

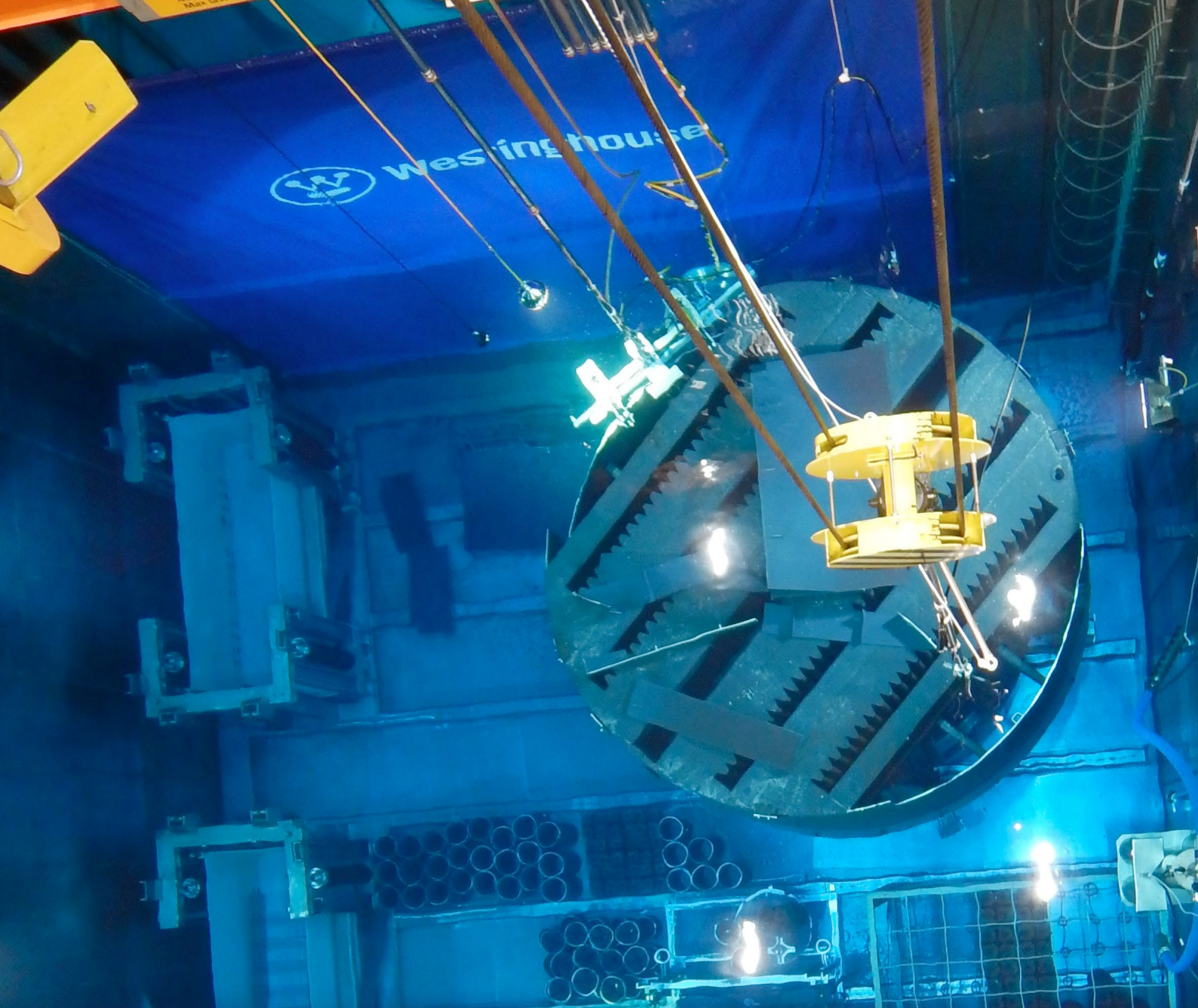


SPANISH NUCLEAR POWER PLANTS

2019

Experiences & prospects





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SPANISH NUCLEAR POWER PLANTS 2019

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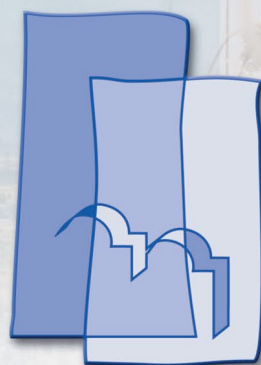
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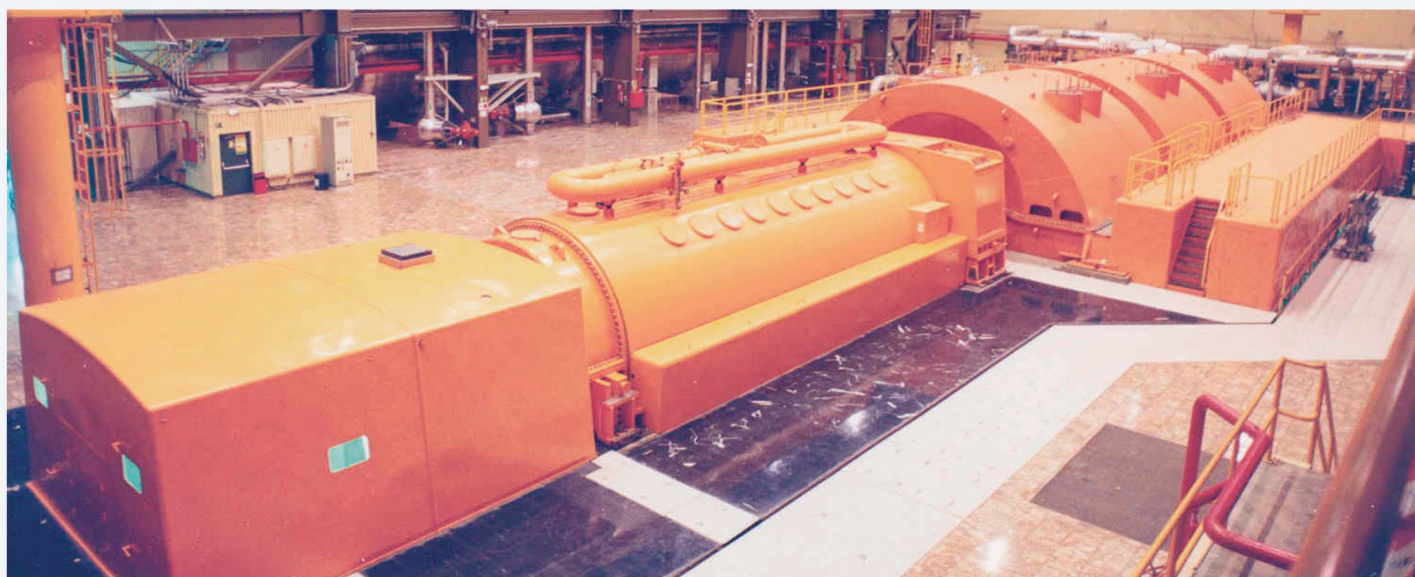
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TRILLO**



**LA SEGURIDAD ES NUESTRO PRIMER
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Centrales Nucleares Almaraz - Trillo

Avda. de Manoteras, 46 bis, Edificio Delta Norte III. Planta 5ª 28050 Madrid.

NUCLEAR SECTOR PROFESSIONALS ANALYZE THE SUCCESSFUL OPERATION OF THE SPANISH NUCLEAR PARK IN 2019

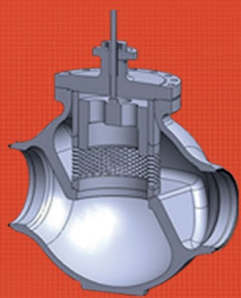
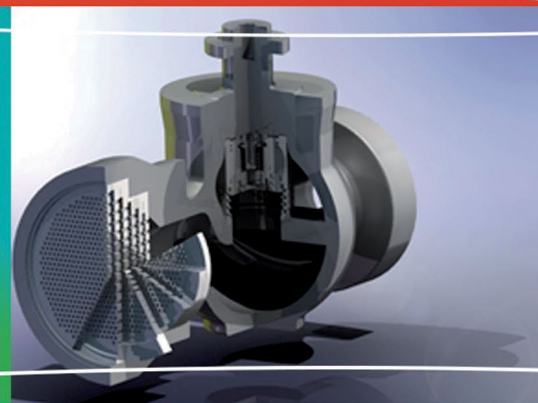
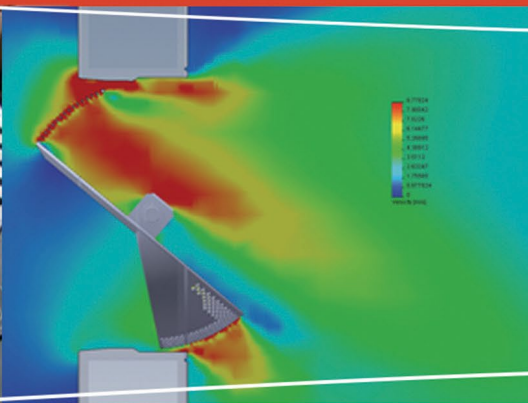
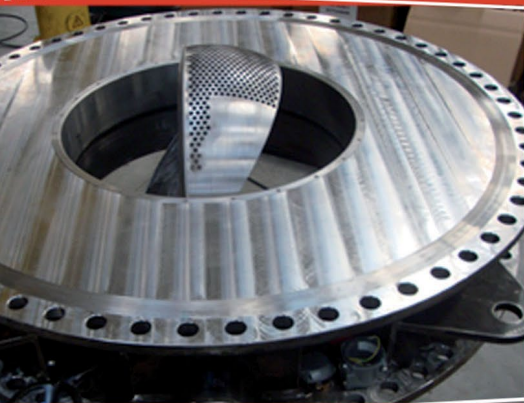
Professionals in the nuclear sector gathered for yet another year at the “Nuclear Power Plants in 2019: Experiences and Outlook” session to reconfirm the successful operation of the Spanish nuclear park during the past year. For the ninth consecutive year, nuclear power production has managed to be the leading source of generation in the peninsular electricity system, covering 22,60% of the country's demand during 2019. This was followed by: wind power (21,5%), combined cycle (20,7%), cogeneration (12%), hydraulic (10%), coal (4,3%), photovoltaic solar (3,6%), thermal solar (2,1%), thermal renewable (1,5%), non-renewable waste (0,8%), pure pumping (0,7%), and renewable waste (0,3%).

The results of electricity generation during the past year show the importance of making an objective and calm assessment of the role of all energy sources that help achieve the ambitious plans established in the Integrated National Plan for Energy and Climate, which would be unattainable if we disregard the energy source that currently contributes the most to emission-free electricity generation. In this sense, nuclear energy, with only 6,55% of installed power, was able to contribute 37% of the emission-free electricity generated during 2019 in Spain.

The availability of the Spanish nuclear park had outstanding figures once again. The plants operated for 7846 hours, which means operation with total safety during 89,5% of the year. These figures are a guarantee of the solid capacity and reliability of this power generation source.

The session, successfully held at the ETS of Industrial Engineers of the Polytechnic University of Madrid, was attended by more than 200 professionals from the sector and included the participation of all the directors from the Spanish nuclear power plants who presented the experiences at their facilities, mainly using new multimedia resources. The event also featured José Emeterio Gutiérrez Elso, Senior Advisor & Consultant and former Westinghouse president, as the speaker for the special session. In the course of the event, it became clear how nuclear energy continues to make a fundamental contribution to the stable supply of electricity, operating on the basis of and reinforcing its role as an essential technology in an energy model that aspires to be free of polluting emissions in the medium term.

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OPENING SESSION



ÓSCAR GARCÍA

Director de la Escuela Técnica Superior de Ingenieros Industriales de la Universidad Politécnica de Madrid (ETSII-UPM)

Óscar García inaugurated the Journey Experiences and Prospects of Spanish nuclear power plants in 2019, manifesting the great honor that it represents for him to present this journey for the first time.

As director of the ETSII in Madrid, he expressed the dedicated support that the School has with the energy sector and, more specifically, with that of nuclear energy.■

JAVIER GUERRA

President of the SNE

Good morning and welcome to the thirty-first Operational Experiences Session, a more than classic meeting for all of us nuclear professionals, with the operation of our plants in the spotlight, to share experiences and knowledge.

On my own behalf and on behalf of the Board of Directors of the Spanish Nuclear Society, I want to thank all those who have made this event possible. Very especially to all the members of our Committee on Programs and, above all, to all of you who are here today. I also want to thank the Industrial School, and its Director Oscar García, who



joins us in this opening event, for the magnificent reception and all the facilities that, for another year, have been provided to us to be able to hold our Conference in this very special setting.

Of course, I also want to thank our guest at the Special Session, José Emeterio Gutierrez Elso, for his kindness and willingness to speak to us about the situation of nuclear energy worldwide from his perspec-



tive as head of one of the world's leading nuclear companies. And of course, also to thank all the directors and plant managers who come today as the main protagonists of this meeting to tell us about the experiences of their respective facilities.

Thanks also to Marina Serrano, President of the Spanish Electrical Industry Association (Aelec) for your willingness to share the results and news for the electricity sector with us, and to Ignacio Araluce, President of Foro Nuclear for your presence and support.

