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ENTIDAD DE UTILIDAD PÚBLICA



Campoamor, 17, 1.º - 28004 MADRID
Tels.: 91 308 63 18/62 89
Fax: 91 308 63 44
sne.1974@sne.es
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C/ Poeta Joan Maragall, 56. 7º D. 28020 MADRID - Tel: (34) 91 373 47 50 • email: nuclear@gruposenda.es

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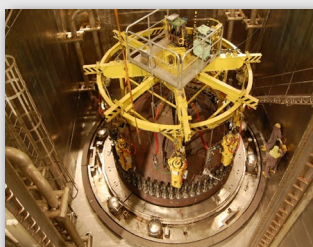
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A pivotal moment

A benchmark in the Spanish nuclear sector since 1989, the Conference on Operating Experiences of Nuclear Power Plants in Spain, organized by the Spanish Nuclear Society (SNE), reaffirmed its role at this 36th edition as an essential forum for sharing knowledge, championing the sector's present, and planning its future. In a year marked by the SNE's golden anniversary, the voice of the nuclear community resonated louder than ever at the School of Industrial Engineering of the Polytechnic University of Madrid, demanding, with rigor and technical arguments, a rethinking of national energy policy.

This edition not only served to delve into the most notable figures from nuclear power plants during 2024, but also provided a space for emotion, memory, and commitment to the future. From the unwavering support for the continued operation of the Almaraz nuclear power plant expressed by colleagues from all nuclear plants, to the enthusiasm of a new generation of professionals already preparing to take over, all of this came together in an event that reaffirmed the need to continue an energy model based on evidence, knowledge, and talent.

The presentations by the plant directors reflected not only excellence in continued operation but also great creativity in the way they were presented, with particularly interesting and informative videos.

The Special Session was led by Rafael Calduch, Professor Emeritus of Public International Law and International Relations. Under the title "Geopolitical Strategies: Energy and Critical Materials," Calduch analyzed the impact of current globalization on geopolitics, driven by technological advances, energy transition, hyperconnectivity, and sustainability. He highlighted the fundamental role of critical materials and underscored the distinct energy strategies of the major powers.

The president of the SNE was particularly eloquent in his defense of the continued existence of nuclear power plants in his final speech before introducing the new Board of Directors. Emilio Mínguez emphasized that "they have been available 84% of the year's hours" and that their production "prevented the emission of more than 20 million tons of CO₂," which makes them an essential pillar of a realistic and efficient energy transition. In his remarks, there was also room for strategic reflection, affirming that the global energy landscape has changed and countries are incorporating nuclear energy into their energy mix. "Spain is determined to go in the opposite direction on a path on which we are being left completely alone." His message was clear: we still have time to rectify this. "Let's do it."





PAULO DOMINGUES SANTOS

President of the Nuclear Spanish Society (SNE)

Text: MATILDE PELEGRÍ Photographs: JOSEP MIQUEL BIARNÉS and GRUPO SENDA

For Paulo Domingues Dos Santos, presiding over an entity like the Spanish Nuclear Society (SNE), with more than 50 years of history, is both an honor and a shared commitment. He assumes this role with optimism and determination, during a period marked by strategic decisions that will define the country's energy future. In this interview, he shares his current vision, focused on strengthening the SNE's technical role as a key agent in knowledge transfer, defending the long-term operation of power plants, and promoting inter-institutional collaboration to ensure a balanced, sustainable, and data-based energy transition. He also makes a special appeal to young people to see the sector as a professional opportunity with enormous potential.

THE SNE

The Spanish Nuclear Society begins a new period following the General Assembly, which ratified the appointment of the new Board of Directors, of which you are the president. What does this election represent for you personally?

Without a doubt, both a great responsibility and a source of pride. The responsibility and pride of representing Spanish nuclear professionals who, at

the same time, are the heirs of an entire legacy, a heritage, handed down to us by the pioneers and all those who came before us. Presiding over the Spanish Nuclear Society, an entity with 50 years of history, is an honor I hope to live up to over the next two years.

And from a professional perspective?

Professionally, I might highlight the challenge of continuing the good work that has been done so far and, if possible, improving it wherever we can. I

have a Board of Directors whose commitment and ability I would like to highlight, demonstrated from the very beginning. I am confident we will be able to work as a team, move forward with the different challenges our society has identified, and consolidate projects that have already been underway.

How do you assess the composition of the Board, which includes a significant number of professional women?

We have begun this new mandate to-

gether, and the first thing I want to emphasize is the commitment, capability, and enthusiasm I have perceived in the entire team, beyond each member's gender. We have a good balance between more experienced individuals and younger ones, but if there's something we all share, it's the desire to work. And with the support of the commissions—which are the true driving force of our Society—we will continue to be a meeting point for nuclear professionals and a reference when it comes to information and knowledge about the Spanish nuclear sector. The composition of our Board of Directors reflects the change society is undergoing, with the progressive inclusion of more and more women in different roles in our companies.

A YEAR TO REMEMBER

You were vice president this past year, a significant period during which the Society celebrated its fifty-year history. What aspects of this milestone would you highlight, which positions the SNE as one of the oldest—and also most active—societies in Europe?

It is frankly difficult to choose just one thing, but if I had to highlight something, it would undoubtedly be the people. The Spanish Nuclear Society, with 50 years of uninterrupted history, is a clear example of generational renewal and, at the same time, the coexistence of different generations and professional profiles, who selflessly give their best for a common project. The work done by the various commissions is, in my view, of incalculable value and offers a very interesting richness of perspectives—from Programs to Terminology, including Technical, Communication, Employment and Development, the Journal, CORA and CTRA, and of course, Young Nuclear Professionals and Women in Nuclear.

What is your assessment of the set of activities organized to commemorate this anniversary? Is there any event you consider especially significant?

The assessment can only be positive, and I would like to highlight two as-

|| The seven nuclear reactors we have in operation are seven treasures, a heritage to protect that we have in Spain, and it is difficult to understand that we are not seeing it that way ||

pects: on the one hand, a broad and very varied program that included many different activities so that the celebration could be extended to as many members as possible; and on the other, the tremendous teamwork carried out by the 50th anniversary group led by Juan Bros, which integrated people from all commissions to shape a celebration worthy of what the occasion undoubtedly deserved. As for what stands out in my memory, more than any specific event, I would especially like to highlight, for all that it means, the decision to allocate part of the budget assigned to this celebration to a donation in favor of the recovery of the areas affected by the DANA of October 29, 2024. Valencia is also SNE, and being able to help, with our small contribution, in overcoming this great tragedy, I believe should be one of the memories we all take away from this year of celebration.

Alongside these celebrations, the Society has been very active throughout the year in defending professionals in the sector, especially the continuity of the Almaraz nuclear power plant. You yourself participated in the march held a few weeks ago in the area, joining the “Save Almaraz” movement promoted by the Young Nuclear Professionals. What are the reasons for requesting the continuation of the Extremadura plant?

Personally, I would like someone to convince us otherwise, to give us solid, technical, and well-argued reasons why a plant like Almaraz should be shut down. The reasons for its continuation seem so clear that we will never tire of repeating them: it is a facility whose good operation is recognized both nationally and internationally, it contributes to the security of supply and to

zero-emission generation with its daily production, and it brings wealth to the territory in which it is located. I have said before, and I won't stop saying it, that the seven nuclear reactors we have in operation are seven treasures, a heritage to protect that we have in Spain. It is hard for me to understand why only in our country, and unlike what is happening in Europe and the rest of the world, we fail to see it that way.

How could its closure affect the industry as a whole?

Unfortunately, I believe the impact would be felt across the entire sector. If we shut down a plant, we will lose capabilities and professionals from our auxiliary companies, with all that implies in terms of knowledge, jobs, and highly qualified employment. We must defend the continuity of Almaraz I, Almaraz II, Ascó I, Cofrentes, Ascó II, Vandellós II, and Trillo. For me personally, the defense and fight is for all of them. It would be terrible if we had to experience the loss of Spain's nuclear capacity just to realize the value it held for the country. I suppose it is expected for us to say this, but it is undeniable that more and more voices from very diverse professional groups are joining this call. Please, sit down and talk about it.

The communication to society about the reality of nuclear energy as a safe, environmentally friendly source that guarantees supply is a constant objective of the SNE. How do you assess the role of commissions such as Jóvenes Nucleares and WiN, both integrated into international organizations?

I surely have much less historical perspective than other members or nuclear professionals, but even so, I have been able to perceive a clear evolu-



tion, a rather deep change, in the public perception of nuclear energy. Things are clearly changing, and without a doubt, the work done by Jóvenes Nucleares and WiN is one of the contributors. Not the only one, of course, but their tireless work, grain by grain, I am convinced, has borne fruit and is also experiencing growth that is anything but linear.

Can you give us a preview of the communication strategies the Society will pursue in the coming months?

We will continue working—intensely. We are in a moment that may not be unique, but is certainly significant, in which our work in favor of outreach, knowledge, and support for nuclear professionals is key—and that is where we will be. The work already being done is very important, but we will always be attentive to what is happening around us to be able to respond in the best possible way.

A LOOK TO THE FUTURE

Throughout 2024, the SNE has cen-

tered its anniversary around “Fifty years of life and a look to the future.” What objectives has the new Board of Directors set for the 2025–2027 period?

We’ve just started out and there are still decisions to be made, but there’s no reason not to maintain that “look to the future.” It is our responsibility to work today so that this future exists, and we will do so hand in hand with the Board and the various commissions. There are well-established projects, activities such as the Operational Experience Day, the Technical Day, or the Annual Meeting itself that are part of our very identity, but we will work on developing new projects that align with our core areas of action—and, of course, on the day-to-day tasks that also fall within our responsibilities.

During the General Assembly, the most relevant data of the organization was presented. The growth in the number of members stands out. What is your assessment of this?

It is great news—and a challenge. Un-

Presiding over the SNE, an entity with 50 years of history, is an honor that I hope to live up to during these next two years

doubtedly, growing in membership is one of the best signs of vitality, of adaptability to change, and of generational renewal in our companies. But it will also certainly be one of the challenges we must keep in mind to maintain or, if possible, increase that trend. The members are the strength of the Society, and having them, with their number increasing, can also be understood as yet another indicator of the good work that has been done so far.

What initiatives will be launched to maintain and enhance services for individual members? And for corporate members?

Not long ago, an internal survey was conducted to identify possible courses of action regarding improved interaction with members. Many of those actions have already been carried out, but there’s still room for improvement, and we will continue exploring those opportunities. With corporate members, we are in a similar dynamic, and once we consolidate the new team we’ve formed, we will get to work on it.

The SNE is a founding member of the European Nuclear Society and maintains excellent relationships with other international entities. Additionally, its contact with national organizations such as the Spanish Society for Radiological Protection, Foro Nuclear, and the Nuclear Safety Council is constant. How important are these relationships to you?

If there is one professional sector where the importance of a strong network of relationships between institutions and professionals is truly understood, I would say it is, without a doubt, the nuclear sector. It is part of our way of working to share operational experi-

ences, to work as a team, to exchange information, and to develop joint projects. Much of the success achieved so far—and the present we are now experiencing with excellently maintained, well-operated plants that can continue to run for many more years—resides in all of that.

How can these relationships be strengthened?

By continuing to work together, as we have done so far, and seeking, wherever possible, new areas of collaboration. Experience shows us that this is how we've achieved important milestones, so I understand that maintaining and strengthening these relationships—and seeking cooperation in every possible area—is essential.

It would be terrible if we had to reach the point of losing Spain's nuclear capacity to realize the value it represented for the country

Looking to the future, it is essential to incorporate young professionals. At the 2024 Operational Experience Day of Spanish nuclear power plants, many students from different universities were present. What message would you give those young people to encourage them to choose the nuclear industry for their professional future?

