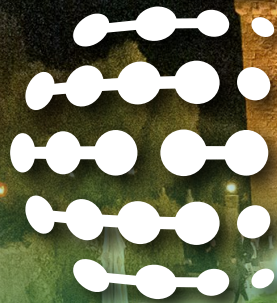




THE MAGAZINE OF NUCLEAR SECTOR PROFESSIONALS



NUCLEAR DIRECTORY



Cáceres 2025
September 24-26

51

**ANNUAL MEETING
SPANISH NUCLEAR SOCIETY**



INTERVIEW:

Rosalía TENA and Luis Felipe DURÁN, Chairpersons of the Organizing Committee and Technical Committee of the 51st Annual Meeting of the SNE

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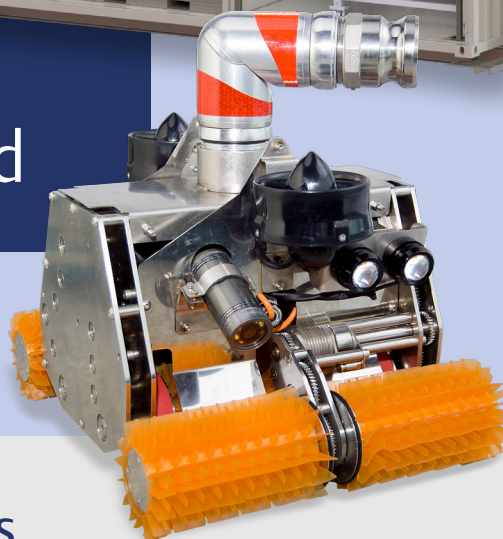
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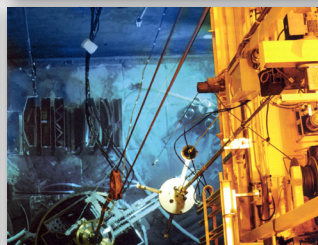
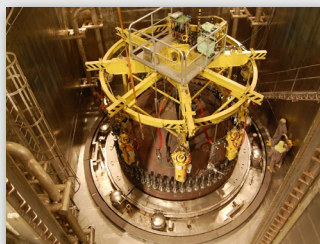
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EDITORIAL

A FUTURE OF LIGHT AND SHADOWS

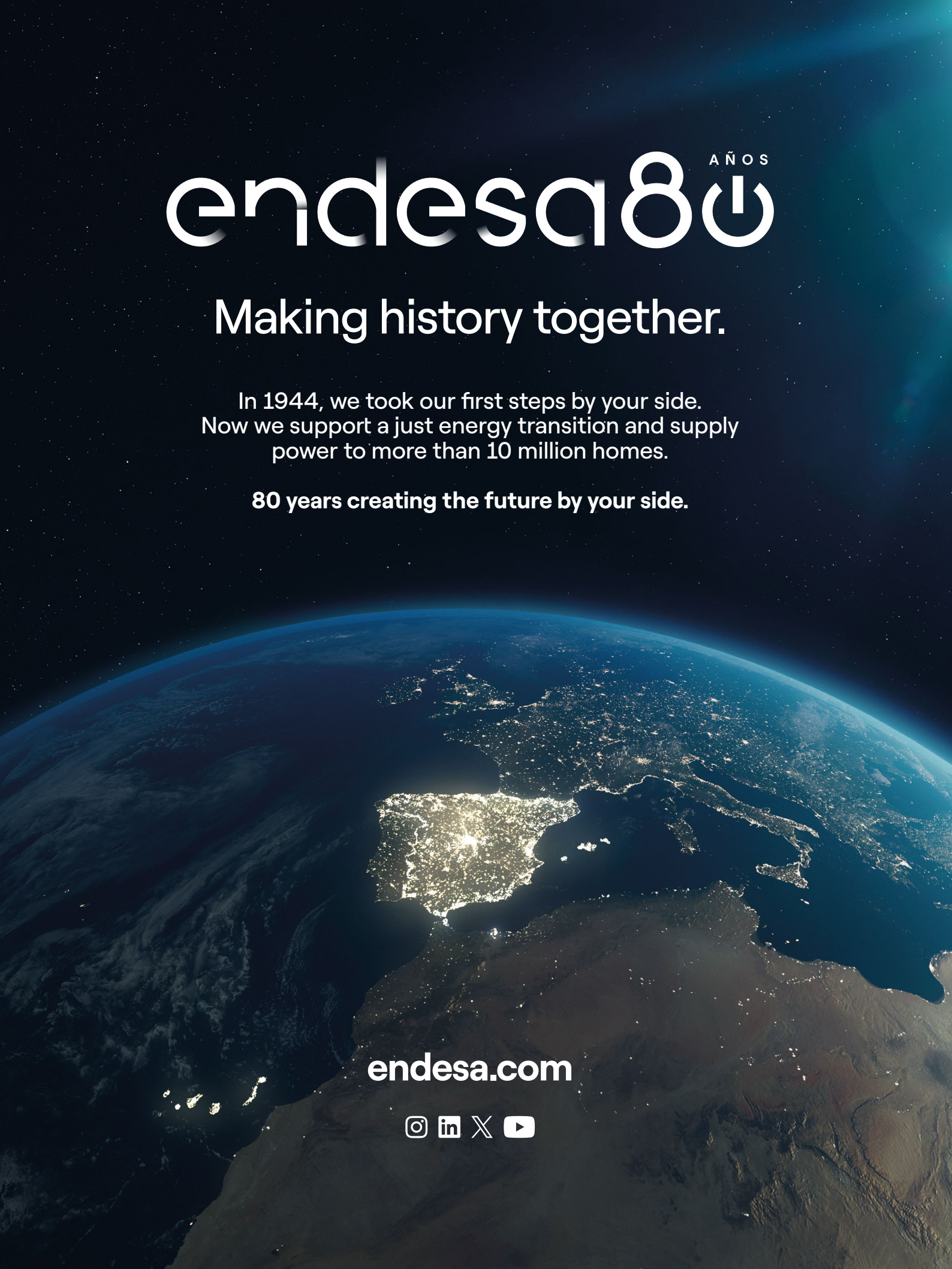
Cáceres, a city steeped in history and history, was this year not only a majestic setting but also a symbol laden with meaning for the 51st Annual Meeting of the Spanish Nuclear Society. Professionals, companies, and institutions linked in some way to the nuclear sector and to Extremadura gathered there, precisely at a time when the name of Almaraz has entered the public and social debate due to the necessary decisions regarding its closure in 2027. If nothing changes, Almaraz I will be shut down in 2027, followed consecutively by Almaraz II, Ascó I, Cofrentes, Ascó II, Vandellós II, and Trillo, until 2035. These seven facilities are currently operating safely, reliably, and sustainably, producing electricity every day of the year, day and night, to power our industry, homes, and services.

The Annual Meeting, once again, provided clear evidence of the strength of the nuclear sector in Spain. The financial stability of the companies and professionals involved, the projects underway worldwide, and the strategic value of a fundamental component of our electrical system—its worth is undoubtedly one of the bright spots that must be highlighted, contrasting sharply with the shadows of a bleak future. Politically, this situation must change to avoid a sad and regrettable end.

The clear and decisive commitment to continuity was, once again, the strategic message of the professionals gathered in Cáceres. In the words of their president, “Almaraz, Ascó, Cofrentes, Vandellós II, and Trillo are humanly and technically prepared to continue supplying electricity,” and these facilities are “a strategic pillar for discussing security of supply and emissions reduction.”

On the other hand, if anything has characterized 2025, it has been the extensive discussion surrounding nuclear energy and our nuclear power plants. Nuclear energy has been legitimized as part of the social conversation about a secure, sustainable, and diversified energy future. The clarity provided by communication allows more and more people to access real and verifiable information, separating them from the myths and half-truths that have always been part of the outdated anti-nuclear rhetoric.

Hopefully, this informed society will become increasingly dominant so that it can speak out and take a stand. Our job, as professionals, is to continue feeding this current of data, arguments, and experiences to make that tide ever larger and for the light to definitively overcome the old shadows.

The background of the advertisement is a high-angle, night-time photograph of the Earth from space. The horizon of the planet is visible, with the dark blue of the atmosphere transitioning into the black of space. The landmasses of Europe and Africa are visible, with the Iberian Peninsula and parts of North Africa and Europe illuminated by city lights, appearing as a bright, glowing yellow and white area. The text is overlaid on this image.

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ROSALÍA TENA AND LUIS FELIPE DURÁN

PRESIDENTS OF THE ORGANIZING COMMITTEE AND OF THE TECHNICAL COMMITTEE OF THE 51ST ANNUAL MEETING OF THE SNE

In a pivotal year for the Spanish nuclear sector, Cáceres once again became the center of the energy debate, hosting the Spanish Nuclear Society's (SNE) Annual Meeting for the third time. Around 800 professionals, 250 technical papers, and a packed agenda of outreach and community engagement shaped this edition, marked by explicit support for the Almaraz nuclear power plant and the evolution of the technical program toward more interactive formats. Rosalía Tena and Luis Felipe Durán, presidents of the Organizing Committee and Technical Committee, respectively, analyze the challenges, lessons learned, and key takeaways from this event, which has left its mark on the sector and reaffirms the SNE's role as a leading forum for the nuclear community.

CÁCERES ONCE AGAIN

Cáceres has been, for the third time, the host city of the Annual Meeting. A common history that began in 1993, when the current San Francisco Cultural Complex received the participants of the XIX Annual Meeting, a smaller gathering in terms of space volume but already very broad in topics of interest. Subsequently, in 2012, the 38th Annual Meeting was held at the Palace of Congresses and Exhibitions, a building that has also been the venue of this 51st edition. What reasons led the SNE to choose this city as the venue of the Annual Meeting?

Rosalía Tena: The choice of Cáceres responds to a criti-

cal moment in the nuclear sector given the proximity to the Almaraz nuclear power plant, without leaving aside its great historical and cultural value. Cáceres is a World Heritage Site and stands out for its capacity to host large-scale events. For these characteristics, it is the third time that the city hosts this Annual Meeting of the Spanish Nuclear Society (SNE).

What has been the response of the regional and local authorities, and of institutions such as the University?

R.T.: The institutional support has been firm from the very beginning. The City Council, the Provincial Council, as well as the Regional Government of Extremadura and the University have welcomed the event with great interest and have actively collaborated in the development of the Annual Meet-

ing. The citizens of Cáceres and their leaders have shown great interest in the event and have offered all the available means for its proper development.

How have the media responded to the invitation of the SNE to cover the congress?

R.T.: Given the interest aroused by the situation of the Almaraz nuclear power plant, precisely at the moment when the Annual Meeting was being held, the coverage was very extensive. They were present at all the activities and meetings that we carried out throughout these days. The local and regional press conveyed to the population what the nuclear society presented, its interest in the continuity of nuclear energy in our country, and highlighted all the impact that this brings to the different Spanish regions, to the electricity fleet, to our country's technology, and to society in general.

What are the general attendance figures?

R.T.: The number of attendees has exceeded 800 and we believe that what is being demonstrated, looking at historical data, is that the Meeting is growing, in terms of participation and impact.

ALMARAZ, AN EXAMPLE OF STRUGGLE

As you indicate, the SNE has shown, with the choice of this venue, its support for the Almaraz plant. Coinciding with the inauguration of the congress, a gathering of the plant's workers took place at the entrance of the Palace, asking for the continuity of the plant. How does the SNE assess this movement?

R.T.: From the SNE we deeply value this movement. It reflects the change of perspective that society has regarding nuclear energy. This is one of the objectives of the SNE, to defend this energy from the knowledge of it. As for the demonstration, we were aware, from the SNE, that this type of demonstration could take place; we did not remain indifferent to them, quite the opposite. Both the president of the SNE and the mayor of Cáceres, who was present at that moment at the Palace of Congresses, went towards the demonstrators, taking interest in their concerns and their demands. And of course, the SNE echoed all of them and they have our full support.

What other initiatives were carried out during the Annual Meeting to support the plant and its workers?

R.T.: One of the premises we had as the Organizing Committee in this Annual Meeting was to give space to all the activities that were requested from outside: platforms, citizens... And in this sense, I feel very proud to have given voice to all of them. The platform "Yes to Almaraz, Yes to the future" had the opportunity, from this Annual Meeting, to be inside the Palace of Congresses at the exhibition and they were given space within the SNE's own stand. We also hosted the messages they wanted to convey to the citizens prior to the theater event organized by WiN, from where they transmitted their demands. We have received the gratitude of all the entities that have participated, for the opportunity that we have given them to disseminate their messages to society from this Annual Meeting.



PROFESSIONAL PROFILE

Rosalía Tena holds a degree in Industrial Engineering from the University of Extremadura. She is part of the Nuclear Supervision Team at Iberdrola Nuclear Generation. Since 2022, she has been a member of the Organising Committee for the SNE Annual Meeting.

As a woman from Extremadura and as a nuclear professional, how have you experienced it personally?

R.T.: For me it has meant a very positive experience to have been President of this Annual Meeting, I have felt very supported both by my colleagues in the sector, and especially by the Organizing Committee, as well as by all the people from Extremadura who have collaborated in the proper development of this Annual Meeting. After more than 25 years in this sector, I have very good friendships among people from Extremadura and/or nuclear professionals, and seeing how all of them have offered me their help and support to organize this meeting has meant for me a real pride. Extremadura



PROFESSIONAL PROFILE

Luis Felipe Durán is an energy engineer with a Master's degree in Nuclear Science and Technology from the Polytechnic University of Madrid. He works as a nuclear engineer at IDOM Nuclear Services, where he has been stationed in Italy working for the Joint Research Centre since 2023. In 2019, he joined the CTRA as a member representing the Board of Directors of Jóvenes Nucleares, where he also participated in the organisation of ENYGF 2021 in Tarragona as Communications Chair and as a representative on the SNE Communications Committee. After two years as vice-president, he has been President of the CTRA since the end of 2023.

has great human potential and very good professionals in all fields, who want to fight for the development of this land. On the other hand, the potential of the nuclear sector is reflected in plants such as Almaraz, a worldwide reference, for its good performance, its level of safety and high reliability. Seeing these two forces united, the people from Extremadura and the nuclear sector, pushing in the same direction, has filled me with satisfaction. I take this opportunity to say THANK YOU to all of them.

TECHNICAL CONTENT

The technical program is the backbone of the Annual Meetings. Which thematic areas have generated the most interest among the congress participants?

Luis Felipe Durán: The tradition that the largest number of papers is concentrated in the area of engineering, innovation and design, as well as in the area of decommissioning and waste management, is becoming consolidated. It is true that these areas consolidate a focus of interest both for the congress participants and for the speakers: they are the technical areas that bring together the most papers and the highest attendance. However, this year we have observed a particularly high interest in the fuel area. It has been a surprise and it has meant a record number of attendees for this technical area. Therefore, we will take this evolution into account when properly sizing the spaces at the next meetings.

And have you managed to detect the reason for that interest in the fuel area?

L.F.D.: We have pending work to see why there is that interest, to see if there is any topic within fuel that has stood out, with the objective of carrying out a remodeling of the different technical areas. We want to make a change for next year; we have to think it through carefully and we have to identify those topics that have the greatest attendance in order to give them their own space within the technical program.

Where is the technical program evolving towards?

L.F.D.: It is evolving towards more interactive formats. This year, for example, we have applied a new format in the Young Session, which has turned out to be much more participatory. We have moved from the typical format of a technical session that we used in the Young Session to a dynamic in which, at a small table, a company sits with two or three young people who rotate. With this, the experience of the congress participant improves because they can interact much more. In addition, we have verified that the feedback received from the companies is also being very positive.