2019 SUMMARY

Marina will give us the numerical information on generation for 2019 with full precision, and I would like to preview that according to REE data and for **the ninth consecutive year, Nuclear Energy continues to be the leading source of electricity generation nationwide**, with 21.4%, closely followed by combined cycles and wind power. And, it was the leading source of electricity free from greenhouse gas emissions, with 36% of it, in a year in which more than 6,000 megawatts of new renewable power was added to the generation park.

The % of electricity from non-emitting sources was 60%, a little lower than what was achieved in 2018 due to the lower participation of hydro. However, from the point of view of emissions from the electricity sector, it has been a very positive year, reaching the figure of 49.6 MT CO₂-eq, the lowest since records have been available, mainly due to partial replacement of coal for gas.

RELIABILITY AND SAFETY

The directors are going to give us a detailed explanation of the most important events for the operation of their plants, and it is not up to me to go ahead and give away any spoilers. But if I would like to highlight the excellent general operation of the park, with an average availability factor of 89.5%, all plants maintaining an excellent international positioning according to WANO's operation indicators. And a fact that strikes me, **only 1 of**



the 5 events reported in 2019 and classified above INES zero by the CSN occurred in one of our facilities, which highlights the excellent work and rigor of our professionals who, year after year, maintain a level of thoroughness and truly commendable results. This is the way forward so that our industry can continue to look to the future with optimism.

INTERNATIONAL OVERVIEW

Worldwide, there are currently 442 nuclear reactors in operation, 54 more under construction, and 109 in the planning phase. Furthermore, all the major world powers have plans for the technological and commercial development of new models of advanced nuclear reactors. In Europe, it employs around 800,000 professionals, generating 26% of electrical energy, which represents approximately half of CO₂-free electricity.

And continuing in Europe, the Mochovce 3 nuclear power plant expects to start its operation this year, Mochovce 4 and Olkiluoto 3 will do so in 2021, and Flamanville 3 in 2022. HPC and Hanhikivi are under construction, expecting to start their operation in 2025 and 2028 respectively. In short, in Europe, in the near future, a new reactor will come into operation practically every year, which clearly highlights that the commitment to nuclear energy is still alive and that, together with plans for new reactors in

Poland, the UK, Bulgaria, France, Romania, and Finland, the long-term operation in the UK, France, Belgium, the Netherlands, Finland, Sweden, and Switzerland, in addition to the technological development of fission and fusion reactors, gives a glimpse of an important future for nuclear technology in the electricity mix for today and the years to come.

One more fact, which is significant for where the world is moving at the moment, is that this year, 2020, it is very likely that China will pass France to position itself as the second country, after the United States, in the ranking of electricity producers of nuclear origin with between 6 and 8 new reactors entering into service.

General Plan for Radioactive Waste (PGRR)

Returning to Spain, the 6th General Plan for Radioactive Waste (PGRR), currently in force, was approved by the Council of Ministers on June 23, 2006. The paperwork for PGRR VII is currently beginning, which has experienced various delays and includes, among other things, the management plan for spent fuel.

Surely, we all agree that the ideal plan, from all points of view (economic, safety, efficiency, and simplicity) is locating all the spent fuel in a single repository, or CTS, at the national level. It is essential to have this infrastructure as soon as possible, to optimize this process, which



is now solved temporarily and absolutely safely by each plant, but with costs that will grow over time.

From here I want to send the message for **the need to have the new Plan as soon as possible, and for it to respond to the greatest possible consensus of all those involved**, in addition to being based on environmental, technical, and economic criteria, leaving other considerations out of the final decision.

License renewal and LTO

On the other hand, between this year and next year, the operating licenses for all reactors except for Trillo will be renewed. We all trust that this process can be carried out on time and with all the guarantees. I speak from the conviction that **our plants are in a technically excellent situation**, both because of the good results in the operation of the park, which are verified year after year, and because of the continuous renovations and investments that have been carried out in all of these facilities to keep them in conditions that allow them to extend their life to where necessary. At least to the 60 years of operation that the vast majority of their American twins will reach.

Flexible operation, as a commitment to the future, to make nuclear and renewables compatible is, without a doubt, one of the challenges that lies ahead in the coming years and that will further enhance an as-

set such as seven reactors operating in our country.

NECP. Strategic Framework for Energy and Climate

Finally, allow me to make a brief reference to the energy and climate commitments that our country has made. The objective is to be climate neutral in 2050, with a reduction of at least 90% of our total gross GHG emissions, in line with the objectives of the European Union, in addition to achieving a 100% renewable electricity system, also in 2050.



Between now and 2030, the new draft of the NECP 2021-2030, published in January of this year, plans to achieve a penetration of renewables in electricity generation of 74% as well as a reduction in GHG emissions of 23% compared to 1990.

In line with this, a mobilization of 241.4 billion euros is estimated, of which 62% will go to electrification and the electricity sector, for which an emission reduction of 72% is expected, making it the leading sector of the economy in terms of reducing emissions, as it has been doing for many years.

Additionally, it is worth noting the climate and environmental emergency declaration made by the Council of Ministers on February 21, in which it undertakes to adopt 30 priority lines of action to combat climate change with cross-disciplinary policies. An emergency that, let us not forget, is marked by GHG emissions from the set of activities and processes that are carried out around the world.

From the Nuclear Society we believe that, in this scenario, the role of nuclear plants currently in operation is essential to guarantee this drastic reduction in emissions, the necessary electrification, and, of course, the supply guarantee on which the development and the future of the country are based. We advocate for the regulatory conditions and tax framework that make this approach possible, knowing that **the plants are technically able to operate safely and efficiently as long as necessary** and that our commitment to safe, reliable, and long-term operation of these facilities is guaranteed.

Many thanks again to all for your presence and attention; I am convinced of the interest of the content that we have planned for this session and that, as every year, it will help us to learn a little more about each other and share operational experiences, without doubt, one of the bases of our continuous improvement. Thanks again.■



MARINA SERRANO

President of the Association
of Electric Power Companies
(Aeléc)

Thank you very much to the Spanish Nuclear Society for the invitation; it is a pleasure for me to participate for the third consecutive year in this traditional event, in which we have the opportunity to present the most outstanding issues that have taken place in the electricity sector during 2019, both from the regulatory and stocktaking point of view, and the outlook for this year 2020.

First, I will review what was most significant for the year 2019, and then I will comment on the regulatory issues that are worth highlighting and finish this part by detailing the aspects of the electricity balance. Finally, I will comment on the regulatory issues that will be of concern to us during 2020.

Among the facts that we can highlight for the year 2019 is that it turned out to be a very active year in terms of regulation despite the peculiar political situation, which resulted in that after the general elections in April they had to be repeated again in November. However, this situation has not prevented it from having turned out to be a year with great regulatory activity in terms of regulatory proposals, strategies, and notices from the National Commission on Markets and Competition, among others.

Regarding **electricity demand**, it should be noted that, after four consecutive years of increases, in

2019 this trend was reversed, with a decrease compared to 2018.

On the other hand, electricity generation **had a decrease in emissions of around 23%**, which is especially noteworthy since 2019 was a normal year in terms of rainfall compared to 2018 which was a wet year.

But, before getting into specific regulatory issues, I would like to review the participation of Aeléc at the **25th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP25)** that was held under the presidency of Chile in Madrid from December 2-15. We led our own delegation as an accredited observer of the Convention and we actively participated with the organization of different sessions.

REGULATORY ISSUES

Regarding the national and European regulatory aspects of 2019, it is of note that with regard to electrical activity, **a total of 137 regulations were approved**, of which there are 4 royal decree laws, 11 royal decrees, 32 ministerial orders, 40 resolutions, 5 CNMC notices, and due to their importance at the European level, 1 European directive on common rules for the internal electricity market and 12 regulations should be highlighted.

Aeléc has had active involvement in most of them, among which we highlight the following:

I) The National Commission on Markets and Competition (CNMC) Notices

In the application of the provisions of Royal Decree-Law 1/2019, by which the CNMC has assumed certain regulatory powers that have materialized in the processing of several notices, almost all of them already approved and published. Among them, we highlight:

- *The Notice on the methodology and conditions for access and connection to the transmission and distribution networks for electrical energy production facilities*, which regulates the procedures, deadlines, and criteria for evaluating access capacity and granting permits. Still pending approval.

- *The Notice that establishes the methodology for calculating the remuneration of distribution activity*. Which sets a methodology, in general, of a continuous nature with the existing one.

- *The Notice that establishes the methodology for calculating the financial remuneration rate for network activities*, as well as the values that result from the application of said methodology. Based on the calculation of the Weighted Average Cost of Capital (WACC) and in line with the rest of European regulators.

- *The Notice that establishes the methodology for calculating electricity transport and distribution tolls*, which sets the distribution of network costs among different consumers and introduces new terms which especially important for domestic consumers such as time of use tariffs for both power and energy use or tolls applied exclusively to the recharging public access electric vehicles.

II) The Strategic Framework for Energy and Climate

This framework is presented as the fundamental pillar of the Government's energy policy with objectives for 2030, with a horizon of 2050, and constitutes the transposition of the commitments of the European Union in the fight against climate change into Spanish legislation.

In February 2019, the now Ministry for Ecological Transition and Demographic Challenge (MITECO) submitted three documents that make up this Framework for public consultation:

- *The Draft Law on Climate Change and Energy Transition*, the norm that must become an institutional tool to facilitate the progressive adaptation of our economic reality to the requirements set by the European Union for the decarbonization of our economy.
- *The Integrated National Energy and Climate Plan (NECP) 2021-2030*, which quantifies the contribution of Spain to these objectives and which must be



submitted to the European Commission for evaluation. Among others, it provides for 74% of electricity generation coming from renewable production with an emissions reduction target of 23%, according to the NECP update presented in January 2020, which aims to increase the EU's ambition to 2030.

- *The Just Transition Strategy*, which includes the necessary instruments to optimize the transition's employment opportunities.

III) Royal Decree on Self-Consumption

On April 6, 2019, Royal Decree 244/2019 was published in the Official State Gazette, which regulates the administrative, technical, and economic conditions of self-consumption of electrical energy. In essence, it introduces three fundamental principles that will govern this activity: i) the right to self-consume electricity without charge is recognized; ii) the right to shared self-consumption by one or more consumers to take advantage of economies of scale is recognized; and iii) the principle of administrative and technical simplification is introduced, especially for small power installations.

IV) The Remuneration of Distribution from Previous Years

From a regulatory perspective, the final remuneration for the years 2017, 2018, and 2019 has yet to be published for the remuneration for distribution activity, which has been requested, as has been the case in recent years. Also, requests for the on-time publication of the reports necessary for the approval of investment plans relating to distribution remuneration are pending.

V) Promoting Electric Mobility

During 2019, Aelēc participated in the preparation of comments and amendments to various regulatory proposals, supporting the electrification of transport as an essential element to achieve the commitments made to reduce emissions and decarbonize the economy in 2050 and proposing measures to eliminate of the barriers to its development.

VI) Bird Life

Regarding this issue, given that the distribution companies have been entrusted with certain obligations regarding the damage caused to birds from electricity lines, during 2019, work was done on solutions that could be implemented from the field of

regulation to ensure an action framework in accordance with bird protection measures.

VII) Environment

Regarding environmental issues, the arguments presented in the draft of the National Program for the Control of Atmospheric Pollution (PNCCA) for the reduction of some air pollutants by 2025 and 2030 are highlighted. In addition, work has been carried out on various regulatory developments that affect air quality and persistent organic pollutants, which have an impact on electrical activity.

VIII) National Strategy against Energy Poverty 2019-2024.

This instrument performs a diagnosis of the energy poverty situation and the lines of action and structural measures that seek to address the problem in the long term are determined.

IX) Access Tolls 2020

Regarding the access tolls for 2020, they are frozen for the sixth consecutive year, that is, the regulated part of the rate remains unchanged, although these tolls are transitional until the CNMC tolling methodology and the charging methodology comes into effect, pending approval by MITECO.

On the other hand, taking into account the concepts of regulated costs that must be covered by tolls, it is worth noting the disappearance of availability service, which this order has eliminated, as it indicates, as long as the capacity mechanisms are not revised for their adaptation to the European regulations and the energy transition process. This is an essential aspect when it comes to addressing the security of electricity supply in the long term.

X) Community Directive on the Internal Market

Regarding European regulatory issues, during the year, (EU) Directive 2019/944 of the European Parliament and of the Council was published, from June 5,



2019 on common rules for the internal market in electricity and amending Directive 2012/27/EU. The internal market for electricity, which has been progressively implemented across the Union since 1996, aims to give real choice to all end customers in the Union, whether they citizens or businesses, to create new business opportunities, competitive prices, efficient investment signals, and an increase in service quality, and contributing to the security of supply and sustainability. All this, through the organization of competitive electricity markets across national borders.

ELECTRICITY SUMMARY

As mentioned at the beginning, in relation to **electricity demand**, it should be noted that the recent trend of increases was reversed, with a decrease of 1,6% compared to 2019. Thus, demand stands at 239 454 GWh, a value that is similar to that registered in 2016, as well as that for the years 2003-2004 (Figure 1).

This is a decrease in demand not aligned with the positive growth of 2,0% of the GDP, which seems to reaffirm the lack of connection between economic growth and electricity demand.

With regard to **electricity generation**, the reduction in demand has not had such a significant impact, mainly due to a lower import balance, which led to a decrease in national production of only 0,1%. Specifically, the net **production** of electrical energy in Spain in 2019 was 260 713 GWh, a value about 270 GWh lower than the previous year (Figure 2).