I consider myself an optimist by nature, and seeing young people in that auditorium is a sign of the energy and vitality we represent. No matter how much has been said—or continues to be said—to the contrary, nuclear energy is a future-oriented option. It is being treated as such all over the world, and we hope it will also come to be seen that way in our country. I am convinced of it, and from the Society, we will work as hard as we can to make it happen.

What role do Jóvenes Nucleares play in this objective?

I'll answer with a question... Who better to speak to young people than young people themselves? Without a doubt, the Spanish Nuclear Society brings together the experience of seasoned professionals in the sector with that of the young—whether they

are students or just entering the workforce—and this is a very valuable combination. But in this case, I believe no one is better suited than them to show their example, their dedication, their capability, and the opportunities the nuclear sector offers.



PROFESSIONAL PROFILE

Paulo holds a degree in mechanical engineering from the Instituto Superior Técnico (Lisbon, Portugal). He is currently the general manager of ANAV, the company that holds the operating permits for the Ascó and Vandellós II nuclear power plants.

He is one of the governors of the Paris center of WANO and a member of the board of directors of the Nuclear Forum.

During his more than 35-year professional career, he has held positions in power generation plants, primarily working in commissioning and maintenance.

He has also held positions of responsibility at a broader level, such as deputy director of technical services for power generation at Endesa, regional manager of power generation for Latin America at Endesa Chile, president of generation at Enel Brazil, and global head of coal-fired thermal power at Enel.

Throughout his career, he has worked with virtually all power generation technologies. He is the author and co-author of several technical publications and has received four EPRI technology transfer awards.



THE NEW BOARD OF DIRECTORS OF THE SNE HAS BEEN ESTABLISHED

Members of the outgoing and incoming boards of directors. Above, from left to right: César Queral, Miguel Barreiro, Pedro Mata, Raquel Ochoa, Adoración Arnaldos, Paulo Domingues Santos, Susana Falcón, Emilio Mínguez, Lourdes Guzmán, María Luisa González, Rosa González, Carmen Paredes, Pablo León, and Óscar Larrosa. Pictured on the right is the Standing Committee of the newly established Board of Directors: Treasurer, President, Vice President, and Secretary General.

**At the time of the interview, Paulo Domingues held the position of Vice President of the SNE. Following the holding of this Conference on Operating Experiences of Nuclear Power Plants in Spain in 2024, the board of directors was renewed, and the new president of the Society was appointed.*



THE PROFESSIONAL PERSPECTIVE

This coming June will mark three years since your appointment as General Director of ANAV. How do you assess this period?

Undoubtedly satisfying. The daily reality of the facilities isn't flat or always positive, but I am left with the pride of leading the team that operates the

Ascó and Vandellós II nuclear power plants and how we face the challenges and projects ahead of us. Here, I would also like to highlight our contribution to emission-free electricity generation and to the security of supply. At the same time, I would like to ask all nuclear professionals working in our plants—both those from ANAV and from all the companies collaborating with us—not to forget what our daily work represents and to continue doing it with safety, responsibility, and commitment.

What are the main challenges ANAV and the nuclear fleet as a whole face, at such a decisive mo-

ment in the timeline defined by the Integrated National Energy and Climate Plan (PNIEC)?

In my opinion, our daily challenge must be to focus on the safe, reliable, sustainable, and long-term operation of these facilities. Continuing to work as we have been, with investments that allow us to affirm that the plants are in better condition today than when they were built, and ensuring proper generational renewal and necessary knowledge transfer—this is the foundation upon which the right decisions can be made. Our well-done work is the best statement we can make about ourselves. ■

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Emilio Mínguez*



**SERGIO
DOMÍNGUEZ**

Acting Director of the
ETSII/UPM

Welcome to the Palace of Industry and the Arts, home of the Higher Technical School of Industrial Engineering at the Polytechnic University of Madrid, for this 2004 Edition of the Conference on Nuclear Power Plants in Spain. By way of a brief introduction—given that we are in the house of industrial engineers, and from now on, of course, your house as well—and although I risk overloading you with commonplaces about the operation of nuclear engineering, I'd like to give some context to explain our interest, as industrial engineers, in any form of energy supply. Logically, when addressing our mission—which is the implementation and operation of any type of industry—one of the

fundamental parameters on which we must base such a project is a reliable, stable, and, if possible, economical energy supply. Without that guarantee, it is impossible to even consider operating any industrial undertaking. With that in mind, naturally, the prospect of nuclear energy—which is what brings you here today—is quite attractive to us, as it provides and guarantees all those characteristics I just mentioned: supply reliability and a relatively economical approach to that supply.

Based on that, we should logically aim to build an energy mix that, taking this energy supply system—which offers these guarantees—as its cornerstone, also allows us to meet the requirements of renewable, zero-emission energy, energy transition, decarbonization, etc. With that idea in mind,

it seems we have recently been receiving good news. As you all know far better than I do, nuclear energy has recently been reclassified as clean energy within the context of the European Union. This opens up quite favorable prospects for us, as industrial engineers, toward some of the goals we have in mind. I insist: the recovery of industrial GDP is essential, and as you know, the goal is to bring the industrial GDP back to 20%. Clearly, attempting to reach that target as industrial engineers is unfeasible without a guaranteed energy supply—and that guarantee can very clearly rest on nuclear energy.

More good news that we've received lately... I was speaking with the president of the SNE, Emilio Mínguez, about a recent news item regarding the discovery of a deposit of one million tons of thorium in China. This opens new prospects for an energy supply based on nuclear technologies, particularly thorium molten salt technologies, which, according to estimates by the Chinese government itself in the news release, could provide for China's entire energy demand for 60,000 years. Naturally, speaking of 60,000 years—even for the Chinese government—is an excessively long timeframe, and if they are willing to share it, it could also open up a very affordable energy horizon for the rest of the global consumer base. If we add to this the news—which appears increasingly hopeful—about new fusion systems, perspectives are opening up within nuclear technology that push us to believe there is a future in these technologies. And if the transposition of these European directives into the Spanish legal framework takes place, and if the decommissioning timelines of our nuclear power plants are reconsidered, it seems a future opens up in which all these goals I've been mentioning start to seem more achievable—at least more so than a few years ago—in terms of recovering industrial GDP. If we add to this initiatives such as the manifesto promoted by the Spanish Nuclear Society, supporting the reconsideration—or even

indefinite postponement—of plant decommissioning timelines, which would not be strange given that the plants are perfectly operational, then we would find ourselves in quite a favorable environment—a tailwind, so to speak—for achieving all these goals. As I said, I believe I've reached the saturation point of commonplaces regarding concepts that you all know far better than I do, so I will now hand over to our president, Emilio Mínguez, thanking you for your presence and once again welcoming you to your home—our Higher Technical School of Industrial Engineering.

Thank you very much.



EMILIO MÍNGUEZ

President of the SNE

Welcome to this thirty-sixth Operational Experience Day, where, as is tradition, we once again have the opportunity to learn about the excellent performance of our power plants during the past year, 2024. First of all, I would of course like to thank Professor Sergio Domínguez, director of the School, for all the opportunities he gives us to organize this event here in this auditorium. I also want to express our thanks to José Manuel Redondo, Deputy Director General for Nuclear Energy of the Ministry for the Ecological Transition and the Demo-

graphic Challenge, for joining us once again for this opening ceremony. Of course, the Board of Directors would like to thank everyone who worked to make this event happen—especially the Programs Committee. In particular, the former chair Eva Celma, the current chair Arancha Risquez, and also Jesús Fornieles for his work between the two chairwomen. And of course, thanks to all the plant directors, who are clearly the main architects of this event and its protagonists; to the moderators; and to our guest speaker, Professor Rafael Calduch, who will deliver the opening lecture. On a heartfelt note, I cannot fail to make a very special mention of someone who is not here with us today: our Secretary General, Julio Blanco. We send him all our love and sincerely hope that, with his great strength, he will be able to return to his normal life soon. Stay strong, Julio!

Now we move on to a second, equally emotional part. Surely everything I'm about to say is already familiar to you, and we must never tire of repeating it—at any time and in any forum. Last year, nuclear power plants supplied 19.57% of the total electricity on the Spanish mainland. And they did so with only 5.44% of the installed power capacity. As an example, Almaraz alone contributes 7% of that total and generates more than 50% of the emissions-free electricity in Extremadura. We've talked about this a lot, but I personally believe it's important not only to highlight the quantity but also the quality. Nuclear power plants are a guarantee of stability, and in moments of highest demand or in extremely difficult situations, it is these facilities that have enabled us to respond and maintain system stability. Nuclear energy is a stable base-load energy and provides constant production. In 2024, the plants were available 84% of the hours in the year. Not only that: their production avoided the emission of more than 20 million tons of CO₂ annually, contributing 25.28% of the emissions-free electricity. As we'll see throughout this event, thanks to our expert plant directors, these



facilities are technologically prepared to continue operating. They are safe, reliable, and economically sustainable—provided they are not penalized with taxes. They are technologically advanced facilities due to the annual investments made in each unit, on average between 25 and 35 million euros. And we mustn't forget the nuclear professionals—an essential part of the successful operation of these plants. Nuclear power plants provide quality employment and generate wealth. Going back to the initial example, Almaraz alone accounts for direct and indirect employment for about 3,000 people, which would be lost if the plant were shut down.

Personally, I will never tire of repeating all these arguments—anywhere, and in any forum where it is necessary. But we are not just defending the continued operation of nuclear plants. Europe already included nuclear generation in the green taxonomy in 2022 as part of the decarbonization process. The energy paradigm shift triggered by the war in Ukraine marked a before and after. And except for Spain, every EU country with operating plants has decided to extend their lives, and those without

have opted to include nuclear generation in their energy mix.

Just to mention the most recent developments: the change of stance in Belgium regarding closures, and the statements of the leader of the winning party in the German elections, who does not rule out a reversal and a return to nuclear energy. Europe is clear that it cannot afford to continue leaving nuclear out of the solution, in the words of the European Commissioner for Climate Action. The Council of EU Member States and the European Parliament agreed to label nuclear energy as a strategic technology for the decarbonization of the European Union. There are many more examples. We've talked about Europe, but it's also very necessary to mention North Anna, in the United States, a twin plant to Almaraz and a reference facility that has already received NRC approval to extend its operation to 80 years. Shouldn't this make us reflect?

Moreover, nuclear plants are positioning themselves as the ideal resource for large energy consumers and for leading companies that own data centers worldwide. These companies are forming partnerships with nucle-

ar power plants to ensure supply for their facilities focused on artificial intelligence and quantum computing. If we want to be part of that race, nuclear energy is not just useful—it's essential. And we're seeing this all over the world. The global energy landscape has changed, and countries are incorporating nuclear energy into their power mix. Electricity generation is picking up speed, while Spain seems determined to drive in the opposite direction—on a road where we are now completely alone. I want to insist: there is still time to change course. Let's do it. Steps are being taken, and we are at a crucial moment. Last week, we learned that the owning companies had formally requested the Ministry to open the much-needed dialogue for change. We sincerely hope the response does not come too late, and that we abandon this path that makes no sense. Nuclear professionals are not alone. More and more respected voices from institutions and companies are calling for a change in energy policy and an extension of nuclear plant operations. Professional associations, companies outside the nuclear sector, large energy consumers, and many others. At this point,

I also want to highlight the initiative of the recently presented manifesto by the electrical sector's auxiliary industry, raising their voice, calling for dialogue and the renegotiation of the 2019 agreement.