The technical program evolves from the point of view of its implementation, but I believe that it will also do so along two lines. On the one hand, in the future we will try to focus it on aspects related to the different applications of nuclear energy at the industrial level, in order to highlight the strategic role of this energy. And, on the other hand, in the field of transversal competences. That is, in a technical program very specialized topics are addressed in the technical sessions; in the special sessions, current issues are addressed, and both in the plenary sessions and in the monographic sessions, issues of current technical relevance are also addressed.

Where we want to put the focus now in order to have a more complete technical program next year is on the different aspects related to transversal competences. That is, that the congress participants who come to the Annual Meeting take away not only an update on the reality of the sector and the latest technical advances, but also an extra contribution, continuing to increase the added value of the Annual Meeting for the congress participants.

As every year, the topics chosen for the plenary sessions reflect the interest of the sector. Data centers, socioeconomic aspects, and the extension of the operating period have focused the debates in Cáceres. What aspects do you highlight from these sessions?

L.F.D.: The most positive aspect has been the discovery of the interest generated by the plenary session on data centers and nuclear energy. It has been a session from which we have particularly received very positive feedback, as with the other plenary sessions. However, this one was somewhat different, precisely because it delved into those aspects of the application of nuclear energy. I believe it has been a differential fact that will mark the evolution of the technical program, at least in the next two years. Apart from the current situation of the sector and issues of energy policy, which are always very interesting for the congress participants.

How do you assess the participation of international speakers?

L.F.D.: The participation of international speakers is always very positive because it helps to position our Annual Meeting on the international map. This year, unlike others, we have been able to make a somewhat different combination: we had a very senior speaker and a very junior speaker in the same plenary session.

Bringing together in the same session international speakers from different organizations and ecosystems, one from the American and another from the European, and, in addition, with a generational difference between them, has made the result of the plenary session different. We want to assess whether this type of combination can continue to be used to give variety to the technical program and to gather the points of view of different generations in the sector.

Everyone knows that a person who started working in the sector in the 1980s and another who began in 2018, for example, are going to have a very different vision. And not only because of the accumulated experience, but because they belong to very different generations.

The technical program includes an activity that has already become consolidated: the Nuclear Technology Workshop. Is it meeting the expected objectives? And what is the response of the participants?

L.F.D.: The Nuclear Technology Workshop has been one of the activities that has worked best in this Annual Meeting. One of the objectives we set ourselves at the beginning was to apply gamification to the workshop. That is, if before we invited different companies to show their latest technological advances, now we have wanted them not to be isolated presentations from five or six companies, but rather for there to be some interaction and a storytelling within the workshop experience, because this is very important for the companies.

The format has improved a lot for them. The feedback we have received has been very positive and, moreover, it is true that a change was needed. Companies do not always present new developments every year, because a company innovates, but it does not necessarily introduce every year a substantial innovation that it wants to show. Instead, we have changed the approach and told them: not only show us what you innovate in, but show us what you do so well that it is already differential, but putting it in context with what the rest of the companies do.

From the company's point of view, this approach has worked very well, but also from the point of view of the congress participant, to whom it provides value because it allows them to understand how companies interact when different topics are addressed. There are different topics that we will explore during the successive Annual Meetings.

MEETINGS WITH CIVIL SOCIETY

The outreach program includes the activities organized by Jóvenes Nucleares and by WiN España, aimed at the society that hosts the Annual Meeting. What aspects do you highlight from these initiatives?

R.T.: This year it is worth highlighting the high participation of the citizens of Extremadura. We have been able to reach a very large portion of the population and, moreover, a very wide range of audiences. We have worked with students in the 3rd and 4th years of ESO, with students from the University of Seniors, and with the general public, thanks to the theater organized by WiN. Evidently, this type of activity is the way to reach society, and that is one of the objectives of the Spanish Nuclear Society, to promote support for nuclear energy from knowledge. Achieving this level of participation is, for the SNE, a resounding success.



DATA

- Attendees (conference participants + guests): **726**
- Number of oral presentations given: **240**
- Participation in sessions: average of **32** (average number of attendees per session).
- Sponsoring, collaborating and exhibiting companies: **48**

L.F.D.: These initiatives should continue to be encouraged, not only to reinforce the technical outreach that helps those who participate to form their own opinion, but also because one of the objectives of the Annual Meeting should be to serve as a showcase for the rest of the commissions, which work on different aspects and topics. The Annual Meeting must also be an opportunity to give them a loudspeaker, to reach a broader audience, audiences of different ages, and to contribute to each commission advancing in its own strategic objectives. In my opinion, that is a very important role that the Annual Meeting must assume.

What relevance do events such as the STEM workshops and the mentoring workshop have in this objective of communicating with society?

R.T.: I believe that the people of Extremadura were delighted to participate in all these activities, and that is a reason for enormous satisfaction. In my case, as a woman from Extremadura and as a nuclear professional, it produced a certain nostalgia in me to see young kids participating with so much enthusiasm in the STEM workshops, because in some way I saw myself reflected in them. Only "a few years" ago I was part of what the nuclear sector offered to young people at that time, the visits by schools to the Almaraz nuclear power plant. Seeing this type of initiative now is a very clear way of ver-

ifying that the nuclear sector is still alive, that its interest in making itself known remains intact, and even strengthened. I felt very comforted to see that we continue organizing all this and that young people receive it with such enthusiasm. That shows that the interest continues.

Sometimes we think that the nuclear sector is a sector reluctant to show itself, and it is just the opposite. The sector wants society to know nuclear energy in all its complexity and particularity. Bringing that knowledge to the youngest is sowing the future, showing them that this works, that it is worth knowing it well and that they are the generational replacement that the sector needs.

L.F.D.: I see it that way as well. When I was young I did not have too many opportunities to get to know the sector either, even though the internet already existed, although it was not what it is now. But the simple fact of living on the periphery meant that I did not have so many options within my reach. The fact that the Annual Meeting changes venue makes there be an effort on the part of professionals to reach young people and show them that there are other paths, other careers and many more possibilities. If I had been 18 or 19 years old and the SNE Annual Meeting had been held near where I was studying, I would have loved it if my university had encouraged me to participate.

R.T.: In that sense, taking the Annual Meeting to provincial capitals is very enriching. It is one thing that, thanks to the internet, we have access to almost everything; but it is quite another for it to be brought to your city, for you to be invited and for your school or university to motivate you to participate in an event like this, in a workshop or in a mentoring activity. That is greatly appreciated.

Regarding the theater organized and performed by WiN, how was it received?

R.T.: This year WiN proposed carrying out a different activity, bringing its message into the format of a play. At first the idea was somewhat striking, because it is not usual in an environment as technical as ours. However, when you see the play, its content and the analogy it draws with the nuclear sector, great parallels are discovered and very interesting conclusions are reached. I especially want to thank the actresses, professionals from the nuclear sector, who have put their talent and their time at the service of this initiative. Getting on a stage is not easy for profiles as technical as ours, but they set themselves that challenge and have passed it with flying colors. The citizens received the activity with great interest and affection; the audience left very grateful.

Just as they have known how to take on that challenge and overcome it with excellence, the nuclear sector is also a sector of great challenges, which has known how to face crises and problems in day-to-day life with great ease and solvency. For all these reasons, I want to thank both WiN for the effort made to launch this activity, and the citizens of Cáceres for their participation and support.

The Technical Committee also promotes the young session with networking, with the participation of companies from the sector. How has this initiative evolved? And how do you assess it from the CTRA?

L.F.D.: I believe that the networking session has been one of the best ideas we have incorporated into the technical pro-



gram. Placing the Annual Meeting as that meeting point between professionals and young people provides a great deal of value to those who are starting out in the sector: master's students, recent recruits, people who still do not know the nuclear ecosystem well or the different companies and what each one does.

Having, within the Annual Meeting, a forum where companies explain what they do, what role they play, and where young people can ask with total freedom, without fear that any question may be trivial, creates a very enriching environment of trust. I think it adds a lot of value to their experience, both in their participation in the Annual Meeting and in their future incorporation into a company.

In addition, many of these young people attend the Annual Meeting for the first time thanks to the awards and competitions organized by the Employment Commission, such as the award for the best Master's Thesis, doctoral thesis, etc. This space not only facilitates interaction with congress participants and companies, but also with the rest of the commissions of the Spanish Nuclear Society. The assessment from the CTRA is very positive.

Does it contribute to introducing younger professionals into the sector?

L.F.D.: Without a doubt. Many of them still do not work in the sector, although some do, and the choice of where to begin their professional career is a very important decision. For that reason, we consider it essential that they have as much information as possible in order to make the best decision. Our intention with this session is precisely to promote a positive experience for young professionals within the nuclear sector and to help guide them in their first steps.

SUPPORT FROM COMPANIES

The commercial exhibition of the Annual Meeting is one of the main meeting points for companies and professionals. What has been the response of the companies in this edition?

R.T.: This year the commercial exhibition has also broken records. There are increasingly more companies interested in exhibiting, in actively participating in the Annual Meeting. In fact, we have reached the point of not having more space available to accommodate all those that wanted to be present. Even so, we have managed to ensure that all the companies get involved and participate in one way or another.

The interest and level of involvement of the companies can be especially highlighted, both when sponsoring different events within the Annual Meeting and in the commercial exhibition itself. Many of them, in addition to their stand, bring materials and small gifts, which makes visiting the exhibition also a pleasant and relaxed experience for the attendees.

It is, of course, an opportunity for companies to make themselves known, but I would say it goes beyond that. Those who have been in the sector for years already know a large part of the companies. What is truly important is human contact: being a provider of certain services involves many phone calls and emails, but it is still necessary to put a face to those people and to those companies. In this sense, the commercial exhibition is the ideal setting, since it helps to show a much more human nuclear sector.

THE SOCIAL MEETING POINT

In addition to a significant level in technical content, the annual meetings also constitute the meeting point for professionals in the sector, especially through the social program. Cáceres has been a perfect setting for these activities. What is the assessment of the social program?

R.T.: I believe that this year, taking advantage of the great heritage that Cáceres offers us, we organized a guided tour through the entire historic center, a Historical and Cultural Heritage site. We consider that the congress participants have enjoyed the city and many of them have taken away a very positive impression. For all these reasons, we assess the social program as a resounding success.

And what about the activities organized for the accompanying persons?

R.T.: In the accompanying persons program we included a visit to the historic center of Trujillo, near Cáceres, and the feedback we have received has also been very positive. The accompanying persons had the opportunity to get to know Trujillo and to visit the Helga de Alvear Museum in Cáceres, a contemporary art museum that is truly worthwhile. We believe that both the cultural event and the accompanying persons program have been very satisfactory for the congress participants and their companions, which was another of our main objectives: that congress participants and accompanying persons enjoy the city and the region that hosts us.

TEAMWORK

The figures of the 51st Annual Meeting are significant. More than (650) people have gathered in Cáceres. Leading the organization of an event of this magnitude, in which more than 250 technical papers have been presented, is not an easy task. What does it represent for you, personally and professionally, to lead the Organizing and Technical Committees?

R.T.: As a personal experience, chairing the Organizing Committee of this meeting has been something very positive. It has given me the opportunity to work with people beyond the strictly professional scope of my day-to-day work, in a much closer environment. This framework of collaboration has allowed us to get to know each other better and to create bonds that, otherwise, might not have occurred. From here, I would like to say THANK YOU to all the exhibiting, sponsoring and collaborating companies for their contribution to this Annual Meeting. I have been fortunate to share this path with wonderful people, such as Luisfe and the rest of the Committee members, great professionals whom I now also consider great friends. That human side is, without a doubt, one of the greatest rewards I take with me.

L.F.D.: From the point of view of the Technical Committee, I believe that we have a team made up of truly exceptional people, who do an enormous amount of work so that the technical program can be carried out with the quality that has been seen at this 51st Annual Meeting. The very positive experience that the congress participants have would not be possible without the level of involvement and commitment of each member of the committee.

I also highly value the work of the Organizing Committee, of which I am part together with Rosalía and the rest of the colleagues. From the Technical Committee we do a part of the work that could not materialize without the effort of the Organizing Committee. In the end, all of this is the result of a joint effort in which many factors are involved. On a personal level, it gives me great satisfaction to relate both with my colleagues from both committees, and in particular with the president of the Organizing Committee. This year has been especially fruitful: we have had many discussions and differences of opinion that have been key to achieving the results that we see today.

Sometimes only the things that have gone well are highlighted, but it is also important to value disagreements and differences, because they are part of the decision-making process and have helped to shape this Annual Meeting as it has turned out.

From a professional point of view, working surrounded by great professionals is a very enriching experience, which undoubtedly makes a difference in my future professional career.

How has the work of the Organizing and Technical Committees been carried out, specifically?

R.T.: In this regard, it is key that there is a good relationship between the president of the Technical Committee and the president of the Organizing Committee. The Technical Committee carries out fundamental work in the Annual Meeting, but that activity materializes through the Organizing Committee. If that relationship did not function, the development of the Meeting would be greatly hindered. It is necessary to know each other, to talk a lot, and to understand both the work carried out by the Technical Committee and the difficulties that sometimes arise in channeling and implementing the activities it proposes.

L.F.D.: Indeed, there has to be harmony. In the end, the role of the president of the Technical Committee is, in addition to making some decisions about the program, to channel the information from all the work of the Technical Committee to the Organizing Committee. The most relevant decisions

are taken hand in hand with the president of the Organizing Committee, and others, more practical ones, are kept within the CTRA or dealt with with other members of the CORA. That is why it is important to clearly identify who does what and to have a good relationship that ensures that the information reaches where it needs to go so that things happen as they should.

What has the relationship with the Board of Directors been like?

R.T.: The Board of Directors, in this Annual Meeting, has supported us in every sense and at all times. My most sincere thanks, because whenever I have doubted whether we would be able to carry out any idea, I have always felt fully supported by the entire Board, and specifically by the Standing Committee. They have made it very easy for me: at no time have I felt questioned; on the contrary, I have always felt supported. It must be taken into account that the moment was not easy; it was quite a critical context for the sector, for the citizens of Extremadura, and for the Almaraz nuclear power plant. We have had to make complex decisions and, even so, the entire Board of Directors has given me unconditional support.

L.F.D.: For me, the Board of Directors has played a facilitating role in everything possible. They have been there at all times. Precisely in that role as facilitators, one of the characteristics that must be highlighted this year has been the continuous support in a very changing environment. On the one hand, the necessary meetings have been held and the debates that needed to take place have taken place in order to make the best decisions; and, on the other hand, we have had formidable continuous help from many members of the Board of Directors and, very especially, from the Standing Committee.

A NEW MEETING IN A CORUÑA

During the closing session it was revealed that the venue of the 52nd Annual Meeting will be A Coruña. The bar set by Cáceres is high, but there are always improvements to promote. What are the lessons learned that are considered most important to pass on to the 2026 Committees?

R.T.: There are always lessons learned. Evidently, everything can be improved, and the nuclear sector lives precisely in continuous improvement. Therefore, if Cáceres has gone very well, A Coruña will go even better. Choosing A Coruña is, in my opinion, very appropriate. It is a very welcoming provincial capital, where the Annual Meeting has also been held on previous occasions. We will support the new president of this Meeting with everything possible and it will undoubtedly be as impactful as Cáceres, if not more so.

