildings.

Figure 5.3.1. Map of Spain's radon potential



In addition to these natural sources of radiation, certain industrial activities process materials containing naturally occurring radionuclides and alter their initial concentrations. These materials are called NORM and may have a radiological impact on human health or the environment.

The table below summarises the most relevant activities carried out in 2021 .

Table 4.4.3.1. Most relevant licensing and control activities at radioactive facilities

CSN ACTIONS RELATED TO NORM INDUSTRIES IN THE YEAR 2021
Nine inspections regarding control of natural radiation exposures; of these, three related to the control of industries processing naturally occurring radioactive material (NORM) and six to workplaces with radon exposure.
As regards lasting exposures and the management of land affected by radioactivity of natural origin (NORM), the company Tragsa (the public company in charge of carrying out the work) notified the CSN in 2020 of the completion of the dredging and sludge treatment works at the Flix reservoir. In 2021, the CSN evaluated the potential doses associated with the re-integration of the water contained in the table stake enclosure into the Ebro River, concluding that such re-integration can be carried out, subject to a series of conditions regarding the duration of the process and the minimum flow of the river.
In December 2020, the CSN received the documentation corresponding to the decommissioning project for the phosphogypsum ponds in the municipality of Huelva and the basic remediation project for the "El Hondón" site (Cartagena). The initial assessment of the documentation resulted in a request for additional information, which was answered by the entity in September 2021
As part of the ordinary environmental impact assessment procedure related to the authorisation file for the sealing and definitive abandonment of the "Castor" natural gas storage wells, the Sub-Directorate General for Environmental Assessment of MITERD requested that the CSN evaluate the documentation submitted by Enagas. The CSN, in addition to the report submitted to this Sub-Directorate, informed that it will carry out the corresponding assessment of the radiological study submitted by the promoter in compliance with the provisions of Title VII of the RPSRI, since this is a work activity.
Several requests have also been evaluated regarding authorisation of entities providing radiation protection services regarding natural radiation
Participation took place in a licensing inspection of a RPTU that requested authorisation to provide radiological protection advice for work activities involving exposure to natural radiation, among other activities.
In the area of radon exposure, with respect to the protection of the public, Directive 2013/59/EURATOM, Basic safety standards for protection against dangers arising from exposure to ionising radiation, calls on Member States to develop radon action plans. The preparation of the future National Radon Plan is coordinated by the Ministry of Health, Consumption and Social Welfare. Pending approval of the Plan, the CSN has already initiated several of its lines of action, which will be carried out through R&D&I projects.
With respect to other areas of land affected by radioactivity of artificial origin, the activities of the technical group formed with CIEMAT and the Jarama Hydrographic Confederation have continued with the aim of sharing and expanding the available information.

Other locations affected by long term exposure

Figure 5.3.2 identifies the sites in Spain with radioactivity caused by human activities, which are briefly described below (excluding Palomares and CRI-9, described in section 5.2 above). So far, all the checks carried out by the CSN indicate that these sites do not pose a significant radiological risk.

- In the Mendaña Marshes, located in the estuary of the Tinto River in Huelva, before its confluence with the Odiel River, is the Inert Waste Recovery Centre, which contains ponds of phosphogypsum waste with the presence of Radium-226, from the former Fertiberia fertiliser factory, closed in 2010. It has an area of approximately 1,200 hectares. Pond No. 9 (CRI-9), with an area of approximately 1,600 m^2, contains Caesium-137, as a result of the dumping of ash from Acerinox in which a radioactive source had melted.

- In the area of El Hondón, in Cartagena (Murcia), with an area of approximately 108 hectares, there are deposits of phosphate sludge with some presence of uranium-238, also from an old fertiliser factory.

- At locations in several municipalities in Madrid and Toledo, on the banks of the Canal Real del Jarama, there are eight trenches of varying length and depth known as the Banquetas del Jarama where there is some presence of fission products resulting from a dumping accident in 1970 and where the artificial isotopes caesium-137 and strontium-90 have been identified.

- The Ebro River reservoir located in Flix, Tarragona, contained phosphate sludge containing uranium-238 from the fertiliser industry. Its removal was completed during 2020.

Figure 5.3.2. Location of sites with soils exhibiting radioactivity not associated with mining

6. MONITORING AND CONTROL OF THE MANAGEMENT OF SPENT FUEL AND RADIOACTIVE WASTE MANAGEMENT

In Spain, radioactive waste is generated in nuclear and radioactive facilities distributed throughout the country, as shown in Figure 6.1.

Figure 6.1. Facilities generating radioactive waste in Spain

The waste inventory generated to date has the origin indicated in Table 6.1.

6.1. Spent fuel and high-level radioactive residues

The spent fuel generated in Spain (except for the reprocessed fuel from Vandellós I NPP, which is stored in France) is stored in the pools associated with the nuclear reactors and in the casks located in the Individualized interin Storage facilities (ITSs) existing in the Trillo, José Cabrera, Ascó, Almaraz and Cofrentes NPPs.

The ITS of the Garoña NPP has had a Commissioning Authorisation since 2018. Its planned entry into operation in 2021 has been delayed to 2022.

In 2021, the Cofrentes NPP carried out the first loading campaign of 5 HI-STAR 150 containers and its storage at the ITS.