Our vision is continuity. Shutting down nuclear power plants means losing 20% of our permanent electricity generation capacity within 11 years. With the closure of nuclear power plants, we lose a lot. These facilities are fully capable of continuing to operate, and we will also lose talent. We will lose the human capital made up of young professionals—like those with us today—and not-so-young, highly trained professionals, who are among the most sought-after in countries beginning to develop their nuclear projects and who look to us as a reference. We have a strong nuclear fleet, with excellent professionals in the plants and across the sector's companies, highly committed, which is an invaluable asset. That's why we defend—and will continue to defend—the continued operation of nuclear power plants as a strategic energy source for Spain under the following terms: That the necessary contribution of nuclear energy to the country's energy design be reviewed, maintaining operation of the nuclear plants up to 60 or even 80 years. That the key role of nuclear plants in base-load energy production—which complements and supports the growth of renewables—be recognized. That opposition to nuclear plants based on radioactive waste be ended, since there are technologically proven solutions for both temporary and final management. That a stable and adequate economic, fiscal, and regulatory framework be established so the plants can continue operating. That the economic and social impact of the currently scheduled decommissioning be analyzed and compared to the outcome of keeping the plants in operation for another 30 or 40 years.

We are convinced that a rigorous and serious technical analysis comparing the current decommissioning timeline to the long-term operation of

our plants would leave no doubt as to which path is more beneficial for this country. I hope this change of course—which today remains only the wish of this president and, I dare say with near certainty, of everyone here and many others not present—soon becomes a reality. I hope that by this time next year, in this same venue, we can move beyond this ongoing plea—the continual appeal made by presidents of the Spanish Nuclear Society and their Boards—and finally speak of a new reality, a true horizon of long-term operation. And that all the young people here today—and many others working or hoping to work in the nuclear sector—become the new generation, the ones who will lead the extended operation of our plants. Thank you very much.



JOSÉ MANUEL REDONDO

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

First of all, I would like to thank the Spanish Nuclear Society and, in particular, its president Emilio Mínguez, for inviting me once again to participate, on behalf of the Ministry for the Ecological Transition and the Demographic Challenge, in this Conference

on the Experiences and Perspectives of Spanish Nuclear Power Plants.

As I always say, it is an honor for me to participate in this meeting, considering the level of the professionals I share the stage with, such as the plant directors who deal day in and day out with the operation of a complex facility like a nuclear power plant.

Once again, with a contribution of 19.6% of the electricity generated in 2024, Spanish nuclear power plants have played a fundamental role in Spain's electricity supply. Just last February, nuclear technology ranked as the leading source in the daily electricity market with a total of 4,733 GWh, followed by hydropower with 4,155 GWh, wind power in third place with 3,967 GWh, and solar photovoltaic in fourth place with 3,316 GWh.

It is evident that these production levels are the result of the excellent work carried out by the professionals in the Spanish nuclear industry, particularly the plant directors who today will tell us how their plants performed over the past year.

For my part, as usual, I will try to inform you about the actions recently undertaken by the Subdirector General for Nuclear Energy, as well as those currently underway.

NEW RINR

On December 3rd, Royal Decree 1217/2024 was approved, establishing the Regulation on Nuclear and Radioactive Installations, and other activities related to exposure to ionizing radiation. In other words, for short: the "new RINR."

Some of the most relevant new features of this new RINR are the following:

- Regarding authorizations provided for in this Regulation, a series of new requirements have been introduced for the documentation to be submitted in the application.

For example, in the case of the op-

erating license, in addition to the documentation previously required, holders must now submit a "Declassifiable Materials Control Plan", a "Preliminary Decommissioning Plan", a "Facility Risk Assessment", and a "Monitoring and Surveillance Program of the characteristics and parameters of the site and external events that may affect the facility's safety." These documents must be submitted within six months of the regulation's entry into force.

- Another new feature is that closure declarations, which until now were issued ex officio by the Ministry, will now be granted upon request by the facility's holder, who must include the relevant documentation.
- The safety analysis report of nuclear facilities must document the safety assessment carried out according to the terms of the Regulation on Nuclear Safety in Nuclear Facilities, approved by Royal Decree 1400/2018, of November 23.
- In accordance with Directive 2013/59/Euratom, the new regulation establishes that holders of nuclear and radioactive installations must report discharges of radioactive gases or liquids into the environment under normal operating conditions, as well as the dose assessments for the representative person among the public.
- The annual information committee meetings held at the town halls of the municipalities hosting nuclear power plants are now extended to include the El Cabril facility.
- For project authorizations requiring an environmental impact assessment, a coordinated procedure is established in line with Law 21/2013, of December 9, on environmental assessment.
- Regarding occupational activities that generate, process, or manage naturally occurring radioactive materials (NORM), the documentation required to be submitted to the competent authority of the autonomous community is expanded.

- These activities include:
- Oil and gas production
- Geothermal energy production
- Coal-fired thermal power plants
- Titanium dioxide pigment manufacturing
- Mining and processing of phosphate rock
- Maintenance and dismantling of hydrocarbon extraction platforms; maintenance and scrapping of hydrocarbon transport ships

Once again, with their contribution of 19.6% of the electricity generated in 2024, Spanish nuclear power plants once again played a fundamental role in the Spanish electricity supply

- Cement production

- Regarding cosmic radiation exposure of aircraft crews, the regulation expands on the obligation, already established in Royal Decree 1029/2022 (on health protection against the risks of exposure to ionizing radiation), to implement a Radiation Protection Program for crews, detailing the program's content.
- Regarding non-medical imaging exposures, for which the above-mentioned Royal Decree already requires authorization by the Directorate General for Energy Planning and Coordination (with prior report by the CSN), the following practices are explicitly included:
 - Radiological health assessment for employment purposes, immigration, or insurance
 - Radiological assessment of children's and adolescents' physical development in relation to participation in physical or sports activities



- Radiological age assessment
 - Use of ionizing radiation to detect objects hidden inside the human body
 - Use of ionizing radiation to detect hidden persons as part of cargo inspections
- Activity and concentration levels are adopted both for: Exemption from regulatory control—i.e., to be exempt from the authorization or declaration requirements of the regulation, and Declassification of materials—i.e., to remove previously authorized or declared radioactive material from regulatory control. This is done in accordance with Directive 2013/59/Euratom, incorporating the recommended values from the IAEA.
 - Design approvals for spent nuclear fuel storage containers previously granted under Article 80 of the former RINR will now be considered authorizations for temporary storage containers for spent nuclear fuel. The ownership of these au-

thorizations will be transferred from ENSA to Enresa. This transfer will be granted, upon request by Enresa, by the Directorate General for Energy Planning and Coordination, with prior report from the Nuclear Safety Council.

EXPANSION OF EL CABRIL

By Resolution of the Directorate General for Energy Planning and Coordination and with the prior report of the Nuclear Safety Council, on January 17, 2025, authorization was granted for the execution and assembly of the Southeast Platform for the final storage of low- and intermediate-level waste at the El Cabril facility.

The construction of this platform is included in the 7th General Radioactive Waste Plan (PGRR), given the need for this facility to increase its storage capacity for low- and intermediate-level waste through the construction of new cells that must be operational by 2028.

Its construction will be carried out in phases. The first phase includes the construction of 12 cells, with up to 15 additional cells to be built later, as needed.

ATI-100 PROJECT

The 7th PGRR includes equipping the sites of the Vandellós II, Ascó I and II, Cofrentes, and Almaraz (Units I and II) nuclear power plants with sufficient temporary storage capacity for spent fuel to accommodate all that generated by these plants. This is known as the “ATI-100 Project.” It is worth noting that Trillo already has this capacity.

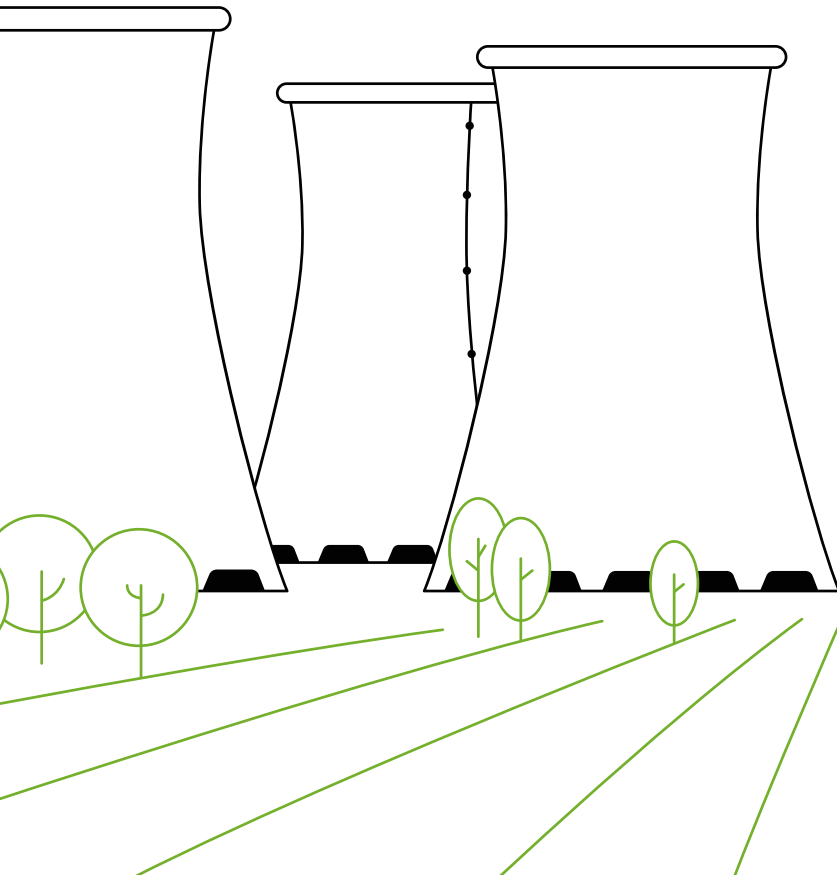
For these new ATI facilities, a storage system has been selected based on welded metal capsules with a concrete enclosure, similar to the current ATIs at Ascó and José Cabrera.

By Resolution of the Directorate General for Energy Planning and Coordination and with the prior report of the Nuclear Safety Council dated November 11 of last year, authorization was granted for the execution and assembly of the Individual Temporary Storage (ATI-100) at Vandellós II Nuclear Power Plant.

By Resolution of the Directorate General for Energy Planning and Coordination and with the prior report of the Nuclear Safety Council, on January 17, authorization was granted for the execution and assembly of the ATI-100 for Ascó I and II Nuclear Power Plants.

By Resolution of the Directorate General for Energy Planning and Coordination and with the prior report of the Nuclear Safety Council, on February 10, authorization was granted for the execution and assembly of the ATI-100 at Cofrentes Nuclear Power Plant.

Almaraz already has the report from the Nuclear Safety Council, but the Environmental Impact Statement has been delayed due to the tardiness of our Portuguese neighbors in sending the required report for the cross-border environmental evaluation of the ATI-100 at this plant.



CONSTRUCTION OF A TEMPORARY STORAGE FACILITY AT VANDELLÓS I SITE

On February 20, an announcement was published in the Official State Gazette (BOE) subjecting to public consultation the project for the construction of a Temporary Storage Facility at the Vandellós I Nuclear Facility, currently in latency phase, as well as its Environmental Impact Study.

This Temporary Storage Facility will house waste resulting from the reprocessing of spent fuel from the plant and special waste generated from its dismantling.

The 7th PGRR foresees its commissioning in 2027, and it will remain operational until the transfer of this waste to the Deep Geological Repository (AGP) for final disposal.