L.F.D.: We have analyzed the lessons learned and we have devoted many discussions to them because we want next year's Meeting to be different. Not because this one has gone badly, but because we want to take advantage of all the experience accumulated in recent editions to give it a significant change. The idea is to maintain, in essence, the traditional structure of the Meeting, but to make it a somewhat different event, one that continues to attract congress participants not only to attend, but to participate actively. ■



SOCIAL EVENTS



The Social Program offers another way to enjoy the Annual Meetings of the Spanish Nuclear Society, providing an opportunity to experience the culture and art of the host cities. The delegates and their companions enjoyed a guided tour that allowed them to discover the historical sites of Cáceres.



Energía de futuro

SOCIAL EVENTS

COCKTAIL AND OFFICIAL DINNER

Cocktail Sponsored by:



The Official Dinner of the 51st Annual Meeting of the Spanish Nuclear Society, in this edition, took place in an incomparable historical setting: the **Castle of Arguijuela de Abajo**, a space located very close to Cáceres.





SOCIAL EVENTS





SOCIAL EVENTS





SOCIAL EVENTS





SOCIAL EVENTS

SNE ANNUAL AWARDS

The SNE Annual Awards ceremony highlighted the excellence, commitment, and innovation of professionals and organizations linked to the sector. These awards recognize both individual talent and collective work in various areas.



Carlos Sánchez del Río Award

The Spanish Nuclear Society wishes to recognize **EPRI** today with the Carlos Sánchez del Río Award for its long history of support and collaboration.



Mención de Honor SNE

With the awarding of this Honorable Mention, we convey the Society's gratitude and recognition to **Pablo León** for his work and dedication to the SNE.



SNE Diploma

With the presentation of this SNE Diploma, we recognize **Juan Bros** for his work, especially that carried out on the occasion of the Society's 50th anniversary.



José María Otero Navascués Award

The Otero Navascués Award is given this year to the **Yes Almaraz, Yes to the Future Platform** for the work they are doing to publicize the reality of our sector, with a focus on the continuity of the operation of CN Almaraz.



SNE Medal

Finally, with the presentation of our medal, we conclude this ceremony and acknowledge, with warm applause, the work done by my predecessor in this position, **Emilio Mínguez**.



WiN Spain Award to **María Eugenia Vega**, for her work in promoting energy



"Juan Alberto González Garrido" Nuclear Young Scientists Award to **Lola Patiño**



COCKTAIL Cocktail Sponsored by:



COMPLEMENTARY ACTIVITIES

ACTIVITIES OF THE COMMUNICATIONS COMMITTEE

PRESS CONFERENCE WITH THE MAYOR OF CÁCERES

The 51st Annual Meeting of the Spanish Nuclear Society (SNE), held in Cáceres from 22 to 26 September 2025, brought together more than 750 professionals from the national and international nuclear sector, once again consolidating its position as Spain's leading technical and outreach forum for the industry. In this context, the SNE Communications Committee played a key role in strengthening the visibility of the event and conveying the organisation's strategic messages to society and the media.

In the months leading up to the Annual Meeting, the Committee worked in close coordination with the Organising Committee and the Technical Committee to define a Communication Plan aligned with the SNE's strategy. The plan focused on promoting the technical programme, opening the congress to the local community of Cáceres, and reinforcing the positioning of nuclear energy as a safe, clean, and strategic source for the future energy mix.

Among the main actions carried out were proactive engagement with national, regional, and local media outlets, the updating of the Society's key messaging, and the distribution of press releases and media advisories both before and during the event. A press conference was also held prior to the opening ceremony, followed by a brief media meeting on



the first day, taking advantage of the visit by the Mayor of Cáceres, **Rafael Mateos**, together with the President of the SNE, **Paulo Domingues**.

The Annual Meeting also strengthened its commitment to engaging with society through the promotion of outreach and educational activities, including STEM workshops, mentoring initiatives, WiN theatre, intergenerational talks, and the Basic Course for Young Nuclear professionals, all of which generated notable media and public interest.

In addition, an institutional communication campaign was launched to highlight the strengths and benefits of nuclear energy in the current context. Through a fun visual approach and accessible language, #Ytodoscontentos showcased the nuclear sector's contribution to environmental sustainability, security of supply, economic competitiveness, and technological progress, among other key aspects.

In the digital sphere, social media activity was particularly intense under the hashtag #NuclearesEnCáceres, achieving significant community growth and high levels of engagement. Instagram consolidated its position as the platform with the greatest impact, while LinkedIn once again stood out as a key channel for professional communication. The Annual Meeting's website and app were continuously updated, ensuring that delegates and media representatives had access to up-to-date information at all times.

The media impact of this edition was remarkable, with more than 40 appearances in press, radio, and television outlets at both regional and national levels, amplifying the SNE's



key messages regarding the continued operation of Spain's nuclear fleet and the strategic role of nuclear energy in the energy transition.

Overall, the 51st Annual Meeting has been highly successful, once again demonstrating the effectiveness of teamwork

and the importance of planned, coordinated, and consistent communication. The Communications Committee remains committed to advancing towards increasingly innovative and effective strategies that reinforce the SNE's role as a benchmark for the sector. See you at the next edition in A Coruña!

COMPANION PROGRAM



A VERY ATTRACTIVE ESCORT PROGRAM

As in previous years, those attending the Annual Meeting as companions had the opportunity to enjoy the host city and its surroundings.

This year, after exploring the trade exhibition and meeting with the stand managers, a private guided tour of the **Helga de Alvear Museum** took place. The museum houses one of Europe's most important collections of international contemporary art, comprising over 3,000 works by various artists.



Furthermore, the building was designed by Emilio Tuñón, winner of the National Architecture Prize.

Trujillo was the city the companions enjoyed, on a meticulously planned guided tour that included a luxurious breakfast at the Monastery of Coria.

The tour of the city began in the Plaza Mayor, continuing through the medieval town and along the Route of the Discoverers, exploring the most important corners and monuments of a city steeped in history, where the Church of Santa María la Mayor stands out.

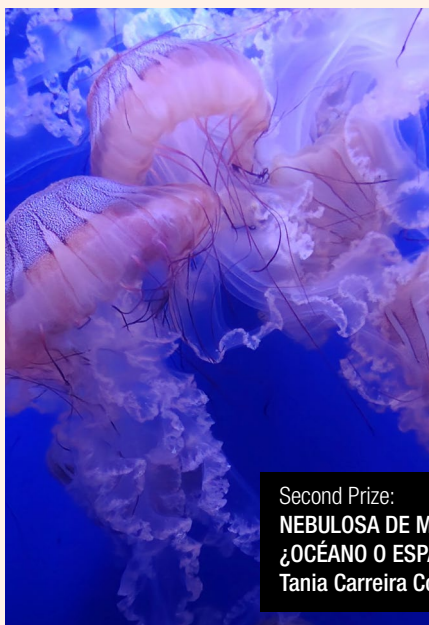
PHOTOGRAPHY CONTEST

framatome

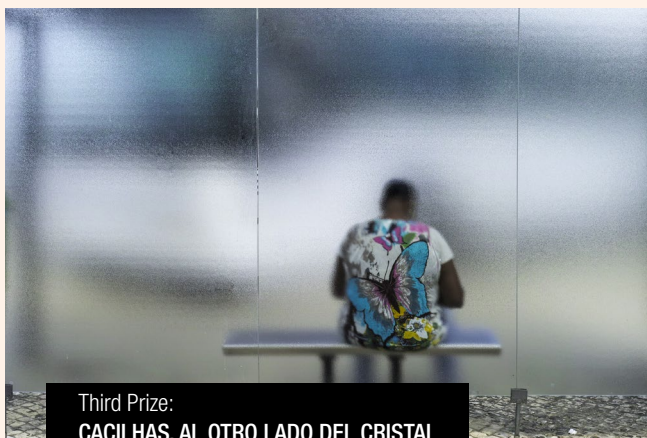
BEST PHOTOGRAPHS GENERAL CATEGORY



First Prize
ENTRE LA NIEBLA LA CONEXION HUMANA Y ANIMAL
Pino Diez Álvarez-Buylla



Second Prize:
NEBULOSA DE MEDUSAS
¿OCÉANO O ESPACIO?
Tania Carreira Couto

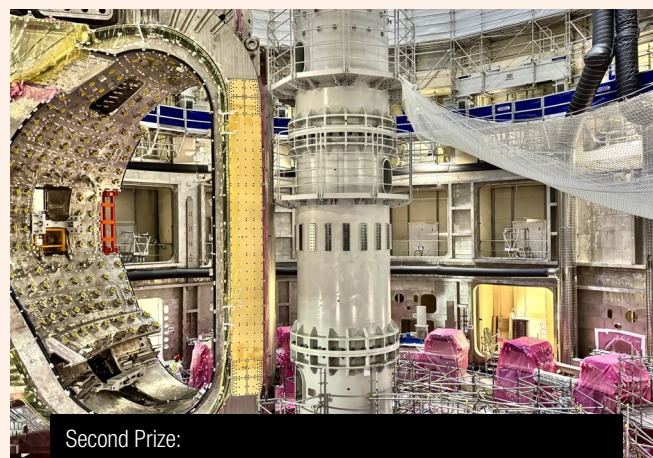


Third Prize:
CACILHAS, AL OTRO LADO DEL CRISTAL
Manuel Muñoz García

BEST PHOTOGRAPHS ENERGY CATEGORY



First Prize
AMANECEER ENERGÉTICO
Montserrat Fernández de la Casa



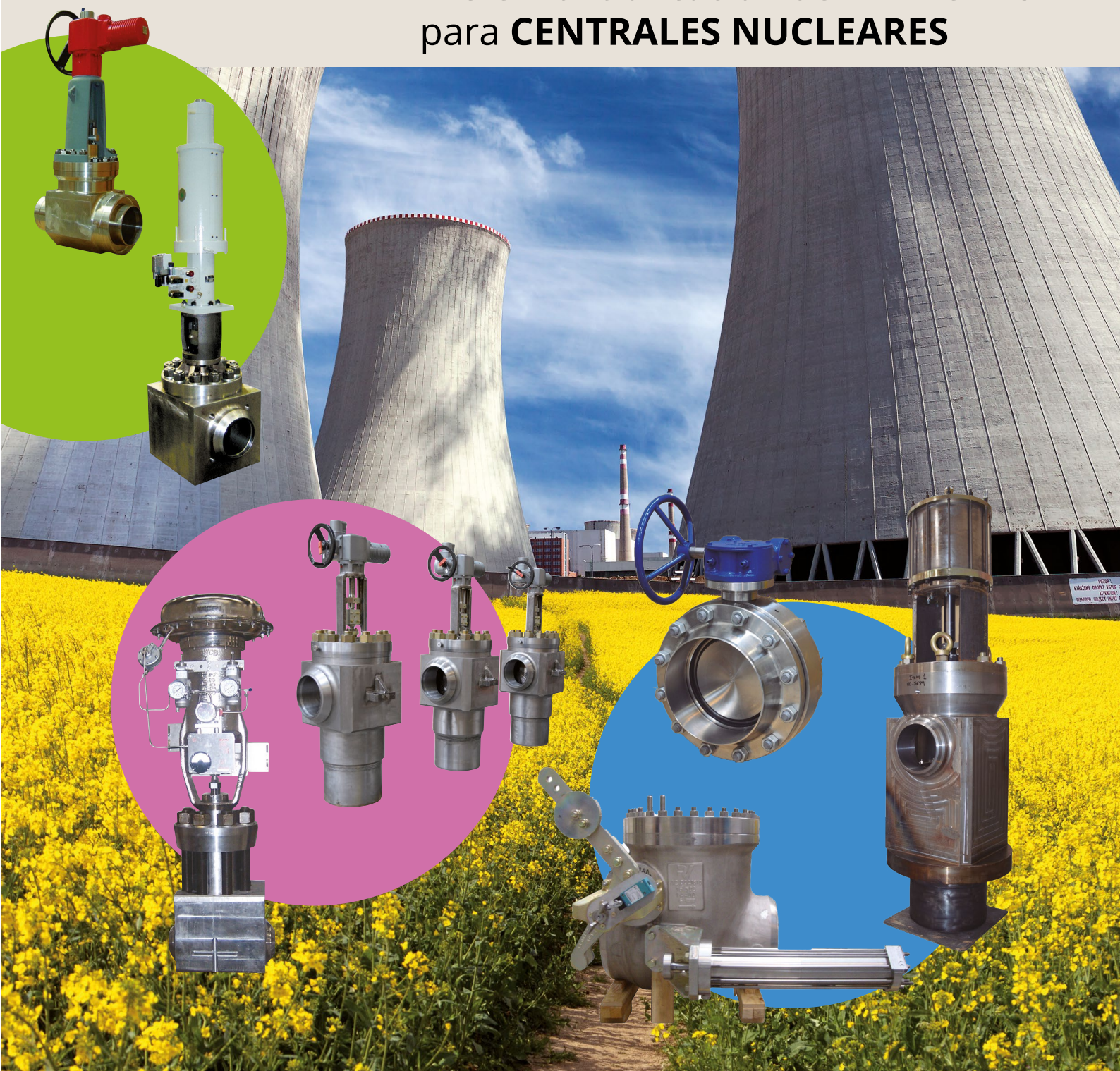
Second Prize:
ITER FORGING A STAR. - WHERE ENERGY WILL EMERGE
FROM DEUTERIUM AND TRITIUM
José Luis Herranz García



Third Prize:
OVEJAS ENTRE PANELES
Montserrat Fernández de la Casa

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OPENING SESSION

22-26 de septiembre

51 REUNIÓN ANUAL
SOCIEDAD NUCLEAR ESPAÑOLA



DAVID MARTÍN IBERDROLA'S INSTITUTIONAL REPRESENTATIVE IN EXTREMADURA



Iberdrola's Institutional Delegate in Extremadura, David Martín, opened his speech with a welcome and words of appreciation, stating that "for us, it is a true honour to have the opportunity to hold a congress like this in Cáceres, where over the coming days experts and professionals in the field will have the opportunity to discuss the main topics of interest and future challenges of such a relevant technology as nuclear energy."

He also encouraged attendees to make the most of the congress and to enjoy the region, recalling that "this is the third time the meeting has been held in this land," chosen "for its many advantages and possibilities."

Martín then highlighted the company's deep roots in the region: "Iberdrola is a company with a strong connection to and presence in Extremadura. This relationship spans more than a century, and over these years we have become the leading energy company in this autonomous community." He also stressed

that Iberdrola is "one of the region's main economic drivers, through its investments, its procurement from local suppliers, the employment it sustains, and through the provision of a high-quality electricity supply, as required by a modern society such as ours."

Reviewing key figures, he pointed out that "Extremadura has become one of Iberdrola's growth regions in Spain, with nearly 5,000 MW of renewable capacity currently installed, both in Cáceres and Badajoz, positioning the company as a regional leader."

Regarding hydroelectric facilities, Martín noted that "these account for 2,000 MW, and work is underway to increase their flexibility and energy storage capacity, which is highly important since hydroelectric plants provide stability, as well as flexibility and near-instant response."

As for photovoltaic installations, renewable generation reaches 2,842 MW across its 14 plants.

Iberdrola's Institutional Delegate in Ex-

tremadura also recalled the company's stake "in the 2,000 MW installed at the Almaraz Nuclear Power Plant, together with Endesa and Naturgy," as well as the extensive reach of its distribution networks. "We supply electricity to more than 340,000 delivery points across the autonomous community, and thanks to the sustained investments made over many years in infrastructure and digitalisation, we provide a high-quality electricity service."

Martín also underscored the innovative nature of the company's projects in the region. "We are developing pioneering projects in Extremadura, as it is a key territory for us, where we are integrating sustainability with technological innovation." He cited specific examples: "We have been pioneers in implementing storage systems at our solar plants, pioneers in developing Solar Communities, and now we are combining both with the recent launch of our first solar community integrating energy storage."

