MANAGEMENT OF THE NUCLEAR ASSETS IN SPAIN

The information disclosed in this document is intended to enhance Enel´s transparency on the management of its nuclear assets in Spain, managed by its subsidiary Endesa, and meet FTSE4Good requirements

1. Endesa Nuclear Policy

The Board of Directors of Endesa S.A. approved the Endesa Nuclear Policy on February 1, 2011, which is fully incorporated in the documents and in the practice of the nuclear facilities. This policy is summarized in the following statement:

"*Through its investments in nuclear technologies, Endesa publicly commits itself as shareholder to ensure that its nuclear facilities* ***adopt a clear nuclear safety policy*** *and are operated with overriding priority to nuclear safety, the protection of nuclear workers, the general public and the environment from risk of harm.*

The policy in respect of nuclear safety is ***to encourage excellence*** *in all plant activities and to go beyond compliance with applicable laws and regulations and to adopt management approaches embodying the principles of Continuous Improvement and Risk Management.*

Endesa will ensure full of its powers as a shareholder that even the relevant nuclear organizations where Endesa has a minority participation have adopted and published ***suitable policies for nuclear and environmental safety****, radioactive waste management and the physical security of nuclear assets.*

Endesa commits ***to provide sufficient resources*** *to implement the safety policy. Endesa also commits to a cooperation policy on safety in the nuclear industry worldwide."*

2. Principles supporting Endesa Nuclear Policy

For the effective implementation of its nuclear policy, Endesa has established the following principles:

1. Recognize **safety as top priority**, using an integrated and consistent approach to all aspects of management to ensure the safe operation of the plants, the physical protection of the facilities and the protection of workers, the public and the environment.

2. Promote **safety culture** at all levels of the organization during all the stages of plant lifetime, which includes identifying and assessing hazards, and minimizing risks, encouraging questioning attitude, prioritizing prudent decisions, and fostering an environment in which individuals feel free for raising problems and concerns.

3. Promote **excellence in the operation**, setting expectations that go beyond compliance and encouraging the exchange of experiences within global nuclear industry, the emulation of best practices, the systematic and timely use of operating experience and the use of human error reduction tools, aiming to achieve an event free operation and preventing unplanned plant shutdowns.

4. Maintain an **excellent material condition** at the facilities ensuring that Design Basis standards are met, through proper maintenance programs, systems health monitoring, and also anticipating and managing timely the ageing mechanisms and obsolescence.

5. Arrange facilities and human resources needed to ensure sufficient response **capabilities to address crisis and emergency situations** derived from internal and external events,

including extreme situations to respond in an exemplary manner to prevent/minimize any harmful impacts on workers, public, and environment.

6. Keep **radiation exposure of workers as low as reasonably achievable (ALARA)**, establishing effective preventive measures to ensure a wide margin with respect to the prescribed limits and stressing the responsibility of each individual with regard to the healthy application of radiation protection principles.

7. Ensure that **generation of radioactive liquid and gaseous effluents** is properly planned and controlled, minimizing the radiological impact on the environment and amply complying with regulatory limits.

8. Reduce the **volume of radioactive waste generated during plant lifetime, including decommissioning waste, to the minimum reasonably practicable** and establish the necessary provisions to comply with regulatory and contractual obligations regarding **spent fuel management and decommissioning**, facilitating the successive management stages while meeting the safety and radiation protection principles.

9. Develop a **Human Resources policy** that guarantees the preservation of the **critical knowledge** needed for the safe and efficient operation of the plants and apply a systematic approach to manage **training programs** of staff and contractors.

10. Maintain an **Integrated Management System** (IMS) consistent with the strategy, policies and objectives of the Organization and linking the different phases of the **continuous improvement cycle: planning** medium and long term; identifying needs, establishing priorities and allocating resources; **executing** through core processes, enabling processes and support processes; **evaluating** through self-assessment and independent evaluation, whether internal or external; and finally defining **corrective actions** to fix deficiencies and deviations with respect to standards and objectives. Identification and assessment of hazards, as well as management and minimization of risks are performed systematically by thorough deterministic and probabilistic methods and are embedded in the Integrated Management System at all stages during the lifecycle of the facilities. Prevention of problems, full troubleshooting, follow-up and rectification are ensured by the IMS.

11. Ensure that Endesa Nuclear Policy and the principles that support it are consistently applied to **contractors and suppliers**, establishing the adequate supervision.

12. Maintain an **internal communication policy** that is rigorous, transparent, and timely, aiming to strengthen confidence and alignment of the staff with the expectations and objectives of the organization. Maintain also an effective **public communication policy**, establishing and maintaining open lines of communication with external stakeholders and ensuring the integrity and transparency of the information.

13. Ensure the provision of **human and material resources** to effectively implement all aforementioned principles.

This approach is fully aligned to **Endesa´s Sustainability Policy** and **Human Rights Policy**, based on the commitment to promote labour practices that reject forced or compulsory labour and child labour, and that foster respect for diversity and non-discrimination, freedom of association and collective bargaining, just and favorable working conditions and ensure health and safety in the workplace; while also the commitment to respecting the rights of the

communities, the zero tolerance of corruption and confidentiality and right to privacy of its stakeholders. This Human Rights Policy, approved by the Board of Directors on 23 June 2013, is based on the United Nations framework on Business and Human Rights, and therefore Endesa has developed a due diligence process throughout the whole value chain, including its nuclear activity.

Additionally, in those nuclear power plants where Endesa has a controlling interest, Endesa maintains an independent oversight structure to monitor safe operation of the plants, comprising a high-level committee composed of international experts and a team of permanent oversight assessors on site.

3. Endesa Nuclear Overview

Endesa has an interest in Nuclear Power Plant Operations in Spain through its shareholdings in following units: Ascó I (100%), Ascó II (85%), Vandellós (72%), Almaraz 1 & 2 (36,021%) and Trillo (1%). The first five are PWR designed by Westinghouse and Trillo is PWR designed by KWU. Overall installed nuclear capacity of Endesa is 3.686 MWe, representing 47,1% of the total installed nuclear power in Spain.

These plants are operated by Joint Venture Subsidiaries: Asociación Nuclear Ascó Vandellós II (ANAV - www.anav.es) and Centrales Nucleares Almaraz Trillo (CNAT -www.cnat.es), which are also the license holders of the respective power plants.

Ownership

UNIT	ELECTRIC POWER MW	ENDESA O\	OPERATOR
Ascó I	1032.5	100%	Asociación Nuclear Ascó-Vandellós II, A.I.E. (ANAV)
Ascó II	1027.2	85%	Asociación Nuclear Ascó-Vandellós II, A.I.E. (ANAV)
Vandellós II	1087.1	72%	Asociación Nuclear Ascó-Vandellós II, A.I.E. (ANAV)
Almaraz I	1049,4	36%	Centrales Nucleares Almaraz-Trillo, A.I.E. (CNAT)
Almaraz II	1044,5	36%	Centrales Nucleares Almaraz-Trillo, A.I.E. (CNAT)

UNIT	ELECTRIC POWER MW	ENDESA O\	OPERATOR
Trillo	1066	1%	Centrales Nucleares Almaraz-Trillo, A.I.E. (CNAT)

Endesa exercises the governance on these assets through its role as Administrator in the respective operating companies: ANAV and CNAT and is verified, in the case of Ascó and Vandellós II, through independent Nuclear Oversight monitoring, depending of the Endesa Nuclear General Manager.

Therefore, as Administrator, Endesa looks to these organizations to have adopted and implemented appropriate policies and procedures, which are consistent with Endesa Nuclear Policy.

Participation in Nuclear Industry Organizations

Endesa encourages membership in nuclear industry international organizations, aiming working together with worldwide utilities and institutions to achieve mutual support, exchange of information and emulation of international best practices.

Endesa subsidiary nuclear organizations are members of or participate in several international

- WANO, World Association of Nuclear Operators
  NEI, Nuclear Energy Institute *(through UNESA)*
  EPRI, Electric Power Research Institute *(through UNESA)*
  Proprietary Groups of Westinghouse and GE

4. Nuclear Safety Management System

As a relevant general framework, the Convention on Nuclear Safety; drafted in Vienna in September 1994, signed by Spain in October 1994, subsequently ratified and signed by His Majesty the King in June 1995, entered into force in October 1996. The objectives of this Convention consist of achieve and maintain a high level of nuclear safety throughout the world through the improvement of national measures and international cooperation; establish and maintain in nuclear facilities effective means of defense against potential radiological risks in order to protect people, society and the environment from the harmful effects of ionizing radiation eventually released by said facilities; prevent accidents with radiological consequences and mitigate them if they occur.

Nuclear Power Plants owned by Endesa follow the approach of IAEA Requirements Document GS-R-3 “The Management System for Facilities and Activities” (July 2006) in establishing the systematic for the continuous safety and performance improvement through the Integrated Management System (IMS). Safety Instruction IS-19 of CSN on the requirements of the management system of nuclear facilities, issued in November 2008, follows closely the reference

of GS-R-3, and Endesa strives for the strict compliance with its requirements.

Integrated Management System (IMS) includes industrial safety, occupational health, environmental, security, quality assurance and economic requirements, which are not considered separately from nuclear safety requirements. All the requirements are defined and implemented in a coherent manner to enable the organization to meet its strategic objectives, integrating all the management requirements so as to prevent the possibility of any of them having a negative effect on safety.