2019 was a normal year in terms of rainfall, compared to 2018, which was classified as wet, which led to a reduction in hydraulic production of 27,1%. This shortfall was offset by increased wind, solar, and nuclear production of 9,3%, 18%, and 4,9% respectively. The technology that most reduced its production was coal, 66%, and the technology that increased the most was natural gas, 83,9%; which is justified by the increase in CO₂ prices.

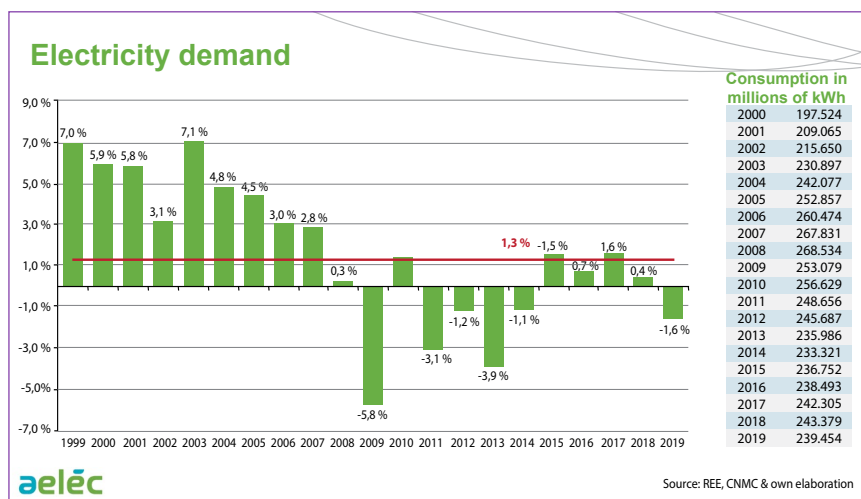


Figure 1.

For its part, **nuclear** generation was for another year the technology that contributed the most to the national electricity mix, 21,4%, and it had 5% higher production.

On the other hand, the production of **renewable** cogeneration and waste technologies amounted to 104 944 GWh in 2019, 7,4% higher than the previous year. Of this amount, 72% corresponded to renewable energy and the remaining 28% to cogeneration and waste treatment. In this segment, the technology with the highest share was wind power, which contributed 54 235 GWh. Likewise, the increase in solar production of around 2200 GWh was notable, due to the installation of almost 4000 new MW of photovoltaic technology this year.

Despite the decrease in hydraulic production, the increase in the rest

of renewable sources allowed this generation to remain at 39% of total production. And if nuclear is incorporated, we had 59% of electricity production in 2019 from sources free of CO₂ emissions.

As I have mentioned, generation decreased by 0,1%. As for the **electricity exchanges** carried out with France, Portugal, Andorra, and Morocco, as in the previous year, the Spanish electricity system had a net importer balance, although notably lower, of 6862 GWh, that is to say, 38% lower. This circumstance was mainly motivated by lower imports from France and Portugal.

It is also worth noting the change of sign for our trade balance with Morocco, which went from exporter to importer due to the commissioning of its new coal plants.

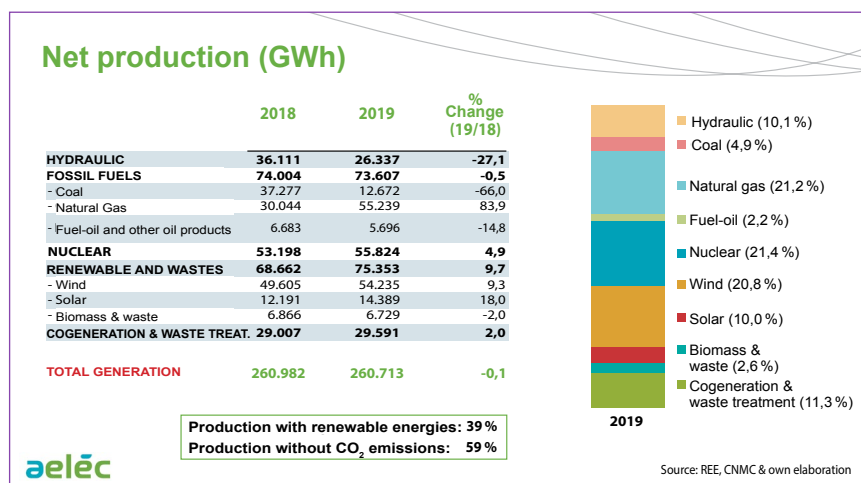


Figure 2.

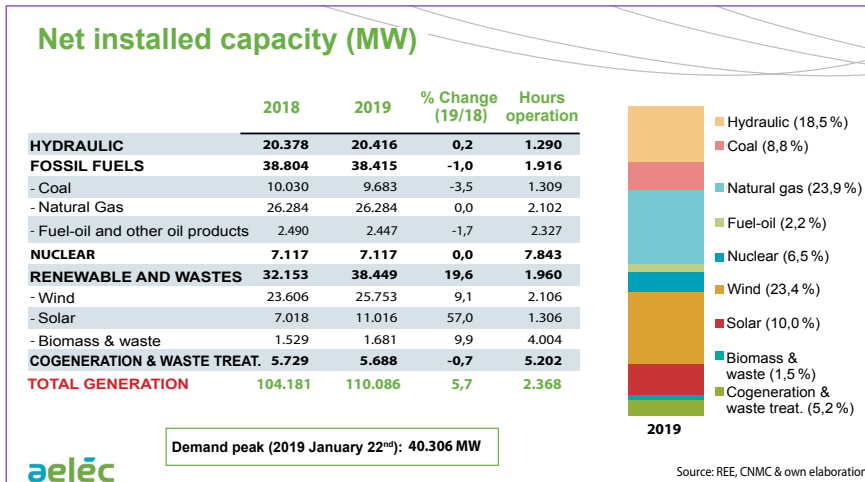


Figure 3.

The **maximum demand of the peninsular system** reached 40 306 MW, in January, and was 11% below the historical maximum reached in 2007.

The **net installed capacity** in Spain in 2019 to cover demand increased by about 5900 MW, reaching 110 086 MW. The main additions were in the solar parks, about 4000 MW, and wind farms, about 2150 MW. The main losses, of 347 MW, occurred in thermal generation with coal (Figura 3).

Combined cycles with 23,9%, wind energy with 23,4%, and hydroelectric power plants with 18,5% are the technologies with the highest share of installed power.

Regarding the number of hours of operation of plants by technology, during 2019, the nuclear park stood out as usual with 7843 hours, followed by cogeneration at 5202 hours, and biomass at 4004 hours. Coal plants only operated an average of 1309 hours.

OUTLOOK FOR THE YEAR 2020

Turning to comment on the electrical regulatory activity for this year, we must begin by highlighting the important legislative challenge that will mark the actions of the new government in energy policy and which is none other than the decarbonization and electrification of the economy to start the path to compliance with the proposed targets to be achieved by 2030, as well as the objective of emissions neutrality by 2050.

On January 21, 2020, the Council of Ministers approved the agreement on the **Declaration on the Climate and Environmental Emergency in Spain**, committing to adopt 30 priority lines of action to combat climate change with cross-disciplinary policies. This Declaration was made in response to the general consensus of the scientific community that calls for urgent action to safeguard the environment and the health and safety of citizens.

In the Declaration, the executive branch commits to implementing 5 of the aforementioned 30 measures in the first 100 days of Government: the Law on climate change and energy transition, the path (Strategy) for long-term decarbon-

ization to ensure neutrality by 2050 at the latest, the creation of a citizen assembly on climate change to achieve the involvement of society, the National Plan for Adaptation to Climate Change, and the transformation of the industrial and service sector that guarantees a just transition through the corresponding agreements and accompanying measures.

As for the medium-term measures in the field of climate change, those related to renewables, storage, or transport in all forms would be notable for the electricity sector. For this, it is necessary to determine a fiscal policy in accordance with these changes that discourages emissions, within a scenario where funding is going to have to actively support this transformation to facilitate the sustainability of the economy.

We believe that this very ambitious goal requires the establishment of **measures to promote the necessary investments**. The electricity sector is prepared for the development and integration of renewable energy, self-consumption, new electrical uses, both in the use of electric vehicles and in the installation of heat pumps or in storage. All this will be possible, provided there is a stable and predictable regulatory framework that facilitates the adaptation of dis-





tribution networks, which must be progressively transformed to allow the paradigm shift that the sector will face in the next 10 years. In turn, for this to be possible, the appropriate market mechanisms that give the right signals, without distortion, must be strengthened, and the necessary investment must be attracted to make these changes a reality in an efficient manner.

In the sectoral regulatory context, the year has started with the publication of the **CNMC Notice 3/2020** that establishes the methodology for calculating tolls for electricity transmission and distribution. As we have commented, the approval of a tolling methodology is not an isolated exercise, but rather it is part of the access tariffs that are completed with the charging methodology that must be established by the Government.

Therefore, the modifications to the structure of tolls that may result from the new notice or the variations in charges that occur after the approval of the corresponding royal decree will materialize in a future order that will establish new tolls and charges to replace current access tolls.

Likewise, as a result of the approval of the new distribution remuneration methodology for this second regulatory period, which begins this year and ends in 2025, it is expected to advance in the regulatory developments that are necessary for its implementation.

Furthermore, as a result of the approval of the new distribution remuneration methodology for this second regulatory period, which begins this year and ends in 2025, it is expected that progress will be made on the regulatory developments that are necessary for its implementation.

Additionally, we are awaiting the processing of the **Notice on access and connection methodology and conditions**. This notice is essential as a massive influx of renewable generation is expected in the coming years. To this end, we must first establish the powers attributed to the CNMC and the Ministry so that each regulator can develop the regulations that correspond to them.

Finally, in relation to European regulatory issues, the **European Green Pact** presented by the European Commission in December will undoubtedly leave a mark on the legislative evolution of this decade, with the great challenge launched of making Europe the first climate-neutral continent and becoming the greatest opportunity of our time. To achieve this, it presented an ambitious plan of measures that, according to the Commission, should allow European companies and citizens to benefit from a sustainable ecological transition. As a main element, the zero-emissions target is established in 2050, proposing a reduction of 50-55% by 2030.

In addition, this year it should be noted that **the new Directive on the**

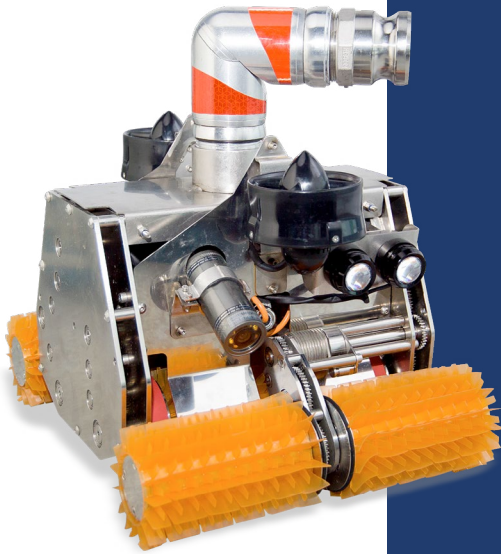
internal electricity market must be transposed into the Spanish legal system, in which three fundamental axes are highlighted: an electricity market that allows the massive incorporation of renewables, the more active role of consumers to advance electrification, and the importance of dealer management as neutral facilitators of generation connection and demand management.

As for the **European Network Codes in 2020**, the approval of the regulatory package consisting of a Royal Decree and two Ministerial Orders is expected. This set of rules will allow for the implementation of the set of European Regulations that approved the so-called Connection Network Codes in 2016.

In short, I would like to conclude that decarbonizing the economy is an essential commitment for our society. And there is no going back. Electrification is the way to combat climate change and, therefore, the most effective way to achieve it is by increasing the importance of electricity in our energy consumption. Therefore, it should be noted that in all the scenarios that are being analyzed, in addition to the electricity sector, transport, industry, and construction must be able to converge towards an increasingly intensive electricity solution.

As a sector, we must be able to transform these objectives into an opportunity and convey the benefits that achieving them entails for society and consumers.■

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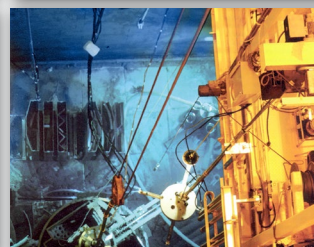
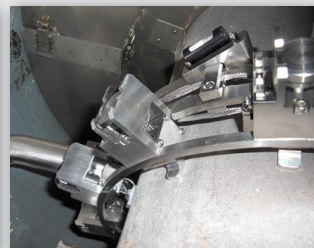
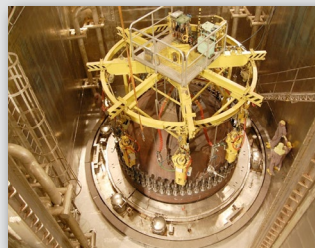
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IGNACIO ARALUCE

President

Spanish Nuclear Industry Forum

I want to start my speech by thanking the Spanish Nuclear Society for inviting me to participate again in this inaugural session for the Session on Operational Experiences for Spanish Nuclear Power Plants. As I will explain later, last year was full of important activities, both for power plants and for the Spanish nuclear industry as a whole.