He also referred to another initiative further north: "In the La Vera region, we will develop the largest public-private forestry project to be carried out in Spain, through Carbon2Nature."

Beyond the economic impact, Martín highlighted Iberdrola's institutional and social commitment, noting its presence in business associations, the development of social and cultural initiatives through the Iberdrola Foundation, and its aim not only to carry out its business activity but also to collaborate and contribute to the overall development of the region.

Finally, he concluded with explicit recognition of the institutions that made the meeting possible: "I would like to end by expressing our most sincere gratitude to the different institutions that have collaborated to make this meeting a reality: the Regional Government, the Government Subdelegation in Cáceres, the Provincial Council of Cáceres, the University of Extremadura, and the City Council of Cáceres. We thank them for their presence here today at this opening ceremony and for their support and collaboration in the many logistical aspects of the Congress, to which they have devoted significant effort."

**PAULO DOMINGUES
DOS SANTOS
PRESIDENT OF THE SPANISH
NUCLEAR SOCIETY**



Dear Mr Mayor, distinguished Rector, dear Chair of the Organising Committee, members of the Organising and Technical Committees, and of course all of you — thank you for being here today. It is a true honour for me to be with you this morning to formally open this 51st Annual Meeting of the Spanish Nuclear Society, for the first time as President and representing this great institution, which—thanks to the selfless yet highly effective collaboration of our members—is experiencing a dynamic period of clear expansion, now bringing together 1,400 individual members and 60 corporate members.

Spain has a strong nuclear industry, and you are the best proof of that strength. It is built upon excellent professional training, complemented by R&D&I carried out in universities, research centres and companies.

Beyond our seven operating nuclear reactors — our seven treasures — modern, safe, reliable and fully prepared to operate for many more years, our industry today encompasses fuel manufacturing, the production of large components, a wide range of advanced services, engineering services, high-, intermediate-, low- and very low-level waste management, and the decommissioning of radioactive facilities, among other activities.

Many of the companies represented here this morning have been working beyond our borders for years, and major technology firms have clearly placed their trust in our country by establishing significant engineering hubs here.

Our sector employs around 30,000 people in Spain and contributes approximately 0.3% to the country's Gross Domestic Product — a far from negligible figure.

Once again, the data speak for themselves: in 2024, nuclear power plants generated 21.1% of all electricity produced in the Spanish peninsular power system, despite representing only 5.8% of the installed capacity.

As could not be otherwise, nuclear professionals firmly support the continued operation of Spain's entire nuclear fleet. Almaraz Nuclear Power Plant, Ascó Nuclear Power Plant, Cofrentes Nuclear Power Plant, Vandellós II Nuclear Power Plant and Trillo Nuclear Power Plant are both humanly and technically prepared to continue supplying electricity.

We are a strategic pillar if we are to speak seriously about security of supply with virtually no greenhouse gas emissions.

Nothing would make me happier today than to be able to stand at this lectern and say that the horizon has cleared and that 2027 is nothing more than another date on the calendar. However, the reality is that, at this stage of 2025, we are still seeing no movement, no change — and we are concerned about the critical situation facing the Almaraz Nuclear Power Plant.

Despite this, our commitment, professionalism and sense of responsibility must lead us to maintain excellence in our work, so that it continues to be, in every forum, the strongest guarantee of the value of our plants. I said it on Monday to the media, and I want to repeat it here today, before all of you: where there is a will, there is a way. Change is possible. The established dates can be revised.

I respectfully call on policymakers and plant owners to sit down and discuss this. If positions are not brought closer together, if there is no dialogue capable of reversing the situation, the current plan foresees that in October — that is, starting next week — the plant will submit the required documentation for its shutdown to the Nuclear Safety Council, in compliance with existing regulations.

The truth is that it is difficult for us to understand how we could set aside — how we could discard — facilities that are safe, reliable and deeply embedded

in who we are. We are all, in some way, part of Almaraz. Each of our nuclear power plants carries something of me and of all of you. I am fully convinced of that.

We can speak about figures that are well known to all of you, but it never hurts to recall them — because now more than ever it is essential that we do not grow tired of explaining, of repeating to every audience within our reach, the reality that surrounds us.

Let us remember, for example, that all Spanish nuclear power plants have a twin reference plant for their original design. In the case of Almaraz Nuclear Power Plant, that reference plant is North Anna Nuclear Generating Station, located in the state of Virginia in the United States.

In August last year, North Anna received authorisation from the U.S. nuclear regulatory authority to operate for 80 years — and it is not the first plant to achieve this milestone.

If the Spanish nuclear fleet ceases operation in accordance with the dates set out in the National Integrated Energy and Climate Plan, it will shut down at an average age of 46 years — just over half the lifetime already authorised for North Anna. Quite simply, it makes no sense.

At the international level, the renaissance we are witnessing is undeniable. An increasing number of countries are seeking to develop their own nuclear programmes, some are reversing legislation that previously banned the construction of new nuclear power plants, and there is growing interest in both large-scale reactors and small modular reactors.

Key factors such as energy independence, security of supply, and grid stability are driving these decisions. These elements are also critical to enabling the industrial fabric to make the investments required to decarbonise the economy and to attract new investment.

Let me share some more specific figures:

- There are 416 nuclear reactors currently in operation worldwide (104 of them in the European Union), and 61 more are under construction globally.
- 258 reactors have been in operation for more than 35 years, and more than 190 have already received authorisation to operate beyond 40 years.
- In most countries, reactors are either already licensed — or in the process of

being licensed — for 60 years of operation.

These figures clearly illustrate that long-term operation is not the exception, but rather the prevailing international trend.

Among the many examples around the world, I would like to highlight two in particular:

Belgium, which has reversed its decision to phase out its nuclear fleet.

Sweden, which has repealed the law that prohibited the construction of new nuclear power plants.

Once again: where there is a will, there is a way. The decision to close Spain's nuclear fleet — starting with Almaraz Nuclear Power Plant — can be reconsidered.

We want our seven nuclear reactors to continue operating. We will keep working towards that goal, but we need the political decision that will make it possible.

Another example that clearly illustrates the sense of contradiction we are experiencing is the construction of a new nuclear unit such as Sizewell C Nuclear Power Station in the United Kingdom. With a capacity of 1,650 MW, it is estimated to cost around €44 billion.

By comparison, the seven nuclear units we currently have in Spain — our seven treasures, as you know I like to call them — are valued at approximately €50 billion, assets that we seem willing to discard. Should this not give us pause for thought? Why are we maintaining a roadmap that runs counter to the direction taken by much of the rest of the world?

In the many international exchanges that are part of the normal functioning of our sector, our counterparts struggle to understand what Spain still intends to do.

And indeed, it is difficult to explain.

There will be consequences if we continue along this path, starting with the weakest link in the chain — consumers.

The premature shutdown of our nuclear fleet at 46 years of operation would result in an increase in costs for consumers of at least €13.00/MWh, according to a study based on modelling and real data carried out by the consulting firm Price waterhouse Coopers.

In Germany, for example, had the country not shut down its nuclear fleet, electricity prices in 2024 would have been €18.00/MWh lower for consumers. At the same time, it could have achieved 94% of its electricity generation free of greenhouse gas emissions, compared with only 61% in 2024.

Today, after Poland and Serbia, Germany ranks among the European countries with the highest greenhouse gas emissions.

¿Do we truly want to continue down this path? I sincerely hope not. I express this today as a personal wish — one that I am firmly convinced is shared by everyone in this auditorium.

Time is running out, but until the very last minute our voice will continue to call for Almaraz Nuclear Power Plant, Ascó Nuclear Power Plant, Cofrentes Nuclear Power Plant, Vandellós II Nuclear Power Plant and Trillo Nuclear Power Plant to continue operating. Above all, I hope that the change we are all waiting for will take place and that, in 2026, we will simply be speaking about the future.

We will do everything in our power to make this happen. Please — sit down and talk. We are already in added time, and the room for debate is running out. Decisions are urgently needed.

Thank you very much for your attention.





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RAFAEL MATEOS MAYOR OF CÁCERES



Rafael Mateos, Mayor of Cáceres, welcomed attendees to the 51st Annual Meeting of the Spanish Nuclear Society and began his speech by thanking the President of the SNE, Paulo Domingues Dos Santos, and the Organising Committee, led by Rosalía Tena, for the intense work carried out over recent months to ensure that everything ran smoothly. He also expressed his satisfaction at hosting such a significant event for the energy sector.

The Mayor highlighted the value of the meeting as a forum for exchanging knowledge, experience and advances in the field of nuclear energy, and thanked the SNE for once again choosing Cáceres and Extremadura as the host venue. He recalled that this was the third time the city had hosted the Annual Meeting and expressed his hope that it would not be the last, underlining the hospitality and readiness of the city to welcome professionals from the sector.

Mateos clearly reaffirmed Extremadura's position regarding nuclear energy, stating that this region "unreservedly says yes to nuclear energy," to the continued operation of its power plants, and to the essential role they play in energy supply, job creation and social development, with special mention of the Almaraz Nuclear Power Plant, "a strategic facility for our region."

The Mayor congratulated the Spanish

Nuclear Society for its outreach work, particularly its efforts to bring the operation and reality of nuclear energy closer to the public — not only within the professional framework of the Congress, but also through activities and workshops open to the people of Cáceres.

He also invited attendees to enjoy the city of Cáceres, a UNESCO World Heritage Site and home to the third best-preserved monumental complex in Europe. He highlighted its unique blend of tradition and modernity, its rich cultural offering, and its renowned gastronomy, with Atrio as a world reference.

He encouraged participants to return in the future to explore more leisurely the city's heritage and the many surprises it offers, such as the Museo Helga de Alvear, which houses one of the most important private collections of contemporary art in Europe.

Rafael Mateos concluded his speech by sharing one of the city's major ambitions: Cáceres' aspiration to become European Capital of Culture in 2031 — a project which, he noted, reflects the essence of a city that is "open, welcoming, with an unstoppable cultural agenda and closely connected to Portugal and Latin America."

PEDRO FERNÁNDEZ RECTOR OF THE UNIVERSITY OF EXTREMADURA



The Rector of the University of Extremadura, Pedro Fernández, also addressed the opening ceremony. He expressed his gratitude for the invitation and highlighted his satisfaction that the University of Extremadura was represented at an event of the significance of the 51st Annual Meeting of the Spanish Nuclear Society.

Fernández focused his remarks on the need to approach the debate on nuclear energy with calmness and knowledge: "We must be capable of carrying out a measured and sensible analysis of nuclear energy and its importance. At the University of Extremadura, as a public higher education institution of our Autonomous Community, we are concerned about this issue. The decisions that are taken and the measures that are adopted must be based on knowledge, on data, and on the reality of both our region and Spain as a whole."

The Rector of the University of Extremadura, Pedro Fernández, raised several issues which, in his view, should form part of the collective reflection. These include ensuring a stable energy supply capable of preventing blackouts or disruptions such as those experienced recently; the enormous electricity demand associated with the development of artificial intelligence and large-scale data analysis; and the future of the Almaraz Nuclear Power Plant, "a facility that plays not only an energy role, but also an economic and social one in the region."

Fernández warned of the need to carefully assess the plant's profitability and viability, as well as to anticipate alternatives that would guarantee employment and economic activity in its surrounding area should its operation be modified. He also stressed that any decision must be grounded in rigorous knowledge, in the availability of resources, and in the real capacity to implement the proposed ideas.

As a final reflection, he advocated moving towards a combined energy model that would allow efficient coexistence between renewable sources and nuclear energy. "It is not so much a question of choosing one over the other, but of achieving a balanced and reasonable use that responds to the country's needs," he concluded.

ROSALÍA TENA
CHAIR OF THE ORGANIZING
COMMITTEE OF THE 51ST RA



“Once again we come together — and there have now been more than 50 Annual Meetings — with an ambitious programme that is today a reality thanks to the joint efforts of many people who, with dedication and enthusiasm, have made this event possible.

Over the coming days, Cáceres becomes the meeting point for more than 700 professionals who share the same vocation: nuclear energy as a driver of progress, sustainability and security. This gathering is not only technical in nature; it is also a human encounter.”

It is an opportunity to reflect, to learn, to connect and to celebrate who we are and what we do — professionals who make this sector stronger and safer every single day.

Supplying nearly 20% of the electricity consumed in our country is no simple task, and I would like to emphasise that it is thanks to the work of all nuclear professionals that this is possible.

This Annual Meeting in Cáceres has an excellent calling card: nearly 300 technical papers, around forty collaborating companies, and numerous outreach activities that once again demonstrate how we continue to surpass ourselves year after year in terms of participation and impact.

Queremos que todas estas actividades hagan de este encuentro anual unas jornadas provechosas, atractivas, e inolvidables.

We want all these activities to make this Annual Meeting a rewarding, engaging and unforgettable experience.

Because the scope of this gathering goes beyond the technical programme and beyond this Conference Centre. We have wanted delegates to discover Cáceres — through its cultural event and official dinner — and to enjoy the historical heritage and gastronomy of this wonderful city.

At the same time, we want the people of Cáceres to gain a deeper and better understanding of nuclear energy. To this end, we have prepared an outreach and technical programme designed to enable citizens of all ages — from secondary school students to university students, young professionals and seniors — to broaden their knowledge of science, technology and nuclear energy.

I would like to highlight and express my gratitude for the strong involvement of the people of Cáceres in the many outreach activities we are carrying out these days.

For us, it is a great source of satisfaction that this commitment to public engagement has been such a success so far, particularly in the activities held on Monday and Tuesday.

Once again, we will be addressing current and highly relevant topics from a sector that has a strong future ahead. This year, we are holding three plenary sessions covering subjects as timely as:

- The advantages of nuclear energy in meeting the growing electricity demand of data processing centres, which we will explore today.
- The socioeconomic impact of nuclear power plants on sustainable development.
- The long-term operation of nuclear power plants beyond 40 years of service.

I would also like to take this opportunity to say a heartfelt THANK YOU:

- First and foremost, to the Organising Committee, which I have had the honour of chairing; to the Technical Committee; to the various Committees of the Spanish Nuclear Society; and to everyone who has devoted so much effort, dedication and time to ensure that these days are a true success.
- To all the sponsoring, exhibiting and collaborating companies participating in this Annual Meeting, who, beyond their presence here over these days, are the true driving force of this sector.
- I would also like to thank all the employees of the local and regional companies who are working this week to make this event possible. Thank you for your positive attitude — so characteristic of the people of Extremadura — in accommodating all our requests, which are not always easy to fulfil.
- A special THANK YOU to the institutions — the City Council, the Provincial Council, the University of Extremadura, and the Regional Government of Extremadura — for their outstanding support. Over the past months, they have provided us with all the assistance needed to make it possible for us to be here today, enjoying the excellent infrastructure of this city, including this magnificent Conference Centre.
- I would also like to thank Iberdrola, the host company of this Annual Meeting, and the Spanish Nuclear Society for placing their trust in me to lead the outstanding team behind the organisation of this event. For me, as a nuclear professional and as someone from Extremadura, it has truly been a source of pride.