Table 6.1. Activities producing radioactive waste

Operation of nuclear power plants (7 reactors at 5 sites), plus Santa María de Garoña NPP, in shutdown since 2013.
Operation of the Juzbado Nuclear Fuel Elements Plant (Salamanca, Spain)
Project to improve CIEMAT facilities in Madrid (PIMIC-D and PIMIC-R)
Operation of industrial, medical, agricultural or research radioactive facilities
Operation of the CA El Cabril low and intermediate level radioactive waste disposal facility (Sierra Albarrana, Córdoba)
Dismantling of José Cabrera NPP
Reprocessed fuel from Vandellós I NPP, currently stored in France and pending return to Spain.
Radiological incidents at conventional facilities, such as scrap metal recycling and remediation of affected sites.
In addition, radioactive waste may be generated by the presence of sources and other materials in facilities or activities not included in the regulatory system

As of December 31, 2021, the total number of fuel assemblies stored at nuclear power plants was 17,062 (9,593 PWR type and 7,469 BWR type). Of these:

- 14,601 (4,428 tons of uranium) are stored in pools.
- 2,461 (942 tons of uranium) are stored in containers at the ITSs.

Graph 6.1.1. shows the inventory of fuel stored in the spent fuel pools of the Spanish nuclear power plants and, where appropriate, in the existing ITSs, as of December 31, 2021.

Graph 6.1.1. Inventory of spent fuel storage facilities at Spanish nuclear power plants as of 31/12/2021 (number of fuel assemblies)

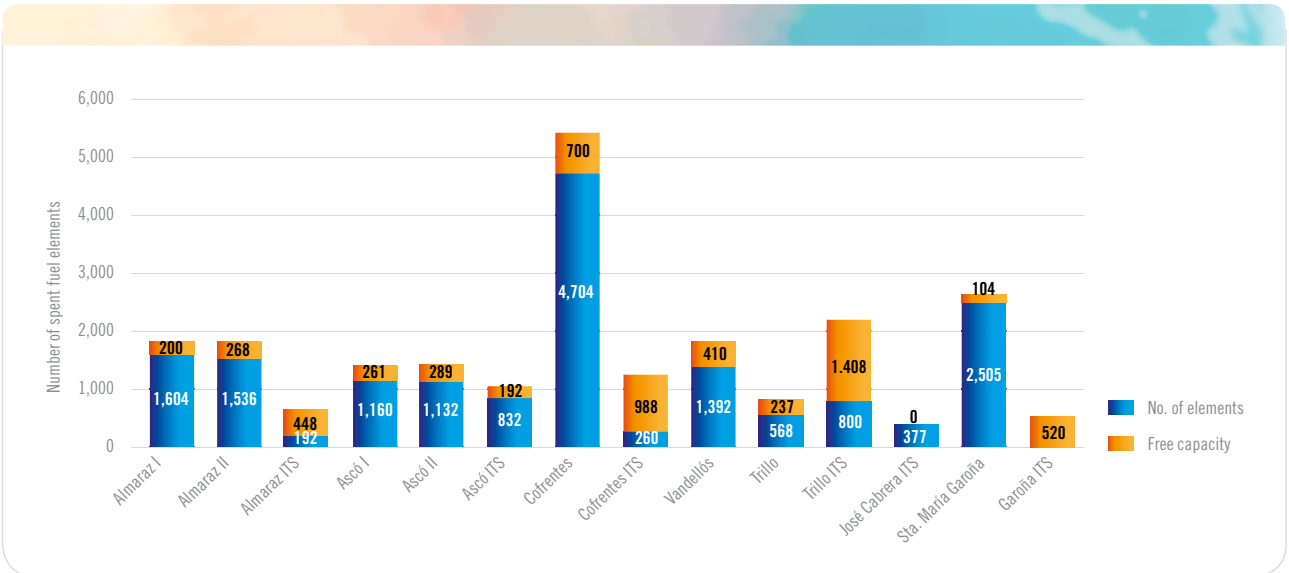
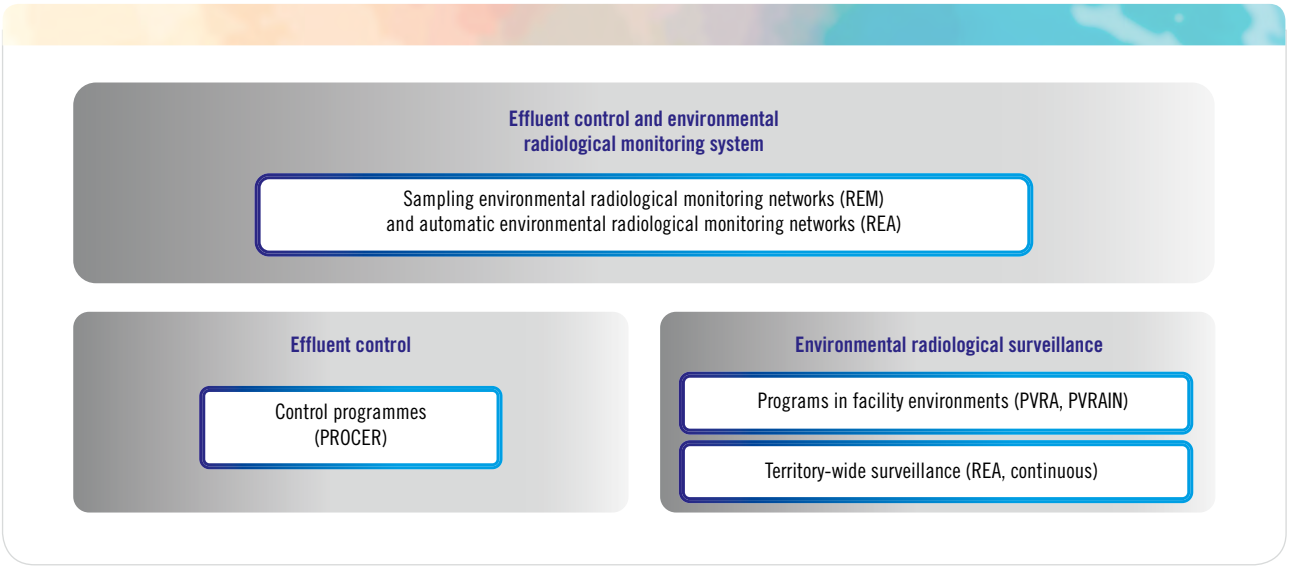


Figure 6.1.1. below summarises the main licensing, supervision and monitoring activities performed by the CSN in 2021 with respect to spent fuel management:

Figure 6.1.1.