IMS seeks to maintain and improve safety throughout the lifetime of facilities (siting, construction, commissioning, operation and decommissioning), and for the entire duration of activities in normal, transient, and emergency situations in a systematic manner by promoting and supporting a strong safety culture within the operating organizations, aiming that individuals and teams carry out their tasks safely and successfully, by putting in place a systematic of continuous improvement and emulating the practices widely accepted as the pattern of **excellence**.

Integrated Management is supported by manuals that are in place in each Endesa NPP, bringing together all the phases of the ***Continuous Improvement*** cycle (planning, execution, evaluation and follow-up):

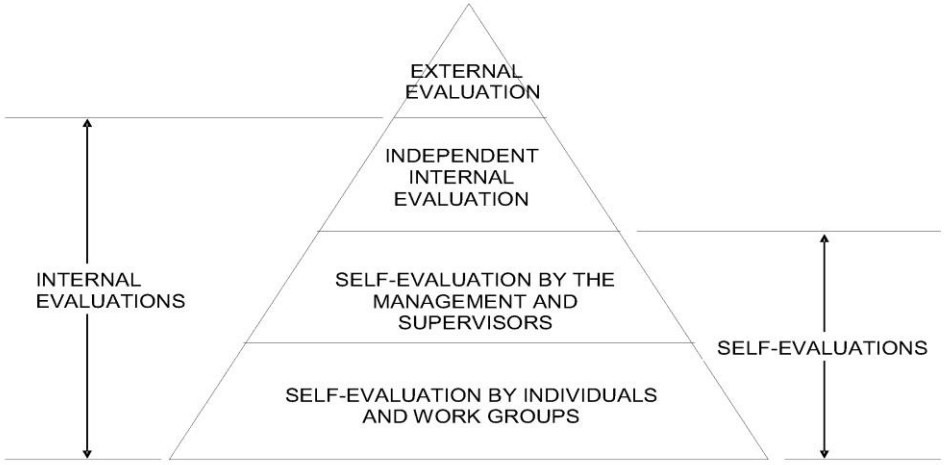
- ***Planning:*** Medium & long term planning is described in the policy document “Strategic Lines, Policies and Objectives”, and pursues to identify investment needs, to prioritise according to the importance for safety, to programme and assign resources on a multi-annual basis and to implement monitoring and control mechanisms. The short-term planning is included in the “Annual Operating Plans” endowed with an annual budget and the Departments’ Objectives**.**

- ***Execution*****:** The management system of Endesa plants is based on the "Standard Nuclear Performance Model", a Process Management Approach that has been defined by American Nuclear Electric Institute (NEI). This model enables the description of:

  Management processes that provide the framework to develop the policies and strategies of the organisation;
  Core Business Operational processes that make up the added value; and
  Enabling processes that provide support to the Operational processes. Among the latter, “Performance Improvement” process consists of evaluating and providing feedback to the rest of the processes.

  A comprehensive set of indicators is established to measure the effectiveness and efficiency of each process and also to determine the effectiveness and efficiency of the whole organisation.

- ***Evaluation:*** Evaluation Model is represented through the following pyramid:



Every year an Annual Evaluation Plan should be defined containing the programme of external evaluations, independent in-house evaluations, and self-assessment programme of the different departments to be carried out during the year.

External Evaluations of Endesa Nuclear Power Plants include the regulatory inspections performed by CSN, the independent oversight performed by Endesa, those evaluations to obtain or maintain certifications (Environmental, Quality, Industrial Safety, or other certifications) and the evaluations requested to international industry organizations or agencies to guarantee the maximum coherence of operating and management practices with respect to best international practices.

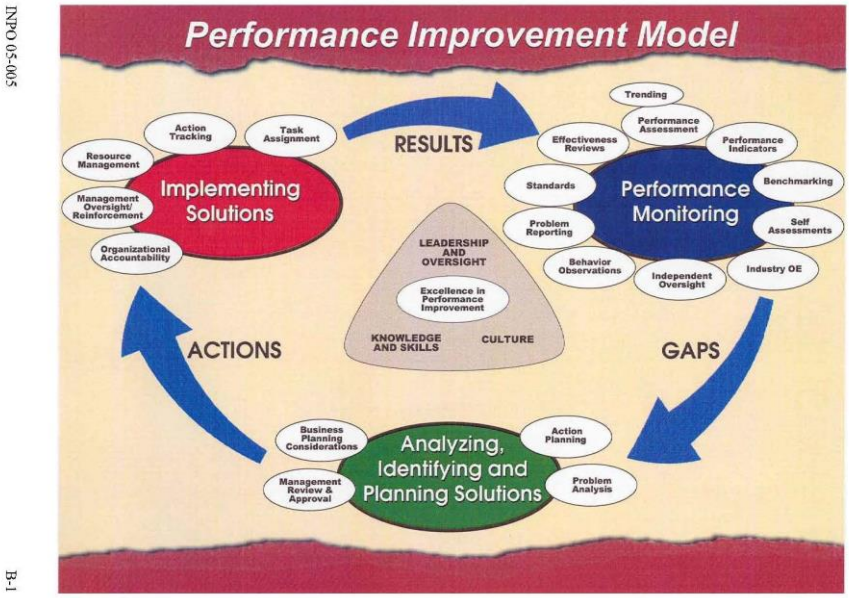
- ***Follow-up:*** The Corrective Actions Programme (CAP) places in a single Data Base all the non-conformities and the corrective actions of each operating organization. It comprises the following phases: problem identification and analysis, categorization of such problems, definition of the corrective actions and, finally, follow up until effective completion of those actions. Problems are categorised according to their importance for safety, radiological protection, physical protection, health and environment. The actions defined to fix them are prioritized according to such importance. Trends, recurrences and the overall CAP performance are monitored through several indicators.

Gradual and systematic approach to a Continuous Improvement Model

Endesa NPPs carry out the practical application of the IMS at all levels (organisation, processes, procedures and people) through a continuous process that seeks to attain the objectives by means of a systematic and gradual approach, so as to deploy appropriate resources on the basis of the consideration of:

- The significance and complexity of each activity,
- The hazards and the magnitude of the potential risk for safety, health, environmental,
  security and quality, taking also into account the economic elements of each activity, and
- The possible consequences if an activity is carried out incorrectly.

In the following figure, the basic elements of the continuous improvement model are represented:



This systematic approach is based on evaluating results and identifying performance gaps regarding the objectives and expectations. These gaps are analysed to identify the fundamental problems and then the proper solutions are defined, planned and implemented. Attributes that are fostered to support performance improvement model include the safety culture, leadership and supervision, and workers´ knowledge and skills.

The gradual approach to implement this model gives priority to the processes and activities which have significant impact on safety, security, quality, occupational health, environment and costs, taking also into consideration the importance and complexity of such processes and activities and the potential consequences of failures and errors.

Specific Management Systems

Nuclear Power Plants owned by Endesa are adopting international best practices aiming the reduction or elimination of unplanned shutdown and other significant incidents and events, which are frequently related whether to inadequate condition of Systems, Equipment and Components or to Human Performance shortfalls.

Systems, Equipment and Components are subject of a continuous surveillance, that include periodic testing to assess they are able to perform their expected functions. On the other side, Operating Experience program provides inputs that are used to update design and procedures based on the lessons learned from internal or external events. For the case of events caused by human factors, comprehensive root cause analysis is performed in order to identify proper preventive measures. Overall, several operating parameters are trended and compared to industry references to identify potential improvements.

Some relevant processes and initiatives are supporting the implementation of industry best practices in Endesa NPPs and contributing to enhance plant and personnel performance:

Work Management: Following INPO guideline AP-928, this process is instrumental to deal with the timely identification, selection, planning, coordination, and execution of work necessary to maximize the availability and reliability of plant systems and equipment, aiming an optimum use of station resources and assessing all risks associated to the conduct of work, to protect personnel health and plant equipment.

Equipment Reliability: Following INPO guideline AP-913, through the Equipment Reliability process the performance and condition of systems, equipment and components critical for nuclear safety and operation are systematically tracked by means of “System Health Reports”. Risk insights, based on Probabilistic Safety Analysis, and feedback from operating experience, provide the base for maintenance programs, paying particular attention to preventing ageing effects.

Organization and Human Factors programmes are in place with particular focus on implementation of error reduction tools, prompt investigation of events caused by human factors, field observations by managers (“managers in the field" program) and coaching, aiming to operate event-free by minimizing human errors. There are specific facilities in place in Endesa NPP´s, like the Human Factor Simulators, where staff and contractors are trained in environments that realistically replicate plant conditions to understand and manage properly the specific risks and potential consequences of the works conducted in different plant settings.

Operating Experience process covers the review, screening and dissemination of internal and external events, relevant information from suppliers and inputs from regulators, to determine specific applicability to the plants. The process also includes communication of in-house events to the worldwide nuclear community through the event reporting system operated by WANO (World Association of Nuclear Operators). In-house events are screened and classified according to their importance, and proper event analysis methodology for each case is defined. Reportable events and other relevant ones are analyzed using formal root cause analysis techniques for comprehensive determination of underlying problems and contributing factors. Consequently, actions are defined and processed through CAP to fix those problems and to avoid recurrence. Regarding external Operating Experience, the OE teams produce internal reports and briefings for staff to consider how it applies to work activities or plant operations. From all external inputs, SOERs (Significant Operating Experience Reports), SERs (Significant Event Reports) or JITs (Just-In-Time” briefing), produced by WANO, are of particular interest.