I am confident that Cáceres will once again — and this being the third time we have organised our event here — prove to be the perfect setting for a successful Annual Meeting.” ■



INAUGURAL CONFERENCE

by JESÚS SÁNCHEZ ADALID

THE ALCÁNTARA RECIPE BOOK

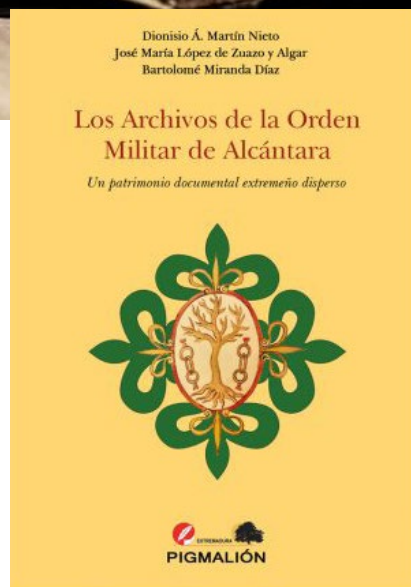


In this lecture, we will travel to the heart of Extremadura, to the autumn of 1807, on the eve of the Peninsular War, when Spain — ruled by Charles IV of Spain and overshadowed by the influence of Manuel Godoy — was hurtling towards one of the most dramatic moments in its history.

The setting is the **Convent of San Benito**, headquarters of the ancient **Order of Alcántara**. There, amid courtly intrigues and political conspiracies encouraged by Infante Antonio Pascual of Spain, a unique cultural treasure was safeguarded: the **Cookbook of the Order of Alcántara**, a manuscript compiling centuries of culinary tradition, which had lent splendour to the banquets and celebrations of the Order.

Context

At the end of the 18th century and the beginning of the 19th, Europe was dominated by the expansionist ambitions of Napoleon Bonaparte. Spain,



ruled by Charles IV of Spain and heavily influenced by Manuel Godoy, sought to maintain a fragile political balance through alliances with France.

Following the Peace of Basel and the Second Treaty of San Ildefonso, this dependency ultimately culminated in the Treaty of Fontainebleau, signed on 27 October 1807. The agreement authorised the passage of French troops through Spanish territory with the stated aim of invading Portugal.

Marshal Jean-Andoche Junot was appointed to lead the expedition. With an army of around 25,000 men, he advanced rapidly westward, passing through Salamanca and descending via the Puerto de Perales before reaching Alcántara on 17 November.

The march was extremely harsh: half of the horses died, a quarter of the soldiers fell behind, and much of the artillery was lost.

There, in Alcántara, the Spanish troops under General Juan Carrafa joined the French forces — but under Junot's effective command — in a clear demonstration of Spain's subordination to the imperial ambitions of Napoleon Bonaparte.

From Alcántara, the imperial army continued towards Portugal along the Tagus valley. On 30 November 1807, the French entered Lisbon with almost no resistance, while Spanish troops occupied Elvas and Oporto.

The Portuguese royal family, together with the Court, the Government and up to 15,000 people, fled hastily to Brazil



under the protection of the British fleet, taking with them treasures, archives and part of the Royal Library.

The Cookbook

The Order of Alcántara, based at the Convent of San Benito, had long enjoyed abundant revenues and privileges that ensured a steady supply of high-quality food. Meat, fish, bread, wine, fruit, game and local produce formed part of a varied diet, which on festive occasions was elevated into extraordinary banquets.

All of this gave rise to a refined culinary tradition, recorded in a celebrated Cookbook, where recipes handed down and perfected over centuries were compiled, reflecting Arab, Roman and Jewish influences.

According to tradition, the manuscript included everything from game stews and river fish dishes to desserts

made with honey and almonds, as well as recipes for liqueurs and preserves. Its fate became uncertain in 1807, during the passage of Napoleonic troops through Alcántara. It is said that Marshal Jean-Andoche Junot requisitioned it and presented it to his wife, the Duchess of Abrantes, and that it later inspired elements of French gastronomy, including dishes such as consommé and truffled poultry.

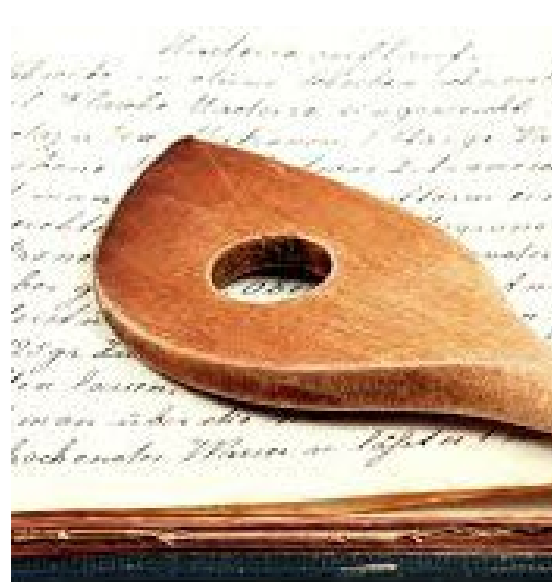
Although the manuscript has never been found, its influence lives on in local culinary tradition and in certain French preparations that still evoke the name of Alcántara today.

Significance of the Event for Extremadura

For Extremadura, the passage of that foreign army meant tension, requisitions and looting, leaving behind deep unrest and administrative disarray. Documentary records preserved in Alcántara clearly reflect the impact of the invasion.

In this climate of uncertainty, the cookbook acquired an unexpected prominence: coveted, stolen and ultimately requisitioned by the French as they advanced towards Portugal. Its disappearance — largely overlooked by historiography — speaks to the fragility of cultural heritage in times of war, but also to the powerful symbolic value of a cookbook capable of embodying memory, authority and tradition.

This episode was far more than a military operation: it was the imme-



diately prelude to the Peninsular War. The conduct of Napoleonic troops in Alcántara and elsewhere on the Peninsula foreshadowed what would soon become the occupation of much of Spanish territory — a conflict that would last until 1814 and mark the beginning of the end of Napoleon Bonaparte's dominance in Europe.

This story, told as a compelling chronicle by Jesús Sánchez Adalid, not only sheds light on a little-known episode of the War of Independence, but also invites us to reflect on the importance of safeguarding historical and cultural heritage in the face of crises and conflict. ■



PLENARY SESSION 1

NUCLEAR ENERGY AND DATA CENTRE



In the face of growing energy demand from data centres — key pillars of the digital economy — nuclear energy is emerging as a strategic source to ensure a stable, secure and low-carbon electricity supply.

During this session, the evolution of data centre energy consumption was examined, assessing the current context and growth projections in Spain and across Europe, while considering the impact this sector has on national and regional energy infrastructure.

The advantages offered by nuclear energy in meeting this increasing demand were analysed, highlighting its operational reliability, its capacity for continuous power generation, and its contribution to the decarbonisation of the electricity system.

The session also featured the presentation of international case studies illustrating models for integrating nu-

clear energy into advanced technological ecosystems. It concluded with a reflection on the regulatory, technical and public perception challenges Spain faces in seizing this opportunity at a pivotal moment of digital transformation.

Four speakers took part in the session: Ricardo Abad (Founder and Director of Quark Sener Group), Francisco Sánchez (Vice President for Strategy, Training and Digital Operations at Westinghouse Electric Company), Ismael Clemente (CEO of Merlin Properties), and Mikel Lotina (Director of Data Centres at IDOM).

The session was moderated by Rodrigo Crabbe, Co-founder and CEO of Exclud.

The session was structured into three main blocks:

- **First Block – Data Centres.** Addressing the question: What is the mis-

sion of data centres, and why are they so relevant today? It also explored the main data centre projects at national and international levels, their approximate energy consumption, and growth forecasts for Spain and Europe.

- **Second Block – Nuclear Energy and Data Centres.** Focusing on the advantages of nuclear energy in meeting these increasing electricity demands.

The discussion covered key international challenges, as well as the debate between large-scale reactors (around 1,000 MW) and Small Modular Reactor (SMR) technology.

- **Third and Final Block – Opportunities in Spain and Europe.** Considering current and potential data centre projects in Spain, the panel examined whether data centres could represent a real opportunity for nuclear energy development in Spain and across Europe.

THE CRITICAL MISSION AND EXPONENTIAL GROWTH OF DATA CENTRES

Data centres (DCs) are defined as the cornerstone of the digital economy and the physical infrastructure where “the cloud” resides. Their functions include receiving, analysing, processing and generating data, as well as acting as interconnection hubs — enabling, for example, image, sound and subtitles from a digital service to converge from different locations.

Their relevance is such that they have become absolutely essential. If data centres were to fail, society would be unable to communicate or access basic services, including something as fundamental as payroll processing.

The growth in power demand from data centres has been described as “brutal.”

At the national level in Spain, significant projects were highlighted, such as the three Amazon and Microsoft campuses in Aragón (1 GW each), along with two announced projects in Extremadura, also of 1 GW each.

Internationally, the scale is far greater: there are already 5 GW campuses in the United States, and particular attention was drawn to the announcement by Nvidia together with OpenAI of a single 10 GW data centre — a figure equivalent to the current installed data centre capacity across the whole of Europe (less than 10 GW).

Globally, data centres account for between 1% and 2% of total electricity

RICARDO ABAD FOUNDER AND MANAGING DIRECTOR. QUARK



FRANCISCO J. SÁNCHEZ VICE PRESIDENT OF TRAINING STRATEGY AND DIGITAL OPERATIONS. WESTINGHOUSE



consumption, reaching around 3% in Europe. Projections suggest that global demand could reach 100 GW by 2030, with Europe approaching 20 GW and Spain between 3 and 4 GW.

Energy demand associated with artificial intelligence training — especially generative AI — is growing at an especially rapid pace, with forecasts indicating growth rates of up to 70% for generative AI applications.

THE GRID BOTTLENECK AND STRUCTURAL CONSTRAINTS

It was pointed out that the main obstacle to data centre development is not a lack of electricity generation. Spain’s annual generation capacity exceeds 600 TWh, compared to a national consumption of around 240 TWh, leaving a potential surplus of 360 TWh that could theoretically be used.

The real bottleneck lies in the electricity transmission and distribution grid, which is not currently prepared to handle such high power demands. This limitation is attributed to insufficient investment in grid infrastructure over time. It was argued that many Western economies have prioritised welfare spending, allocating public expenditure mainly to current spending rather than to long-term infrastructure investment, resulting in a network that is not yet adapted to the scale required by large data centre projects.

Three common stigmas associated with data centres were also addressed:

1. **Water Consumption.** This perception can be misleading, as there are data centres designed to operate with zero water consumption. Reported figures should be placed in context. For example, a data centre park consuming 62 million litres per year may seem significant, yet a single hectare of rice cultivation requires around 18 million litres annually.

2. **Electricity Consumption.** Data centres are said to make use of surplus electricity capacity, with the real challenge lying in the transmission and distribution of that power. The bottleneck is therefore the grid, not generation itself.

3. **Employment.** Data centres create highly qualified jobs, including engineers and advanced vocational training professionals. A 22 MW facility, for instance, employs around 67 people in operations, in addition to specialised support staff.

NUCLEAR ENERGY AS A TECHNOLOGICAL SOLUTION

The speakers agreed that nuclear energy is the only technology currently capable of meeting the growing demand from data centres at the required scale. The advantages of nuclear energy are particularly critical for the digital sector:

- **24/7 Supply:** Data centres require continuous, uninterrupted power — something that variable renewable sources cannot reliably provide on their own. Nuclear energy ensures stable baseload generation, essential for mission-critical digital infrastructure.
- **Low Carbon Footprint:** Nuclear power

RODRIGO CRABBE CO-FOUNDER AND CEO. EXACLOUD



ISMAEL CLEMENTE CEO. MERLIN PROPERTIES



has one of the lowest lifecycle carbon footprints of any large-scale energy source. This is particularly important for the data centre sector, which has committed to achieving carbon neutrality by 2030.

- **High Energy Density and Power Quality:** Nuclear energy offers unmatched energy density (for example, it has been noted that around 14 large oil tankers such as the Jerry Viking would be required to match the energy output of a single 1,000 MW nuclear reactor). In addition, nuclear plants provide high-quality, stable electricity, helping to prevent harmonic distortions and frequency oscillations that could jeopardise data centre operations.

There is a growing trend among hyperscalers such as Amazon, Google and Microsoft to explore Small Modular Reactors (SMRs) due to their scalability and greater flexibility in siting.

SMRs could enable off-grid solutions for large data centre campuses, reducing dependence on the electricity grid and avoiding lengthy connection timelines, which can extend up to four years.

Large reactors, on the other hand, offer clear economies of scale — with lower costs per MW installed — and benefit from extensive operational experience, with more than 400 reactors currently in operation worldwide.

OPPORTUNITIES, REGULATORY CHALLENGES AND SOVEREIGNTY

The session highlighted several key challenges that must be addressed in order to seize this opportunity.

Among the most significant are social acceptance — as Spain is often perceived as “anti-nuclear” — the lengthy licensing timelines associated with nuclear projects, and the initial cost uncertainty surrounding Small Modular Reactors (SMRs).

In addition, the issue of talent and generational renewal within the nuclear industry was underscored. Ensuring the availability of qualified professionals and attracting new generations to the sector will be essential to support both current operations and future nuclear developments.

The importance of both data sovereignty and energy sovereignty was strongly emphasised. At present, most of the AI engines and applications used in Spain are not hosted within the country. In the current geopolitical context, it is considered imperative for Europe to manage a significant share of its own data in order to avoid strategic dependence on other economies.

The growing demand from data centres is therefore seen as a tremendous opportunity to relaunch the nuclear industry in Spain. One proposal discussed was to extend the operational lifetime of the existing nuclear fleet (the seven remaining reactors) and gradually replace them with Small Modular Reactors (SMRs), making use of already amortised grid evacuation infrastructure.

It was also noted that the scale of investment in the digital industry is extraordinary — with figures such as the \$50 billion reportedly announced by Alibaba Group in a single year — and that this financial momentum could

MIKEL LOTINA DATA CENTER MANAGER. IDOM



accelerate SMR development and ultimately drive political acceptance.

Finally, to address the grid bottleneck, public-private cooperation was proposed as a key solution. It was stressed that investment in transmission and distribution networks must be remunerated more attractively. While the European average return ranges between 7.3% and 8.6%, Spain currently offers a regulated return of 6.46%, which may limit incentives for accelerated infrastructure development. Given that the private sector in Spain is considered to be relatively deleveraged, it was argued that it could play a greater role in strengthening and meshing the grid, enabling faster upgrades and improved capacity to accommodate the large power demands associated with data centres and digital infrastructure. ■



EQUIPO AHORRO



TE **AYUDA
A AHORRAR.**
SEA CUAL SEA
TU ENERGÉTICA.

PLENARY SESSION 2

A STRATEGIC SECTOR FOR SPAIN





Cáceres 2025
22-26 de septiembre
51 REUNIÓN ANUAL
SOCIEDAD NUCLEAR ESPAÑOLA

SESIÓN PLENARIA 2

#NuclearesEnCáceres

Un sector estratégico para España



PATRICIA da COSTA
Decana
Colegio de Ingenieros
Industriales de Extremadura



MARIA LLOP
Catedrática de Fundamentos del
Análisis Económico
Universitat Rovira i Virgili



ALBERTO MARTÍN
Socio
PwC



JULIÁN MORA
Catedrático de Ordenación
Territorial
Universidad de Extremadura

Under this heading, Plenary Session 2 of the 51st Annual Meeting of the Spanish Nuclear Society was held at the Cáceres Conference and Exhibition Centre.

The second plenary session of this edition focused on the socioeconomic aspects of nuclear energy, offering a comprehensive view of its strategic role in Spain's sustainable development.

Through the speakers' presentations, data were provided on the nuclear sector's contribution to Gross Domestic Product (GDP), its capacity to generate high-quality employment, as well as its competitiveness compared to other energy sources, particularly in terms of generation cost, price stability, energy density and energy independence.