6.2. Low and intermediate level radioactive waste

In 2021 the CSN carried out the supervision and monitoring of the different stages of the management of low and intermediate level radioactive waste (LILW) generated at the Spanish nuclear facilities, as described below:

6.2.1. Operating nuclear power plants (including Garoña, in shutdown)

In 2021 the operating nuclear power plants (and those set for definitive shutdown) generated 2516 packages of solid low and intermediate level and very low level radioactive waste (VLLW), with an estimated activity of 31.981 GBq, which were conditioned in 220-litre drums and other types of metal containers. Table 6.2.1.1 gives a breakdown of the packages by facility and those transferred to El Cabril in 2021.

Table 6.2.1.1. Radioactive waste packages (LILW and VLLW) generated at the operating nuclear power plants (and those set for definitive shutdown) and transferred to El Cabril in 2021

FACILITY	PACKAGES GENERATED	PACKAGES TRANSFERRED TO EL CABRIL
Santa María de Garoña	27	917
Almaraz I & II	638	560
Ascó I & II	349	608
Cofrentes	1,073	812
Vandellós II	283	303
Trillo	146	342
Totales	**2,516**	**3,542**

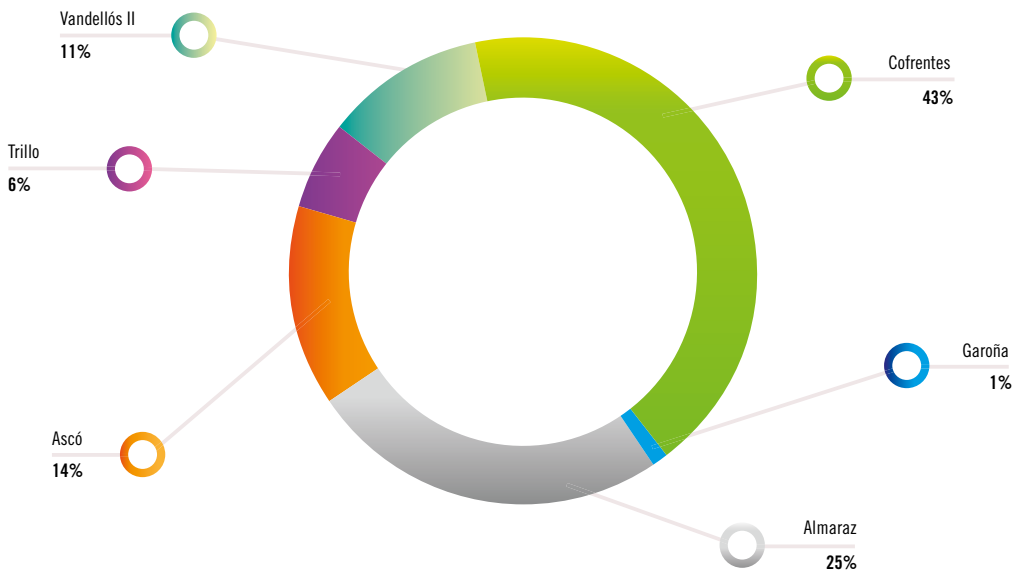
Table 6.2.1.2 shows the waste stored for each facility as well as the capacity of the temporary storage facilities and their percentage of occupancy as of December 31, 2021.

Graphs 6.2.1.1 and 6.2.1.2 show the percentage contribution of each plant to the total generation of radioactive waste packages and to the total activity content of these packages in 2021.

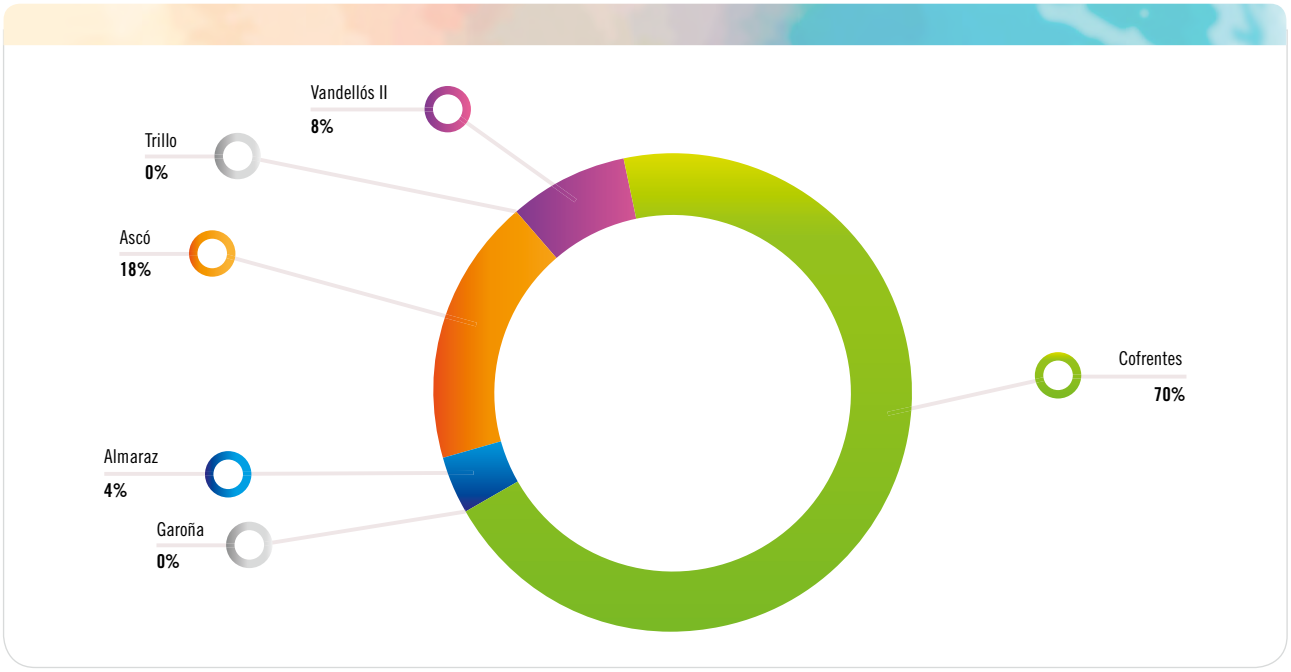
Table 6.2.1.2. Status of temporary waste storage repositories of operating nuclear power plants (and those set for definitive shutdown) as of 31 December 2021