Training improvement is a strategic cornerstone in Endesa NPPs. Main Objective of Training Programs is to maintain and update knowledge, qualification and skills of the staff to perform safely and reliably the tasks and functions assigned, fulfilling the company expectati ns. SAT methodology supports Endesa NPPs Training Programs, based on determining training needs from job and task analysis, defining training objectives according to job performance requirements, developing training materials, methods and instructor guides to address learning objectives, implementing training and trainee evaluation consistently with those objectives and, finally, evaluating the overall program through trainee feedback, observations of training, training performance and plant performance

Regulatory framework for training is defined by CSN safety instructions IS-11 and IS-12, which

he objectives and criteria for accreditation, as defined by the

National Academy of Nuclear Training (ACAD) supported by INPO.

A set of meaningful performance indicators is established to assess the effectiveness of the specific management systems on a periodic basis, and the achievements are yearly reviewed through a self-assessment.

5. Risk Management and Safety Assessment: Defence in Depth

Several approaches of risk management are used in Endesa NPPs, based upon deterministic and probabilistic criteria, among which "Probabilistic Safety Analysis" and "Periodic Safety Review" are highlighted. The assessment affects the whole lifecycle of the installation, from construction to decommissioning, and covers every plant operating mode (full power, shutdown, etc.) addressing all potential initiating event scenarios, internal or external. On the other side, a set of external and internal evaluations comparing the Endesa NPPs practices against best standards and practices worldwide, programmed on a periodic basis, provides a continuous and comprehensive safety assessment of the plants, being the results managed through the Corrective Action Program aiming to improve plant safety (continuous improvement model).

- **Defence in depth**

  Prevention of accidents and minimization of potential consequences if prevention fails is made in the Endesa NPPs through the implementation of a defence in depth strategy consisting of five different levels: 1) prevention of abnormal operation and failures (by means of a conservative design and high quality in construction and operation), 2) control of abnormal operation and detection of failures (by means of control, limiting and protection systems and other surveillance features), 3) control of accidents within the design basis (by means of the engineered safety features and accident procedures), 4) control of severe accident plant conditions (by means of complementary measures and accident management), and 5) mitigation of radiological consequences of significant releases of radioactive materials (by off-site emergency response).

  Every nuclear power plant has its specific on-site emergency plan detailing the activities, measures and responsibilities for the preparation and response before accident conditions with the goal of mitigating the accident consequences and minimizing such consequences on workers, public and environment. The on-site emergency plan identifies and describes in detail aspects, among others, as the following:

  - Initiating events and emergency categorization
  - Emergency response organization including the external support centers, functions, responsibilities and interfaces with on-site, and off-site organizations
  - Assessment, monitorization and reporting to the Authorities (among them the Regulatory Body, and the local and regional Authorities, for example)
  - Emergency termination and recovery
  - Emergency response centers, communication systems, and emergency response resources

  Specific aspects of the emergency response are further developed in dedicated procedures, as for example, procedures for reporting to and sharing information with the Regulatory Body, as well as with local, regional, and national Authorities, activation of and actions to be carried out by the different emergency response collectives, procedures for evacuation identifying

preferential routes, as well as alternative routes, list of contacts for emergency situations, etc. The on-site emergency plan is an official licensing document so, modifications have to be reported to the Regulatory Body who assesses the modification proposal and approves, if appropriate such modifications.

To ensure preparedness for intervention, on-site emergency plans are periodically tested (partially and globally). A full scope emergency drill is carried out by every nuclear power plant on a yearly basis with the goal of testing the organization´s emergency response capabilities. In addition to these yearly full scope exercises, partial exercises are also scheduled to test specific aspects of the emergency response organization. Also, as part of the annual continuing training program, plant personnel go through specific training on the on-site emergency plan, with theoretical, as well as practical training sessions. In addition to check the effectiveness of the plan, the emergency drills are also a training opportunity for the organization. Dates for each emergency drill are proposed by the nuclear power plants and an integral schedule is agreed and submitted to the Regulatory Body for approval. Once approved, the schedule is communicated to the local and regional Authorities to facilitate the presence of representatives of these organizations during the execution of the exercise. Goal, and scope for the drills are defined by the Regulatory Body. Drill scenarios are required to be sent to the Regulatory Body for approval.

Emergency drills are observed by the regulatory body and by plant staff, and weaknesses are reported into the corrective action program (CAP), as part of the continuous improvement model.

In addition to internal self-assessments, periodic evaluations by the regulatory body, audits, and evaluations by independent nuclear oversight organizations, emergency preparedness and response is also evaluated by WANO every four years, comparing the plant practices against the best industry standards. Weaknesses are reported into the CAP to improve the process (continuous improvement model).

- **Probabilistic Safety Analysis**

The Probabilistic Safety Analysis (PSA) is a comprehensive, structured approach to identifying failure scenarios, constituting a conceptual and mathematical tool for deriving numerical estimates of risk and identifying actions to minimize it.

All Spanish nuclear plants have made two levels of PSA: Level 1 (front-end analysis) consists in the analysis of the design and operation of the nuclear power plant so as to identify potential sequences of accident that might leading to damages to the reactor core and changes in its structural geometry, their root causes, and their average annual frequency. Level 2 (back-end analysis) takes the results of level 1 and analyses the behaviour of the containment building, evaluates the release of radioactive material, and quantifies off-site releases.

As a tool with a high level of detail for the analysis of the design and operation of each nuclear power plant, the PSAs are updated periodically in order to incorporate design and procedural modifications, as well as to apply methodological updates to reduce uncertainties. The application of PSAs to different fields requires a permanent maintenance and update process, which is known as “Live PSA”. Safety Guide 1.15 guides the update and maintenance processes of the PSAs along the lines of the live PSA.

Endesa NPPs have carried out levels 1 and 2 of the PSAs, including all the possible internal

events, as well as floods and fires during power operation. The assessments of the studies of risks during shutdown for fuel recharge have been also completed.

Additionally, external catastrophes and extreme conditions as earthquakes, floods, heavy rain, high winds, snow, extreme temperatures (high and low), frost, droughts, and forest fires have been also addressed and analysed by every Endesa NPP as part of their Individual Plant Examination for External Events (IPEEE), meeting and going beyond regulatory requirements.

As far as PSA applications are concerned, the methodologies have been tested in pilot projects jointly with CSN, giving rise to the preparation of Guides, which were used in several plants as support to request approval by the Regulatory Body for changes to Plant Technical Specifications, or to the In-Service Inspection Manual of valves or pumps, for example.

Apart from PSA applications aimed at assessing requests from the licensees, as previously indicated, it is also worth mentioning that CSN is using risk information given by the PSAs for their own internal processes and the Integrated Plant Supervision System (SISC).

Post-Fukushima Assessment

In the aftermath of the Fukushima event, the European Commission (EC) under mandate of the European Council set up a self-assessment process (Stress Tests) for the operating nuclear plants in those safety relevant areas of design and operation which revealed tragic weaknesses at Fukushima. The exercise was defined at the European level (ENSREG is the association of European Nuclear Regulators and WENRA the association of western European Nuclear Regulators) and the national Regulators enforced the process at the national level with slight modifications.

The self-assessment exercise was defined in the form of a “Stress Test”: the plant response to extreme scenarios, such as earthquakes and flooding beyond the plant design basis, was requested to be assessed through the response of systems, procedures and operators, evaluating the existing margins before significant radioactive releases into the environment might take place. Final Reports were published by the end of 2011.

In spring 2012, a Peer Review process managed by the European Regulators, under the coordination of ENSREG, was finalized in April 2012 with the issuing of a technical report to the EC. The report includes the assessment of the National Reports and provided the EC with evidences of generic breaches in the safety at the installations, suggesting safety improvements and lessons learned.

In December 2012, the European Council endorsed the summary report developed by the European Commission which included proposal for further actions. National Action Plans were issued by Regulators to implement the outcome of the Stress Test assessment and the Peer Review process.

Action Plans envisaged as a result of the Stress Test and endorsed by CSN through Complementary Technical Instructions to each plant, were arranged in short, medium and long term actions:

- Short-term actions (2011-2013), that included the specifications for an Alternative Centre for Emergency Management on site (CAGE), the analysis of the human resources needed for reinforce emergency organization or the setting of a Centre for External Support to all

Spanish NPPs (CAE). A number of analysis covering consequential effects of beyond design basis events and the reinforcements needed were also established.

- Mid-term actions (2013-2014), that include the installation of mobile equipment (diesel generators and pumps) at the plants to cope with Station Blackout scenarios, the implementation of measures against flooding, the implementation of design modifications to increase seismic margin or improving Spent Fuel Pool temperature and level instrumentation, all of which had been fully implemented by the end of 2014.

- Long-term actions (2015-2016 or first refueling outage after 2016), that include the implementation of measures to improve communication systems, the construction of an Alternative Centre for Emergency Management (CAGE) in all sites, the installation of passive seals in the reactor coolant pumps of Ascó and Vandellós II, as well as the implementation of containment filtered venting systems and passive H2 re-combiners.