The territorial impact of nuclear power plants was also addressed, both those in operation and those in the

process of closure, with special attention to the socioeconomic fabric of the affected region, population retention, local development, and the training and indirect employment opportunities generated by the sector.

The session also reflected on the social acceptance of nuclear energy, the evolution of public perception in Spain, and the fundamental role played by education, scientific outreach and transparency in building an informed vision of the present and future of this technology.

The session was moderated by **Patricia Da Costa**, Dean of the College of Industrial Engineers of Extremadura, and featured the participation of the following speakers:

- Maria Llop, Professor of Fundamentals of Economic Analysis at Rovira i Virgili University.
- Alberto Martín, Partner at PwC.

PATRICIA DA COSTA PARTNER AT PWC



MARIA LLOP
PROFESSOR OF FUNDAMENTALS
OF ECONOMIC ANALYSIS AT
ROVIRA I VIRGILI UNIVERSITY



- Julián Mora, Professor of Regional Planning at the University of Extremadura.

After a brief introduction by the Moderator, **Maria Llop** first reviewed the different impacts of the nuclear industry, recalling that not all of them are economic, as there is also a social, geographical/territorial, energy, technological and environmental impact.

Additionally, she outlined the economic impacts, distinguishing between those that are short-term (production, employment, income, public revenues) and those that are long-term (productivity, production capacity, economic growth).

She then presented data on the short-term economic impact in a specific region of Spain over a recent four-year period, analysing the Direct, Indirect and Induced Effects and the relationship between them.

The data show that, in terms of Production, there is a multiplier effect of 4.1 for every euro of direct production. Regarding the impact on employment, nearly three jobs are generated through direct and indirect effects for every direct job created.

She also presented relevant data on the social perception of nuclear energy in Spain.

Going deeper into the impact of the nuclear fleet on the energy market, **Alberto Martín** presented a series of data from which the following conclusions can be drawn:

ALBERTO MARTÍN
PARTNER AT PWC



- Nuclear power plants provide a constant, competitive and emission-free generation base, which reduces costs for the electricity system and allows for lower prices for consumers.
- Nuclear energy produces carbon-free electricity. The nuclear fleet avoids, on average, the emission of 34 million tonnes of CO₂ per year.
- The Spanish nuclear fleet bears an increasing tax burden that includes redundant and unjustified charges, placing it well above other European countries in comparison. Moreover, it is the technology within Spain's energy mix that carries the highest tax burden.
- Nuclear energy provides stability and security to the electricity system, guaranteeing continuous supply and delivering firm, synchronous power with voltage control capability.
- The management of radioactive waste is a scientifically and technically resolved challenge, although it still faces difficulties in terms of political and social support.

Passing the floor and shifting the focus to the local socioeconomic impact, **Julián Mora** provided a historical overview of a series of indicators showing the impact of the Almaraz Nuclear Power Plant on its surrounding area:

- Direct, indirect and induced employment in the municipalities in the area is estimated at around 2,900 jobs, due to its synergistic effects.
- Population growth without parallel in "depopulated" Spain, thanks to the

JULIÁN MORA
PROFESSOR OF REGIONAL
PLANNING AT THE UNIVERSITY
OF EXTREMADURA



arrival of technical workers and their families, which altered the demographic structure of the area, attracted people from outside and retained the local young population.

- Economic level, reflected in high average household income levels in Almaraz, above the Spanish average, an unemployment rate (8%) lower than the national average, and a higher percentage of Social Security contributors (47.4%) than in the rest of the country.

He added that the decommissioning of the Almaraz Nuclear Power Plant would mean economically emptying northeastern Extremadura, as the entire accumulated business structure would collapse and all the aforementioned indicators would decline.

Regarding the environmental impact of the Almaraz Nuclear Power Plant, the case of the Arrocampo ZEPA (Special Protection Area for Birds) was presented. Paradoxically, this protected area was created due to the environmental value of the plant's cooling reservoir, and its decommissioning would have a negative impact on this protected space.

Finally, a lively debate took place among the speakers and the moderator, who also conveyed a series of questions from the audience. During this discussion, the participants reflected further and clarified the data previously presented. ■

PLENARY SESSION 3

THE 60S ARE THE NEW 40S



At the 51st Annual Meeting of the Spanish Nuclear Society, the final plenary session, entitled “60 is the new 40,” brought together leading experts to discuss a highly topical and relevant issue for the sector: the future of nuclear energy through Long-Term Operation (LTO). The global energy landscape is undergoing a significant transformation, and nuclear energy plays an essential role in this evolution. Many of the world’s nuclear reactors are reaching the end of their design lifetime, making LTO an increasingly relevant consideration to ensure safe, reliable, and sustainable nuclear generation in the decades ahead. The session, moderated by **Patricia Cuadrado** (Women in Nuclear, Spain), addressed the economic and strategic

motivations that have driven the extension of the operating lifetime of nuclear power plants. Among these were the optimization of existing assets, the amortization of investments already made, and the containment of energy costs in a context of growing electricity demand and decarbonization.

It was also emphasized that LTO is not only a technical decision, but also a strategic one, as it helps strengthen security of supply, maintain highly skilled employment, and make use of established infrastructure, all under the strictest safety standards and regulatory oversight.

The panel featured three distinguished speakers, who shared their knowledge and experience from different perspectives within the nuclear sector: **Martín**

PATRICIA CUADRADO **WOMEN IN NUCLEAR, SPAIN**



MARTÍN MARCHENA
NUCLEAR SAFETY OFFICER,
DIVISION OF NUCLEAR
INSTALLATION SAFETY, IAEA



Marchena (IAEA), **Garry G. Young** (EPRI), and **Etienne Hoarau** (Tractebel).

Martín Marchena, Safety Officer in the Division of Nuclear Installation Safety at the IAEA, opened the session by explaining how the IAEA supports Long-Term Operation (LTO) through the development of reference safety standards and the implementation of Peer Review programmes, as well as expert committees in the various areas involved.

Next, Garry G. Young, Technical Executive in the nuclear sector at EPRI, provided several data points on LTO in the United States, where 13 reactors already hold operating licenses for up to 80 years, and 12 more are currently under review. In total, more than 90% of U.S. reactors are operating under long-term operation.

He also added that “the best way to demonstrate the relevance of long-term operation is to run plants safely and reliably — and that is exactly what we are already doing.”

Finally, Etienne Hoarau, Long-Term Operation Program Manager at Tractebel, shared the case of Belgium, which is particularly interesting, having transitioned—due to the international context—from a full phase-out plan with a 2025 horizon to extending the operation of two of its nuclear power plants for at least 10 more years.

The plan includes an ambitious programme of staggered operating phas-

GARRY G. YOUNG
TECHNICAL EXECUTIVE, LTO AND
AGING MANAGEMENT STRATEGY,
EPRI



es during the winter, combined with maintenance outages in the summer months (over a four-year period).

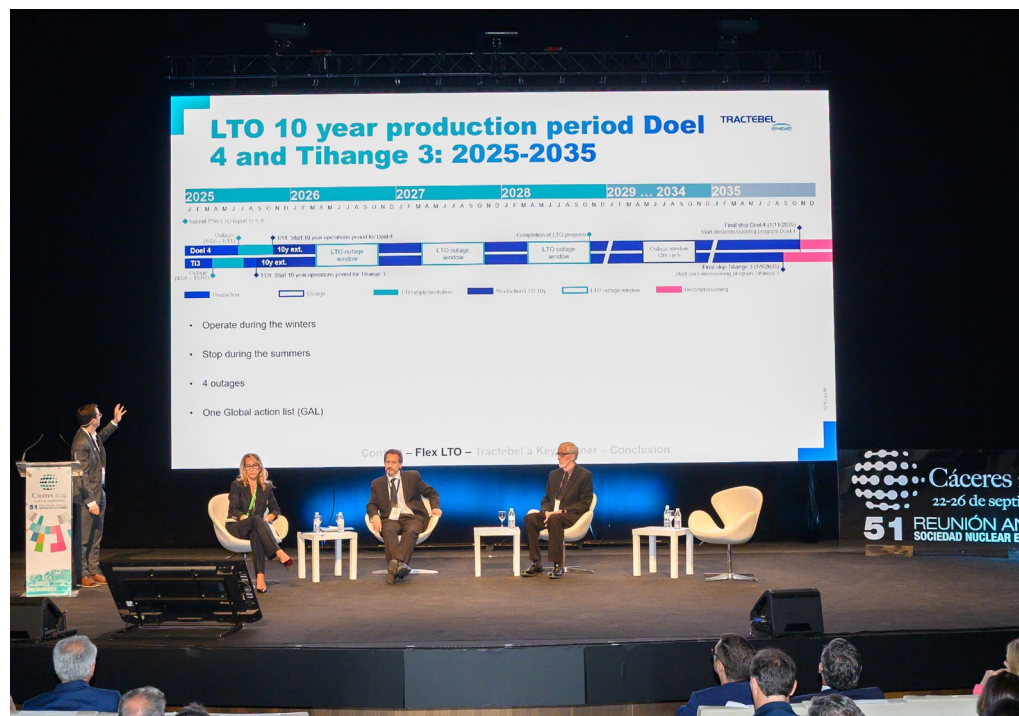
Subsequently, a roundtable discussion was held, enabling the panel to further explore the topics presented and respond to questions from the audience. Among the issues addressed were the technical and organizational challenges of safely operating nuclear power plants for 40, 60 years or more,

ETIENNE HOARAU
LTO PROJECT MANAGER,
TRACTEBEL



and how international organizations such as the IAEA and EPRI are adapting their support to Member States in ageing management and long-term operation, particularly in countries with varying regulatory and industrial maturity levels.

The session demonstrated how extending the operation of nuclear power plants can contribute to sustainability, energy security, and decarbonization objectives. ■



CLOSING SESSION

MARISA GONZÁLEZ VICE PRESIDENT OF THE SPANISH NUCLEAR SOCIETY



Dear delegates, distinguished guests and authorities, colleagues from all the committees who have done an outstanding job in making this event possible, dear friends.

I have the immense honour of being here at this Closing Session, sharing the stage with Mercedes Morán, Regional Minister for Agriculture, Livestock and Sustainable Development of the Regional Government of Extremadura; José Manuel Redondo, Deputy Director General for Nuclear Energy at the Ministry for the Ecological Transition and the Demographic Challenge; and Juan Carlos Lentijo, Chairman of the Nuclear Safety Council.

Today we bring to a close a week that has been intense in terms of work, activities, and moments that will remain in our memory and that we will now see captured in a short summary video.

We can affirm that the 51st Annual Meeting of the Spanish Nuclear Society has been a true success in terms of attendance. More than 694 participants have attended 42 sessions, featuring over 248 technical presentations, complemented by one poster session and one session on nuclear technology and innovation organized by our dear Young Nuclear members, all made possible thanks to the sup-

port of 31 sponsors and collaborators.

The 51st Annual Meeting also featured 23 exhibitors who contributed with their stands and information to the success of this event. I would therefore like to thank them for their contribution, without forgetting the Organizing and Technical Committees, the Board of Directors, and all the people who, through their roles—whether more or less visible—have contributed their efforts, some for many months, to ensure that everything worked properly throughout this intense week.

Next, I will proceed to present the nine winners in the three categories of the SNE Photography Contest, sponsored by Framatome, to whom we once again express our gratitude for their collaboration. Many thanks to all the participants, and congratulations to the winners.

We will now meet the winner and the two finalists for the Best Master's Thesis and Final Project awards, as well as the winners of the Best Papers presented across the ten defined technical areas, in addition to the Young Session and the Poster Session awards.

The high quality of all the papers presented is a hallmark that continues to surpass itself year after year at each Annual Meeting. For this reason, I would like to thank all the authors who have shared their work over these three days, and to especially congratulate the authors of the award-winning papers, as they are a true reflection of this excellence.

As is customary, these awards will be presented at the Operational Experience Conference, which we expect to hold in March next year.

We are approaching the end, but first we are going to see the official dinner group photo, because we are undoubtedly a great family that gathers every year to share knowledge, training, and information, as well as wonderful moments together.

I am coming to the end, but before I do, I would like to share with you one of those special moments from these past days. This Monday, on my way to Cáceres, while driving and seeing Almaraz on my right, the famous phrase by Martin Luther King came to my

mind: I have a dream!!!!

And yes, I too have a dream — a dream that I would like to share with all of you.

My dream is that Almaraz, Ascó, Cofrentes, Vandellós II and Trillo — our seven Treasures — will continue operating for many more years, providing the much-needed energy for our country. I dream that the long-awaited agreement will be reached, and that we will stop feeling 2027 as a sword of Damocles hanging over our heads. Hopefully, at the 2026 Annual Meeting, we will be able to look to the future with optimism and concern ourselves only with guessing where we will meet the following year.

May my dream — which I hope is also yours — very soon become our reality.

Before saying goodbye, I would also like to express my very special thanks to José Manuel Redondo, who will soon be retiring, for the many years in which he has accompanied the Spanish Nuclear Society on numerous occasions.

Thank you very much for your attention.

JOSÉ MANUEL REDONDO DEPUTY DIRECTOR, MITECO



Good morning.

First of all, and as always, I would like to thank the Spanish Nuclear Society for inviting me once again to participate in the Clos-

ing Session of this Annual Meeting. As I have mentioned on other occasions, this invitation not only gives me the opportunity to inform such a relevant group as the one you represent about the work we have carried out at the Deputy Directorate-General for Nuclear Energy since the last Annual Meeting, but it is also always an honour for me.

I will begin by recalling something that has likely already been mentioned during this meeting: the seven nuclear reactors currently operating in Spain generated 52,133 GWh of electricity in 2024, representing a 19.6% contribution to national electricity production. Nearly 28% of this energy was produced by the two units at Almaraz.

Also, following the previous Annual Meeting, in November of last year, the renewal of the operating license for the Trillo Nuclear Power Plant was granted, extending its validity until 16 November 2034.

With regard to the front end of the nuclear fuel cycle, in 2024 Enusa manufactured 511 fuel assemblies at its Juzbado plant. Of these, 309 were exported to Belgium, Finland, France and Sweden, representing 63% of total production in terms of tonnes of uranium.

Since Russia's invasion of Ukraine, the procurement strategy for enriched uranium adopted by Enusa and the nuclear power plant owners has focused on maximizing supply diversification, reducing dependence on material sourced from Russia.

Within Enusa's business scope, it is worth noting that, following the corresponding parliamentary process, the Common Protocol relating to the Application of the Vienna Convention and the Paris Convention on Civil Liability for Nuclear Damage entered into force for Spain on 19 August. This will facilitate the company's ability to secure nuclear fuel supply contracts with Eastern European countries such as Hungary, the Czech Republic, and the Slovak Republic.

Moreover, regarding the final disposal facility for low-, intermediate- and very low-level radioactive waste at El Cabril, and in accordance with the provisions of the 7th General Radioactive Waste Plan (7th GRWP), the processing of the project to expand its storage capacity for low- and intermediate-level radioactive waste has con-



tinued through the construction of new disposal cells, which will be built on a new platform (Southeast Platform).

These cells are expected to be operational in 2028, and their construction will be carried out in phases. The first phase includes the construction of 12 cells, followed by up to 15 additional cells as needed. In relation to this project, the execution and assembly of this platform were authorized on 17 January.

With regard to the interim management of spent fuel, I would like to remind you that the 7th General Radioactive Waste Plan (7th GRWP) establishes that this management will be carried out through seven Decentralized Interim Storage Facilities. These facilities will consist of the corresponding Independent Spent Fuel Storage Installation (ISFSI) — or, where applicable, their respective ISFSIs — together with a new complementary installation or additional measures enabling the maintenance and repair operations of their storage casks.