CENTRAL	STORED PACKAGES (EQUIVALENT TO 220 LITRE DRUMS)	STORAGE CAPACITY (IN 220 LITRE DRUMS EQUIVALENT)	WAREHOUSE OCCUPATION (%)
Santa María de Garoña	3,013	10,080	29.9
Almaraz	14,203	23,544	60.3
Ascó	7,040	8,256	85.27
Cofrentes	10,521	20,100	52.3
Vandellós II	2,578	9,432	27.3
Trillo	2,907	11,500	25.3
Total	**30,763**	**82,912**	**47.2**

Graph 6.2.1.1. Distribution of the 2516 radioactive waste packages (LILW and VLLW) conditioned at operating nuclear power plants (and those set for definitive shutdown) in 2021

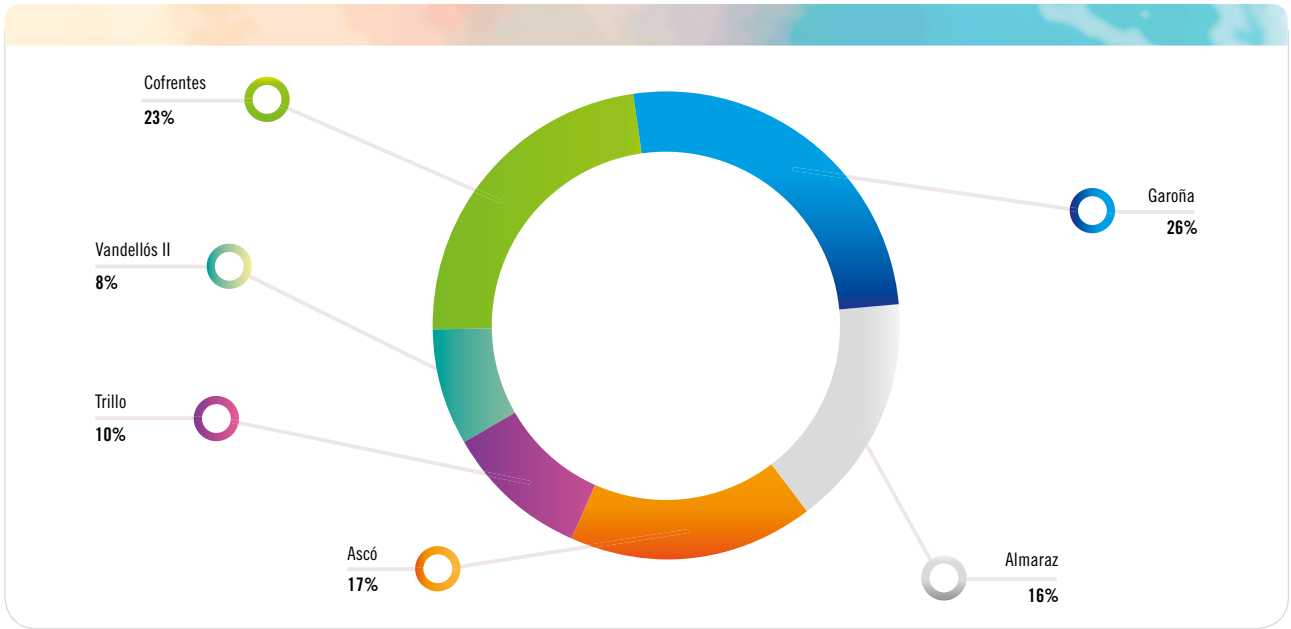


Graph 6.2.1.2. Distribution of the activity (31,981 GBq) contained in the radioactive waste packages (LILW and VLLW) generated in 2021 in operating nuclear power plants (and those set for definitive shutdown)



Graph 6.2.1.3 shows the distribution by facility of the 3542 packages of radioactive waste transferred by ENRESA to the El Cabril facility in 2021.

Graph 6.2.1.3. Distribution by facility of the 3,542 packages of radioactive waste shipped by ENRESA to the El Cabril facility in 2021



6.2.2. Nuclear power plants undergoing dismantling (Vandellós I (dormancy) and José Cabrera)

Table 6.2.2.1 includes the wastes stored in the facilities available at Vandellós I, as of December 31, 2021. In 2021, a CMD-type container was generated from compactable waste resulting from waste reconditioning at the "ATOC" warehouse. In 2021, no packages were shipped to CA El Cabril.