All the above listed post-Fukushima safety improvement actions are in place in all the Endesa´s nuclear power plants as scheduled.

- **Periodic Safety Review**

The Periodic Safety Review (PSR) is a systematic reassessment every 10 years of the safety of an operational facility or activity carried out at regular intervals to deal with the cumulative effects of ageing, modifications, operating experience and technical developments, and aimed at ensuring a high level of safety throughout the operating lifetime of the facility or activity.

The format and content of PSR is defined in the Safety guide 1.10 of CSN. These periodic reviews do not aim to replace the analysis, control, and surveillance practices continuously carried out at the plants but to perform an overall assessment of the safety of each plant and of the possible improvements to be introduced taking into account their current state and the best international practices.

Among the objectives of the PSR are the following:

- Ensuring that the analysis process derived from the operating experience has been correctly applied, including the overall revision of the modifications carried out because of generic studies.
- Analysing the overall plant performance over long periods of operation, including the results of equipment surveillance and maintenance requirements, with the idea of verifying that plant safety levels have not decreased over said periods and of ensuring a safe operation during the following period.
- Assessing the plant safety regarding the new requirements established by national standards, international recommendations and prescriptions in the country of origin of the project for plants of a similar design, the application of which to Spanish plants has been generically or specifically established by the CSN.
- Updating the status of the different assessment programmes and establishing adequate improvement programmes.

The results of the Periodic Safety Review may be used to improve the operation during the following period. As a result of the execution of Periodic Safety Reviews, an update of the documentation associated with each facility has to be done; in certain cases, discrepancies have been detected between different documents and design modifications of some

importance have even been carried out. A set of programs to improve some aspects affecting the safety of the facility has been established in each plant as a result of PSR. Among these, the improvement programmes of the organisational aspects and of the human factors have received special consideration.

This systematic defined in the CSN Safety Guide 1.10 is equally valid for those cases in which the renewal of the Operating Permit exceeds the lifetime originally considered in the initial design of the facility. In this case, special additional analyses must be presented, as it has been done for many plants in USA country of origin of the technology of the Spanish plants and in many other countries, such as the facility aging management plan and an update of the radiological impact analysis, to permit the operation of the plant to be extended beyond the 40 years initial design lifetime.

- **External Evaluations**

Regulatory Inspections: CSN carries out a systematic inspections program through the application of the so called "Integrated System of Plant Supervision" (SISC), comprising a set of indicators and criteria to rate the safety significance of inspections findings. Each NPP is placed quarterly in an Action Matrix, which grades the inspection programme of the regulator and the interactions with plant management in each of them. From best to worst, it goes from the first column, from "the owner's response" (all the indicators and finding in green) to the fifth column, which corresponds to an "unacceptable operation".

Evaluations of Independent Organizations (WANO, OIEA...): Endesa NPP requests from international nuclear industry organizations to carry out Safety and Performance evaluations. These mainly include WANO Peer Reviews and IAEA OSART Missions. These evaluations are performed by teams comprised of 20 or more experts coming from different countries, during 3 weeks, with the aim to compare the plant practices with the best international practices. WANO Peer Reviews are performed every 4 years, with a follow up in between.

Safety Culture assessments are performed periodically to measure current level of development of key elements of safety culture through surveys that use structured questionnaires to elicit staff attitudes, values and perceptions towards safety and its management. Results are analyzed to determine how mature the organization is and how evolves.

- **Internal Evaluations**

Independent Oversight by Endesa: Endesa, following the practice in many countries, has established an independent safety oversight of plant operations and performance in Ascó 1 & 2 units and also in Vandellós 2, consisting of a high level Committee called ENSOC, whose members have a wide experience in nuclear safety in different countries and which advises to the Nuclear Energy General Director, and a permanent staff of "resident assessors" at the plants, which perform a continuous evaluation of safety performance having as guidance the Performance Objectives and Criteria of WANO, used by this organization in its evaluations of the plants.

Independent in-house evaluation is accurately defined in the Quality Assurance Manual of each NPP, which content meets the National QA Standard UNE 73.401 The mechanisms in place include audits, inspections and documentary reviews.

Self-Assessment is performed at managers and supervisors level and at individuals and work teams level. The self-assessment programme is carried out based on compliance with the Management expectations, which include: Mission, Vision and Values; Strategic Objectives linked to the Strategic Lines and Policies; Annual Operating Objectives, which are detailed in the Objectives of each department.

6. Radiological Protection of workers, public and environment

The management of radiological protection is a part of the Integrated Management System of Endesa NPPs and as such, submitted to the continuous improvement process. Clear criteria are defined and proper measures established for the protection of workers and public to prevent harmful effects of ionizing radiation.

Radiological Protection ***policy*** of Endesa NPPs states that radiation exposure within the plant and due to any release of radioactive material from the plant is as low as reasonably achievable, economic and social factors being taken into account, and well below regulatory limits, and also to ensure mitigation of the extent of radiation exposure due to any potential accident.

The ***principles*** of radiation protection are based on the recommendations of the International Commission on Radiological Protection (ICRP), which are widely accepted and endorsed internationally. Spanish regulations on Radiological Protection are defined in a coherent manner with regard to these recommendations and summarized in the ***"Reglamento de Protección Sanitaria Contra las Radiaciones Ionizantes"*** approved by Royal Decree 783/2001.

The basic principles applicable in Endesa NPPs are:

- **Principle of optimisation**: The optimum level of protection corresponds to the value of the collective dose in which the balance between the increase in radiological protection measures and the reduction of the associated radiological risk is reached. That is, exposure to radiation should be kept as low as reasonably achievable (ALARA principle, As Low As Reasonably Achievable.

- **Principle of limitation**: The aim is to ensure that the collective dose that results from applying the optimization principle will not entail unacceptable doses in any of the exposed individuals.

The ***methods*** provided to address the effective protection of the workers, the public and the environment, include the following:

- Work planning and execution is carried out in such a way that potential exposures are kept to the lowest achievable level.
- Dose limits below legal dose limits are set up internally by the Endesa NPPs as a means to increase the level of protection of the workers and guarantee that individual and collective doses are kept below the regulatory dose limits.
- Regular staff and permanent contractors receive continuing training on Radiological Protection.
- Eventual contractors are provided with induction training in Radiological Protection.
- Managers reinforce the use of PPEs (among them, the use of Radiological Protection equipment) as well as the adherence to the organization written standards and procedures.

- Workers, both regular staff and contractors, are accountable for the sound implementation of Radiological Protection principles.
- Risk assessment is systematically performed before any task taking place in an area with radiological risk.
- Radiological Areas are classified and adequately signalled. Periodical review and surveillance of this classification is systematically performed.
- Precision and accuracy of measurement systems and equipment is maintained according to the state of the art of technology.
- Plant activities are planned to minimize gas and liquid effluents, as well as the generation of solid radioactive waste.
- Activity of gas or liquid effluents releases is monitored online and corrective actions taken in the case of any deviation from expected values.
- Off-site radiological surveillance is preformed through extensive sampling and analysis of air, water, soil and food chain ***(PVRA)***
- Lessons learned from industry operating experience regarding radiological protection are systematically analysed and all applicable recommendations are implemented.

The site specific "***Radiation Protection Manual"*** (RPM) is the document reflecting the practical implementation of the license holder responsibility for radiation protection by establishing policy, principles and methods to achieve continuing compliance with the legislation in force and to apply ALARA principle.

Discharges of liquid or gaseous radioactive materials originated during normal plant operation released into the environment are systematically planned and properly controlled, always within limits authorized by the regulatory body, and aiming continuous improvement with regard to **reduction** and control ***(MCDE).*** To this respect, on an annual basis the Endesa NPPs set up effluent discharge limits to guarantee that the dose to the public is kept well below an established dose constraint for each NPP, which is up to a decade below the Regulatory dose limits for the public.

In addition to internal self-assessments, periodic evaluations by the regulatory body, audits, and evaluations by independent nuclear oversight organizations, the RP area is also evaluated by WANO every four years, comparing the plant practices against the best industry standards. Minimization of liquid and gaseous radwaste is also within the scope of such evaluations. Weaknesses are reported into the CAP to improve the process (continuous improvement model).

The Spanish legislation on Licensing of Nuclear and Radioactive Facilities ***(Royal Decree 1836/99, Art. 20)*** requires submission and approval of "Radiation Protection Manual (RPM)" in the licensing process of a Nuclear Power Plant (NPP).

7. Security Management

According to the ***Convention on Physical Protection of Nuclear Materials***, ratified by Spain on 6 September 1991, Security System should be kept confidential and only accessible to those who hold direct responsibilities regarding its management.

Under the request of Nuclear Safety Council (CSN), Endesa NPPs modified their internal systems for physical protection taking into consideration the new threats revealed by terrorist attacks in September 2001 in New York and Washington. The revision was undertaken using the reference of the criteria established by the United States Nuclear Regulatory Commission on the physical security.

Framework for Security is defined by ***CSN Instruction IS-09*** that establishes the criteria to be applied for the systems, services and procedures of physical protection for nuclear facilities and materials, and also by the ***Royal Decree on the physical protection of nuclear installations***, ***nuclear materials and radioactive sources***.