FLEXIBLE OPERATION OF NUCLEAR POWER PLANTS

Although Spanish nuclear power plants have traditionally operated in what is known as base-load mode—producing 100% of their nominal power steadily, except during automatic shutdowns, scheduled outages, or planned power reductions for maintenance or other operational situations—changes in the electricity market have led to increased requests from their delegated load dispatches to generate electricity below their maximum output at certain times.

Specifically, last spring, a series of storms boosted wind and hydro generation, driving electricity prices to historic lows and, occasionally, even into negative territory. As a result, after receiving the corresponding load dispatch requests, some plants (Cofrentes and Almaraz I) decided to shut down.

In response to this de facto situation, on May 28, the Nuclear Safety Council (CSN) approved a Supplementary Technical Instruction concerning the applicable requirements for flexible operation strategies for Al-

maraz, Ascó, Cofrentes, Vandellós II, and Trillo. It also required that, within one month, plant operators submit analyses related to the procedural modifications implemented for flexible operation.

Thus, this past November, the plant operators submitted to the Ministry their respective applications for approval of shutdown strategies, which, since they represent modifications to the plants' operating conditions, must be approved by the Ministry with prior CSN report.

It is clear that, due to the successful large-scale deployment of renewable technologies—by the end of last year, of the 129,176 MW of installed capacity, 32,585 MW were from solar photovoltaic technology, and 32,123 MW from wind, while nuclear power accounted for 7,117 MW—we have reached the paradox in which the contribution of nuclear plants is sometimes unnecessary and sometimes essential.

RATIFICATION BY SPAIN OF THE JOINT PROTOCOL RELATING TO THE APPLICATION OF THE VIENNA CONVENTION AND THE PARIS CONVENTION ON CIVIL LIABILITY FOR NUCLEAR DAMAGE

Moreover, on February 12, the Plenary Session of the Spanish Congress of Deputies granted the authorization requested by the Government, as provided for in Article 94.1 of the Constitution, for the State to express its consent to be bound by the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention on Civil Liability for Nuclear Damage, signed in Vienna on September 21, 1988.

The processing of this file was initiated, at the request of Enusa, by the Subdirector General for Nuclear Energy in February of last year.

This ratification aims to facilitate Enusa in securing nuclear fuel supply contracts with Eastern European countries—such as Hungary,

the Czech Republic, or the Slovak Republic—for which it is well positioned. Without this ratification, Enusa would find itself at a competitive disadvantage compared to other companies from surrounding countries, such as France, Germany, or Sweden—also Contracting Parties to the Paris Convention—that have already ratified the Joint Protocol.

Additionally, Spain's ratification of this Protocol would represent a significant strategic contribution to the European objective of reducing energy dependence on Russia.

CLOSING REMARKS

I am finishing now, and I don't want to conclude without referencing the topic that, as the President has already anticipated, will surely hover over this Conference—and which, in recent days, has become something of a “trending topic.”

Of course, I'm referring to the Orderly Shutdown Protocol for the nuclear power plants, in relation to which a debate has emerged in Spanish society about the role of nuclear plants in electricity supply—a debate that is always healthy and allows the public to make more informed decisions.

Indeed, in 2019, a schedule for the orderly shutdown of operations was agreed upon. Six years later, some of the operating companies have indicated that circumstances have changed, while also requesting a reduction in the tax burden affecting their operations. In short, we'll see what happens in the end.

In any case, I have no doubt that this uncertain situation highlights even more the value of the professionalism of the Spanish nuclear sector's workers, to whom I close by reiterating my recognition. Thanks to their work, knowledge, and dedication, nuclear energy has regained the prominent role it has played in recent years in guaranteeing Spaniards access to something as essential as electricity.

Thank you very much. ■



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our ongoing expectation is to further
improve what we are doing well

COFRENTES
NUCLEAR POWER PLANT

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IBERDROLA
Generación Nuclear

www.cncofrentes.es

SPECIAL SESSION



Geopolitical Strategies, Energy and Critical Materials

During the Industrial Revolution of the 19th century and early 20th century, the dynamics of scientific and technological innovation drove the main political, economic, and sociocultural changes, as part of a broad historical process of globalization that had begun with the discoveries and colonizations carried out by the Spanish and Portuguese starting in the 15th century.

In recent decades, we have been witnessing the emergence of a new historical process that we refer to as globalization, which is transforming

the structural foundations of the International Society in which we live.

To understand the nature of the structural change we are currently experiencing, it is necessary to point out that while globalization (mundialización) was a process of change and innovation that was transferred from one country and society to another until it reached the entire world, globalization (globalización) is characterized by the emergence of challenges and/or problems that, from their very origin, have a universal scope and, therefore, affect all of humanity—requiring responses or solutions that are also universal.

This category of global challenges includes the threat posed by the strategic nuclear arsenals of the United States and Russia; the legal guarantees and effective protection of human rights; or environmental sustainability, to name just a few.

The major drivers of the new globalization process are:

A. Scientific advances and new technologies

Starting with the development of new scientific knowledge in biology; quantum and materials physics; chemistry; communication sciences; or behavioral and social psychology, and

culminating in their technological application in computing, robotics, biotechnology, genomics, or new materials such as graphene or.

B. The energy transition

The major changes in industrialization and economic modernization over the past two centuries have required the incorporation of new energy sources. At present, we are already witnessing an energy transition that includes mixed options combining fossil fuels (oil and natural gas) with nuclear energy and renewable energies (hydro-power, solar, wind, or biofuels).

In the long term, the full deployment of fusion nuclear power plants will provide the majority of the energy supply needed to continue advancing in production and consumption processes across societies.

C. Hyperconnectivity through the Internet and social networks

The emergence of the Internet and its global diffusion through social networks—with more than 60% of the world's population using the World Wide Web—constitutes the decisive cause of the mass communicative hyperconnectivity now occurring on a global scale and in real time.

To grasp the dizzying speed at which this phenomenon is occurring, we need only recall that the globalization of mass media, which emerged at the end of the 18th century, took two centuries to complete—thanks to the so-called CNN effect (satellite television) in the early 1990s. Now, the spread of the Internet has managed to reach a global scale in just three decades.

As a result of this communicative hyperconnectivity, a virtual society is emerging, based on narratives circulating online regardless of their social or material reality, which—by interfering with real society—is irreversibly altering its political, economic, and cultural dimensions.

For now, and until states reach a global regulatory agreement, control of this growing hyperconnectivity is in the hands of the major corporations that generate information and communication technologies, as they determine the technical procedures and communicative functionality of the global web.

D. Economic and environmental sustainability

The last driver of the globalization process is linked to the necessary universal responses to two decisive challenges:



RAFAEL CALDUCH CERVERA

Professor Emeritus of
Public International Law and
International Relations, Camilo
José Cela University

The importance of critical materials also varies depending on the different energy strategies followed by the world's major powers





The energy strategies of the world's major powers differ significantly from each other, so there is no uniform geopolitical pattern on a global scale

a) The limitations arising from the size and configuration of the Earth, that is, the demand for environmental sustainability compatible with demographic growth and human development, and b) The limitations on the availability of scarce resources needed to meet growing human needs—in other words, economic sustainability.

Both constraints of the globalizing process compel us to seek common solutions and to implement universal collective actions, without which the depletion of resources and the physical degradation of the planet will lead us toward a scenario of ultimate collapse.

Within this general framework, we must place the analysis of the geopolitics of energy and critical materials in order to establish its short- and

medium-term evolution and thereby anticipate the most likely scenarios of strategic rivalry that lie ahead between major powers.

Critical Raw Materials (CRMs) are raw materials—minerals and metals—required to generate renewable energy, produce non-polluting technologies, and enable the transition to a more sustainable and low-carbon future. These materials are considered critical by the EU based on two criteria: a) their decisive importance for the EU economy, and b) the high risk associated with their supply.

In its 2023 report, the European Commission included a list of 32 critical materials (see table).

Unlike fossil fuels, critical materials are available in limited extractable quantities, have reduced profitability,

but their role in industrial processes makes them essential to ensure the energy transition. Furthermore, they are reusable since they are not consumed (burned) during their use.

From a geopolitical standpoint, the availability of these critical materials is widely distributed across the continents, with major concentrations located in countries such as the Democratic Republic of the Congo; the People's Republic of China; South Africa; Australia; or Indonesia.

However, this dispersion of deposits contrasts sharply with the high concentration of mineral processing: China controls 65% of chemical refining, 80% of cathode manufacturing, 93% of anode manufacturing, and 79% of battery cell production used worldwide.

THE GEOPOLITICAL STRATEGIES OF THE GREAT POWERS	
 United States	Strategic Nuclear Power and Leading Global Economic Power Strategic Priorities: 1) Indo-Pacific; 2) Euro-Atlantic; perhaps an understanding with Russia; 3) Middle East; Instruments of global projection: investment/aid/economic sanctions; technological dominance; military interventionism; cultural influence
 China	Nuclear Power and Global Economic Power Strategic Priorities: 1) Indo-Pacific Region; 2) Global Supply Routes and Trade Expansion; Instruments for Global Outreach: Investment/Economic Aid; Technological and Commercial Penetration in Foreign Markets
 Russia	Potencia Nuclear Estratégica y potencia energética mundial Strategic Priorities: 1) Euro-Atlantic Region; 2) Central Asia; 3) Caucasus and the Middle East; 4) Indo-Pacific Region Instruments of global projection: energy links; military expansionism; media and cyberspace manipulation (agitprop)
 European Union	Strategic Nuclear Power and Global Energy Strategic Priorities: 1) Euro-Atlantic Region; 2) Russia; 3) Mediterranean and Middle East; 4) Indo-Pacific Region Instruments of global projection: economic and financial cooperation; development cooperation and humanitarian aid; multilateral diplomacy

32 CRITICAL MATERIALS 2023 European Commission Report

Aluminio/bauxita
Antimonio
Arsénico
Barita
Berilio
Bismuto
Boro
Cobalto
Carbón de cocina
Feldespató
Fluorespató
Galio
Germanio
Hafnio
Helio
HREE
Litio
LREE
Magnesio
Manganeso
Grafito natural
Neobio
PGM
Fosfato
Fósforo
Escandio
Sílice metálico
Estroncio
Tántalo
Titanio
Tungsteno
Vanadio

In order to break strategic dependency on China, the European Union has established its Critical Raw Materials Plan, under which it must reach mid-term autonomy in processing. To this end, it aims to achieve 40% recycling of the critical materials used in its industrial and energy processes.

In addition to extraction and processing capacities, the importance of critical materials also varies depending on the different energy strategies pursued by the world's major powers. Therefore, for a geopolitical assessment, it is useful to review these strategies:

In the United States, nuclear-generated electricity in 2023 accounted for only 18%, while 64.5% of energy was produced through a combination of natural gas and coal. China had 55 operational nuclear plants and 22 under construction, with a total generation in 2021 of 408 TWh—equivalent to 5% of the country's total consumption. Its decisive energy mix was composed of hydropower and coal, which together accounted for 79% of final energy consumption. In Russia, nuclear power generated in 2020 represented only 20%, with hydropower and natural gas being the main energy sources—accounting for 63% of the total. In the European Union, nuclear-generated power in 2024 reached 24% of final consumption, while a mix of fossil fuels and renewables provided 61% of the total.

Based on this data, we can con-

Once again, with their contribution of 19.6% of the electricity generated in 2024, Spanish nuclear power plants once again played a fundamental role in the Spanish electricity supply

clude that the energy strategies of the world's major powers differ significantly, and therefore there is no uniform geopolitical pattern on a global scale.

It is clear that the infrastructures and facilities supporting each of these energy strategies can only be significantly modified in the medium to long term.