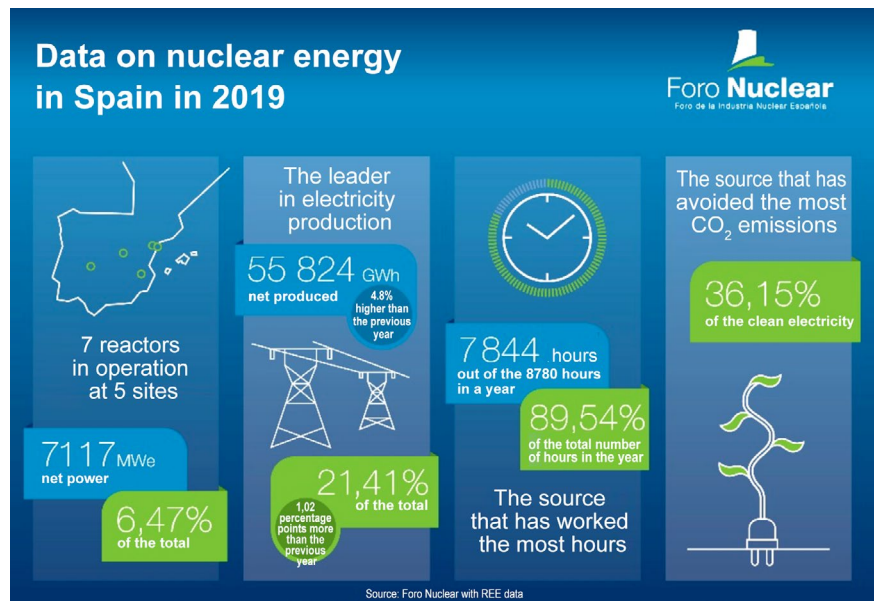
In 2019, the net electrical energy produced by the seven reactors that make up the Spanish nuclear park was 55 824 GWh (4.8% higher than the previous year), which represented **21,41% of the country's total net electricity production**, 1,02 percentage points more than the previous year. Gross production was 58 395 GWh. **Nuclear technology was, for yet another year, the source that generated the most electricity in the Spanish electricity system.**

In addition, it was also the leading source regarding the number of hours of operation in the system. In fact, **the average operation of the nuclear park was 7844 hours**, which represents 89,54% of the 8760 hours in a year.

As of December 31, 2019, the net installed capacity of the nuclear park was 7117 MW, 6,47% of the total net installed capacity in the country. The gross power was 7398,7 MW.

On the other hand, nuclear production **accounted for 36,15% of the CO₂-free electricity generated** in the country and was the source that avoided the most emissions.

Spanish nuclear power plants are safe, and this is not only stated by the Nuclear Safety Council



(CSN), but **worldwide our facilities are a reference**, which is achieved thanks to the experience of the nearly 28 000 professionals who work in the nuclear sector and the **capacity and commitment to excellence of the companies in the Spanish nuclear industry**, which covers the entire nuclear fuel cycle value chain.

Good proof of this is that in recent years, the operating indicators of Spanish nuclear power plants are among the best in the world, with overall values of over 90%.

Within the framework of the Integrated National Energy and Climate Plan 2021-2030 of the Ministry for Ecological Transition, the continued operation of the seven reactors that make up our nuclear park

must continue to play an important role in the transition towards a decarbonized economy and electrical system.

In this respect, on March 22, 2019, Almaraz-Trillo, A.I.E Nuclear Power Plants submitted the application for the renewal of the current operating authorizations for unit I of the Almaraz nuclear power plant until November 1, 2027, and for unit II until October 31, 2028. Likewise, on March 27, 2019, the Ascó Nuclear Association -Vandellós II, AIE presented the corresponding request for renewal of the operating authorization for the Vandellós II nuclear power plant until July 2030.

Regarding the **perspectives for the 2020 period** that we are beginning, fuel refueling and general





Outlook for 2020



Since January 1: increase in the fixed unit rate of the financial contribution for funding Enresa (Enresa fee)

6,69
€/MWh

▲19,2%

7,98
€/MWh

4

refueling
stops

Almaraz I
Ascó I
Ascó II
Trillo

Predicted
net production:

56 600 GWh



maintenance stops will be carried out throughout the year for unit I of the Almaraz plant, the two units of the Ascó plant, and the Trillo plant. The net electricity production planned for the whole of the Spanish nuclear park is 56 600 GWh.

A noteworthy fact is that, since January 1, the fixed unit rate of the financial contribution for funding the National Radioactive Waste Company (Enresa) contributed by

the companies operating the nuclear power plants **has increased by a 19,2%**, going from a value of 6,69 euros/MWh to a value of 7,98 euros/MWh.

Furthermore, before the end of the first quarter of the year, the application for the renewal of the operating authorizations currently in force for the two units of the Ascó plant and the Cofrentes plant will be submitted.

On the other hand, **in order to continue maintaining the ongoing operation of the nuclear park, it is necessary to ensure its economic and financial viability** during the time in which the energy transition occurs. Nuclear generation is subject to a significant tax burden due to the various national, regional, and local rates, taxes, and duties that it is faced with and which in recent years represent more than 40% of the annual revenue of the nuclear park for the production of electricity.

To end my speech, I want to emphasize once again the important role that nuclear energy must continue to play in guaranteeing electricity supply, in the continued operation of the system, in maintaining competitive energy prices for Spanish society, and, above all, on all in its contribution to meet the demanding environmental commitments to fight climate change and reduce emissions that we have committed ourselves to in the area of the energy and climate packages for the European Union and the Paris COP21 United Nations agreement.■

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SPECIAL SESSION



THE FUTURE OF NUCLEAR ENERGY: A GLOBAL VISION



HÉCTOR DOMÍNGUIS

Vice-President of the SNE

The truth is that as the first time presenting the special session for the operational experiences session ... you have made it very easy for me ... Because today I am

lucky and honored to present a friend to us all, who besides being well-known to everyone, is one of the Spanish Directors with the greatest recognition and experience on the international nuclear scene.

José Emeterio Gutierrez, as you well know, was president of the Spanish Nuclear Society in 2009 and 2010, as well as a member of Foratom and the European Nuclear Society.

Although he has lived in the US for more than 7 years, we have all been able to follow his career and he has visited us whenever possible.

And although no further introduction would be necessary, I want to quickly review his career. Because in addition to showing the path of a brilliant career, it reaffirms the importance of the presentation that he will give us next.

José Emeterio is a Civil Engineer from the Polytechnic University of Madrid. He began his professional career at Técnicas Reunidas, as part of the Construction Engineering team for the Trillo NPP.

Subsequently, he joined ENUSA, where he spent more than 20 years performing various responsibilities in Quality, Information Technology, Engineering, and Production until assuming the position of Fuel Director.

In 2008 he joined Westinghouse Spain, where he held positions in Technical Management, Vice-President in Spain and Southern Europe.

Until 2012, when he packed his bags and went to the United States as Senior Vice President of Fuel & Components, where he continued his career until being named President and CEO of Westinghouse Electric Company in 2017, also chairing the Boards of Westinghouse Sweden, France, and Ukraine, in addition to being part of the Westinghouse Councils in Bulgaria, Japan, and Italy.

Now we are very lucky to have José Emeterio back in Spain, where in addition to continuing to collaborate with Westinghouse as a member of the Global Advisory Board, he also advises various Industrial Groups.

I have no doubt that having been in charge of one of the main companies in the nuclear sector, with more than €4 billion in revenue and more than 10,000 employees, has allowed José Emeterio to have a vision of our sector that is within the reach of few.

And it is fortunate that today he is with us to share his vision on "The Future of Nuclear Energy from a Global Perspective."

Before starting, I would like to remind you that at the end of the exhibition there will be 20 minutes for questions, which like last year, are done digitally through the website enabled for it and that is printed on your credentials card.

Thank you very much José Emeterio ... Anytime.■



JOSÉ EMETERIO GUTIÉRREZ EL SO

Senior Advisor & Consultant and former President of Westinghouse

Before talking about what the future of nuclear energy may be, I would like to refer to three aspects that have a notable influence on the energy sector as a whole: the **new geopolitical balance, the environmental debate, and technological change.**

Energy has been used by the main world powers as a geopolitical weapon; which in many cases has affected politics and the world economy. For some years now, we have been immersed in a change in the global balance of forces and a change in the focus of power.

All of us have studied geography with a world map that had the Atlantic Ocean at its center and the United States and the Soviet Union as world powers. However, our grandchildren will study with a world map where the Pacific Ocean will be at the center and the **United States, China, and Russia will be the protagonists.** The center of gravity of the world has already shifted towards that area, on whose shores we meet the aforementioned powers in addition to Canada, Japan, and South Korea. **Europe, and to some extent the Middle East, has taken a back seat.** This change is linked to new energy strategies for the United States and Russia.

Geopolitical Situation



During this year, 2020, the United States will go from being a net importer of petroleum products to being an exporter and the world's largest producer. We could say that the **United States is already energy self-sufficient.** This represents a radical change in its foreign policy, and more specifically in its relationship with the countries of the Middle East. For its part, **Russia is trying to use the scarcity of resources of European countries and the loss of North American interest in the region to increase its influence,** making Europe more dependent on its exports. This is being done through the construction of new gas pipelines and the supply of nuclear power plants. If we add the interest of the Viseg-

rad Group countries to the Russian power plants in Finland, Hungary, Turkey, and Iran, Russia would be building a very dangerous arc of energy dependence.

Returning to the Pacific Ocean, I would like to point out how all the powers that are part of that region, plus India, have two things in common: their **commitment to nuclear energy as a future technology and their decision to transition to a world with fewer CO₂ emissions without harming their economies.**

On the other hand, we are engaged in a **debate on environmental protection, focused above all on reducing CO₂ emissions.** In my opinion, the environmental problem of our planet goes beyond simply reducing these emis-

The environmental debate





sions. We have significant problems with pollution in many parts of the world, with access to water, with huge amounts of waste, and with increasing pollution of the seas. **Solving all those problems would require much more globally coordinated action than simply reducing CO₂ emissions.** However, in the absence of a realistic plan and better indicators, CO₂ emissions can be used to measure environmental progress. From 1990 to 2019, emissions have only increased from year to year, and in my opinion, they will not stop doing so in the coming years. **Governments set aggressive targets, with the European Union at the forefront, while**

failing to implement realistic plans to reduce them. The example of Germany is clear. After the Fukushima accident in 2011, the German government made the decision to phase out all its nuclear power plants by 2022. Since then, Germany has replaced nuclear energy with coal to generate electricity, increasing its CO₂ emissions and its foreign energy dependence. **The data shows that the countries with the lowest CO₂ footprint are those that have nuclear energy in their portfolio of electricity generation technologies,** such as France, Spain, and Sweden.

Regardless of the excessive politicization of everything surrounding

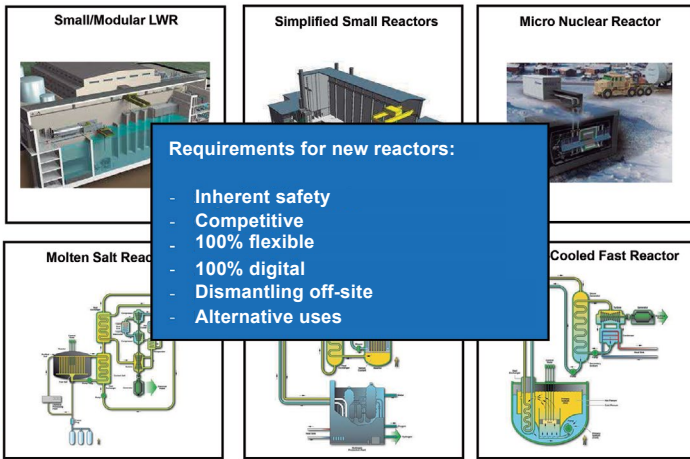
the environmental issue and the failure of the COP25 summit held in Madrid last December, there is no doubt that concern for the environment is a reality that will continue to grow. In this way, we will see growth for wind and solar energy, although hopefully in an orderly manner, and the electrification of transport. All this is possible thanks to the rapid technological development that we are experiencing, as has never occurred before in the history of humanity.

At this point, I think it is appropriate to engage in some self-criticism and recognize that **the nuclear industry has been slower than other industries in incorporating new technologies.** It is true that nuclear power plants have introduced numerous modifications, especially with regard to safety, but **we continue to use the same technology from 40 years ago** and in many cases the same systems, such as analog instrumentation. There are no excuses; **we should have developed innovative solutions,** as the automotive, aeronautical, and pharmaceutical industries have done, which would not only have improved the safety of the plants but also transformed their way of operating in line with the evolution of electricity generation markets.

Although many do not believe it, every year there are more reactors in operation in the world than the previous year, with new startups taking place in Asia and shutdowns in the United States and Europe. On the other hand, it is also true that the American electric companies are licensing operation to eighty years for their nuclear power plants. The NRC has granted said license to 6 reactors. In my opinion, about half of the North American park will operate at eighty years. Another benchmark country in this regard is Canada, whose government is fully committed to meeting its environmental objectives and is therefore committed to emission-free technologies: hydro, wind, and nuclear. For this, Canadian electricity companies are making very important investments in the modernization of



New reactors



their nuclear power plants so that they can operate for at least 20 more years.