Endesa NPPs have developed an "Integrated Security Model" that was approved by the Nuclear Safety Council (CSN) in June 2002. CSN also defined the technical criteria for the capability of the measures taken by the license holder to comply with the Integrated Security Model. Three fundamental concepts build up this model: On Site security, for which plant management is responsible; Off Site security, in charge of the State Security Forces and Bodies and an intelligence plan, in charge of the State Intelligence Services.

Physical Security Programs are in place adapted to the aforementioned model and physical protection measures are proportional to the risk associated to each facility, nuclear material or working practice. The development, implementation, operation, maintenance and upgrade of such programs correspond to plant management and it is supported by Endesa through the Board of Administrators. Any update of the Physical Security Program will conform to the security criteria as defined by the CSN.

8. Radioactive Waste Management & Decommissioning

Spain is part of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (AIEA 5th September 1997). This Convention was signed by Spain the 30th June 1998 and ratified on 30th April 1999.

The Convention applies to spent fuel, radioactive waste resulting from nuclear reactors operations and dismantling and to planned and controlled releases into the environment of liquid or gaseous radioactive materials from regulated nuclear facilities. Additionally it also applied to spent fuel and radioactive waste related to defence military programmes.

The purposes of this Convention are:

- Achieve and maintain a high level of safety in the spent fuel and radioactive waste

s

The obligations of the Contracting Parties are fundamentally based on the principles established in the IAEA Safety Fundamentals document "The Principles of Radioactive Waste Management", published in 1995. These Fundamentals include the obligation to establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management, and the obligation to ensure that individuals, society and the environment are adequately protected against radiological and other hazards, by ensuring the safety of facilities along their lives. Other matters addressed are the trans-boundary movement of spent fuel and the safe management of disused sealed sources.

Endesa is committed to the safety in all stages of radioactive waste and spent fuel management undertaken on each site, encouraging the application of effective measures to protect the workers, the public and the environment form any risk or harmful effect from ionizing radiation,

considering both present and future generations.

Endesa promotes proper control of generation and flow of radioactive materials, addressing the following objectives:

- Minimizing the amount of waste generated
- Recovering of waste materials
- Guaranteeing the interdependence of all phases of management

All this is done in such a way that safety and radioprotection principles are met in the transfer to other stages of management and keeping environmental impact to the minimum practicable level.

- **Legal framework:**

The following national and international regulations establish the pattern for nuclear waste management in Spanish NPPs:

Ley 25/1964, 29th April, where the bases for the nuclear development in Spain are established.

Joint Convention on Safety in Spent Fuel Management and the Management of Radioactive Waste signed in Vienna on September 5, 1997, and ratified by Spain on April 23, 2001.

Real Decreto 1836/1999, 3rd Dicember, that approves the Reglamento sobre instalaciones nucleares y radiactivas, further modified by RD 35/2008

Real Decreto 5/2005 that modifies the ENRESA financing system, stablishing the owners of the NPP are responsible of the financing of all the activities related to radwaste, spent fuel management and NPP dismantling from 1/4/2005. This decree stablishes that the long term compromises are responsibility of the Spanish State.

Ley 24/2005, 18th November, of productivity-boosting reforms, where the role of ENRESA in the management of the radioactive waste, including the spent fuel and the dismantling and closure of nuclear power plants and other radioactive installations, is confirmed

Ley 11/2009, 26th October, regulating Public Limited Companies for Investment in the Real Estate Market (Sociedades Anónimas Cotizadas de Inversión en el Mercado Inmobiliario), where the tax values for the financing of the PGRR funds are established.

Joint Convention on Safety of spent fuel and radioactive waste, signed in Vienna 5th October 1997 and ratified by Spain on April 1999.

Directive 2011/70/Euratom 19th July 2011

Real Decreto 102/2014, 21th February, for the responsible and safe management of spent nuclear fuel and radioactive waste, that stablishes the internalization of all the costs of the radwaste management.

- **Waste Management System**

In Spain the final management of low, intermediate and high activity radwaste, as well as decommissioning of nuclear installations is, by law, a responsibility of the Spanish State. For this purpose, the State has created a 100% State owned company, ENRESA, that is responsible for these activities. ENRESA objectives are defined in the General Plan for Radioactive Waste Management (PGRR). The PGRR is an official document prepared by ENRESA, approved by the Ministry of Ecological Transition and Demographic Challenge (MITERD), and presented to the Parliament. This document is periodically reviewed taking into account the new scenarios and the

technological improvements related to this topic. In this revision financial aspects are also considered.

To implement the PGRR, in 1989 an agreement between ENRESA and the utilities was undertaken and approved by the Ministry of Industry. This agreement, which is reflected in the *Contrato Tipo*, specifies the scope of services to be provided by ENRESA to manage radioactive waste, spent fuel & decommissioning of Spanish NPP and the responsibilities of each party. Based on the *Contrato Tipo*, a specific contract in signed between ENRESA and each of the NPP.

Services provided by ENRESA under these contracts cover the following:

- ENRESA defines the criteria for waste characterization and conditioning previous to the evacuation from the site and promotes, jointly with each NPP, the actions for waste volume reduction or waste clearance, aiming these actions should help to optimize the utilization of El Cabril, the centralized facility for storage of medium, low and very low activity waste.

- ENRESA is in charge of defining the conditions for Dismantling and Decommissioning operations. License holders take part in these plans for decommissioning and dismantling of their facilities. Appendix J of the Standard Contract establishes the responsibilities in this regard and provides the reference schedule for transferring the facility from the owner to ENRESA once the definitive cessation of the operation takes place.

Each NPP has in place a plant specific “Radioactive Waste Management Plan” (RWMP). This document defines the framework for waste and spent fuel management during the entire plant lifetime, including the decommissioning phase.

The Plan addresses the production, handling, treatment, conditioning, temporary storage and, when applicable, the provisions for future steps management. An updated inventory of the waste generated (volume or weight) from different plant systems is kept updated and the management standards for the aforementioned operations is properly defined. Minimization of radwaste volumes and protection of the health and safety of plant workers, public, and environment from harmful effects in every stage of the plant lifetime are the main goals pursued by the Plan.

Royal Decree 5/2005, regarding the financing system of ENRESA, establishes that the Spanish NPPs were responsible for funding all activities related to waste management, spent fuel and decommissioning of Spanish NPPs from April 1, 2005. This financing provision must cover until the year 2100. Past this date, further long-term liabilities correspond to the State. The pending costs of the PGRR from now until the end of the activities of the plan for the management of waste and decommissioning amount to 20.219 € million. The distribution of these costs is the following:

- Low and intermediate radwaste management 13%
- Spent fuel and high radwaste management 53%
- Nuclear power plants decommissioning 24%
- ENRESA structure and other costs 8 %
- R&D 2 %

For this purpose a specific tax, payable by the utilities owner of the NPP, has been created. This tax applies to the energy produced in each NPP and is different for each type of reactor. It is paid on a monthly base.

Low and intermediate radwaste management

In the ENRESA-Utilities Standard Contract mentioned above, there is a specific annex related to this type of radwaste. In this annex, the responsibilities and activities of each part are defined.

The NPP characterizes and conditions the radwaste in solid form in standardized receptacles, usually 220 litre drums, according to the requirements defined by ENRESA: The resulting filled drums are stored in the temporary storage facility inside the NPP site. These are specifically designed warehouses, radiologically controlled, where the conditioned drums are classified and prepared for their expenditure to the national repository. While being stored, the responsibility for this radioactive material is of the NPP.

As stated in the ENRESA-Utilities agreement, conditioned waste is transported on a regular basis to the national repository for medium and low level waste located in “El Cabril” (Cordoba), at the south of Spain. The transport is done by conditioned trucks belonging to an authorized company for this kind of transports and is responsibility of ENRESA. This strategy prevents waste from building up in the site, facilitating future decommissioning activities and reducing the amount of wastes to be dealt with during that phase of the plant life.

Radwaste minimization is also addressed by the plant strategic business plan, where specific challenging targets based on best industry practices are set up. Targets are reviewed periodically, and action plans for achieving the goals are consequently defined and implemented.

According to the RWMP, diverse radwaste minimization techniques are used to minimize the radioactive waste volume during the entire lifecycle of the facility, including the decommissioning phase. Waste streams are classified according the origin, nature, radioactivity, physical & chemical characteristics, hazard, and the management route defined for each waste stream.

Clearance of waste materials, to enable processing them through conventional routes, is also carried out in application of several clearance projects developed in a joint utility framework.

Use of state of the art equipment, in-situ waste segregation, material reuse, recycling, and decontamination are also addressed by the RWMP to minimize radwaste volumes.

Accordingly, work activities are planned and conducted to minimize radwaste generation.

Spent fuel and high level radwaste management

In the ENRESA-Utilities Standard Contract mentioned above, there is also specific annex related to this type of radwaste. In this annex, the responsibilities and activities of each part are defined.

Initially spent fuel and other high activity wastes are stored under water in the spent fuel pool. This is a specially designed pool of borated water that is in the spent fuel building in the Westinghouse design and inside the containment in the KWU design. Insider the pool there are metallic racks where the fuel rods extracted from the reactor core and canisters that hold the other high activity waste are inserted. The mission of the water is both extraction of the residual heat from the spent fuel and the shielding for the radiation generated by the disintegration of the fission

products. All the building is considered radioactive area with special surveillance and filtered ventilation.