This allows us to reasonably consider that the current dependence on critical materials by each of these powers represents a scenario that will undergo only limited changes in demand in the short term. ■



SESIÓN I



JAVIER SALA

Director of
COFRENTES NPP

In October 1984, the Cofrentes Nuclear Power Plant was connected to the electrical grid for the first time, and this year, 2024, we celebrated the 40th anniversary of that milestone. Four decades later, the plant continues to operate with maximum safety and reliability.

SAFETY

The safety results from the Integrated Plant Supervision System (SISC), developed by the Nuclear Safety Council, show that Cofrentes NPP maintains all its indicators in green, placing the plant in the licensee response column—this being the best Nuclear Safety status.

Throughout the year, we reported six

events to the Nuclear Safety Council, all classified as INES 0, meaning no safety significance. Nevertheless, three of these events resulted in automatic shutdowns of the facility, which led us to implement a robust program to reduce such events in the future.

In 2024, Cofrentes achieved a significant milestone: zero lost-time accidents, both among regular staff and contracted workers. This achievement is the result of continuous efforts to improve occupational safety practices, with over 1,431 observations carried out throughout the year. These observations allow us to identify and correct unsafe behaviors and conditions, thereby maintaining a safe working environment and continuously improving it.

RADIATION PROTECTION

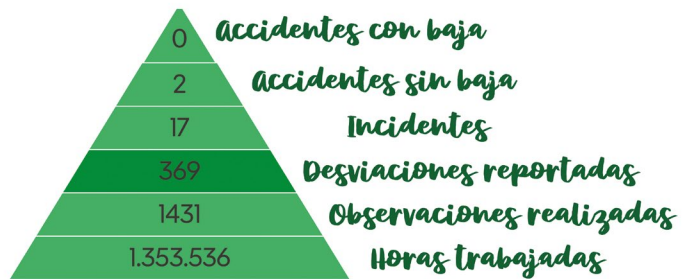
Radiation protection is a top priority at Cofrentes. In 2024, we achieved our best-ever result in collective dose, with 151 millisieverts (mSv), and a maximum individual dose of 3.7 mSv. These results stem from close collaboration with the Radiation Protection Service and the implementation of ALARA (As Low As Reasonably Achievable) practices.

Additionally, our environmental radiation monitoring program ensures that the impact of our operations on the surrounding environment is negligible.



We look to the future with the confidence that we will continue to overcome challenges and achieve new goals, thanks to the excellent professionals who make up our team

Prevención de Riesgos laborales 2024



CERO
ACCIDENTES





FUEL MANAGEMENT AND OPERATIONAL FLEXIBILITY

The year 2024 was intense in terms of fuel management. We loaded six spent fuel containers in preparation for the next refueling in September 2025. We are currently building a temporary storage facility to manage 100% of the spent fuel—a critical project to ensure efficient decommissioning of our facility, regardless of when it may take place.

In 2024, Cofrentes generated 7,916 gigawatt hours, representing 33% of the electricity consumption of the Valencian Community. Operational flexibility is essential in a context of growing renewable energy production. In March of last year, due to high renewable generation and low demand, our plant temporarily disconnected, demonstrating our ability to adapt to the needs of the electricity market.

DANA

One of the most important events of 2024 in the province of Valencia was, without a doubt, the flooding caused by the DANA on October 29, during which the Cofrentes Nuclear Power Plant performed excellently. At that

FIABILIDAD DURANTE LA DANA

Generador eléctrico síncrono de 1100MW, con un rotor de 200 T

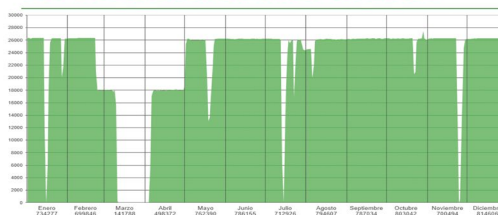
Proporciona **INERCIA y ESTABILIDAD** a la red ante perturbaciones en la red

El día 29/10 hubo numerosos eventos en la red de Alta Tensión

El Generador de C.N. Cofrentes absorbió las fluctuaciones y **ASEGURO EL SUMINISTRO ELÉCTRICO** a la provincia de Valencia



Producción Eléctrica en 2024



7.916 GWh

33% del consumo de la C. Valenciana

Factor de Operación 91,4%

Factor de Disponibilidad 96,6 %



In October 1984, the Cofrentes nuclear power plant was connected to the electricity grid for the first time, and this year, 2024, we celebrate the 40th anniversary of that milestone. Four decades later, the plant continues to operate with maximum safety and reliability



Knowledge transfer in 2024



Training

62,447 hours of training
619 courses - 1,296 sessions
Human Factors Simulator
Technical, practical, and leadership courses

Collaboration

A total of 20 professionals have collaborated in the shutdown of combined cycle plants and in the refueling of other nuclear power plants.

Participation

BWROG sessions and visits
Peer Review
Benchmarking with other plants
Technical missions in WANO
2,000 instances documenting own experiences

time, the facility remained connected to the electrical grid, ensuring a stable electricity supply for the province of Valencia, despite the storm and its numerous effects on the high-voltage transmission network throughout the province. These events were yet another demonstration of the inertia and stability provided by nuclear units to ensure a reliable power supply.

CONTINUOUS TRAINING

Continuous training is key to our operational excellence. On average, each employee dedicated 62 hours to training in 2024, covering technical topics, leadership, and error prevention, among others. We also collaborate with other plants to share experiences and improve our practices.

Cofrentes complies with the five principles of WANO's "Action for Excellence," and our commitment to continuous improvement led us to participate in the "Staying on Top" program, for which we carried out a self-assessment, always seeking to improve our results.

In summary, the Cofrentes Nuclear Power Plant continues to be a benchmark for safety, reliability, and commitment to excellence. We look to the future with confidence that we will continue to overcome challenges and achieve new milestones, thanks to the outstanding professionals who make up our team. ■



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Oviedo: Melquiades Álvarez 26, Planta 1A

SESSION II



JORGE MARTÍNEZ

Director
of ASCÓ NPP

SAFETY

During 2024, the Ascó Nuclear Power Plant reported to the Nuclear Safety Council (CSN), following the protocols established in Safety Instruction IS-10, a total of 7 reportable events for Unit 1 and 8 for Unit 2, all of them classified as level 0 on the INES scale.

Regarding shutdowns, in 2024 there were two unplanned shutdowns of Unit 1 to carry out various inspections and interventions in the plant. In addition, on November 2, the scheduled outage for the 30th refueling was carried out.

As for Unit 2, four unplanned shutdowns occurred due to actions of the plant's safety and protection systems.

In 2024, both units remained in the "Licensee Response" column with all indicators in green on the SISC indicators.

Regarding accident frequency, the total event frequency index (combining ANAV and partner companies) remained below the target for the entire year, except for a slight increase in February.

With respect to radiation protection, the evolution of individual doses shows that good ALARA management of the activities carried out is being consolidated.

PRODUCTION

Ascó I recorded a load factor of 79.92% in 2024, with a total gross pro-

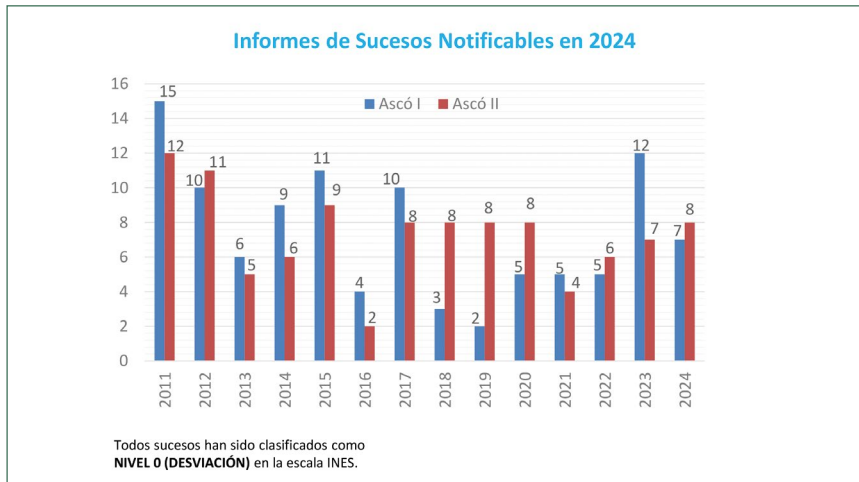


Fig. 1. Security ASCÓ NPP

PEER REVIEW CN Ascó

- ✓ **Identificadas 6 áreas de mejora:**
 - OE: Eficacia de los mandos.
 - OP: Fundamentos de operación (2).
 - MA: Fundamentos de mantenimiento.
 - EN: Fundamentos de ingeniería.
 - EP: Liderazgo en la preparación para emergencias y accidentes graves.
- ✓ **Identificadas 3 fortalezas:**
 - La central desarrolló un equipo de triple verificación de seguridad ("Live-Dead-Live") para trabajos con riesgo eléctrico, basado en el concepto anglosajón TBT ("Test Before Touch").
 - Los Bomberos realizan prácticas elaboradas de rescate técnico en la central, en especial rescate de personas en altura o en fosos mediante el uso de cuerdas con formación y habilitación según el estándar IRATA ("International Rope Access Trade Association").
 - La central utiliza una herramienta de realidad virtual para formación de los miembros de la ORE en la realización de maniobras con equipos FLEX en terreno.

Fig. 2. Operating Experience 2024. Results of the ASCÓ NPP Peer Review



**ÓSCAR
LARROSA**

Board Member

**The plant will
commemorate
the 40th
anniversary of
Unit 2 in 2025**

duction of 7,248.03 GWh, resulting in a CO₂ emissions savings of 2.7 million tons.

For its part, Ascó II recorded a load factor of 85.05% in 2024, with a total gross production of 7,674.22 GWh, leading to a CO₂ emissions savings of 2.9 million tons.

30TH REFUELING ASCÓ I AND OPERATIONAL EXPERIENCE

During the 30th fuel outage, held from November 2 to December 23, 60 fuel elements were replaced in the Ascó I reactor. In total, over 15,000 work orders were executed, and 23 design modifications were carried out aimed at improving the plant's reliability and safety.

Notable tasks included the replacement of the casing seal of BRR pump "A," replacement of the control systems for the polar crane, and major inspection of both low-pressure turbines and bearings 3, 4, 5, and 6, among others.

Regarding Unit 2, it is worth highlighting the replacement of the Rotor/Exciter assembly, carried out in parallel with the Unit 1 refueling between November 11 and December 19. For 38 days, the Ascó team, supported by the Vandellós II team, carried out both projects with great commitment and ownership.

Additionally, in 2024, a WANO team conducted a Peer Review, identifying six areas for improvement in leadership effectiveness, operational fundamentals, maintenance and engineering, and leadership in emergency and severe accident preparedness, which the plant has already begun to address. Three strengths were also highlighted: the development of the Live-Dead-Live team to avoid electrical hazards, training of fire protection professionals, and virtual reality training for ORE members.

OUTLOOK FOR 2025

The main challenges for 2025 at Ascó Nuclear Power Plant include preparation and execution of the 29th refueling outage at Ascó II, the spent fuel transfer campaign to the ATI, which will complete the facility's capacity, and progress in the construction of the new ATI100.

Additionally, the plant will commemorate the 40th anniversary of Unit 2 in 2025.



**ANTONIO
MARTINAVARRO**

Director
of VANDELLÓS II NPP

Additionally, from April 27 to June 12, the scheduled outage was carried out to execute the tasks related to the 26th refueling, which included, apart from replacing 60 fuel elements, eddy current inspection of Steam Generator 'B,' sludge lancing of the secondary side of the three Steam Generators, vessel and vessel head inspections, and replacement of the three pressurizer safety valves, among others.