Table 6.2.2.1. Radioactive waste storage at Vandellós I as of December 31, 2021

STORAGE FACILITY	STORED WASTE
Temporary storage of containers (ATOC)	31 220-litre bags of debris 8 packages of non-compactable material 37 packages of 220 litres and 2 CMD-type containers of compactable material 289 CMD-type containers 303 drums of 220 litres with concrete scarifying dust 27 drums of 400 litres with concrete scarifying dust 26 CMD type containers with thermal insulation
Graphite temporary storage (GTD)	230 CME-1 type containers with crushed graphite 93 type CBE-1 containers with stirrups and absorbers 5 type CBE-1 containers with waste from the emptying of swimming pools 11 type CE-2a containers containing: 25 drums of 220 litres with non-compactable waste and 166 drums of 220 litres with graphite

CBE-1: CME-1 ENRESA shielding container. ENRESA metal container. CE-2a: ENRESA container.
MTC: Metal transport container. CMD: container for declassifiable waste material

Table 6.2.2.2 summarises waste management at José Cabrera NPP in 2021.

Table 6.2.2.2. Management of conditioned radioactive waste at the José Cabrera nuclear power plant in 2021

	GENERATED		TRANSPORTED TO EL CABRIL	
	PACKAGES(1)	STORAGE UNITS(2)	PACKAGES(1)	STORAGE UNITS(2)
Year 2021	1,754	0	1,259	0

(1) Waste conditioned in containers of different volumes (220, 400, 480, 750, 1,000 and 1,300 litres).

(2) Storage units in CE-2a and CE-2b containers.

As of December 31, 2021, José Cabrera NPP has the temporary radioactive waste storage facility (Warehouse 4) and the "Declassifiable Tent" and "DESCLA" (Spare Parts Warehouse A/B) where potentially declassifiable waste is located.

6.2.3. Juzbado Fuel assembly Factory

Table 6.2.3.1 summarises waste management at the Juzbado factory in 2021, indicating the packages generated, those transferred to the El Cabril facility and the occupancy of the facility's temporary radioactive waste storage facility as of December 31, 2021. Data on VLLW generation are detailed in section 6.3 of this report.

Table 6.2.3.1. Activities related to the management of LILW and VLLW radioactive waste at the Juzbado factory in 2021 and occupation of its radioactive waste storage facility

RADIOACTIVE WASTE MANAGEMENT ACTIVITIES	
Packages of waste generated	146 x 220-litre packages
Packages of recyclable residual materials generated	30 x 220-litre packages
Packages transferred to El Cabril	88 x 220-litre packages
Packages transferred for external recycling	6 x 220-litre packages
OCCUPATION OF THE TEMPORARY RADIOACTIVE WASTE STORAGE FACILITY	
Packages of radioactive waste.	1639 x 220-litre packages
Packages with recyclable waste materials	186 x 220-litre packages

6.2.4. CIEMAT

Table 6.2.4.1 shows the degree of occupancy of the temporary radioactive waste storage facilities of the PIMIC-Dismantling project, as of December 31, 2021.

Table 6.2.4.1. Level of occupancy of the temporary radioactive waste storage facilities at PIMIC-Dismantling December 31, 2021

WAREHOUSE	CONTAINER TYPE	NUMBER OF CONTAINERS	CAPACITY (BIG BAG MEASURING 1M³)	OCCUPATION
E11-REACTOR	Big Bag measuring 0.5m³	892	2,249	20.0%
E11-ANEXO	CMD (2m³) Big Bag measuring 0.5m	2 409	483	42.3%
CAZE ENLARGEMENT	CMD (2m³)	36	504	14.3%

6.3. Very low-level waste

6.3.1. Nuclear facilities waste

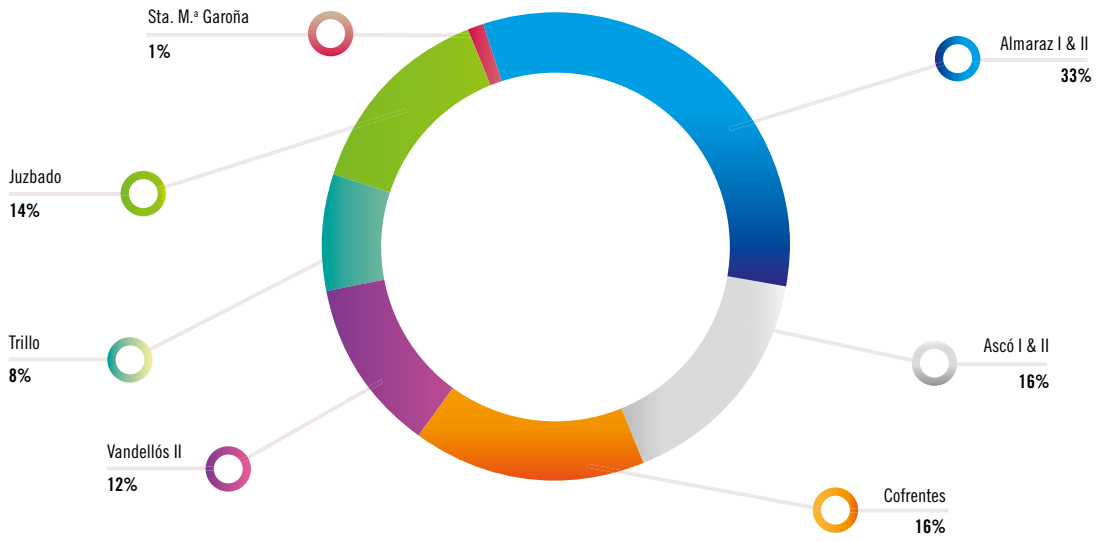
Table 6.3.1.1 details the generation of VLLW packages in 2021 at the operating nuclear power plants (and those set for definitive shutdown), as well as at the Juzbado fuel factory.

Table 6.3.1.1. Packages of very low level radioactive waste (VLLW) generated in 2021 at the operating nuclear power plants (and those set for definitive shutdown) and at the Juzbado Plant

FACILITY	PACKAGES GENERATED
Santa María de Garoña	11
Almaraz I & II	355
Ascó I & II	166
Cofrentes	172
Vandellós II	133
Trillo	88
F. Juzbado	153
Total	**1,078**

Graph 6.3.1.1 shows the percentage contribution of each nuclear power plant and the Juzbado plant to the generation of VLLW packages in 2021.