For further management of the spent fuel, Spain has decided the option of “open cycle”, that is with no reprocessing. Thus, after cooling and decaying in the spent fuel pool, the spent fuel rods are to be handed over to ENRESA for their custody and safe storage. For this purpose, in the 7th PGRR ENRESA plans the preservation of the management ability in the nuclear power plants by means of dry Individual Temporary Storage facilities (ATI) and the implementation of a Decentralized Temporary Storage (ATD) in each nuclear power plant with spent fuel (Almaraz, Ascó, Cofrentes, Santa María de Garoña, José Cabrera, Trillo and Vandellós II), and a deep geological installation (AGP) for final disposal of the high activity waste. The ATDs will remain operational until all spent fuel is transferred to the AGP.

Ascó 1 and 2, Almaraz 1 and 2, Santa María de Garoña, Trillo and Cofrentes NPPs already have their ATI in operation.

ENRESA has ordered a spent nuclear fuel storage and transport system for the Ascó 1 and 2, Almaraz 1 and 2, Cofrentes and Vandellós II nuclear power plants. The system will be designed so that it can be installed in new ATI to be built at the sites (the ATDs) and for the transport of spent fuel from each plant to the future AGP.

Thus, the current procedure is that spent fuel rods are initially stored under water in the spent fuel pool, until the thermal and radioactive characteristics of the spent fuel allow its dry storage in
spent fuel casks. The spent fuel rods are then introduced in the casks and taken to the on-site ATI or ATD, as appropriate. Later, when the AGP will be ready these casks will be transported to the AGP.
All this processes are subject to the safety regulations and in addition to internal self-assessments, periodic evaluations by the regulatory body, audits, and evaluations by independent nuclear oversight organizations are undertaken. The radwaste management process is also evaluated by WANO every four years, comparing the plant practices against the best industry standards. Weaknesses are reported into the CAP to improve the process (continuous improvement model).

Nuclear power plants decommissioning

In the ENRESA-Utilities Standard Contract mentioned above, there is also specific annex related to nuclear installations decommission. In this annex, the responsibilities and activities of each part are well defined.

According to the established scheme, following the definitive shutdown of the nuclear power plant, the latter is responsible for conditioning and delivering to ENRESA all the operational and structural radioactive waste produced during the operating period and still stored on site. The NPP is also responsible for emptying the pool of spent fuel and high level radioactive waste produced during the operating period. This type of waste must be conditioned in spent fuel casks, which will be stored in the temporary storage facilities (ATI or ATD) existing at each of the nuclear power plants until they are transferred to the AGP, once it is operational.

After these conditions are met, ENRESA will take over the responsibility of the installation and will undertake all the dismantling activities to take it over to a “green field” condition. The site will be then returned to the initial owner.

According to the 7th PGRR, the duration of the projects for these operations are 3 years to

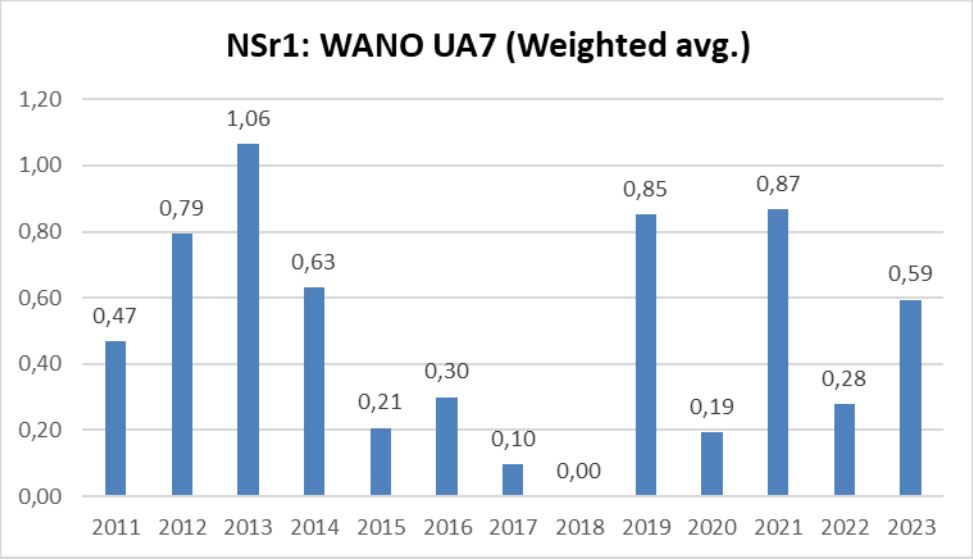
condition the low and intermediate operational and structural radwaste and the spent fuel, and 10 years for the dismantling process.

By the Spanish legislation, the dismantling project is subject to an environmental evaluation, that includes public participation and is approved by the Government. As a result of the evaluation, corrective and preventive measures may be implemented to minimize the impact of these activities.

9. Nuclear Performance Indicators

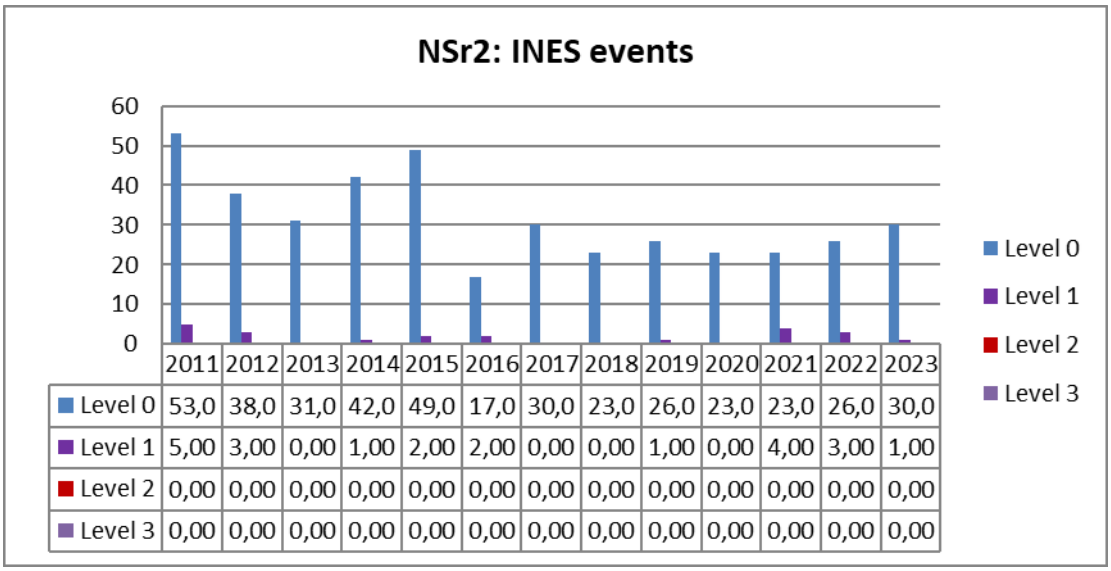
NSr1: UNPLANEND AUTOMATIC SHUTDOWNS PER 7000 HOURS CRITICAL (WANO UA7)

Values are calculated on annual basis (http://www.wano.info/) to monitor evolution of unplanned automatic shutdowns.
The indicator has worsened compared to the previous year, having gone from a value of 0.28 in 2022 to 0.59 in 2023. On 08/12/22, the automatic shutdown of Almaraz 1 occurred as a consequence of the action of the turbine electrical protections. On 05/16/23 another automatic shutdown of the same plant took place, this time due to a high level in a steam generator resulting from an electrical anomaly in a relay panel. On the other hand, on 08/13/23 the automatic shutdown of Vandellós 2 occurred due to a low level signal in the steam generators. The signal was generated after several pumps in the secondary circuit tripped due to an electrical anomaly. A month later, on 09/20/23, there was a new automatic shutdown of the plant, this time due to voltage fluctuations in the external electrical network.In accordance with the procedures, the event was reported to the Regulatory Body (CSN), that classified it as INES level 0.



NSr2: NUMBER OF REPORTABLE EVENTS CLASSIFIED ON THE INES SCALE

Events reported to the Regulator (CSN) according to the criteria established on Safety Instruction IS-10 and classified on the INES scale (http://www-ns.iaea.org/tech-areax/emergency/ines.asp).



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Level 0	53,0	38,0	31,0	42,0	49,0	17,0	30,0	23,0	26,0	23,0	23,0	26,0	30,0
Level 1	5,00	3,00	0,00	1,00	2,00	2,00	0,00	0,00	1,00	0,00	4,00	3,00	1,00
Level 2	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Level 3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

The figure shows evolution along last 13 years of the number of events in Endesa NPPs. No INES 2 or higher have been reported during the period.

In all cases, root cause analyses were performed to identify the underlying causes and contributing factors. Consequently, corrective actions have been implemented to address them; actions have included procedural changes, enhanced operating practices, reinforcement of supervision, training of key personnel, and human performance improvement, for which the use of “Human Factors” Simulator has been instrumental.