With regard to these facilities, it should be noted that, since the last Annual Meeting, at all the sites where the so-called ATI-100 project is planned — that is, to provide sufficient capacity for the interim storage of all the spent fuel generated by the plant, namely Vandellós II, Ascó I and Ascó II, Cofrentes, and Almaraz — authorization has been granted for the execution and assembly of the ATI-100 facilities, and their license holders have already submitted the corresponding application for the required modification to allow their commissioning.

It should be noted that, in the case

of Almaraz, the Environmental Impact Statement for its ATI-100 project included the corresponding trans-boundary environmental assessment, in which Portugal participated.

With regard to Santa María de Garroña, the plant has an ISFSI (ATI), whose commissioning authorization was granted in 2018. Since this ISFSI was initially designed to allow the continuation of plant operation, it has been necessary to amend its licensing so that it can accommodate, in 49 casks, all the spent fuel generated, as well as special waste arising from its decommissioning, in five additional casks. This capacity expansion was authorized on 20 May.

Likewise, on 28 October 2024, Enresa submitted the application for authorization to carry out the execution and assembly of a Support Facility for the ISFSI (ATI), which, in accordance with the provisions of the 7th General Radioactive Waste Plan (7th GRWP), will constitute, together with the ISFSI itself, the Decentralized Interim Storage Facility.

Regarding this Support Facility, a simplified environmental impact assessment procedure has been carried out, resulting in the Environmental Impact Report for the project, issued by resolution of the Directorate-General for Environmental Quality and Assessment on 24 April.

As for Vandellós I, after completing the public information process and consultations with the affected public authorities and interested parties, on 6 August the Deputy Directorate-General for Nuclear Energy forwarded the environmental impact assessment file

to the Secretary of State for the Environment, so that the corresponding Environmental Impact Statement may be issued for the project to construct an Interim Storage Facility at this installation, which is currently in the latency phase.

The 7th General Radioactive Waste Plan (7th GRWP) provides for this facility to be available in 2027, and it will be capable of accommodating the waste resulting from the reprocessing of spent fuel from this plant that must be returned from France.

With regard to the regulations approved since the last Annual Meeting, as many of you already know, there has been an important development: the approval of the Regulation on nuclear and radioactive facilities, and other activities related to exposure to ionizing radiation, through Royal Decree 1217/2024 of 3 December.

One of the main differences compared to the previous RINR is that this new Regulation extends its scope of application to other activities related to exposure to ionizing radiation, such as occupational activities in which naturally occurring radioactive materials are generated, processed or managed, as well as exposure to cosmic radiation affecting aircraft crews or exposure for non-medical imaging purposes.

I would like to highlight that, among other aspects, this new RINR establishes that the design approvals for spent nuclear fuel storage casks granted under the previous RINR will now be considered as authorizations for temporary spent nuclear fuel storage casks. It also provides for the transfer of ownership of these authorizations to Enresa, through the corresponding authorization issued by the Directorate-General for Energy Planning and Coordination, subject to a prior report from the Nuclear Safety Council.

However, this new RINR also establishes that, once the transfer of ownership has been granted, the original holder of the cask design approval may retain a favourable appraisal of the cask design, which will be issued by the Nuclear Safety Council (CSN) upon request.

As regards the regulations currently under processing, it should be noted that we are handling a draft Royal Decree amending the Regulation on the protection of health against the risks arising from exposure to ionizing ra-

diation, approved by Royal Decree 1029/2022 of 20 December, which has two objectives:

- on the one hand, to complete the transposition of Directive 2013/59/Euratom with regard to the scope of application of the aforementioned Regulation, particularly concerning interventions in existing exposure situations.
- and, on the other hand, to take into account the experience gained in the implementation of this Regulation, as well as the recent approval of the new RINR.

Before concluding, I would like to express my recognition to the professionals of the Spanish nuclear sector who, year after year, continue to contribute through their work, expertise, and dedication to ensuring that nuclear energy maintains—under safe conditions—the significant role it plays in our society, not only in an essential sector such as electricity supply, but also in other equally essential fields such as healthcare, industry, and research.

I would also like to congratulate the Organizing Committee and the Technical Committee, as well as all those who have participated in the various sessions held over these three days, whose effort and dedication have contributed to the success of this Annual Meeting.

Since, as some of you already know, this is the last Annual Meeting in which I have the honour of participating, as next October — using that cycling term so often employed on such occasions — I will be entering a new stage of life known as retirement, I do not wish to conclude my remarks without saying goodbye.

That the Spanish Nuclear Society has invited me, throughout the years in which I have served as Deputy Director General for Nuclear Energy, not only to this Annual Meeting but also to the Conference on Operating Experience and Perspectives of Spanish Nuclear Power Plants, has not only been an honour for me, but has also given me the satisfaction of, at times, feeling part of a community whose main objective in its work is excellence — as is the Spanish nuclear sector.

My participation, not only in these events organized by the Spanish Nuclear Society, but also in the information committees of the nuclear power plants held annually at the respective town halls, has given me the opportunity to witness firsthand the high level of rigor, commitment, and, ultimately, professionalism of the personnel involved in the safe operation of nuclear power plants — from the Plant Manager to the last field operator. A professionalism that, even in times of uncertainty such as the one we are



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REFERENCIAS

- C.N. Almaraz 1 y 2
- C.N. Cofrentes
- C.N. Trillo
- C.N. Vandellós 1 y 2
- C.N. Ascó 1 y 2
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- C.T. Los Barrios

currently experiencing, is never called into question.

I am coming to the end. On every occasion I have had the opportunity to take part in this Annual Meeting, I have highlighted how positive the substantial increase in the participation of renewable energies in the Spanish electricity supply has been in recent years. Specifically, so far this year, this share has reached nearly 57%.

However, one aspect I have also consistently referred to is the role that nuclear energy plays in this electricity supply as the backbone of the system — a role to which, this being the last opportunity I have to address you, I cannot fail to refer once again.

In this regard, we have recently seen how terms have appeared in the media that, until now, the vast majority of “members of the public” (to use the terminology of the Regulation on health protection) had never heard before, such as “grid frequency,” “synchronous power,” “reactive energy,” and so on — terms that serve to highlight the value of the role played by nuclear energy.

In conclusion, despite the uncertainties that lie ahead — something that, unfortunately, has long been a recurring feature of the Spanish nuclear sector — for my part, I choose to trust that the decision ultimately adopted will be the best one for Spain.

Thank you very much and farewell.

JUAN CARLOS LENTIJO CHAIRMAN OF THE NUCLEAR SAFETY COUNCIL

Good morning.

On behalf of the Nuclear Safety Council, I would like to thank you for the invitation to this closing ceremony of the 51st Annual Meeting of the Spanish Nuclear Society. It is a pleasure for me to join you in the wonderful city of Cáceres.

I am not going to dwell on the enormous historical, cultural, and human treasures that enrich this fantastic city, because I am sure that others have already done so with far greater authority than I could.



What I am certain of is that Cáceres has provided the perfect setting to host this Annual Meeting of the Spanish Nuclear Society, which, as we all know, is an essential event in the calendar of the nuclear sector in our country.

And as Marisa pointed out in her introduction, the technical programme — with 42 sessions and nearly 300 presentations — has made a significant contribution to research and knowledge in our field.

Because, as the Nobel Prize in Physics laureate Enrico Fermi stated in 1938, “There is no use trying to stop the progress of knowledge. Ignorance is never better than knowledge.”

Dear friends,

I have seen that the opening lecture was about “The Alcántara Recipe Book,” and I thought that the best way to close this Congress was to come full circle by referring to it. Because, although they may seem like separate worlds — cooking and nuclear energy, stoves and reactors — they share certain fundamental principles.

First of all, tradition as the accumulation of knowledge. In this regard, nuclear science does not emerge from nothing: it rests upon multiple disciplines and experiences — mostly successes, but also some failures, from which we learn.

Secondly, innovation. Just as “The Alcántara Recipe Book” does not merely preserve traditional dishes, scientific and technical research drives

progress in nuclear applications, making them more efficient and safer.

And thirdly, ignorance as the real danger. When the French troops, in their retreat, took with them the recipe book from the kitchen of the Conventual Guesthouse, they did not ignore it; rather, they helped to strengthen haute French cuisine, consolidating dishes that are now world-renowned.

In the nuclear field, research, communication, and transparency are essential; to ignore them — or to disregard regulations and the fundamental principles of safety — that would indeed be a risk.

Therefore, we can conclude that, more than two centuries later, “The Alcántara Recipe Book” continues to offer valuable lessons: beyond a nostalgic culinary journey, it stands as a true tribute to research, to the preservation of knowledge, and to informed boldness.

Dear friends,

Having taken this liberty, allow me now to move on to more specific matters. At the “Conference on the Experiences and Perspectives of Nuclear Power Plants” held last March, I already summarized for you the main milestones achieved by the CSN over the past year. I would now like to remind you of the key actions undertaken by the CSN — our own recipes — so far in 2025.

In this regard, at the very beginning of the year we hosted the follow-up mission to the IRRS (Integrated Regulatory Review Service) mission carried out in 2018 by the International Atomic Energy Agency (IAEA). We are very satisfied with the results, as the international review team concluded that the approximately thirty recommendations and suggestions issued in 2018 had been satisfactorily addressed.

In addition, the team identified two good practices: the implementation of the digital radiological record card and the centralized digital dosimetry system.

On the other hand, we have issued favourable reports on the authorizations for the execution and assembly of the new Individualized Interim Storage Facilities (ATI-100) at Almaraz and Cofrentes, which complete those previously reported for Vandellós II and Ascó. We have also reported favourable

bly on the expansion of the ATI at Santa María de Garoña (Burgos), which is currently in Phase 1 of decommissioning.

Likewise, we issued favourable reports on the modification of the flexible operating strategy of all nuclear power plants currently in operation, following the Complementary Technical Instructions on the requirements applicable to these strategies, which we sent to their license holders last year. It is now the responsibility of the Ministry for the Ecological Transition and the Demographic Challenge (MITERD) to proceed with the corresponding authorizations.

Last July, we issued the Complementary Technical Instruction regarding the submission of the official shutdown documentation for Unit I of Almaraz, which, as you know, is the regulatory instrument specifying the documents to be submitted and the deadlines for their submission by the plant license holder to MITERD and the CSN for the declaration of cessation of operation. All of this is in accordance with the regulations and procedures applicable to this type of situation.

I would also like to highlight the normal performance of the nuclear power plants, with regard to nuclear safety, during the power outage that affected the Iberian Peninsula on 28 April. Following the loss of off-site power supply, their on-site power systems operated as expected.

The CSN declared its Emergency Mode 1, which allowed us to closely monitor the actions of all nuclear power plants and other nuclear and radioactive facilities across the country, and to keep the competent authorities and the general public properly informed.

At present, we continue to assess the different aspects of the event in order to draw lessons for improvement in the various areas involved: emergency response, interactions between the plants and the external power grid, and communication-related aspects.

To conclude, allow me to share that, in this new stage of the CSN, which began in April of this year, we are preparing a new Strategic Plan for the next five-year period, with several key orientations of interest: strengthening safety culture, delivering public service excellence, and enhancing efficiency and agility in our regulatory processes.

All of this, of course, within the commitments and values that underpin an independent and impartial regulatory body such as the CSN.

In this context, we are considering establishing both internal and external consultation processes to ensure that we are fully aware of expectations regarding the future of the CSN across the different areas of activity.

Dear friends, I will now conclude.

Over the past few days, here at the Conference and Exhibition Centre of Cáceres, very important issues for the future of nuclear energy have been raised, many of them highly relevant to nuclear safety, and on some of which we at the CSN are already working as well.

This is what we must do: discuss our challenges with the greatest possible degree of information and transparency, always focused on identifying opportunities for improvement.

All that remains for me is to congratulate you once again on the success of this fifty-first meeting. Congratulations to everyone whose work has made it possible.

See you in A Coruña in 2026.

Thank you very much.

MERCEDES MORÁN **MINISTER OF AGRICULTURE,** **LIVESTOCK AND SUSTAINABLE** **DEVELOPMENT OF THE REGIONAL** **GOVERNMENT OF EXTREMADURA**

Dear nuclear friends,

First of all, I would like to thank the Spanish Nuclear Society — and to do so through its President — for inviting me to take part in the closing of your Annual Meeting. I am very much looking forward to finding out where the next one will be held.

What does nuclear energy contribute? Nuclear energy is a clean source of energy, with zero emissions, and it guarantees our energy sovereignty — I would even say it is essential in the current geopolitical context. I begin with this statement because, from the very outset, I want to convey the support and firm position of this Government of the Regional Government of Extremadura — a position that has always been



the same and will continue to be so, without any change of opinion — in favour of nuclear energy.

This Government unequivocally supports this energy source, without hesitation and without ambiguity, and, of course, we firmly defend the continued operation of the Almaraz Nuclear Power Plant.

For all these reasons, I would also like to thank the Spanish Nuclear Society for having chosen Extremadura — and this wonderful city of Cáceres — to host its Annual Meeting. It places the spotlight on our region and on our unwavering commitment to highlighting the importance of our plant, the Almaraz Nuclear Power Plant, which is an indispensable asset for Extremadura and, of course, for Spain.

And yet, it is the first plant to be in the sights of the central Government and included in the closure timetable that has been set — a timetable that, in our view, is misguided. I say misguided because insisting on its closure at this time is contrary to all logic and common sense. It runs counter to technical criteria and is far removed from the majority view — at least among the people of Extremadura.

Almaraz is indispensable because of the employment and wealth it generates, and because of its fundamental contribution to the economy of its surrounding area and of Extremadura as a whole. But we must go further, because this nuclear power plant does not concern Extremadura alone; it is not only important for our region, it is vital for Spain, as it generates 7% of the nation's electricity.

José Manuel Redondo explained this very clearly today, and I would like to congratulate him on his new stage in life and wish him every happiness.

What would have happened if the nuclear power plants had been operating at 100% during those days we experienced last spring? In my view, there would not have been a blackout. A blackout that was said to be impossible — something that could never happen. I must say that this was what was conveyed to me months earlier by the Ministry when I was defending the extension of Almaraz's operating life. And yet, it happened.

Moreover, without nuclear power plants, electricity bills for families would rise significantly and, of course, the competitiveness of our companies would suffer. We cannot go against the times. We need nuclear energy and, therefore, the continued operation of the Almaraz plant and, of course, the rest of Spain's nuclear power plants.

A large part of society understands this — experts, you yourselves, business leaders, and many other groups and stakeholders. I believe that the only one who does not understand it, or who is going against the current, is the Government, which, in our view, does not fully grasp the global situation we are facing or the direction other countries are taking.

I believe the Government must find the moment to meet with the owner of the Almaraz nuclear power plant, with a genuine willingness to engage in dialogue. And I believe that what is needed is fair taxation, not what is

being presented as justified but which amounts to undue pressure. Here I must pause for a moment. It is well known that the percentage of taxes paid by the plant's owners is paid to the State. This is not my assertion; it is stated in the FEDEA report.

Nevertheless, the Regional Government remains firmly committed to defending the continued operation of Almaraz, and we will act accordingly. We will adjust Extremadura's regional taxation, if necessary, should the plant's continuity depend on it.

Have no doubt that this represents a major effort on the part of Extremadura, but it is an effort that must be made at every level of government for the future of our country.

And, of course, we need to follow the path set by Europe, where countries around us are opting for precisely the opposite of what Spain is pursuing. I would like to recall that in 2023, more than 20 countries signed an agreement at the COP, committing to triple their nuclear capacity by 2050.