The continued operation of the current park of nuclear power plants for as long as they are safe and profitable is essential for the so-called energy transition to be a transition and not a new failure. However, these plants are under significant financial pressure due to the price level of electricity generation and the excessive and unjustified taxes they bear. In some countries, there are times of the day when the market price is zero, which means that plants like nuclear power plants that cannot stop, such as hydroelectric plants or

gas plants, cannot cover their fixed costs. Although the operation and maintenance cost per kilowatt-hour produced of a nuclear power plant is low compared to other technologies, this situation forces companies to look for ways to continue reducing costs or to cover periods of low prices with other revenues. Along these lines, **the sector must make a significant effort in innovation in 4 areas: digitization, advanced fuels, new operating models, and alternative uses for the heat generated.** Some opportunities for the use of energy or heat produced and that is not remunerated by the system could be: desalination, hydrogen production, energy storage, or heat

supply for industrial or residential uses.

Not only must we look at the approximately 450 reactors in operation worldwide, but we must also pay attention to the construction of new plants. **There are already a few Spanish companies participating in international projects for the design, planning, and construction of plants in various countries.** Again, it must be said that it will be in Asia (China, India, and Russia) where most of the plants will be built. But we are also talking about Finland, the United Kingdom, Hungary, and Turkey, and a number of countries that are considering increasing their nuclear fleet or investing in this technology. Among the first are Canada, the Czech Republic, and Ukraine; while among the latter we can include Poland and other countries in South Asia.

The list of countries will increase, including the United States and France, if we are able to develop a new type of reactor that is intrinsically safe, competitive in today's markets, flexible, fully digital, that incorporates alternative uses, and that is decommissioned offsite. I do not know if any of the designs that are being talked about lately will be successful and can be marketed, especially the so-called SMRs. I believe that innovation is still lacking, and that in some cases, we may be falling into mistakes made in the past.

I would like to end by sharing my belief that **nuclear energy has an important future, and with it, the nuclear sector as a whole.** It is not only necessary to continue supporting and improving the operation of the current nuclear power plants, but we must also participate in international projects for new construction, we must develop alternative uses for plants, and finally, we must participate in the growing market for the decommissioning of plants. But all this must be done bearing in mind the two ideas that I have tried to develop: **we must invest more in Research and Development and the geographical area of work must be expanded to the whole world.** In short, we are talking about Innovation and Globalization. ■



MAINTENANCE AND SUPPORT SERVICES FOR OPERATION OF THERMAL, HYDRAULIC AND NUCLEAR POWER PLANTS

SERVICES

- Component maintenance
- Operational support services
- Support services for stops and refueling
- Plant decommissioning

ACTIONS

- Preventive, predictive and corrective maintenance
- Design modifications
- Auxiliary activities in the NSSS
- Boiler and turbine adjustments

REFERENCES

- Almaraz 1 & 2 NPP
- Cofrentes NPP
- Trillo NPP
- Vandellós 1 & 2 NPP
- Ascó 1 & 2 NPP
- Sta. M^a de Garoña NPP
- José Cabrera NPP
- Valdecaballeros NPP
- Andújar Uranium Plant
- Escombreras TPP
- Castellón TPP
- Aceca TPP
- Escatrón TPP
- Escucha TPP
- Alcudia TPP
- Velilla TPP
- Narcea TPP
- Elcogas TPP
- Los Barrios TPP



FIRST SESSION



From left to right: Rafael Campos, Lourdes Borondo (President) & Francisco Javier Vallejo.



RAFAEL CAMPOS

Director
ALMARAZ NUCLEAR POWER PLANT

ACTIVITIES FOR THE YEAR 2019

The Almaraz Nuclear Power Plant units generated a total of 16 966 million kWh in 2019, the second-highest production in a year at Almaraz. Between both units, they accumulated a gross production of 545 637 million kWh at source. Almaraz Nuclear Power Plant continues to provide electric-

ity, for yet another year, for more than 6% of the national electricity consumption.

By Unit, the main activities were as follows:

Unit I

This unit remained connected to the network continuously throughout the year, accumulating a total of 365 days at the end of it.

Regarding power reductions to consider, only three were registered, one in August to repair an expansion joint for a high-pressure turbine extraction line to a superheater, another in October to replace the seal of a feedwater turbocharger, and the third in December at the request of the Delegate Office, for flexible operation.

The gross electric power generation was 8984 million kWh, the maximum annual electric power production per unit at the Almaraz NPP; the accumulated production at source was 275 246,51 million kWh.

Unit II

The most notable was the stop for the 25th refueling and maintenance stop carried out from October 6 to November 13.

It should be noted that this Unit remained continuously connected to the electricity grid for 512 days, operating at full power during its twenty-fifth cycle, accumulating a total of 12 567 593 MWh, the highest record in a cycle at the Almaraz NPP.

This unit has reached five years without registering unscheduled unavailability, and more than 6 years without automatic stops. Gross electric power generation was 7982,12 million kWh, accumulating 270 390,50 million kWh at source.

Other Activities

On April 29, the second ENUN 32P container loaded with 32 spent fuel elements was transferred from the Unit I Fuel Building to the Individualized Temporary Storage "ITS"



Twenty-fifth Refueling for Unit II

The 25th refueling and maintenance stop took place between October 6 and November 13.

For the execution of the scheduled tasks, a total of approximately 1,100 people joined, in addition to the usual supports during the operation of the plant.

The most notable activities carried out during the stop were the following:

- Unloading and loading of fuel elements from the reactor core, which was configured with 60 new elements, 5 reused from previous cycles, and the remaining 92 from the last cycle.
- Cleaning of sludge and inspection by induced currents for 33% of tubes for the three steam generators, with satisfactory results, without the need to plug any tubes.
- Inspection of nozzles of primary circuit cold branches.
- Maintenance of both safeguard trains.
- Program for the replacement of pipes due to MIC in lines of the essential services cooling water system.
- Inspection of metallic tanks for life management.
- Replacement of the 3 pressure relief valves.
- Replacement of the heat exchanger of the steam generators purge.
- Major overhaul of the alternator.
- Replacement of the RCP-2 reactor cooling pump motor.
- Modification of the control circuit for closing and opening the valves of the component cooling system for voltage recovery.
- 33 design modifications were installed.

Reportable Events

During the year 2019, 2 events for Unit 1 and 6 events for Unit 2 were reported to the regulatory body (Nuclear Safety Council), all at level zero on the INES scale (with no significance for Safety), 7 30-day reports and 1 24-hour report. The list of events is as follows:

UNIT I

REFERENCE	DATE	TYPE	
ISN1-19/001 COMMON	4-15-19	ISN 30 DAYS	Failure to perform all required surveillance tests when replacing activated carbon filters in VA1-MS-71A/B filter units in the fuel building ventilation system.
ISN1-19/002 COMMON	05-10-19	ISN 30 DAYS	Failure to carry out the Functional Test of the Source Range channels for the Nuclear Instrumentation System on time.

UNIT II

REFERENCE	DATE	TYPE	
ISN2-19/001 COMMON	4-15-19	ISN 30 DAYS	Failure to perform all required surveillance tests when replacing activated carbon filters in VA2-MS-71A/B filter units in the fuel building ventilation system.
ISN2-19/002	05-03-19	ISN 30 DAYS	Exceeding the value for controlled leakage for the Reactor Refrigerant system (injection flow to seals to the RCP-2 reactor cooling pump).
ISN2-19/003 COMMON	05-10-19	ISN 30 DAYS	Failure to carry out the Functional Test of the Source Range channels for the Nuclear Instrumentation System.
ISN2-19/004	06-14-19	ISN 30 DAYS	Preventive shutdown of the 4DG during the 1-hour monthly test, to proceed with its inspection, due to the presence of vapors with unburned fuel (diesel and oil) in the connection of an injector with its cylinder in motor 2.
ISN2-19/005	06-12-19	ISN 24 HOURS	Minimum voltage in bus 2A4 due to the unexpected opening of switches 52-5 and 52-6 in 220kv park, during Red Eléctrica tasks with start-up and connection of the GD4-4DG
ISN2-19/006	10-31-19	ISN 30 DAYS	RTD response time of the hot branch of loop 2 greater than that required by Operating Technical Specifications.

International Missions

The Almaraz Nuclear Power Plant OSART mission took place from February 5 to 22, 2018, the 200th for the IAEA.

The results were very positive, being worldwide among the plants with the least number of improvement proposals (3 recommendations + 6 suggestions) since the start of the OSART missions.

From November 26 to 28, 2019, the Follow-Up for this mission took place, with 5 proposals closed and 4 with satisfactory progress.

On January 20, the Peer Review 2020 mission began at the Almaraz Nuclear Power Plant. For three weeks, a team of 25 nuclear experts and professionals from 9 different nationalities reviewed the plant's processes and expecta-

tions, exchanging experiences and knowledge, in order to continue improving the safety and reliability of the facility. Previous observations were made for refueling, simulation, as well as the review of the Plant Design.

As a result, 5 areas for improvement (AFI) were identified in Industrial Safety, Human Factors, Engineering, Operation, and Performance Improvement as well as 3 proposals for Strengths to share with the nuclear industry: ICO Index, Refueling Management, and Chemical Injection to lengthen the useful life of Steam Generators.

CHALLENGES FOR 2020

During this year 2020, the main challenges that the Plant will undertake are to continue with the actions associated with the most



outstanding Project for the facility: ZERO Accidents, the execution of Refueling 27 for Unit 1, obtaining a new Operating License, the leadership empowerment program for its staff, continuing to load spent fuel containers, and continuing to enhance the actions and associated improvement plans with WANO.

All this will be possible thanks to the excellent human team that makes up the Almaraz Nuclear Power Plant and CNAT.■



FRANCISCO JAVIER VALLEJO

Director
TRILLO NUCLEAR POWER PLANT

GENERAL SUMMARY

The operating results related to production were good, as the planned objectives were met.

Net production reached a value of 7905,287 GWh, higher than the target set for 2019.

The plant was connected to the network throughout the year except for the refueling period, with a load factor of 90,6%.

The refueling stop lasted 713 hours, 53 hours longer than planned.

The unscheduled unavailability was 0,611%.

There were no unscheduled shutdowns this year or reactor trips.

There were three reportable events during the year.

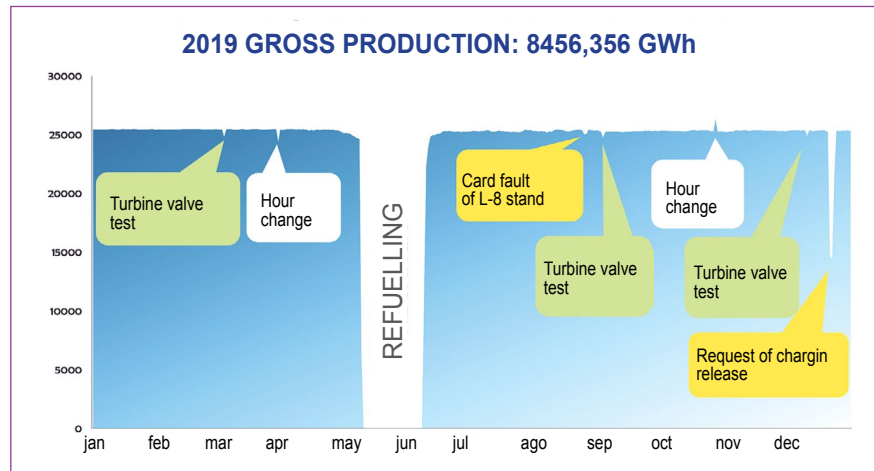


Figure 1.

ANNUAL RESULTS

• Gross electrical production

In the graph for Figure 1, the variations of electrical power during the year 2019 and their causes can be seen.

• Reportable events

The plant operated during the past year without significant incidents regarding safety. The three reportable events that occurred are described below.

– ISN-T-19/001; 05/30/19.

Inoperability of the TF30 loop of the component cooling system due to malfunction of the TF30S014 quick-closing valve.

– ISN-T-19/002; 06/04/19.

Inoperability of the TH10 train for the low-pressure safety injection function due to an anomaly in the TH10S029 valve. Non-inclusion in the surveillance requirement SR 4.2.1.3.19 of an explanatory note, describing the plant conditions necessary for its implementation.

– ISN-T-19/003; 06/08/19.

Manual tripping of the reactor in a subcritical state when the D-STAFAB limit value GW20 was triggered, causing the startup of the chemical dosing system for the primary coolant TB by injecting boric acid at 7000 ppm into the primary circuit.





• **Collective exposure**

90% of the total collective dose was due to recharge operations, with the total dose for the year 2019 being 179,03 msvxp.

In all cases, the doses associated with the different activities carried out are kept at very low values. As an example, the maximum individual dose this year was 2 mSv.

• **Accident rate**

Although the goal of zero accidents with sick leave was not achieved, the frequency rate with sick leave for all personnel working at Trillo was 0,61, better than that obtained in 2018.

There were a total of 5 accidents, only one with leave.

• **SISC**

All the indicators are green, with 8 findings, also green, identified throughout 2019.

Likewise, a finding from the year 2018 derived from the development of the 2018 simulation was classified as White.

2019 REFUELING

The development of the thirty-first refueling was marked by the following critical path:

- Plant shutdown phase and periodic tests.
- Network work. 2/6
- Network work. 3/7.
- Network work. 1/5.
- Vessel closing and start-up process.

In parallel, the following activities were carried out, among others:

- Unloading and loading the core.
- Inspection of the lower radial bearing and seals of a main pump.
- Replacement of two internal nuclear instrumentation fingers.
- Cleaning and sanitation of an essential services pool,
- Etc.