The following list reflects the events classified as INES 1 by CSN since 2012 (No INES 2 or INES 3 events have taken place in the period):

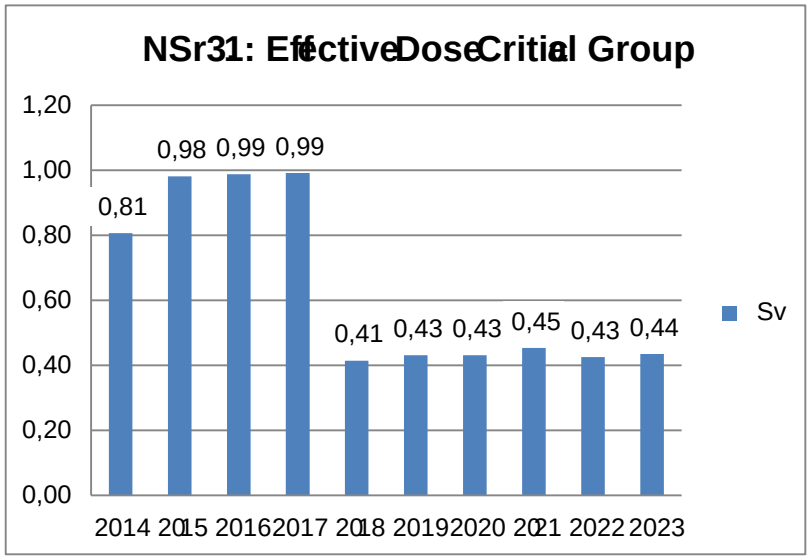
- INES 1- Asco 1 and 2 (10/11/2012): latent defect discovered in reactor protection logic
- INES 1- Vandellós 2 (04/12/2012): latent defect in the instrumentation valve line up
- INES 1- Vandellós 2 (28/11/2014): two of the four level transmitters of the refueling water storage tank (RWST) failed, leading to initiate the shutdown sequence according to Technical Specifications, but due to a misinterpretation that sequence was initiated later than required
- INES 1- Almaraz 1(20/02/15): some fire protection watches were not performed
- INES 1- Almaraz 2 (20/02/15): some fire protection watches were not performed
- INES1-Almaraz 1 (25/07/16): surveillance of the component water cooling system heat exchangers efficiency not fulfilled
- INES1-Almaraz 2 (25/07/16): surveillance of the component water cooling system heat exchangers efficiency not fulfilled

- INES1-Vandellós 2 (06/04/19), leak affecting the pressure boundary located in a welding of the drainline of Steam Generator B. This event, initially classified by the Regulator as INES 0, was finally reclassified as INES 1 due to the repetition of similar events in Vandellós 2.
- INES 1-Ascó 1 (15/04/21), Automatic reactor shutdown due to failure of a Solid State Protection System (SSPS) card and subsequent inoperability of the auxiliary feedwater turbine-driven pump.
- INES 1-Santa María de Garoña (29/04/21), for non-compliance of the Technical Specification in shutdown related to surveillance requirements to be carried out prior to the movement of heavy loads above the spent fuel pool.
- INES 1-Trillo (12/05/21), due to the inoperability of two trains of the spent fuel pool emergency cooling system.
- INES 1-Vandellós 2 (18/08/21), for non-compliance of the Technical Specification associated to the remote shutdown panel due to a misalignment of a pressure transmitter of the steam generator B.
- INES 1- Vandellós 2 (14/01/22), due to an error in a converter card of the reactor protection system that was found to be above the calibration tolerance during the calibration tests of the temperature measurement channel of the refueling water storage tank.
- INES 1-Trillo (04/06/22), due to discrepancies in the interpretation of the regulations related to the storage of lubricating oil that allows diesel generators to operate for up to 72 hours in the event of an earthquake.
- INES 1_Trillo (12/18/22), due to inoperability of an emergency diesel generator for a time longer than that established in the Technical Specifications. The inoperability occurred as a result of a small leak from the cooling water system into the oil system of one of the two engines.
- INES 1_Ascó 1 (06/16/23), because of during the plant's start-up, once the activities corresponding to its 29th refueling were completed, the plant shutdown sequence had to be initiated due to the inoperability of two channels of the reactor's automatic shutdown system (overtemperature and overpower).

NSr3.1: EFFECTIVE DOSE FOR THE CRITICAL GROUP (PUBLIC) Sv

Values correspond to the potential accumulated annual dose, taking into account the actual releases and evaluating their impact on an hypothetical individual within the worst case conditions in terms of exposure pathways, which represents very conservatively the most exposed individual of the local community.

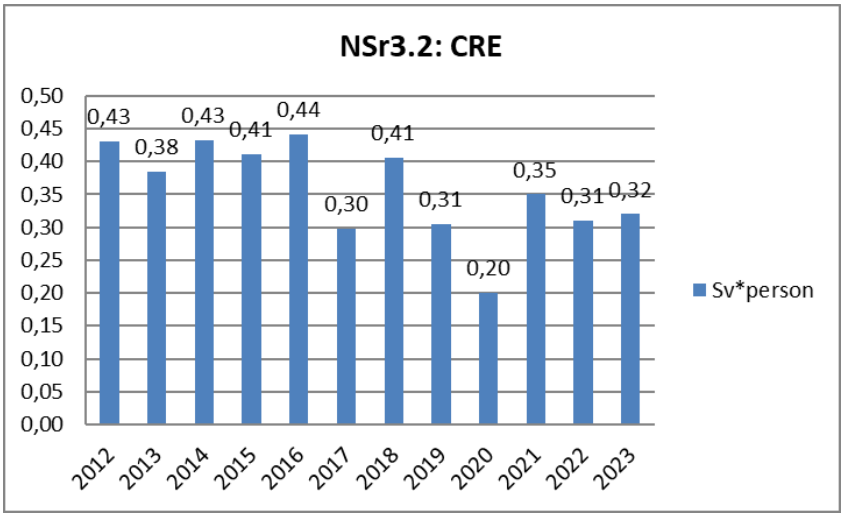
Actual values, as reflected in the figure, are very well below the legal limits (by around 3 orders of magnitude). Anyway, measures are systematically taken to optimize effluent releases.



NSr3.2: COLLECTIVE DOSE (WANO CRE) (Workers) Sv.Person

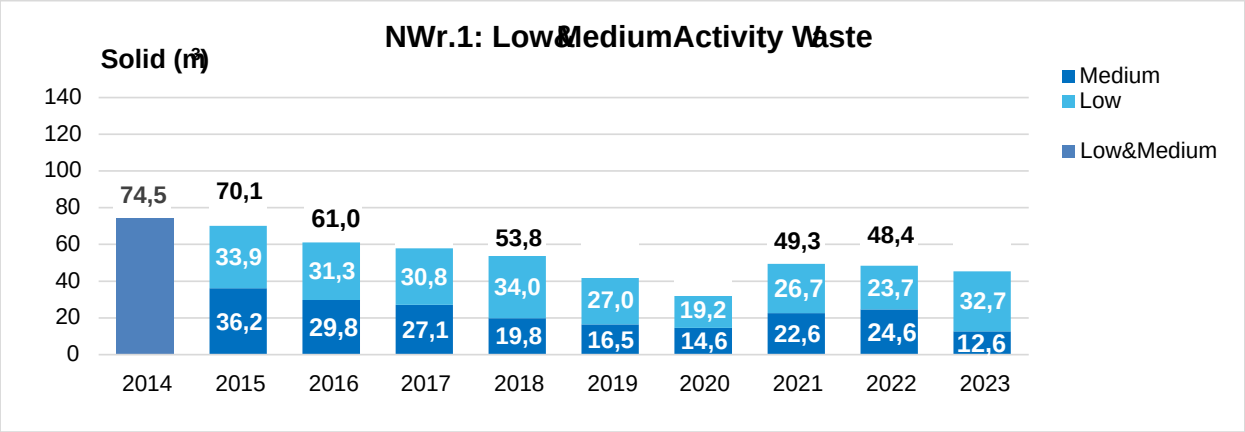
This indicator shows the effectiveness of radiological protection programs in minimizing radiation exposure to plant workers. Annual values are subjected to normal fluctuations depending on the number and duration of refueling outages, since a relevant number of maintenance activities take place during outage periods. In 2023 four refueling outages took place: Ascó 1 NPP, Ascó 2 NPP, Almaraz 1 NPP and Trillo NPP. The indicator continues showing an overall good performance, in line with the results of benchmark plants.

Actions continue to be taken to optimize collective doses in the long term.



NWr1: LOW & MEDIUM ACTIVITY WASTE GENERATED AND PACKED (m3)

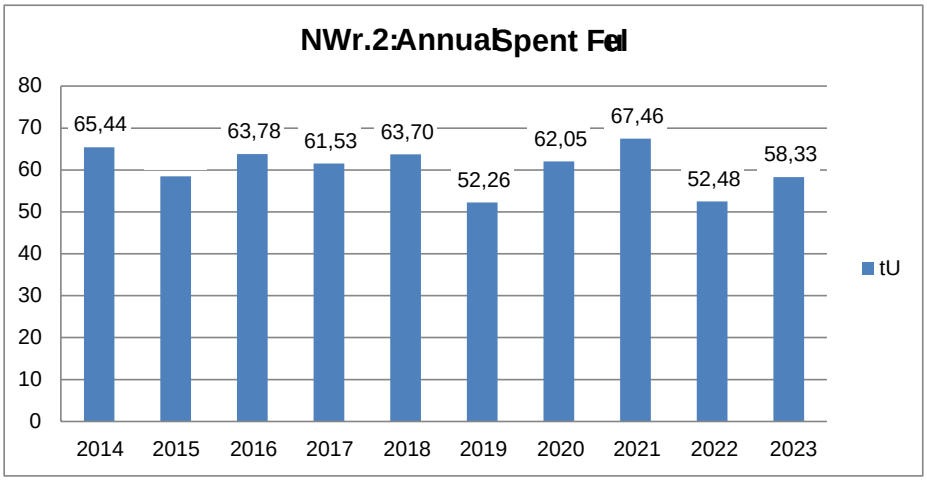
This indicator reflects the amount of solid radwaste (low & medium activity) generated and packed in each plant along the year. Annual values depend on the number of refueling outages performed in the year and are subjected to normal statistical fluctuations.