Among the major tasks of 2024, the implementation of filtered ventilation systems in the radiological buildings also stands out.

There were also two power reductions: one automatic turbine load reduction to 70%, and one drop to

20% to repair a leak in a flange of the high-pressure turbine exhaust pipe.

OUTLOOK FOR 2025

The main challenges for 2025 at Vandellós II Nuclear Power Plant include preparation and execution of the 27th refueling outage, scheduled to begin on June 12; progress on the project for the new ATI100 spent fuel storage facility; and the scheduled follow-up visit from WANO in September under the new ePM evaluation methodology.

The plant is also continuing to work on improving its operational reliability with specific plans aimed at detecting and resolving issues related to equipment obsolescence and strict adherence to the plant's maintenance plan, with its sights set on long-term operation. ■

SAFETY

During 2024, the Vandellós II Nuclear Power Plant reported a total of 8 reportable events to the Nuclear Safety Council (CSN), following the protocols established in Safety Instruction IS-10.

With regard to the SISC indicators, the plant remained in the "Licensee Response" column with all indicators in green.

In terms of accident rate, the general frequency index for all events (combining ANAV and partner companies) met the target set for 2024.

PRODUCTION

In 2024, Vandellós II Nuclear Power Plant recorded a load factor of 84.22%. In total, the plant generated 8,304.45 GWh gross during the year, resulting in a CO₂ emissions savings of 3.2 million tons.

OPERATIONAL EXPERIENCE

In 2024, an automatic reactor shut-down occurred due to insertion of the control rods following a failure in one of the motor-generators.

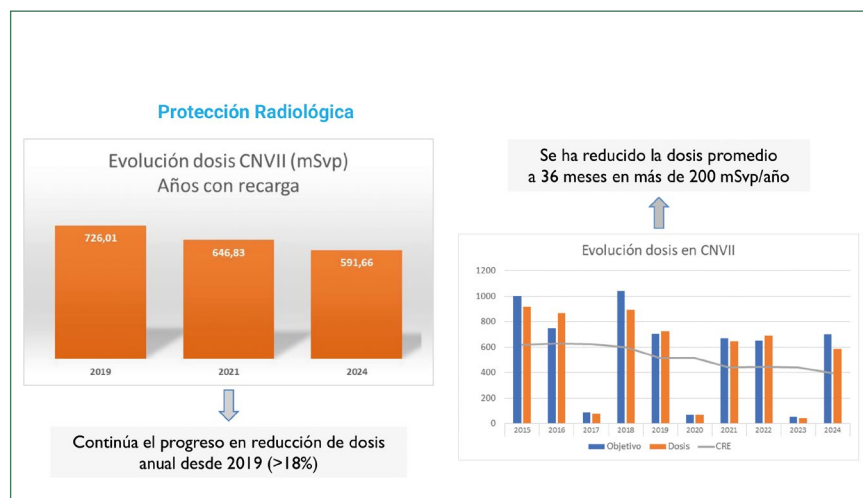


Fig. 3. Security VANDELLÓS II NPP



Fig. 4. Outlook 2025. VANDELLÓS II NPP

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

SESSION III



RAFAEL CAMPOS

Director
of ALMARAZ NPP

In 2024, the gross electricity production generated by the two units of Almaraz Nuclear Power Plant totaled 15,655 GWh (CNA1: 7,589 GWh; CNA2: 8,066 GWh), and net production reached 15,035 GWh (CNA1: 7,285 GWh; CNA2: 7,750 GWh).

Almaraz NPP generates 7% of the electricity consumed in Spain, equivalent to the consumption of 4 million households.

Unit I operated stably throughout 2024, except in late February, when the plant's power was maintained at 61% following a load dispatch request. Later, from March 8 to March 24, it was shut down as it was not matched in the electricity market. For the rest of the year, the plant operated at 100%

capacity except during the refueling period, from October 7 to November 8.

Unit II operated stably throughout 2024. On March 30, it was disconnected from the national grid until the start of its 28th refueling on April 3. It was reconnected to the grid on May 6 and operated at full power for the remainder of the semester.

OTHER NOTABLE DATA

As of December 31, a total of 168 consecutive days had passed without occupational accidents with medical leave. A record of 6,943,128 consecutive hours worked without accidents with medical leave was also achieved.

In 2024, five containers were trans-

LO MÁS REPRESENTATIVO DE NUESTRO 2024
Sí a Almaraz, sí al futuro

Almaraz, más allá de 2027
Continuidad para Ascó, Cofrentes, Vandellós II y Trillo

#nuclearessí



CERO ACCIDENTES



LOURDES GUZMÁN

Board Member



More than 13,000 maintenance and improvement activities were carried out at the Plant, and 27 design modifications were implemented, including those linked to requirements and commitments with the Nuclear Safety Council (CSN)

ferred to the ATI (Individual Temporary Storage), resulting in 12 containers stored as of December 31, holding a total of 544 fuel elements. The ATI is at 85% capacity. There are 1,804 fuel elements in the spent fuel pools of both Unit 1 and Unit 2.

CNA2 – 28TH REFUELING CNA1 – 30TH REFUELING

The 28th fuel outage of Unit 2 began on April 3, with reconnection to the grid on May 6, marking the start of operation cycle 29.

This was the sixth consecutive refueling without workplace accidents and met both dose and schedule objectives. Over 13,000 maintenance and plant improvement tasks were completed, including 27 design modifications—some related to CSN (Nuclear Safety Council) requirements and commitments.

Unit 1 was reconnected to the grid on November 8, marking the start of operation cycle 31.

The outage lasted 32.5 days (25 hours

ahead of the initial schedule) and was the 7th consecutive outage with zero workplace accidents, improving both collective dose and outage duration targets.

Along with the replacement of 56 reactor core fuel elements, nearly 13,000 work orders were executed, including maintenance, plant improvements, and 17 design modifications—some linked to CSN requirements.

More than 1,200 additional workers

During 2024, the gross electricity production generated by the Trillo Nuclear Power Plant was 7,676 GWh and the net production was 7,128 GWh

from around 70 specialized partner companies, mostly from the surrounding area, were brought in to perform the scheduled tasks.

RELATIONS WITH THE CSN

SISC (Integrated Plant Supervision System) data show that all indicators at Almaraz are green, with one white finding in mitigation systems.

Six events (INES 0) were reported to the CSN in 2024.

INTERNATIONAL MISSIONS

There were no WANO Peer Reviews or Follow-ups at Almaraz NPP in 2024.

CHALLENGES FOR 2025

- Occupational safety: zero accidents
- Refueling reliability plan (CNA2 Refueling 29)
- Improvement of work practices and supervision
- Move to Zero Scrams program
- Post-WANO Peer Review actions
- Transition to decommissioning
- Readiness for flexible operation

All of this is to be achieved thanks to the work and commitment of the excellent team of professionals at Almaraz NPP and CNAT.



ALBERTO PORRAS

Director
of TRILLO NPP

In 2024, Trillo NPP generated 7,676 GWh gross and 7,128 GWh net.

The plant avoided the emission of 3 million tons of CO₂, accounting for 3.9% of Spain's emissions-free electricity production in 2024, according to official data from Red Eléctrica Española (REE).

From May 23, 1988, to December 31, 2024, the plant's cumulative gross production totaled 296,148.52 GWh.

Trillo operated stably throughout 2024, except during the refueling period (May 11 – June 11) and upon load dispatch requests.

OTHER NOTABLE DATA

Trillo ended 2024 with 643 consecutive days without occupational accidents involving medical leave, making the plant an international benchmark for occupational risk prevention in the nuclear sector.

In November 2024, the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) granted Trillo a license extension to continue operating satisfactorily beyond its current authorization date in November 2034.

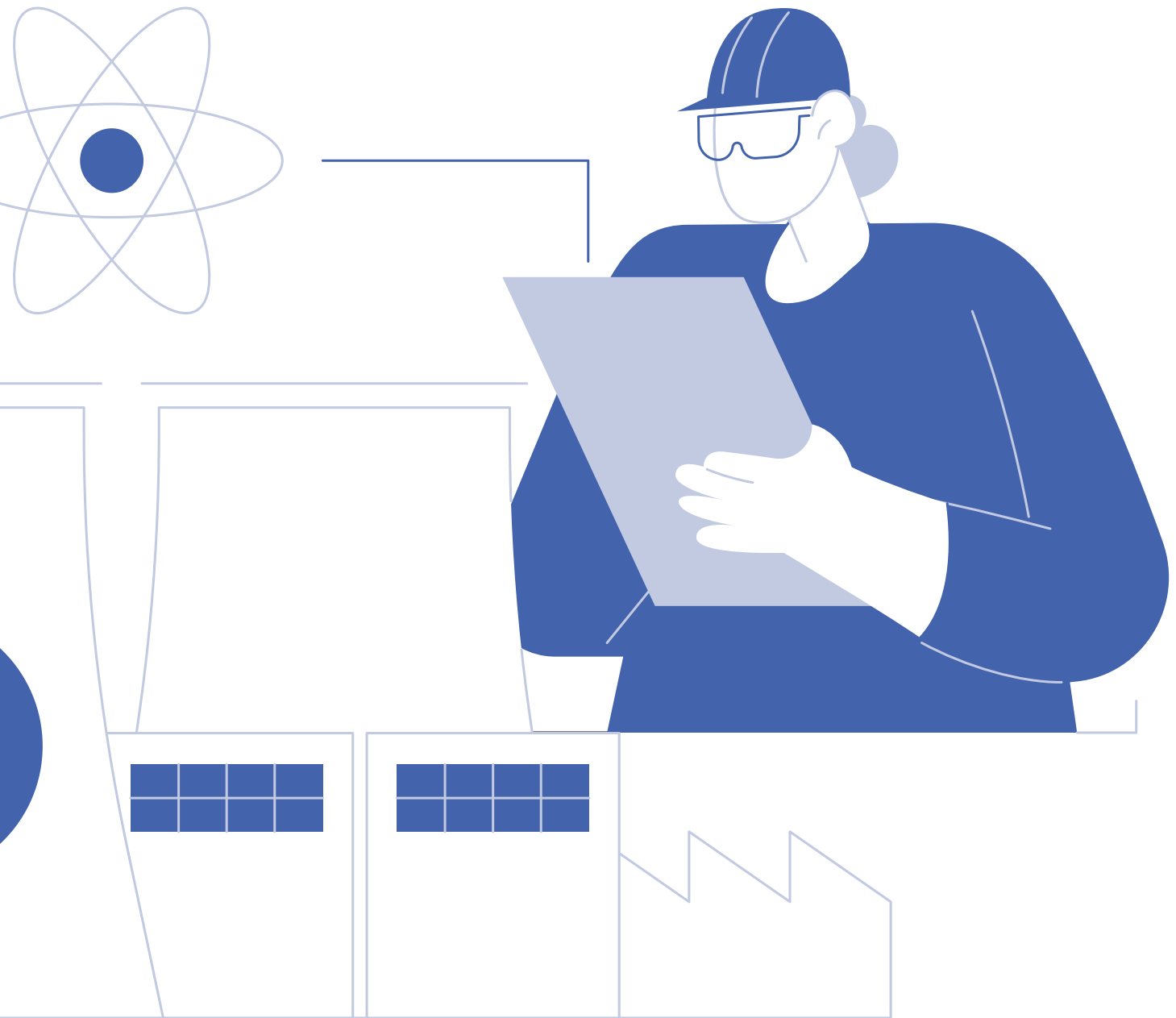


As no new containers were loaded into the ATI in 2024, a total of 413 tons of uranium are stored as of December 31 across 40 containers (32 DPT and 8 ENUN32P), containing 928 fuel elements.