During the preparation phase, special emphasis was placed on the planning of the execution of the various design modifications within the inoperable windows of the systems and/or redundancies.

MISCELLANEOUS

In 2019, the follow up of the Peer Review conducted in 2018 took place.

The AFI resolution identified has been positively evaluated in accordance with the established action plans, with the exception of two that require revision of their action plan.

CODE RED IN THE REFUELING SAFETY ASSESSMENT

The key safety functions (KSF) that are monitored during shutdown are:

- Residual heat extraction.
- Inventory Control.
- Electrical Availability.
- Reactivity control.
- Containment status.

According to the refueling detail program, the various phases are classified into:

GREEN

More systems or conditions are available than those required in Performance Specifications (PS).

YELLOW

Only what is required in PS is available.

RED

It is clearly below what is required by PS.

During refueling, unplanned unavailability of one item of equipment occurred, which along with the planned inoperability of other equipment caused the key safety function of residual heat extraction to enter RED status.

The actions taken required the evaluation of the Plant Safety Committee to apply compensatory measures in order to ensure the temperature of the fuel pool with a sufficient margin.

CHALLENGES FOR 2020

In addition to the activities indicated above, the following activities are considered as priorities:

- Reducing the accident rate through the implementation of the A-CERO program.
- Strengthening the organization's leadership according to the new WANO criteria.
- Continue loading the ENUN32P containers.■



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Asociación Nuclear Ascó-Vandellós II

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SECOND SESSION



From left to right: Rafael Martín, Carolina Anherth (President) & Jordi Sabartés.



RAFAEL MARTÍN
Director
VANDELLÓS II
NUCLEAR POWER PLANT

SAFETY

During the year 2019, following the protocols established in the IS-10 Safety Instruction, the Vandellós II nuclear power plant notified the Nuclear Safety Council (CSN) of a total of 6 reportable events, all of them classified at level 0 on the INES scale. The plant is located in

the "Regulatory Response" column in the action matrix of the Nuclear Safety Council Integrated Plant Supervision System (SISC) because indicator E1 "Response to emergency situations and drills" has been placed on the white band.

On the other hand, regarding accidents with sick leave, the general frequency index stands at 2,66% compared to 2,88% in 2018.

PRODUCTION

The operation of the Vandellós II nuclear power plant has maintained a load factor of 80,71% and 2019 has been marked by three unscheduled stops and the stop for refueling. The first unscheduled stop occurred on April 6 due to a slight drip in the B steam generator drain line due to a localized hole in a weld. During the synchronization and power increase process of the plant, an automatic shutdown of the plant occurred. On the other hand, on August 27 there was an automatic shutdown of the plant due to the loss of the 400 kV power

line outside the facility due to the strong storms happening in the area.

On November 9, the work of the 23rd refueling began, which was a unique project and a commitment to the future involving the replacement of the two moisture separator-reheaters (better known by the acronym MSR), equipment from the secondary system that will allow the plant to gain efficiency and thermal performance. It is worth mentioning the refurbishment of the fuel management system, the remote visual inspection of the surface of the vessel lid and other components of the reactor, various inspection and cleaning activities in the steam generators, both in the part belonging to the circuit primary as well as secondary, and the installation of new equipment for measuring venting in the containment.

CHALLENGES FOR 2020

The year 2020 poses various important challenges for Vandellós II,



among which it is worth mentioning the continuation of work on the Periodic Safety Review project that is associated with the Operating License renewal, for which an application was completed in March 2019. In preparation for Long-Term Operation, the process of evaluating the plant for operation beyond the 40 years that the IAEA completes through its SALTO (Safety Aspects of Long Term Operation) missions program has also begun.

In the year 2020, the project for replacing racks or re-racking in the spent fuel storage pool will also be undertaken, which will allow expanding its capacity and, therefore, expanding operating capacity without the need, yet, to build an Individualized Temporary Storage (ITS) facility.

Also noteworthy are the challenges relating to its processes, among which are the transition to improved technical performance specifications (MERITS) and the implementation of actions corresponding to the ANAV Efficiency Plan and the implementation of a proactive obsolescence management plan.■



JORDI SABARTÉS
Director
ASCÓ NUCLEAR POWER PLANT

SAFETY

During the year 2019, following the protocols established in the IS-10 Safety Instruction, the Ascó nuclear power plant notified the Nuclear Safety Council (CSN) of a total of 10 reportable events, 2 corresponding to Unit I and 8 to Unit II. All of them



have been classified at level 0 of the INES Scale.

Regarding occupational safety, the general frequency index with leave in 2019 was 1.83, compared to 1.38 in 2018.

PRODUCTION

In terms of production during the year, it has remained stable, with uninterrupted operation for the Ascó I NPP, which reached a load factor of 99.81%, and two short unscheduled stops were registered for Unit II (January 3 and July 1) and the scheduled stop for the Ascó II NPP refueling (April 27 to June 5). Among the important activities carried out in this 25th Refueling, it is worth mentioning the refurbishment of the fuel management system, pipe inspection by induced currents in the three steam generators, and the replacement of three of the intranuclear thermocouples. These devices are part of the instrumentation used to measure the temperature of the water inside the reactor and to determine the power at which it operates. The inspection of the vessel's cold leg nozzles, the remote visual inspection of the vessel, and the replacement of motors for various safety equipment were also completed. In addition, a general overhaul of the high-pressure turbine was carried out and improvements were implemented in the alternator's hydrogen processing station.

OUTLOOK FOR 2020

The Ascó NPP will face significant challenges during 2020, which includes a year with two refueling operations as highlights: the 27th Refueling for Unit I, which is scheduled to start on April 28, and the 26th Refueling for Unit II, scheduled for October 3. The plant will continue with the spent fuel loading plan at the Individualized Temporary Storage (ITS) and will continue working on the Periodic Safety Review project that is associated with the renewal of the Operating License, the application for which was submitted in March 2020. It will also make progress with ENRESA to expand the spent fuel storage capacity. In the area of preparation for Long-Term Operation, it has also started the process of evaluating the plant for operation beyond the 40 years that the IAEA carries out through its SALTO mission program (Safety Aspects of Long Term Operation). In this sense, during this year, the SALTO Mission of the Ascó NPP will be prepared, which will take place in 2021.

Ascó will also face challenges related to its processes, among which are the transition to improved technical performance specifications (MERITS) and the implementation of actions derived from the ANAV Efficiency Plan and a specific plan for proactive obsolescence management.■



THIRD SESSION



Javier Sala & Susana Falcón (President).



JAVIER SALA
Director
COFRENTES NUCLEAR POWER PLANT

As always, I will begin my speech by talking about the high level of safety with which the Cofrentes nuclear power plant has operated throughout 2019.

Throughout the year, the plant remained with the best rating from the Integrated Plant Supervision System (SISC), which is evaluated by the Nuclear Safety Council. All the indica-

tors reported in 2019 are in green and all the findings identified during the year are of minimum significance for safety, so the plant is in the Owner's Response pillar of the SISC action matrix (Figure 1).

During the year, four events were reported, classified as level zero on the International Nuclear Event Evaluation Scale (INES), that is to say, not on the scale and of no significance for safety.

Another aspect of safety that we are very satisfied with the results obtained for at Cofrentes is the aspect regarding occupational safety, where for the third consecutive year we have not registered any accident with sick leave and more than 1000 days have passed with this status.

This is a difficult milestone to reach since it requires excellent planning, training, and awareness campaigns, supervision, and above all, it shows great quality in the execution of our work.

It must be kept in mind that in 2019 we had a refueling, and that means that a large number of people carried out their work on the site. Our motto has been Zero Tolerance for unsafe behavior (Figure 2).

In the field of radiation protection, our results in 2019 have been very good, and in no case have the limits set been exceeded. The value of

2019 NUCLEAR SAFETY - SISC

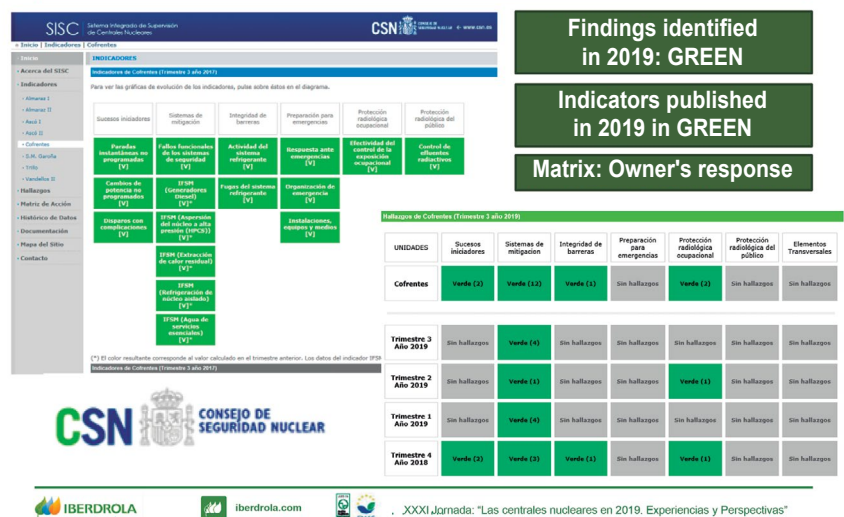
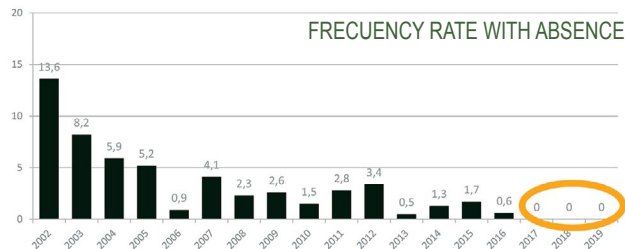


Figure 1.



WORK SECURITY 2019

	DECEMBER 2019
Frequency rate with absence (own & contracted personnel):	0
Severity rate (own & contracted personnel):	0



THIRD YEAR WITH 0 ACCIDENTS WITH ABSENCE



XXXI Jornada: "Las centrales nucleares en 2019. Experiencias y Perspectivas"

Figure 2.

our collective dose in a year with refueling was 1918 mSv with a target of 2443 mSv.

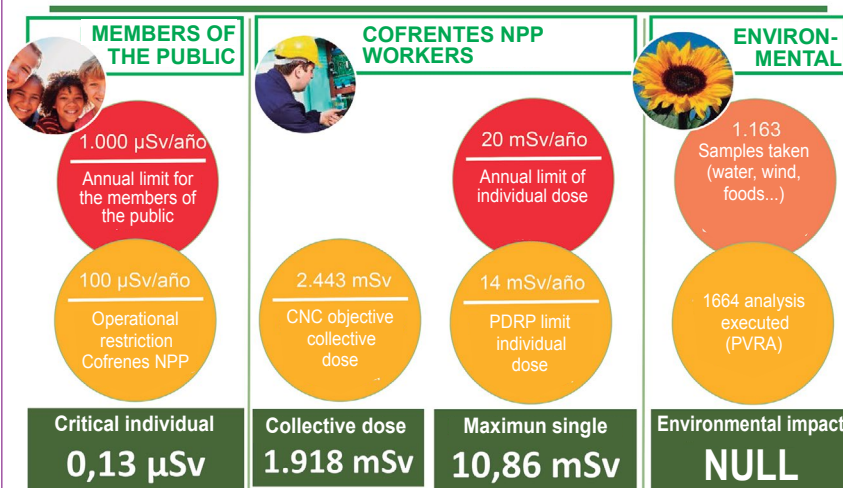
In addition, radiological protection monitors the impact on members of the public and the environment, and as can be seen in the chart below, we can conclude that the radiological impact of the plant on its environment has been negligible. Through the Environmental Radiological Surveillance Program, we can affirm that the radiological impact of the plant on the environ-

ment has been zero in all its years of operation (Figure 3).

The Environmental Management System for the Cofrentes NPP has the EMAS III (Eco-Management and Audit Scheme) certification which is the most demanding environmental management process at the European level.

In 2019, no environmental incidents were registered, and we have fully complied with the actions outlined in our Environmental Management Program.

RADIOLOGICAL PROTECTION 2019



XXXI Jornada: "Las centrales nucleares en 2019. Experiencias y Perspectivas"

Figure 3.

These actions are aligned with the Sustainable Development Goals (SDGs) and in 2019 all the commitments for maintaining the EMAS III certification have been met (Figure 4).

Related to the physical safety of the facility, it is known that all Spanish nuclear power plants have incorporated the response units of the Civil Guard, as established in the R.D. 1086/2015 on Physical Protection for nuclear facilities and materials and for radioactive sources. In the case of Cofrentes, the Civil Guard was incorporated in the month of December, thereby increasing its capacity to respond to potential threats that affect the physical safety of the facility.

PRODUCTION RESULTS

The net energy generated by the Cofrentes nuclear power plant in 2019 was 8063 GWh. It must be considered that this excellent result was obtained in a year with refueling, having remained connected to the grid for 89,66% of the possible time, delivering 88,22% of the maximum of producible energy.

The 2019 production results were very positive, because despite the stop for refueling, and a short three-day stop in January for maintenance, 2019 was the refueling year with the highest production, since the plant operates in 24-month cycles.

As a contribution to the electricity system, I would like to point out that Cofrentes represented just over 3% of total national electricity production and around 30% of electricity demand in the Valencian Community, where it continues to be the quintessential energy vector.