Graph 6.3.1.1. Percentage distribution of the 1,078 packages of VLLLW radioactive waste conditioned at the nuclear power plants and the Juzbado Plant during the year 2021



6.3.2. Waste generated in other activities

Residues from Quercus Plant. Process and water treatment residues

In the era of static leaching at the Quercus plant, some 1,107,896 tons of exhausted ore with a particle size of less than 15 mm were accumulated. In addition, the tailings dam accumulates approximately 853,242 tons of tailings from the dynamic leaching process.

In 2021, 405,281 m3 of previously treated water was discharged, generating waste in the process in the form of precipitate cakes, which were deposited at the peak of the static leaching era, or repulped and sent back to the tailings dam.

6.4. Declassified waste

Table 6.4.1 lists the most relevant milestones for 2021 in relation to the declassification of waste in nuclear facilities.

Table 6.4.1. Most relevant milestones for 2021 in relation to the declassification of waste in nuclear facilities

The CSN approved the results of the third extension of the CIEMAT test plan (PIMIC project), prior to the declassification of materials from the Montecillo area.
The CSN received the test plan documents and execution schedules corresponding to the declassification of non-sampleable residual materials from Ascó NPP.
The CSN received the test plan documents and performance schedules corresponding to the declassification of sampled materials from Ascó NPP.
The CSN received the documents of the test plan for waste declassification at the Juzbado Fuel Manufacturing Plant and inspected the execution of the aforementioned plan.
The CSN received the test plan documents corresponding to the declassification of residual materials stored at the Vandellós I ATOC.

6.5. Disused consumer product

In 2021, 22 lightning rods were removed, although no sources were sent to the UK in 2021. As of December 31, 2021, the cumulative total of lightning conductors withdrawn is 22,929 units, with 59,796 sources shipped to the United Kingdom.

Table 6.5.1. Disused consumer product

ACCUMULATED LIGHTNING RODS AS OF 12/31/2020	ACCUMULATED LIGHTNING RODS AS OF 12/31/2021	LIGHTNING RODS REMOVED IN 2021	ACCUMULATED DISASSEMBLED HEADS AS OF 12/31/2021	AM -241 HEADS IN CIEMAT STORAGE 12/31/2021	NUMBER OF SOURCES SHIPPED TO THE UNITED KINGDOM AS OF 12/31/2020	NUMBER OF SOURCES SENT TO UNITED KINGDOM AS OF 12/31/2021
22,907	22,929	22	19,224	0	59,796	59,796

7. NUCLEAR AND RADIOLOGICAL EMERGENCIES

The CSN has an emergency centre referred to as SALEM. It is the operational coordination centre for the Agency's emergency response. The CSN also has an Emergency Communications System (SICOEM). This system ensures communications between the different agencies in charge of nuclear or radiological emergency management and nuclear facilities. The CSN also has a contingency emergency room (Salem 2) located at the headquarters of the Military Emergency Unit at the Torrejón de Ardoz air base.

The activities carried out in 2021 are summarised in table 7.1 below.

Table 7.1. Summary of international emergency activities

ACTIVITY TYPE	DEVELOPMENT	DATES
Participation in TWO EXERCISES organised by the IAEA	ConvEx-1b	April 14
	ConvEx-1a.	November 16
European Commission	Communications test as national point of contact for Ecurie	September 22

Table 7.2 shows a summary of the national exercises and drills held in 2021.

Table 7.2. Execution of exercises and drills in 2021

EXERCISES OF THE RADIOLOGICAL GROUPS OF THE EXTERNAL NUCLEAR EMERGENCY PLANS		
PLAN	**TYPE OF EXERCISE**	**HOSTING**
PENBU	Access control and routing of Municipal Operational Coordination Centres	October 2021
	Classification and Decontamination Station	October 2021
PENCA	Access control and routing of Municipal Operational Coordination Centres	November 2021
	Classification and Decontamination Station	November 2021
PENGUA	Access control and routing of Municipal Operational Coordination Centres	May 2021
	Access control and routing of Municipal Operational Coordination Centres	November 2021
	Classification and Decontamination Station	April 2021
PENTA	Access control and routing of Municipal Operational Coordination Centres	October 2021
	Access control and routing of Municipal Operational Coordination Centres	December 2021
	Classification and Decontamination Station	June 2021
PENVA	Access control and routing of Municipal Operational Coordination Centres	September 2021
	Classification and Decontamination Station	June 2021

RADIOLOGICAL EMERGENCY EXERCISES	
Type of exercise	Hosting
Management of a radioactive waste transport accident	November 2021
Simulation of an accident in a gammagraphy facility	December 2021
Zaragoza airport general aeronautical drill	November 2021

In 2021, the CSN Emergency Response Organisation was activated in reduced response mode on one occasion on May 16 due to the activation of the Trillo NPP site emergency plan in pre-alert mode. The cause was a fire in the main AT02 transformer that lasted 15 minutes and did not affect safety systems. The fire was extinguished by the plant's fire brigade without radiological consequences. The event was reported to national and international organisations under the agreements signed by the CSN for the exchange of information in emergency situations.