36TH REFUELING OUTAGE

Trillo's 36th Fuel and General Maintenance Outage began on May 11 and ended on June 11, 2024.

More than 40 specialized companies participated, adding over 1,000 workers to complete scheduled tasks. The outage met and exceeded



objectives in terms of duration—finishing 4 days ahead of schedule—nuclear safety, radiation protection, and work quality.

Notably, this marked the third consecutive refueling without any workplace accidents.

- Replacement of 28 fuel elements
- Inspection of fuel elements and control rods
- Inspection of the high-pressure turbine casing
- Overhaul of one main reactor coolant pump and seal inspection of another



Hitos significativos

Renovación Autorización de Explotación





- Major inspection of redundancy system 2/6
- Execution of 22 design modifications related to design and reliability improvements

RELATIONS WITH THE CSN

SISC data show that all indicators at Trillo are green, with no findings above green level.

Two events (INES 0) were reported to the CSN in 2024.

INTERNATIONAL MISSIONS

No WANO Peer Reviews or Follow-ups took place at Trillo NPP in 2024.

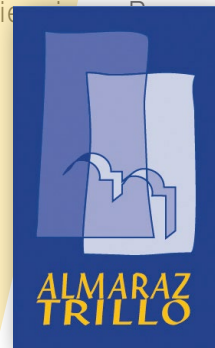
CHALLENGES FOR 2025

- Occupational safety: "zero" accidents
- Refueling reliability plan (Refueling 37)
- Improvement in work practices and supervision
- Diesel generator renewal (GY42 and GY80)
- Container loading
- Preparation for long-term operation
- WANO PI > 97.5%: early detection of adverse trends
- Modernization of reactor control system (YR)
- Digital transformation plan

All of this is to be achieved thanks to the work and commitment of the excellent team of professionals at Trillo NPP and CNAT.■

Objetivos cumplidos





**Una alternativa
limpia, segura
y competitiva ...**

**En continuo
proceso
de mejora,
actualización
y modernización**



CLOSING



EMILIO MÍNGUEZ

President of the
Spanish Nuclear Society

In addition to the review of the nuclear power plants, 2024 also marked the 50th anniversary of the Spanish Nuclear Society. For this reason, we would like you to become familiar with the book that was published in print and is now also available in digital format. Where can it be found? On the SNE website, under the “Publications” section, you will find a downloadable PDF version. In this digital version, you can also watch a comprehensive video summarizing all the celebrations carried out in honor of the anniversary—that is, all the activities carried out throughout 2024 and also some from this current year. One of the main activities was a special day at the National Music Auditorium in Madrid, featuring a performance by a major, interesting, and very entertaining group. Later, in November, we held a more

open event for all members. Everything is captured in this commemorative video.

That’s all for now. On behalf of the Board of Directors, we want to express our thanks to the 50th anniversary working group, to Juan Bros, and to all the committees that were fully committed to every event and initiative related to this celebration. This legacy remains for all of us—and for those who will come in the next 50 years—because surely, we will still be here. Nothing more.

I will now introduce the people who are with me. First, Juan Carlos Lentiño, President of the Nuclear Safety Council (CSN). Most of you, if not all, know him. And also the soon-to-be President of the Spanish Nuclear Society and current Vice President, Paulo

Domínguez, who will present a brief summary of the session.

I only want to add one thing: when I see someone who is 40 years old, I think they look great. Nuclear power plants are 40 years old—and they look great. We've just seen it, and we must continue enjoying them. I believe the spirit we've seen from the directors of Spanish nuclear plants is being passed on to their teams—precisely to maintain that mindset that we must keep operating.



PAULO DOMINGUES

Vicepresident of the Spanish Nuclear Society

First of all, I want to thank you all for being here today. The Operational Experience Conference is one of the most established meeting points of the Spanish Nuclear Society, along with our Annual Meeting. It is also the time of year when our seven reactors take center stage—or as I often tell those who contact me more frequently, our seven treasures. These treasures, although they represent only 5.7% of the net installed power on the Spanish mainland electrical system, produced 20.6% of the net electricity generated in that system last year.

The excellent presentations delivered

by Javier Sala, Jorge Martínez, Antonio Martín Navarro, Rafael Campos, and Alberto Porras leave no doubt about several points already mentioned in our President's opening remarks—but I would like to emphasize some of them:

Nuclear power plants are a fundamental asset when we talk about supply security and reliability. All our plants undergo continuous and exhaustive evaluation, maintenance, and design improvement programs, which make them even better and safer today than they were in the past.

The professionals who work in these plants day after day—and forgive me for including myself in this group—whether they belong to the operating companies or to auxiliary companies in the sector, are one of our greatest assets. But it's not just those of us working in the plants—there are universities training future professionals, regulatory bodies, and many others beyond the plants themselves: fuel, waste management, and so on. And their value is widely recognized at the international level.



Spanish Nuclear Society 1974-2024 Fifty years of life and a look to the future

Additionally, we contribute wealth to all the regions where we operate—this is undeniable.

I also want to highlight another important aspect—one that gives this event its name: let us value the exercise of sharing operational experiences, which allows us to continuously grow together.

Year after year, we talk about extremely high availability factors, and this is only achieved through the spirit and determination for continuous improvement that is so characteristic of our sector and its professionals.

We've talked about ourselves and our plants, but it's always a privilege to have speakers like Rafael Caldach, and the perspective he brought in his address focused on geopolitics—a subject of utmost importance in these challenging times. And, if you'll allow me to say so, I appreciated how he ventured into the politically incorrect. It's wonderful to hear genuine, authentic opinions that are not influenced other interests.

Thank you to everyone who made this event possible—from the organizers, technical support, session chairs, and many others.

Thank you once again for making everything run so smoothly and for paying attention to every detail.

Thank you also to all the attendees—it's a joy to see a room full of young people joining those of us who are a little less young.

And of course, my thanks also go to the institutional support from the School and the presence of two people I greatly appreciate: José Manuel Redondo and Juan Carlos Lentijo, to whom I have the honor of giving the floor to formally close this session with his remarks.

**Thanks to all of
you who made this
meeting possible**



**JUAN CARLOS
LENTIJO**

President of the Nuclear
Safety Council

On behalf of the Nuclear Safety Council, I want to thank you for the invitation to this closing session of the thirty-sixth Conference on Operational Experiences and Perspectives of Nuclear Power Plants in 2024, organized by the Spanish Nuclear Society. It is a pleasure for me to join you in the auditorium of what was once my own school, the Technical School of Industrial Engineering.

Today's session not only provides an opportunity for plant directors to present the most relevant aspects of their operations over the past year—it is also an excellent venue for exchanging information and reviewing all the activity that has taken place regarding nuclear power plants. Without a doubt, it is a key event on the sector's calendar.

For these reasons, I would like my brief remarks—before the awards and recognitions ceremony—to complement this overview with the role played over the past year by the regulatory body I have the honor to lead.

In addition to routine tasks—inspections, compliance reports, design modifications, operating specifications, emergency drills, etc.—which are part of the CSN's daily activity, and without

intending to list everything, I would like to highlight a few milestones.

The renewal of the operating license for the Trillo Nuclear Power Plant. The favorable report for the execution and assembly authorizations of the ATI facilities at Vandellós II and Ascó (and so far this year, also those of Cofrentes and Almaraz); the work related to the peer review on Fire Protection in Nuclear Facilities, established under Directive 2014/87/Euratom; the 40th anniversary of the Resident Inspection system. The favorable report for the Regulation on Nuclear and Radioactive Installations (RINR).

We also approved: Instruction IS-46, on physical security during the transport of nuclear materials and radioactive sources. A Supplementary



|| The conference we are concluding today is not only an opportunity for the directors of the various plants to present the most relevant aspects of their operations during the past year; it is also an excellent meeting place to exchange information and review the activity that has taken place during the last year regarding nuclear power plants ||

Technical Instruction (ITC) on the requirements applicable to flexible operation strategies of Spain's operating

nuclear power plants (Almaraz, Ascó, Cofrentes, Vandellós II, and Trillo), to strengthen the regulatory framework



associated with operating strategies that involve producing electricity below 100% of nominal power during specific time periods.

Although not directly related to nuclear power plants, I also don't want to forget the INVEAT Plan, through which we have licensed 263 pieces of equipment over the past 30 months, concluding this significant investment for the National Health System in 2024.

Last year, we also published the effective dose coefficients for internal exposure to ionizing radiation; we launched the Digital Radiological ID Card, which has generated unprecedented international interest—it's the first time this has happened, and we are very pleased about it. We signed a collaboration agreement with the Ministry of Labor and Social Economy, through the State Labor and Social Security Inspectorate, with the aim of strengthening the protection of workers against risks arising from exposure to radon gas in the workplace. We also issued a favorable report for the request to construct and assemble the southeast platform for final storage of low- and intermediate-level radioactive waste at El Cabril.

From an institutional standpoint, it has also been a very rewarding year: from an audience with King Felipe VI at the Palace of La Zarzuela; to meetings with Ministers Margarita Robles (Defense), Mónica García (Health), Yolanda Díaz (Labor), and Ana Rondo (Equality); to the visit to our headquarters by a delegation of the Parliamentary Committee responsible for relations with the CSN in the Congress of Deputies—something that had not happened since 2014.

Internationally, several highlights include: the visit of the NEA Director General, William Magwood; a delegation from the USNRC, led by its Chair, Christopher T. Hanson; the hosting of an international seminar and meeting of HERCA's Steering Committee; the verification mission for compliance with Articles 35 and 36 of the Euratom

om Treaty; and Spain's assumption of the presidency of ENSREG, the European Nuclear Safety Regulators Group.

We also strengthened our relations with civil society, signing four new agreements and 19 extensions, and participating in Local Information Committees in areas with nuclear facilities.

Looking ahead to the new year we are now in, some of the main activities we will carry out include:

- The follow-up mission of the Integrated Regulatory Review System (IRRS), carried out by the IAEA, which originally visited Spain in 2018 and returned in the last week of January with great success, highlighting two best practices.
- In October, the ARTEMIS mission will take place, reviewing Spain's regulatory framework for Radioactive Waste and Spent Fuel Management, Decommissioning, and Site Remediation
- The update of our Strategic Plan for the 2026–2030 period
- The review of the CSN's Emergency Response Plan (PAE)
- The issuance of the report regarding the request for approval of the HI-STORM-FW cask design
- The evaluation of applications for new proton therapy facilities in public hospitals

Among the CSN's core functions is the proposal and drafting of rules and regulations. Thus, for this year, our Regulatory Plan includes the drafting of nine instructions—four of them new, and five revisions of currently in-force instructions. Of the total, four focus primarily on nuclear safety, and five relate to aspects of radiation protection.

To conclude, I would like to address a topic of great relevance to us: talent acquisition. As a regulatory body, it is essential for us to have a highly skilled team, equipped with the tools needed to develop and strengthen their technical knowledge and experience. This not only guarantees the



Our goal is to ensure a smooth transition between those who have dedicated their lives to this work and the new generations...

safety of workers, but also that of the environment and society as a whole.

Taking advantage of being in a university setting, surrounded by those reflecting on their professional future, I invite you to consider a career in the Senior Corps of Nuclear Safety and Radiation Protection of the Nuclear Safety Council.

Every year, we offer public employment opportunities (12 positions in each of the last three calls), a trend that will continue in the coming years

due to generational turnover in our workforce.

Our goal is to ensure a smooth transition between those who have dedicated their careers to this work and the new generations, thereby facilitating the transfer of knowledge without affecting our mission as a regulatory authority.

If you're looking for a professional future with impact, stability, and a clear vocation for public service, this could be your opportunity.