The historical capacity factor of Cofrentes in the last decade ranges between 85% and 90%. Undoubtedly, these good results for Cofrentes are a consequence of the high sustained reliability with which the plant has been operating, and the continuous technological updates that the equipment and systems of the facility receive.

One of the milestones that denotes the high level of reliability that the Plant maintains is having passed



Figure 4.

a period of ten years without having had automatic shutdowns of the reactor.

All these accumulated achievements to date have been achieved thanks to the phenomenal team that makes up the Cofrentes NPP. We have an excellent human team that shows its commitment, training, and professionalism every day.

In addition to maintaining current high levels of safety and reliability, Cofrentes faces important challenges in the coming years, which will allow its operation until 2030. We must complete the project for the management of our spent fuel and complete the Periodic Safety Review.

One of the main pillars for the plant's next decade is spent fuel management. The various necessary projects have already been launched, some of which have already been successfully concluded and others are currently in the execution phase (cutting of channels and control bars; increase in the capacity of the fuel handling crane; construction and ITS licensing). Our goal is for all the aforementioned projects to be completed in the second half of 2020, and from then on, we

will start with the loading of containers.

Another fundamental challenge for the operation of the coming years is to complete the Periodic Security Renewal project, which will be presented shortly, and the evaluation phase of the CSN will begin. This has meant a great team effort that the entire organization has worked on.

Regarding the most important milestones for the year 2019, the most notable is undoubtedly the refueling that we performed between November 4 and December 6: 34 days of intense work with more than 11,000 scheduled activities, among which included 40 design modifications that we performed on different

equipment and systems as highlights, and whose objective, among others, was to technologically modernize the plant, which is prepared for the continuity of operation in any of the scenarios that may arise.

The most significant actions for the refueling, apart from the replacement of 252 fuel elements of the 624 that make up our core, focused on the ultrasound inspection of the equipment of the reactor vessel and the low-pressure rotor of the main turbine.

In addition, we have installed new cooler units and we have improved the design of the closure in the Turbo Feedwater Pump "A," new protection relays, recorders in the Control Room, and new vibration systems have been installed in HVAC units, as well as a new transformer monitoring system, new regulation transformers, feed water flow measurement booths, and a new Recirculation motors Vibration system.

We have completed projects to improve the occupational safety of workers, reducing the risk of fires by building a protective wall in the transformer park, and in the Foreign Materials Exclusion (FME) area, new filters were placed on the Drainage Heater lines.

Similarly, we have improved in load handling, adding new access and anchorage points for maneuvers. We have made improvements in the electrical logic of different systems and in the field of radiation protection and we have installed a new monitor for iodine and particulate matter.

I want to mainly highlight the human aspect of the Cofrentes NPP, who have managed to carry out all these refueling activities with maximum safety and quality, ensuring that the work at the Plant is carried out in a magnificent working environment.

Therefore, our goal for the future will be to maintain the current levels of safety and reliability of the facility and to successfully complete the challenges that may arise.■



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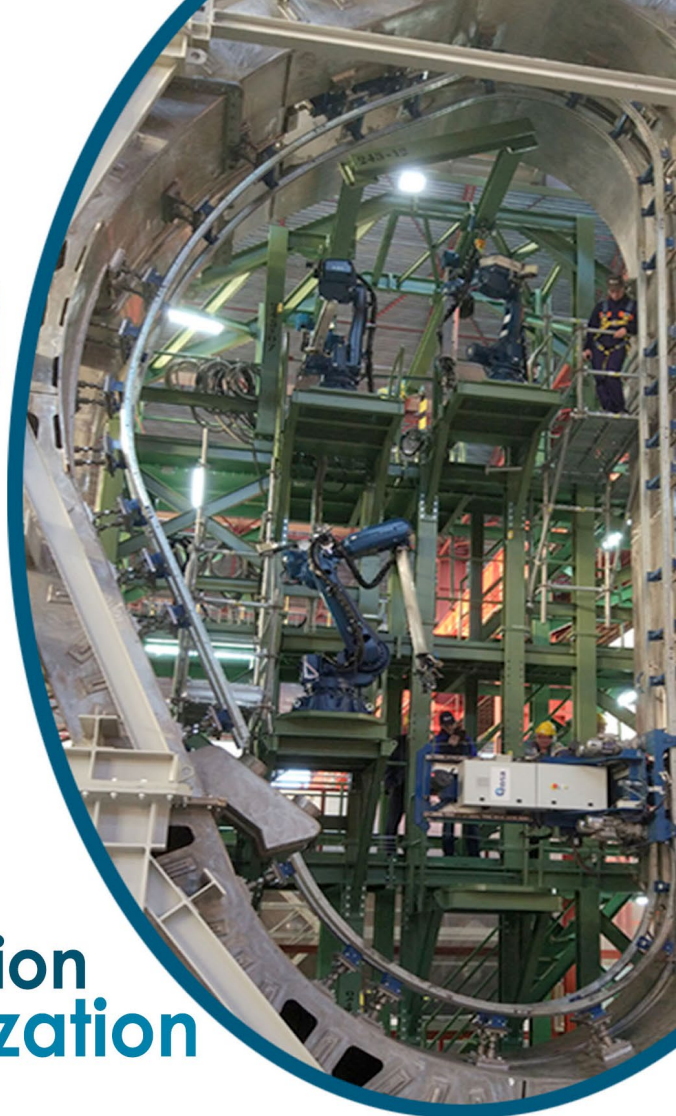
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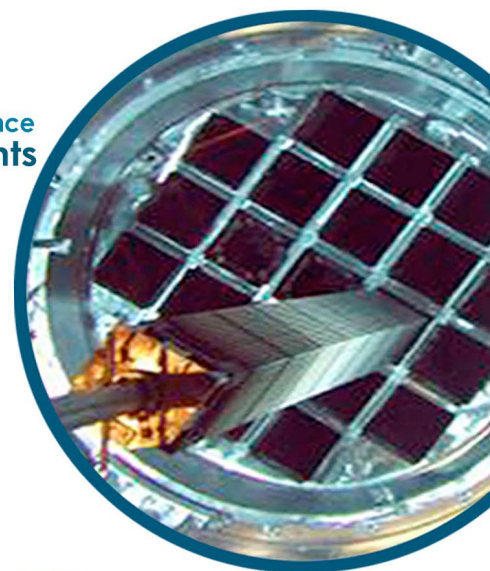
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Flexibility
Operational Support
Safety
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CLOSING SESSION



Javier Guerra, Javier Dies, José Manuel Redondo & Héctor Domínguez.



JAVIER DIES LLOVERA

Board Member of the Nuclear Safety Council (CSN)

Board Member Dies thanks the SNE for having invited the Nuclear Safety Council to participate in the closing of this conference. The Board Member commented on five significant points in the current activity of the Nuclear Safety Council:

INCORPORATION OF 24 NEW TECHNICIANS INTO THE CSN

Just last Monday, 24 new staff members joined the Upper Management of the Nuclear Safety and Radiological Protection Technical Division. The photo shows the welcoming event for the new technicians, attended by the general session, directors, and deputy directors.

The objective of the CSN is to balance the number of technicians who retire with the number of technicians who are joining, and at present this has been achieved since there have been more entries than exits, given that retirement is voluntary in the range from of 65 to 70 years, and therefore the actual retirement age can vary by five years, which is difficult to predict.

Since this event takes place at the School of Industrial Engineers of Madrid, and in the room, there

are students from the "nuclear" Master's Degree in Madrid and the "nuclear" Master's Degree in Barcelona who attend to learn from this interesting day with high technical content. It should be pointed out that of the 24 new technicians, there are 5 who have completed studies at the ETSIIM-UPM and one at the ETSIIB-UPC, and several have completed the CIEMAT MINA Master's Degree. I underline this to encourage you to study hard and apply for future CSN competitions or offerings from the nuclear sector.

PROJECT TO IMPLEMENT A SYSTEMATIC METHODOLOGY FOR TRAINING CSN STAFF (SAT METHODOLOGY)

The CSN has launched a Project to implement a systematic methodology for training its own personnel (SAT-Systematic Approach to Training methodology). This methodology has already been applied for years at Nuclear Power Plants.



Figure 1. Welcome event at the CSN for the 24 new staff members for the Upper Management of the Nuclear Safety and Radiological Protection Technical Division.

For analysis and design, an external support project has been launched for two years with an investment of around €600,000.

Although there are great SAT experts in the room, for those who are not familiar with it, the typical steps to develop for these projects are:

1. Define what the necessary competencies are for each CSN position.
2. For each position, identify the competencies of the person who occupies that position.
3. Organize training to fill in the skills that are missing from the person who occupies that position.

IMPROVEMENT OF THE CSN EMERGENCY ROOM

The CSN emergency room is operational 24 hours a day and 365 days a year, and a simulation of each of the Spanish nuclear power plants is performed there every year. At present, the room improvement project has been completed in terms of data visualization for more effective emergency man-

agement. In the photograph, the new display screen can be seen, which at that time was divided into 8 screens, each one displaying data of interest, physical parameters of the plant (temperatures, flow rates, neutron flux, etc.), atmospheric dispersion models of radioactive isotopes (Pasquill models) which indicate the direction of the plume and therefore guide which direction an evacuation should be performed if required, the dose rate at different points, videoconferencing with the government sub-delegation, television channel reporting on the emergency, etc.

TRANSITION TO NFPA-805, FIRES, ALMARAZ NPP

At present, an important effort made during recent years by the owners and CSN technicians is coming to an end: the transition to NFPA -805, on fires, for the Almaraz NPP and also for Asco.

If a probabilistic safety analysis is carried out in each of the Spanish nuclear power plants, and the ini-

tiating events are sought, it can be seen that, in general, around 50% of the frequency of damage to the core in an accident is initiated by a fire, so, therefore, fires are an important issue.

The evaluation of Probabilistic Fire Analysis (PSA) has been developed, as well as analysis for increases in risk.

This is a complex and laborious process, especially for existing plants.

Risk informed management has been used.

The evolution of the Core Damage Frequency (CDF) and the increase in the Core Damage Frequency (Δ CDF) have been calculated.

- The aim is to calculate the increase in core damage frequency, by fire areas, and visualizing whether that action supposes a significant increase in core damage frequency or not, and thus prioritizing those actions that have a significant increase in core damage. Figure 3 illustrates risk-informed management.
- Δ CAF = CDF (Base) - CDF (Deterministic Fulfillment) < 1.0E-05, by Fire Areas and Overall.

THE EVOLUTION OF THE RENEWAL OF THE OPERATING LICENSE FOR THE ALMARAZ AND VANDELLOS II NUCLEAR POWER PLANTS

Renewal of the Operating License for the Almaraz NPP

CSN technicians are scheduled to do a presentation for the general session on March 31 and April 1 on

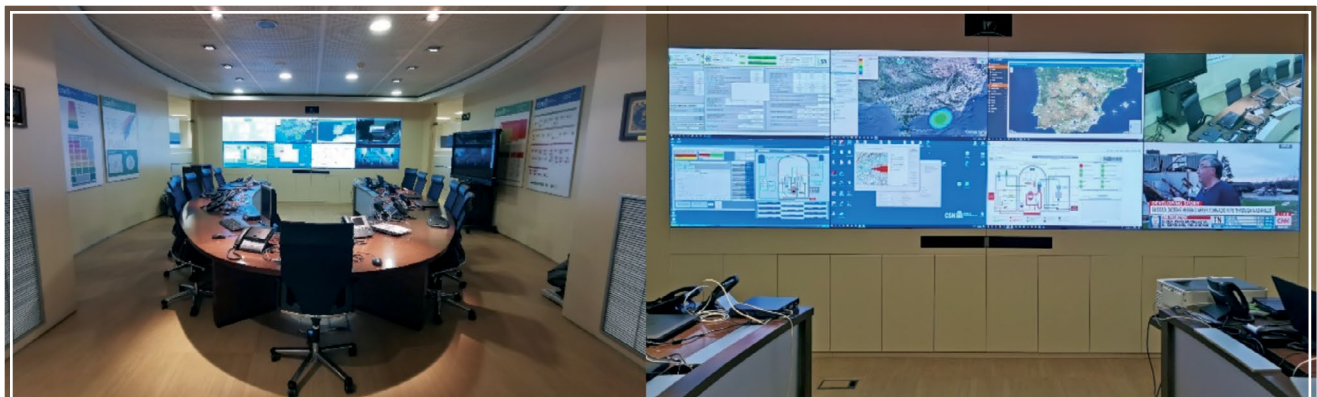


Figure 2. Improvement of the CSN emergency room. A new display screen divided into 8 sub-screens shows data of interest for emergency management.

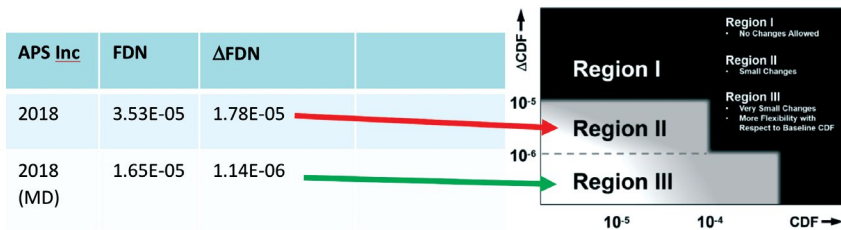


Figure 3. Visual of risk-informed management methodology. Calculation of increased core damage frequency and analysis of whether it is significant or not. Depending on whether it is in region I, II, or III.

the Renewal of the Almaraz NPP Operating License, containing the Periodic Safety Review (PSR). Each of the 16 safety factors evaluated by the different areas of the CSN will be presented. The estimated time for presentations is around 6 hours.