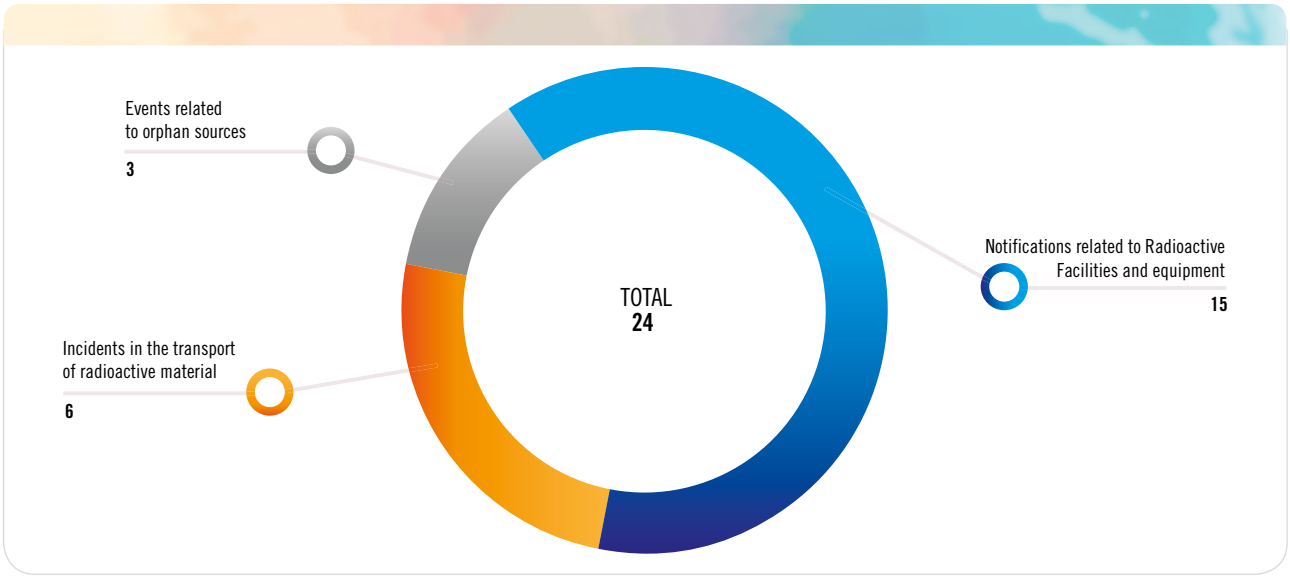
Prior to this event, on February 17, the Trillo NPP's internal emergency plan was activated for similar reasons without the need to activate the CSN's ERO due to the speed with which the fire was extinguished.

In 2021, the SALEM received the notifications of events relating to nuclear facilities described in section 3 of this report (see Figure 3.1).

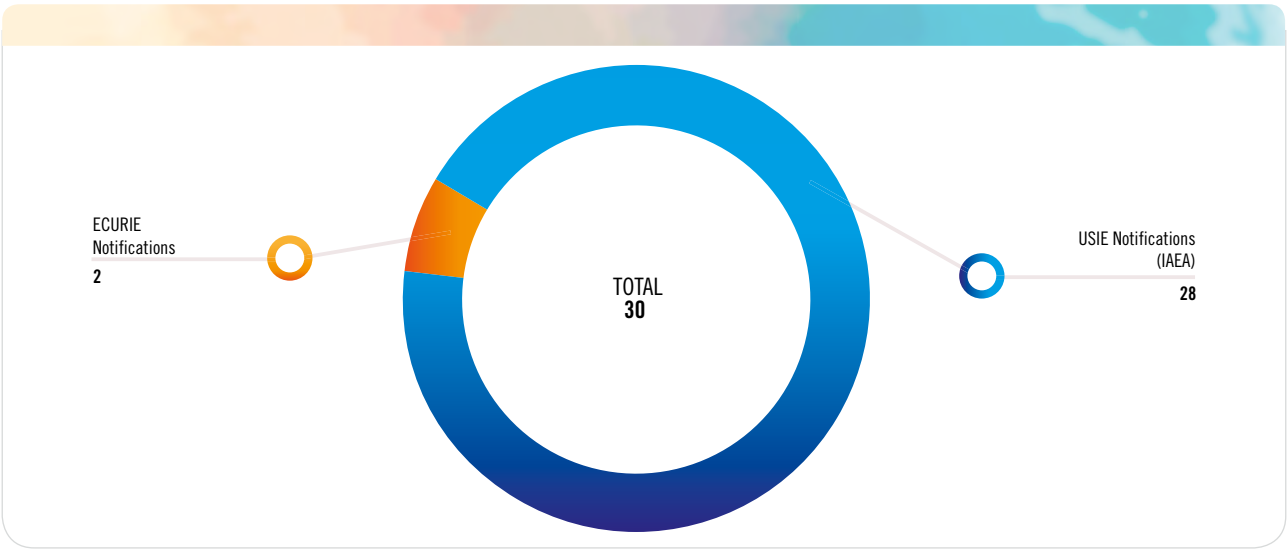
Excluding nuclear facilities, a total of 21 reportable events have been received at the Salem; 15 related to Radioactive Facilities and 6 to the transport of radioactive material. As for the 15 events at radioactive facilities, after the corresponding analysis by the Radiological Protection Technical Directorate, 14 of them were classified as INES 0, and 1 as INES 2. Of the 6 transport events, 5 were classified as level 0 and 1 as level 1 on the INES scale

In addition, 3 communications have been received reporting the appearance of orphan sources or orphan nuclear equipment.

Graph 7.1. Notifications received at SALEM of radiological incidents in 2021



Graph 7.2. International notifications



The 30 international notifications received in 2021 are shown in Figure 7.2

ECURIE notifications generally refer to events occurring within the European Union, while USIE notifications cover relevant events worldwide.

Table 7.3. includes a list of the 10 drills carried out by Spanish nuclear facilities in 2021. All Indoor Emergency Plan (IEP) drills for these the facilities were subject to on-site inspections by CSN technicians, respecting the sanitary recommendations and restrictions in force at all times.