The Spanish Nuclear Society is a fundamental actor in our country for promoting knowledge of nuclear science and technology. And this conference is a wonderful example of that.

So, I will simply close by thanking you for organizing it, congratulating you on this new edition, and proceeding to its official closure. Thank you very much. ■



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SNE AWARDS 2024

■ NUCLEAR ESPAÑA AWARD FOR BEST TECHNICAL ARTICLE IN NUCLEAR ESPAÑA MAGAZINE

GLOBAL CHALLENGES ARISING FROM ZAPORIZHZHIA NPP IN A WAR CONTEXT. **Alejandro Zurita**

■ NUCLEAR ESPAÑA AWARD FOR BEST POPULAR SCIENCE ARTICLE IN NUCLEAR ESPAÑA MAGAZINE

THE UNEXPECTED EVOLUTIONARY EFFECT AFTER THE CHERNOBYL ACCIDENT. RADIATION ADAPTATION IN TREE FROGS. **Pino Díez Álvarez-Buylla**

■ BEST PRESENTATIONS – 50TH ANNUAL MEETING

QUALITY AND HUMAN FACTORS: ERROR PREVENTION TECHNIQUES PLAN – REFUELING 24 AT COFRENTES NPP. **Joaquín Hernández Ortega and Andrés Hernández Lorente**

FUEL: EVALUATION OF CR-COATED ZIRCALOY CLADDING UNDER ACCIDENT CONDITIONS WITH FRAPTRAN-TUMECH. **Pau Aragón, Francisco Fera, and Luis E. Herranz**

DECOMMISSIONING AND WASTE MANAGEMENT:

1. ANALYSIS OF THE OPERATIONAL HISTORY OF VANDELLÓS I FOR COMPLETE DECOMMISSIONING OF THE FACILITY. **Gonzalo Medinilla Téllez, Pablo Carrasco, and María Elisa Gimeno**
2. TRANSITION PLAN TO DECOMMISSIONING AT ALMARAZ NPP **Víctor Rojas Moreno**

COMMUNICATION AND TRAINING: LOOKING BEYOND THE GOGGLES: CHALLENGES AND REFLECTIONS ON VIRTUAL REALITY AS A TRAINING TOOL IN THE NUCLEAR INDUSTRY. **Emma Merino Cue**

ENGINEERING, DESIGN AND INNOVATION:

1. REVERSE ENGINEERING FOR VOLTAGE CONDITIONERS AT TEMELÍN NUCLEAR POWER PLANT. **Luis Rejas López and Daniel Adrados Espada**
2. DESIGN OF HIGH-TEMPERATURE NUCLEAR COMPONENTS: CREEP EFFECTS IN MATERIALS AND APPLICATION OF ASME BOILER AND PRESSURE VESSEL CODE SECTION III DIV. 5. **Fernando Oleo Blanco**

NUCLEAR MEDICINE AND RADIATION PROTECTION: MONTE CARLO SIMULATION STUDY OF THE NEUTRON SPECTRUM IN A PROTON THERAPY TREATMENT ROOM. **Adrián Díaz Comeche, S. Oliver, B. Juste, R. Miró, and G. Verdú**

OPERATION AND MAINTENANCE: APPLICATIONS OF ARTIFICIAL INTELLIGENCE AT COFRENTES NUCLEAR POWER PLANT. **Elías Gosálbez Guijarro**

ADVANCED REACTORS AND NUCLEAR FUSION: SIC-1 HYDROGEN MONITORING SYSTEM IN THE ITER PROJECT **Beatriz Martínez Manzanares**

NUCLEAR SAFETY AND LICENSING:

1. WHERE WERE YOU BACK THEN? MAJOR LICENSING MILESTONES IN 40 YEARS OF COFRENTES. **Miguel Sánchez López and Miguel Ángel del Barrio**
2. ANALYSIS OF THE PASSIVE SAFETY SYSTEMS IMPACT IN VVER-1000 REACTORS. **Elena Redondo Valero, César Queral, Kevin Fernández Cosials, and Víctor Hugo Sánchez Espinoza**

THERMAL-HYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION:

1. FLEXIBLE OPERATION IN PWR-KWU REACTORS: XENON TRANSIENT SIMULATION WITH RELAPS/PARCS

Bárbara Navarro Mas, T. Barrachina, R. Miró, G. Verdú, M. García-Fennell, and J. M. Posada

2. VALIDATION OF THE PARUPM-GOTHIC 8.3(QA) CODE COUPLING AGAINST PAR RECOMBINATION EXPERIMENTS HR-2 AND HR-12 PERFORMED IN THE THAI FACILITY

Araceli Domínguez Bugarín, Ernst-Arndt Reinecke, Gonzalo Jiménez, Miguel-Ángel Jiménez, and Sanjeev Gupta

POSTER SESSION: EFFECT OF THE PRESENCE OF SUPERPLASTICIZERS ON THE ADSORPTION OF RADIONUCLIDES IN CEMENTS AND HYDRATED PHASES. **Tiziana Missana, O. Almendros-Ginestá, M. Mingarro, and M. García-Gutiérrez**

YOUNG SESSION: OVERCOMING PLUTONIUM DEPENDENCY: PRELIMINARY RESULTS ON THE MANAGEMENT OF PU IN HALEU-FED FAST REACTORS. **Sonia Panizo Prieto and F. Álvarez-Velarde**

■ BEST DOCTORAL THESIS

ALKALI-ACTIVATED CEMENTS FOR SAFE AND SUSTAINABLE IMMOBILIZATION OF NUCLEAR-GRADE SPENT ION EXCHANGE RESINS **María Jimena de Hita**

■ BEST DOCTORAL THESIS IN NUCLEAR SCIENCE AND TECHNOLOGY 2023 – TECHNICAL COMMITTEE

MODELING AND EXPERIMENTAL DESIGN TO CHARACTERIZE PERMEATION AND GETTERING OF HYDROGEN ISOTOPES IN FUSION MATERIALS **Sebastian Johannes Hendricks**

■ BEST MASTER'S THESIS

INTERUNIVERSITY MASTER'S DEGREE IN NUCLEAR PHYSICS **José Ángel Capitán García**

FINALIST – MASTER'S DEGREE IN INDUSTRIAL ENGINEERING: PARAMETRIC MODEL FOR THE ANALYSIS OF POST-WELD INDUCTION HEAT TREATMENTS. **Diego Cayón Terán**

FINALIST – MASTER'S THESIS IN NUCLEAR PHYSICS. MASTER IN NUCLEAR SCIENCE AND TECHNOLOGY: **Alfred Neutronics Benchmark David Álvarez Romero**

■ BEST ACADEMIC RECORDS

Antonio Roig Andreu, Juan Antonio Monleón de la Lluvia Mazagatos, Marta Sayago Rodríguez, Damiano Stramaccioni

■ 2024 TALENT ATTRACTION CONTEST

• ELECTRICAL ENGINEERING AND ENERGY ENGINEERING AWARD **Alex Bartlett Margarit, Adrià Soles Sabat, Víctor Gómez Royo**

• FIRST PRIZE – ARGONA

Adrián González Briones, Germán López Adamuz, Verónica Fernanda Zaldivar Sánchez, and Pablo Osés Ezquerro

• SECOND PRIZE – NAF

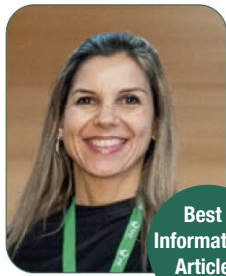
Jaime Andrés Santé, Jaime Valverde Hernández, Alejandro Taboada Asensio, and Nikita Khvatkin Petrovsky

• THIRD PRIZE – QUANTUM QUIJOTES

Bárbara Culebras Villalva, Iñigo Gayo de León, Alberto González Vega, and Emilio Mora Rodríguez



Best
Technical
Article



Best
Informative
Article



Best
Presentation.
Quality



Best
Presentation.
Fuel



Best
Presentation.
Dismantling



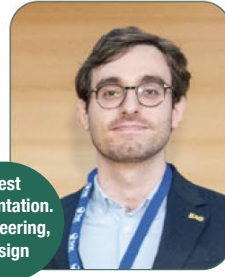
Best
Presentation.
Dismantling



Best
Presentation.
Communication
and Training



Best
Presentation.
Engineering,
Design



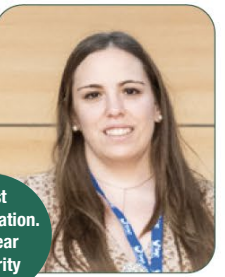
Best
Presentation.
Operation



Best
Presentation.
Communication
and Training



Best
Presentation.
Nuclear
Security



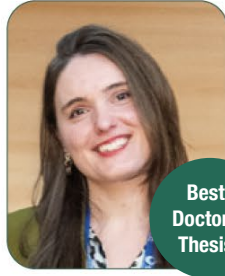
Best
Presentation.
Thermo-
hydraulics



Session
Poster



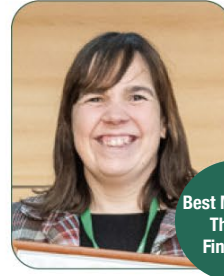
Session
Young



Best
Doctoral
Thesis



Best
Master's
Thesis



Best Master's
Thesis
Finalists



Attraction
Talent.
ARGONA



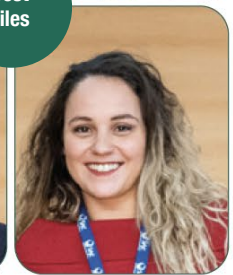
Attraction
Talent.
NAF



Best
Files



Attraction
Talent.
QUANTUM



CONTEST

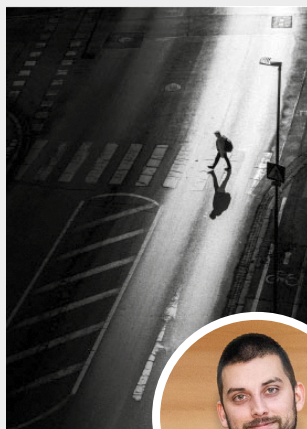
BEST PHOTOGRAPHS

framato

GENERAL CATEGORY



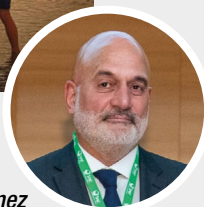
First Prize:
SITTING ON A NYBODER BENCH
Manuel Muñoz García



Second Prize:
WALKING
Jaime Andrés Sante



Third Prize:
SUNSET AT MONT SAINT MICHEL
Carlos Martínez Martínez
Paulo Domingues Santos
collects on behalf of the winner



ENERGY CATEGORY



First Prize:
WHITE AND RED
Iván Sánchez Hernández



Second Prize:
SPRING PERFUME
Josep Miquel Biarnés Sanz
Montse Godall
collects on behalf of the winner



Third Prize:
REFUELING
Montserrat Fernández de la Casa



POPULAR JURY



First Prize:
SAND BATH
Mario Gómez Villa
Iván Sánchez Hernández
collects on behalf of the winner



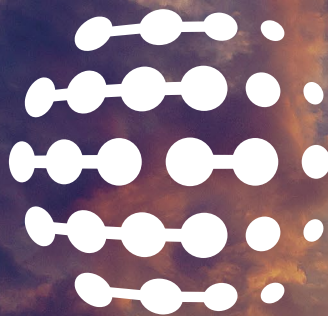
Second Prize:
INTERCEPTIONS
Francisco Javier Hernáez Delgado



Third Prize:
NOSTALGIA FOR YESTERDAY
Eva María Celma González-Nicolás



**SAVE
THE
DATE**



Cáceres 2025
22-26 de septiembre

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