The month of April has been planned for analysis, debate, and decision-making in the general session on the Renewal of the Almaraz Operating License.

Renewal of the Operating License for the Vandellós II NPP

The proposal for a technical opinion on the Renewal of the Vandellós II Operating License is scheduled to reach the general session on May 24.

CSN technicians are scheduled to do a presentation for the general session in May 26 & 27 on the Renewal of the Vandellós II NPP Operating License. Each of the 16 safety factors evaluated by the different areas of the CSN will be presented. The estimated time for presentations is around 6 hours.

The month of June has been planned for analysis, debate, and decision-making in the general session on the Renewal of the Vandellós II NPP Operating License.

IMPROVEMENTS IN THE LICENSING PROCESSES BEING PROMOTED BY THE CSN, SUCH AS THE USE OF THE INUC APPLICATION AND PROJECT MANAGEMENT TECHNIQUES

In order to improve the licensing processes, an INUC computer tool has been in operation since January 2019. The concept of the dossier has been introduced. There is tracking of licensee and CSN documentation and a scorecard.

A Work Group has been created to incorporate project management tools into INUC. The group is made up of the CSN President, Board Member, General Secretary, Directors (Director of Nuclear Safety, Director of Radiological Protection), Computer Systems, Planning Unit). A module developed to implement "PERT" methodologies will be introduced in INUC, resources will be managed (allocations), and annual activities will be planned. ■



JOSÉ MANUEL REDONDO

Deputy Director General for Nuclear Energy from the Ministry for Ecological Transition and Demographic Challenge

First of all, I would like to thank the Spanish Nuclear Society; its President, Javier Guerra, and its Vice President, Héctor Domínguez, for the invitation given me to participate on behalf of the Ministry for Ecological Transition and Demographic Challenge, one more year, in the Closing Session of this Conference on experiences and

perspectives of the Spanish nuclear power plants.

As already mentioned in this Conference, during the last year, something that has become a tradition in recent years has been fulfilled, and nuclear energy has once again become a fundamental pillar in supplying Spanish society with something as fundamental as electrical energy, as it is, for the ninth consecutive year, the technology that has contributed the most production to the Spanish electricity system, with 21.43%.

Without a doubt, these levels of production are, once again, the result of the excellent work being done by professionals who are part of the Spanish nuclear industry. I am referring to both those who are in charge of the operation of our nuclear power plants and to those who carry out their activity in the field of support engineering, fuel manufacturing, etc.

Also following tradition, I am going to take advantage of my speech at this Conference to report on the most important issues that are currently the focus of attention at the Ministry.

The first thing I am going to talk about is the start of the process for the 7th General Radioactive Waste Plan which Enresa will send to the Ministry shortly.

As you know, the currently in force 6th GRWP was approved in June 2006 and does not comply with the requirements of the 2011/70/Euratom Directive, which establishes a community framework for the responsible and safe management of spent nuclear fuel and radioactive waste, which requires each Member State to notify the European Commission of its national program for the implementation of the policy for the management of spent nuclear fuel and radioactive waste, adjusting its content to what is required in this Directive.

To meet this requirement, Spain should have submitted its National Program, that is, the 7th GRWP, before August 23, 2015, something that was not done because the reference scenario of this Plan was not determined, in what refers to the



operational life of nuclear power plants, a condition that determines the amount of radioactive waste to be managed and the decommissioning schedule.

As a result of not submitting this Plan, last November the European Commission, as part of an infringement procedure, sent Spain what is known as a "Reasoned Opinion," as a preliminary step to the filing of a complaint with the European Courts.

In the draft of the 7th GRWP, which Enresa will present to the Ministry shortly, the reference scenario that is contemplated, with respect to the operating time of nuclear power plants, is based on the predictions established in the updated draft of the National Energy and Climate Plan 2021-2030 (NCEP), specified in the Protocol of Intent for the orderly closure of nuclear power plants, signed between Enresa and the owners of the plants last March; in other words, the 7 reactors currently in operation are expected to cease operation between 2027 and 2035, with an average lifetime of about 45 years.

With regard to the management of radioactive waste with very low, low, and medium activity, it is anticipated that this waste will be managed at El Cabril, a storage center where these types of waste that are generated in Spain are definitively managed, for both those resulting from the operation and decommissioning of nuclear power plants, and those produced in hospitals, laboratories, and industries.

For very low-level waste, this draft of the 7th GRWP confirms that there is an authorized capacity at El Cabril that exceeds the expected need for storage of this type of waste in the future. However, for low and medium activity radioactive waste, an expansion of the capacity of this facility is planned.

Regarding the management of spent fuel and highly active waste from nuclear power plants, different options are included in the environmental documentation that accompanies the draft of the 7th GRWP; basically, a single site or several. During the process for the Plan, it should be defined whether the strategy of a single centralized facility is maintained, as has been considered in

the GRWPs approved by successive Governments since 1987.

The delay in the availability of CTS, something that has also become traditional in this country, means that, as you know, currently all the plants either have or are building an ITS, except Vandellós II, which requires the corresponding containers to be available.

Going back to the future 7th GRWP and in relation to the definitive management strategy for spent fuel and high-level waste, it must be said that Deep Geological Storage (DGS) is maintained as the most sustainable and safe option, this being the concept generally accepted by technicians, as indicated in the preamble of the aforementioned 2011/70/Euratom Directive. For the purposes of economic calculations and planning, this facility is expected to come into operation after 2073.

With regard to the decommissioning and closure of nuclear power plants, the provision for immediate total decommissioning of all plants, following their cessation of operation, is maintained. The preparatory work for the site will begin at least three years before the date of cessation of operations, and the dismantling is expected to begin at least three years after said cessation. In these six years, the activities





of emptying the fuel pools, the preparatory tasks for decommissioning and obtaining the decommissioning authorization will be carried out. Subsequently, a term of ten years is estimated for the material execution of decommissioning.

As for the funding of Enresa's activities, as you know, this is carried out through the "Fund for the Financing of GRWP Activities," regulated by the sixth additional provision of Law 54/1997, on the Electric Sector, which establishes a system of four rates that must be satisfied by the entities that benefit from the services that Enresa provides. Also included in this fund are the yields derived from the transitional financial investments of the Fund.

It should be pointed out that, following the amendment made to the General Tax Law 58/2003, by Law 9/2017, on Public Sector Contracts, what until now were "rates" have come to have the legal nature of "non-taxable public financial contributions."

Recently, with the approval of RD 750/2019, from December 27, which modifies the fixed unit rate related to the non-taxable public asset provision through which the Enresa service to operating nuclear power plants is financed, the Government has updated what until now had been called Enresa rate 2.

The draft of the 7th GRWP will be submitted for strategic environmental assessment, as provided in Law 21/2013 on environmental as-

essment. The process will also be developed in accordance with the provisions of RD 102/2014, for the responsible and safe management of spent nuclear fuel and radioactive waste, promoting public participation, in the terms provided for, both in Law 27/2006, regulating the rights of access to information, public participation, and access to justice in environmental matters, and in the aforementioned Environmental Assessment Law.

Moving on to another topic and, regarding the regulatory field, I am going to refer to two regulations that are currently being processed by the Ministry.

First, the Royal Decree approving the Regulation on health protection against risks arising from exposure to ionizing radiation, which modifies and repeals the currently in force Regulation on health protection against ionizing radiation and is aimed at transposing the 2013/59/Euratom Directive, which establishes basic safety standards for protection against the dangers arising from exposure to ionizing radiation.

The processing of this Regulation is currently in the reception phase of receiving reports from the Ministries involved and it is expected that it will be approved in the second half of this year.

On the other hand, the approval of this Regulation, along with that of the Regulation on nuclear safety in nuclear facilities, approved by RD 1400/2018, in November 2018, which

incorporates the 2014/87/Euratom Directive on nuclear safety into Spanish law, makes it necessary to revise the Regulation on Nuclear and Radioactive Facilities (RNRF), in order to complete the regulatory framework related to nuclear energy in a coherent manner.

Through this revision of the RNRF, the aspects of the aforementioned 2013/59/Euratom Directive that affect its scope will be transposed, harmonizing its content with the provisions of the Regulation on nuclear safety in nuclear facilities and taking advantage of the experience gained in applying the RNRF.

Currently, the text of this Royal Decree is in the drafting phase and, once the project is available, the procedure for hearing interested parties and informing the public about the project will be carried out.

Before finishing, I would like to refer to what the fourth Vice President of the Government and Minister for Ecological Transition and Demographic Challenge said in her appearance on February 19 before the Commission on Ecological Transition and Demographic Challenge for the Congress of Deputies, in relation to some of the topics I have referred to.

Regarding CTS, she stated her belief that *"everyone agrees that the best waste management is probably to have centralized storage,"* underlining the importance of continuing to invest in this facility.

And regarding the cessation of operation of the plants, she stated that *"in any case, the system operator must also determine that what happens must be compatible with security of supply."*

Finally, I would like to express, once again, my appreciation to the work of the professionals who, during the past year 2019, have contributed with their work, knowledge, and dedication to the fact that nuclear energy has continued to have the leading role it has had in the Spanish electricity supply and my confidence that professionalism and the pursuit of excellence, which are traditional in this sector, will allow this role to continue to be achieved under the same conditions of safety. ■

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PRESS



Within the framework of the “Nuclear Power Plants in 2019: Experiences and Perspectives” session, the Spanish Nuclear Society organized a meeting with the Madrid media that served to discuss current issues in the nuclear sector and to review the operation of the nuclear park in Spain and the world during 2019. On this occasion, the Communication Commission chose to hold a breakfast with journalists one day before holding the event organized by the SNE featuring Javier Guerra, president of the Society, and José Emeterio Gutiérrez Elso, Senior Advisor & Consultant and former President of Westinghouse.

In 2019, for the ninth consecutive year, electricity production from nuclear origin managed to become the main source of generation in the peninsular electricity system, according to Red Eléctrica de España, contributing fundamentally to the stable contribution of electricity, operating on the basis of and reinforcing its role as an essential technology in an energy model that aspires to be free of polluting emissions in the medium term, as Javier Guerra highlighted in his speech.

The excellent operation of the Spanish nuclear power plants during 2019 allowed nuclear energy to be, once again, the leader in hours of operation as a source of CO₂-free generation and production. During the meeting, it was pointed out that nuclear energy,

with only 6,55% of installed capacity, has managed to cover 55,8 TWh of the 247 TWh that Spain demanded in 2019, a demand lower than last year.

The availability of the Spanish nuclear park was another of the outstanding strengths as it has once again achieved outstanding figures. The plants operated for 7846 hours during 2019, which means operation with total safety during 89,5% of the year. In addition, emission-free production, including nuclear and renewables, has accounted for 61,6% of the total generation in Spain, with nuclear technology contributing the most with 37% of emission-free electricity generation.

“The professionals who make up the Spanish Nuclear Society, with the performance of our nuclear

power plants as an endorsement, defend the continuity of the operation of the Spanish nuclear park and reiterate the request for an objective and composed evaluation of the role of all energy sources that help to achieve the ambitious plans established in the Integrated National Energy and Climate Plan, unattainable if we disregard the energy source that currently contributes the most to an emission-free generation”, said the President of the SNE at one point during the meeting.

PROFESSIONALS: KEY IN THE SECTOR'S MILESTONES

The role of professionals in the nuclear sector has been another of the points analyzed in the meeting with the media that attended the event. It was highlighted that the



excellent operation of the Spanish nuclear park year after year is the result of the capacities, technologies, and experience of the industry, along with the high degree of training and on-going education of the professionals in the sector.

The human factor is a key element in the successful operation of Spanish nuclear power plants. Both the companies and their professionals invest a high number of hours to carry out continuous training and to execute campaigns that encourage a "0 accidents" policy. Javier Guerra pointed out that these factors, along with the high level of professionalism of the people who make up the nuclear sector, make it possible to achieve outstanding degrees of efficiency, with quality and safety standards

superior to those of any other industry.

José Emeterio Gutiérrez highlighted that the result of this effort for continuous improvement, carried out by the Spanish nuclear sector for more than 30 years, is recognized worldwide. "Our country's plants appear in the top positions of international references as the indicators of the World Association of Nuclear Operator (WANO)," he said.

THE CTS

The Spanish Nuclear Society considers that decisions on the construction of the Centralized Temporary Storage (CTS) should be made based on the data and studies that have been conducted in recent years, prioritizing the gener-

al interest of society. This facility would favor joint future management of spent fuel from Spanish nuclear power plants and eliminate the dependence on costs that we bear to third countries for keeping radioactive products. It was also indicated that its implementation would provide the opportunity to continue research and development of highly active waste management technologies and would represent an economic and employment driver for the area where it is planned.

For all these reasons, the President of the SNE, Javier Guerra, pointed out that the CTS "must be available as soon as possible and be a single repository" as it is a facility that is and will continue to be necessary.■



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■ Almaraz Nuclear Power Plant (Spain).



■ Angra Nuclear Power Plant (Brazil).



■ Cofrentes Nuclear Power Plant (Spain).



■ ITER (France).



■ Trillo Nuclear Power Plant (Spain).



■ Temelín Nuclear Power Plant (Czech Republic).