In 2021 there were two actual activations of the Trillo NPP's EIP for similar causes, with two emergency pre-alerts being declared, on February 17 and May 16, both due to small fires in the main transformer of very limited duration that did not affect safety systems or entail any radiological consequences for workers or the population.

Table 7.3. Schedule and minimum scope of nuclear facility EIP emergency drills in 2021

NUCLEAR FACILITY	TEST DATE	BRIEF DESCRIPTION OF THE EXECUTED SCENARIO
Cofrentes NPP	17/06	Based on a "Station Black Out" type event that leads to the declaration of a Site Emergency. Core cooling is compromised and shall be performed by equipment pertinent to the extensive damage mitigation strategies.
José Cabrera	24/06	The PEID is activated by a physical security initiating event, reaching Emergency Alert.
Ascó NPP	23/09	In Unit I, during the transfer operations of a container loaded with fuel elements to the ITS, a fire breaks out, and several people are injured, which leads to the declaration of an Emergency Alert. Subsequently, in Unit II, an operational transient is originated that evolves into an Emergency at the site.
Sta. Mª de Garoña	30/09	Fire occurs and evolves to PEID Emergency Alert, requiring the abandonment of the CAT and the Control Room.
Juzbado	07/10	Coinciding with very adverse weather conditions, an accident occurs in the ceramic area in which several workers are injured and contaminated, leading to the declaration of an emergency at the site.
C.N. Almaraz	21/10	There was a loss of reactor coolant (LOCA) event affecting the residual heat removal (RHR) system, coinciding with the general loss of communications between the CAT and the Control Room, which will require transfer to the CAGE; additionally, the loss of data transmission to SICOEM will be simulated. The presence of intruders in the ITS area will be simulated, as well as a fire in the auxiliary building, which will require the rescue of an injured worker. Events will evolve to General Emergency and entry into Severe Accident Guidelines (SAMG).
El Cabril	28/10	During the unloading of very low level waste (VLLW) in Cell 30, the lorry fell into the pit, spilling the waste and catching fire. There was one injured person affected by the fire and debris.
Ciemat	04/11	Physical security initiating event, together with fire involving the declaration of an IEP Emergency Alert, with some contaminated casualties.
C.N. Trillo	18/11	A major earthquake occurs, resulting in loss of external power supply and a major plant fire with injuries, requiring external support and the deployment of extensive damage mitigation teams. Very significant damage occurs in the turbine building, affecting the secondary, the emergency feed water system and the fuel element pool cooling. Unavailability of secondary Bleed&Feed (B&F). General Emergency is reached. Relief will be provided to CAT personnel.
C.N. Vandellós II	16/12	Plant at 100% power and performing fuel movement tasks. A fire occurred affecting the auxiliary feed water system, coinciding with the fall of a fuel element in the spent fuel pool, which caused damage to part of its rods. In this situation, an attack by an armed group takes place, the evolution of which leads to the declaration of an emergency at the site. During the event, data transmission to SALEM through SICOEM is lost. The emergency will be managed from the CAGE from the beginning since the CAT is unavailable.

8. PHYSICAL PROTECTION OF NUCLEAR MATERIALS AND FACILITIES, RADIOACTIVE SOURCES AND TRANSPORT

Table 8.1 summarises the activities carried out during the year 2021 related to the physical protection of nuclear materials and facilities, radioactive sources and of transport, in accordance with Spanish Royal Decree 1308/2011 on the physical protection of nuclear facilities and materials and radioactive sources:

Table 8.1. Physical protection assessments of nuclear facilities and materials and radioactive sources

FACILITY/LICENSEE	REQUEST
PHYSICAL PROTECTION PLANS AND PHYSICAL PROTECTION AUTHORISATIONS FOR FACILITIES AND TRANSPORTS	
Santa María de Garoña NPP	Evaluation of the request for the physical protection authorisation associated with the decommissioning authorisation (Phase 1) and transfer of ownership of the Santa María de Garoña Nuclear Power Plant.
Vandellós II NPP	Evaluation of proposed change PC-008, Rev. 0 to the physical protection plan for the Vandellós II nuclear power plant.
Almaraz NPP	Evaluation of the proposed revision 8 of the Almaraz NPP physical protection plan.
Ascó NPP	Evaluation of proposed change PC-006 Rev. 0 for the physical protection plan for the Ascó I and II nuclear power plants Evaluation of change proposal PC-007 Rev. 0 for the physical protection plan for the Ascó I and II nuclear power plants. Evaluation of the request for renewal of the physical protection authorisation for the Ascó I and II nuclear power plants.
Trillo NPP	Analysis of the potential impact on the security system of the Trillo nuclear power plant by newly constructed photovoltaic plants in the area.
Cofrentes NPP	Evaluation of the request for renewal of the Cofrentes Nuclear Power Plant Physical Protection Authorisation, including assessment of the proposed change PC-02-20 Rev. 0 of the plant's physical protection plan. Evaluation of the proposed change PC-01-21, Rev 0. to the physical protection plan of Cofrentes NPP.
Juzbado Factory	Proposed approval of Revision 1 of the referenced proposal: MAN-PROP-ADM-PPF-01/20 for the physical protection plan of the Enusa Fuels Plant in Juzbado.
PHYSICAL SAFETY CLEARANCES IN TRANSPORTATION	
ETSA	Evaluation of the request for specific physical protection authorisation for the transport of category III nuclear material from the Juzbado Plant to the Ulba metallurgical plant in Kazakhstan.
ETSA	Evaluation of the request for specific physical protection authorisation for the transport of category III nuclear material from GNF (USA) to the Juzbado Fuel Fabrication Plant in 2022
ETSA	Evaluation of the request for renewal of the generic physical protection authorisation for the transport of category III nuclear material.

Nuclear Safety Council Report to the Parliament

2021

Summary Report

CSN CONSEJO DE SEGURIDAD NUCLEAR