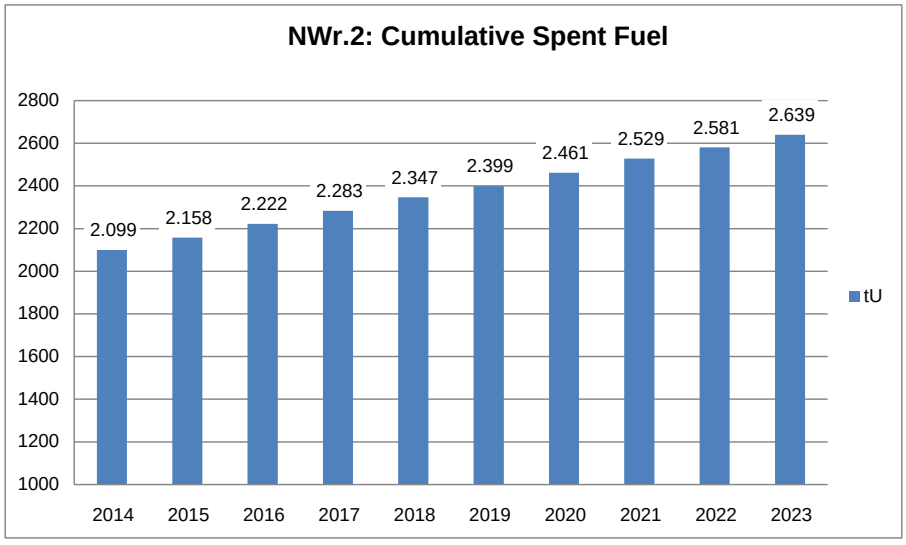


The classification in very low, low and intermediate waste is done according to the ENRESA document: 031-ES-IN-0015 “Criterios de aceptación de bultos de RBBA (residuos de muy baja actividad)”

NWr2: ANNUAL & CUMULATIVE SPENT FUEL (tU)

Annual values are calculated according to the amount of fuel assemblies unloaded from the core in the corresponding year in all NPP´s, taking into account the percentage of ownership of Endesa in each one of them; for the calculations the weight of Uranium in the fresh fuel has been considered. Annual values show normal fluctuations depending on the number of refuelling outages in the period. Cumulative spent fuel evolves as expected, with yearly increases consistent with the aforementioned number of refuelling outages.





NWr3: DECOMMISSIONING

As commented in the point related to “Waste Management System” in this document, in Spain the decommissioning of nuclear installations is, by law, a responsibility of the Spanish State. For this purpose, the State has created a 100% State owned company, ENRESA, which is responsible for this activity and the final management of low, intermediate and high activity radwaste, including spent fuel.

Therefore, in case of decommissioning of any nuclear plant currently managed by Endesa, ENRESA is in charge of defining the conditions for Dismantling and Decommissioning operations. License holders take part in these plans for transferring the facility to ENRESA. Appendix J of the Standard Contract establishes the responsibilities in this regard and provides the reference

schedule for transferring the facility from the owner to ENRESA once the definitive cessation of the operation takes place, and the requirements to carry out said transfer are met.

ENRESA's detailed plans for decommissioning and dismantling nuclear facilities are included in the "ENRESA's Plan General de Residuos Radioactivos".

On December 27th, 2023, the Council of Ministers approved the 7th Plan General de Residuos Radiactivos (PGRR), available to the public at:

https://www.miteco.gob.es/es/energia/nuclear/residuos/plan-general.html

In summary, Endesa is financing the corresponding costs of the dismantling and management of radioactive waste from its nuclear plants, through contributions to the fund managed by ENRESA, in proportion to the energy generated by its nuclear power plants, as established in the ENRESA General Radioactive Waste Plan.

On 12 March 2019, the electricity utilities and ENRESA sign the "Protocol between ENRESA and the owners of the Spanish nuclear power plants, based on the 2025-2035 time horizon, for the orderly closure foreseen in the integrated National Energy and Climate Plan, PNIEC"

In this document, a plant shutdown schedule is defined, in accordance with the dates of the PNIEC, between 2027 and 2035. On the basis of these new shutdown dates, ENRESA updates the Economic and Financial Study for the Ministry. This update implies a variation in the volumes of LILW and LILW and spent fuel management. On the basis of the new calculations, ENRESA proposes a new value for the fee payable by the nuclear power plants. The fee currently set according to RD750/2019 is 7.98 €/MWh, approximately 20% higher than the previous one. However, following the recent approval of the 7th GRWP, it is expected to be set at 11.14 €/MWh, which would represent an increase of 40% with respect to the current rate.

ENRESA previsions are that during the future dismantling of the Spanish nuclear power plants, with closure dates according to the Protocol, 121.700 m3 of very low, low and intermediate activity, additional to the 12.700 m3 already generated in the dismantling of Vandellós I and Jose Cabrera Nuclear Power Plants, and that are being stored in El Cabril facilities (Cordoba). Additionally 21.786 spent fuel rods must be managed.

In the 6th PGRR in force, the management of spent fuel was foreseen to be carried out with dry storage casks, initially in the Individual Temporary Storage Facilities (ATI, by its acronym in
Spanish), within each nuclear site, and afterwards in the Centralized Temporary Storage (ATC in Spanish), which Enresa planned to build and have operational in 2028, according to the last
(AGP in Spanish) when this was operational.
th PGRR in 2020. The spent fuel was to be transferred in the Deep Geological Disposal
of the 7 draft
In accordance with the 6th GRWP, as well as with the first draft of the 7th PGRR (2020), spent fuel management was foreseen to be carried out with dry storage in casks placed in the Individual Temporary Storage (ATI in Spanish) facilities at each nuclear site, for subsequent transfer to the Centralised Temporary Storage (ATD in Spanish) that ENRESA planned to construct and have operational in 2028. The casks would be stored at this facility until the Deep Geological Disposal (AGP in Spanish) became operational.

However, the approved version of the 7th PGRR bases the spent fuel management strategy on the Decentralised Temporary Storage Facilities (ATD) at each nuclear site. Spent fuel will remain

in the ATDs until the Deep Geological Disposal (AGP) becomes operational in 2073.

More information on the dismantling projects that Enresa is developing can be found here:

https://www.enresa.es/eng/index/activities-and-projects/dismantling-and-environmental-restoration

In 2023, the Transfer of Ownership takes place, followed by the dismantling of the Santa María de Garoña NPP, managed by Nuclenor, a company in which Endesa and Iberdrola hold a 50% stake.

Currently, there are three plants being dismantled in Spain:

1. Vandellós 1 Nuclear Power Plant, owned by Hifrensa, which ceased operation in 1989. It is a graphite gas reactor, in which ENRESA has defined a phased dismantling. Phase 1 of dismantling began in 1998, with the transfer to ENRESA of the plant. It has been in a latency period since 2003. In the year 2030, it is planned to begin Phase 2, with a duration of 15 years.
2. José Cabrera Nuclear Power Plant, owned by Naturgy, which ceased operation in 2006. It is a PWR reactor, in which ENRESA has proposed immediate dismantling in one phase. In 2010, the plant was transferred to ENRESA, which is expected to complete its dismantling process in 2025.
3. The Santa Mª de Garoña NPP is located in the municipality of Valle de Tobalina, province of Burgos. It had an installed power of 466 MW with a BWR type reactor. The transfer of ownership to ENRESA took place in June 2023, and the plant is currently being decommissioned. The duration of the decommissioning is estimated to be approximately 10 years, with immediate decommissioning in two phases. Phase 1 (2023-2026) will involve disassembly of the systems, structures and components of the Turbine Building and its refurbishment as a new Auxiliary Dismantling Building (EAD). Simultaneously with this work, the spent fuel will be removed from the pool to the Individualised Temporary Storage (ITS) located in the eastern area of the facility.

   Subsequently, in Phase 2 (2026-2033), with the fuel out of the Reactor Building, the final dismantling of the radiological buildings will be addressed, continuing with decontaminations, declassifications and demolitions to finally conclude with the restoration of the site.

The preliminary waste estimates to be managed by ENRESA during the decommissioning of the Garoña NPP are:

- Very Low Activity Waste: 7,100 tons
- Low and Medium Activity Waste: 3,700 tons
- Material declassified and not impacted: 160,000 tons

That is, the total material to be managed would be 170,800 tons, of which 6.3% would be radioactive waste to be managed in El Cabril.