Europe and the world are moving along the nuclear path; they are aware of its importance, of the need for it, and of the energy security it provides. Meanwhile, in Spain, we seem determined to head in the opposite direction — increasing our dependence on other energy sources... In short, a misguided course of action.

Our region is a renewable energy powerhouse. However, despite the growth of renewables, we still need nuclear power plants to guarantee our energy security.

From the Regional Government of Extremadura, we want to continue promoting renewables and to play a leading role in the energy transition. But that does not prevent us from firmly defending nuclear energy, because although it cannot be classified as renewable, it is indeed classified as clean energy — Europe itself recognizes it as clean — and within Extremadura's energy mix, both sources are equally important.

Out of a total of 31,173 megawatt-hours generated in 2024, the breakdown was practically 50% renewables and 50% nuclear. And it is true that Extremadura meets all the conditions required to produce clean energy — in all its forms.

And that development depends not only on renewables, but also on the continued operation of the Almaraz Nuclear Power Plant. We will defend it to the very end, without seeking confrontation or division, because we understand that maintaining nuclear energy requires unity among all those who believe in it, and who believe that both models can perfectly coexist.

In short, let me once again thank you for the invitation extended to the Regional Government of Extremadura, which will continue to defend the need to keep the Almaraz Nuclear Power Plant in operation and to support nuclear energy.

You can count on us as allies in firmly rejecting the inconsistency of closing nuclear power plants.

Thank you very much. ■

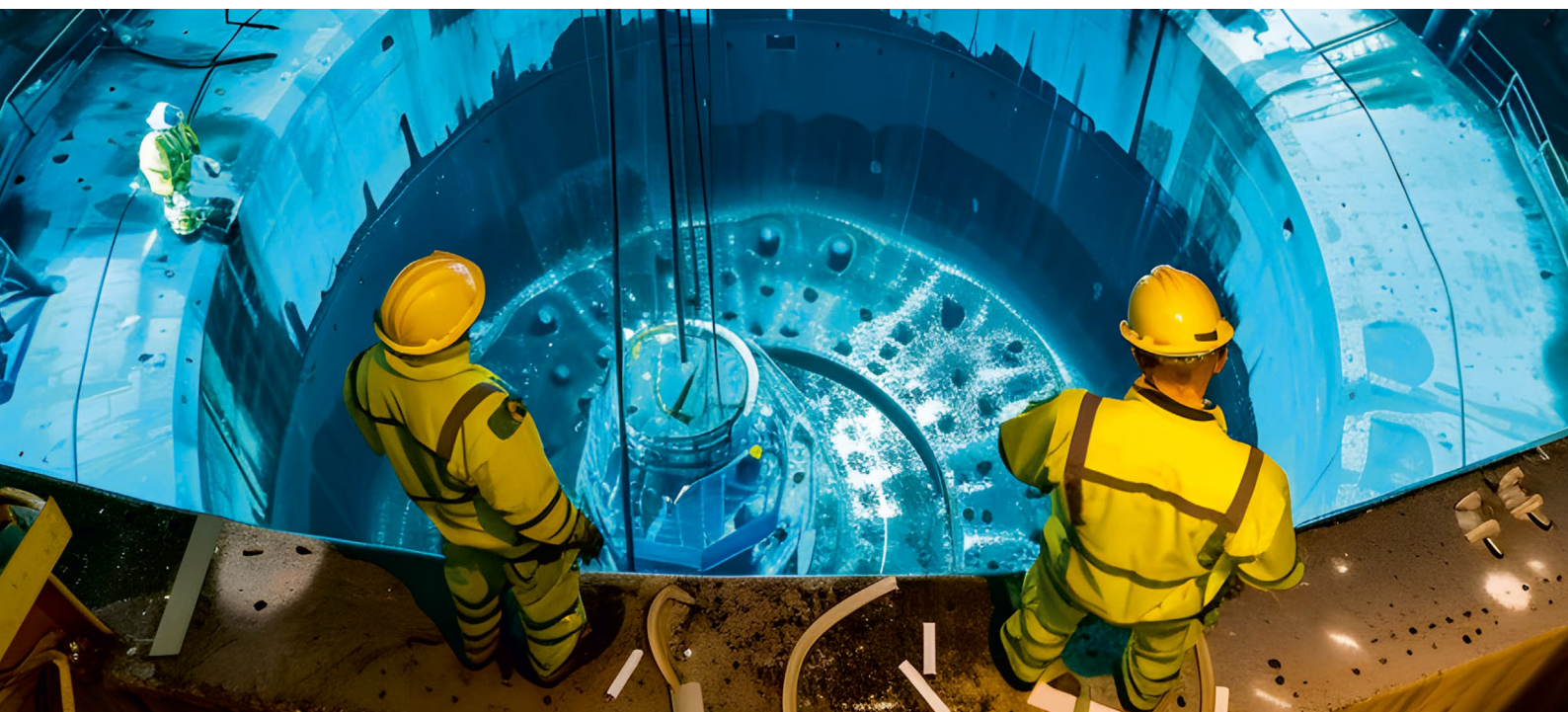


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TECHNICAL SESSIONS

SESSION 1 SECURITY AND LICENCE (I)

The session brought together six presentations offering an overview of industry activities related to Probabilistic Safety Analyses, seismic and fire analyses, and Severe Accident Analysis.

Francisco Beltrán

Fragility analysis is essential in seismic Probabilistic Safety Assessments (PSA). The Separation of Variables (SoV) method, with more than 35 years of application, is considered the most accurate approach for developing fragility curves for structures, systems, and components. This method enables the characterization of random variables through median values and standard deviations. In addition, it proposes leveraging this framework to implement Monte Carlo Simulations (MCS), thus avoiding the conventional second-order moment method. The presentation explains how to apply MCS within the SoV framework, offering a clear and well-structured overview of the methodology.

Mario Rodríguez Cruz

It proposes adapting the existing internal events model to fire analysis within the ANAV IPE-PSA project, rather than developing a new one from scratch. The presentation compares both models and highlights clearly defined objectives, professional relevance, and a well-structured approach.

Cesar Serrano

During cold shutdown, maintaining primary containment integrity is not a requirement of the Technical Operating Specifications (ETFM). However, during refuelling outages at Cofrentes NPP, containment opening is restricted until the reactor cavity is flooded with the vessel head removed. This configuration allows for the rapid re-establishment of containment in the event of a loss of core heat removal. The measure is justified by its impact on risk analysis, specifically in terms of source term release in accidents involving fuel damage. The presentation was clear and above average in terms of evaluation criteria.

Giacomo Tinfena

The presentation addresses the pioneering application of the Inverse Uncertainty Quantification (IUQ) methodology in the field of Severe Accidents, within the framework of the SEA-KNOT-EU project. The fractional release of cesium modeled by MELCOR was analyzed, reviewing more than sixty experimental datasets and selecting a representative subset. Using the IUQ procedure based on CIRCE, the uncertainty range of the Revised CORSOR-Booth model was determined and subse-



Jorge Martínez
PRESIDENT



Javier Gutierrez
COORDINATOR

quently validated against data from the PHEBUS-FPT1 experiment. The work is of high scientific interest and was presented in a coherent manner and within the allotted time.

Alvaro Fernandez Romero

The objective is to apply the NUREG-2262 methodology to the Fire Probabilistic Safety Assessment (PSA) of Vandellòs II NPP in order to characterize High Energy Arcing Fault (HEAF) fires and compare the results with those obtained using the previous NUREG/CR-6850 methodology. A sensitivity analysis of Core Damage Frequency (CDF) is performed to assess the impact of the methodological change. The study focuses on representative areas containing medium-voltage switchgear and grouped or isolated phase bus bars. The results anticipate improvements in CDF values in the most critical areas, and the presentation satisfactorily met the evaluation criteria.

Yago Martínez González

A detailed 3D thermal-hydraulic model of the NuScale modular reactor was developed using the TRACE code, including the DHRS and ECCS systems, the containment vessel, and the reactor pool. A generic transient with SCRAM and normal DHRS actuation was simulated, also analyzing failure scenarios such as the initial non-activation of the DHRS and the opening of the safety relief valves (RSV). The scenarios assessed reactor behavior depending on whether the RSV reclosed or remained open, as well as the intervention of the ECCS and the Chemical and Volume Control System. In addition, additional safety margins were evaluated using advanced cladding materials to improve the response time available to the Control Room.

SESSION 2 COMMUNICATION AND TRAINING (I)

The session began with a presentation by **Ana González Felgueroso** (Nuclear Risk Insurers) on the Joint Protocol, tracing its development from its origins to the present day. She explained how this instrument ensures compensation for victims of nuclear accidents without legal gaps, as well as the challeng-

es that have hindered its ratification in various countries — including Spain — and the impact its implementation would have on the legal and insurance framework of the nuclear sector.

Next, **Antonio Cruzado** (Westinghouse Electric Company) presented the application of artificial intelligence in nu-

clear training, focusing on the return-to-operation process of the U.S. Palisades plant through the HiVE platform. This tool enables the extraction of learning objectives, the generation and review of questions, and their storage in a centralized database, thereby optimizing training processes. Cruzado emphasized the need to combine AI with human oversight and high-quality reference materials in order to maintain effectiveness and safety in technical training.

Lucía Sanchis (GDES) presented the company's solidarity response following the DANA storm in Valencia (October 2024). In coordination with clients and partners, GDES mobilized technical resources and equipment to support cleaning, supply, and assistance efforts, structuring its response around three key pillars: the immediate availability of industrial resources, support for employee volunteer initiatives, and the transparent channeling of aid provided by third parties.

For his part, **Lluís Batet** (Universitat Politècnica de Catalunya) presented the Master's Degree in Nuclear Engineering, taught in English at the Barcelona School of Industrial Engineering (ETSI) and forming part of the European EMINE programme. He highlighted the importance of the joint participation of industry, the regulatory body, and research centers in the education and training of future nuclear engineers.

Next, **Irene Montero** (University of Extremadura) explained the collaboration with the Almaraz Nuclear Power Plant through the Chair of Energy and Environment, established in 2011. Since then, more than eight research projects have been carried out, ten technical staff members have been hired,



Pilar Sánchez
PRESIDENT



Abel Milena Pérez
COORDINATOR

over forty paid internships have been offered, and one doctoral thesis has been promoted, in addition to numerous technical visits and seminars.

Finally, **María Benavides**, Head of Training at Trillo NPP, highlighted the importance of training for the Emergency Response Organization (ERO) staff, whose preparation is based on the Systematic Approach to Training. Exercises are carried out through integrated drills within the emergency management centers themselves, assessing both individual and team performance. This ensures rigorous preparation and the continuous improvement of procedures.

SESSION 3 ENGINEERING, DESIGN AND INNOVATION (I)

The session began with **Juan Sabater Alloza** (ANAV), who presented the calculation of floor response spectra for Vandellòs II NPP for use in a seismic Probabilistic Safety Assessment (PSA). The study incorporated nonlinear behaviors such as sliding and uplift at soil-structure interfaces, in accordance with ASCE 4-16, comparing linear and nonlinear results to assess their impact on seismic response.

Olga Riba (Amphos 21 Consulting) presented a criticality assessment for deep geological repositories using a compartmental model implemented in AMBER for NWMO (Canada). The analysis considers the dissolution and differential transport of uranium and plutonium, container failure scenarios, and long-term isotopic evolution, complemented by Keff calculations performed with SCALE.

Javier Grande Marlasca (Westinghouse Electric Spain) presented the optimization of local post-weld heat treatment (LPWHT) in steam generators in accordance with RCC-M. Through FEM simulations, the axial thermal gradient was reduced from 20 °C to 11.2 °C, and residual stresses were lowered from 460 MPa to 150 MPa, while also simplifying operational control.

David Martínez Verdú (ANAV) explained the design of a seismically reinforced refuelling water storage tank at Vandellòs II NPP, with a capacity equal to or greater than twice the Safe Shutdown Earthquake (SSE). Different alternatives were analyzed, and a solution was defined that preserves the tank's original functionalities.

Ismael Sañudo Lagoaceiro (Westinghouse Electric Com-



Marta Vázquez
PRESIDENT



Sergio Gómez
COORDINATOR

pany) detailed the soil-structure interaction analysis methodology for the AP1000® and its adaptation to European projects. The approach includes free-field studies, stratigraphy, numerical models, and specialized software, applied to the Lubiatowo-Kopalino project in Poland.

Finally, **Yedy Felipe Vargas Alzate** (Universitat Politècnica de Catalunya) presented a methodology for generating seismic records matched to target spectra using 3D FEM models, reducing undesired high-frequency effects and improving consistency between seismic hazard and structural response. The Capacity Spectrum Method was applied to assess seismic fragility in critical infrastructure.

SESSION 4 ADVANCED REACTORS AND NUCLEAR FUSION (I)

Technical Session 4, entitled ADVANCED REACTORS AND FUSION (I), was very well attended, and a total of seven presentations were delivered during the session.

These presentations were as follows:

1. Neural Operators for Neutronic Optimization in IF-MIF-DONES
2. FMEA (Failure Modes and Effects Analysis) and RBD (Reliability Block Diagram) Analysis of the Helium-Cooled Pebble Bed High Pressure (HCPB-HP) DEMO Breeding Blankets (BB)
3. RAMI Analysis of a Central Safety System Function of ITER
4. Implementation of the Safety Function for Explosion Risk Management in Battery Rooms in PIC Buildings 44–45
5. Reactor Selection for Nuclear Propulsion of Merchant Ships
6. Physics-Informed Neural Networks for Neutron Diffusion
7. Artificial Intelligence for the Automation of Validation and Data Acquisition in the Ultrasonic Testing of Welds During the Manufacturing Process of the ITER Vacuum Vessel.

In the first presentation, **Nikita Khvatkin Petrovsky**, from Hi Iberia, introduced a new methodology for multi-objective optimization of the deuteron beam shape for IFMIF-DONES, making use of the differentiability of Neural Operators.

Next, **Rafael García Gómez**, from Empresarios Agrupados Internacional, S.A., presented the fault detection process, as well as the reliability and availability analysis of the new HCPB-HP conceptual design for the DEMO Breeding Blankets reactor. The results of his work made it possible to identify several improvements from an availability standpoint.

The third presentation was delivered by **Ignacio Busons Rodríguez**, from Empresarios Agrupados Internacional, S.A., and addressed the application of a RAMI analysis to validate the design of the ITER central safety system architecture. The process involves evaluating the functions that make up this system, selecting one of them as a case study. A comprehensive analysis is then carried out on this function, described step by step — from the preparation of the corresponding diagrams to the detailed interpretation of the results obtained. Finally, it was concluded that the analyzed function fully meets the requirements established by the client and can therefore be integrated into the central safety system.

The fourth presentation was delivered by **Laura Jurado Llamas**, from Empresarios Agrupados, who presented the implementation of the I&C safety function for battery rooms providing backup to critical systems, ensuring that ITER operates under safe conditions by helping to prevent hydrogen (H₂) explosions generated in these rooms. The strategy combines early detection, redundant ventilation, and automatic disconnection, while applying the principles of defense-in-depth and the single-failure criterion.



José Manuel García
PRESIDENT



Luis Cerrada
COORDINATOR

The fifth presentation, delivered by **Cristian Garrido Tamm** from Idom, addressed the challenges of maritime transport and developed a structured hierarchical analytical selection process to determine the most suitable propulsion alternatives based on new advanced SMR designs. As a starting point, the IAEA SMR catalogue was used. In the first phase of the project, the options were narrowed down to seven, and in the second stage, they were further reduced to three.

The sixth presentation was delivered by **Empar Navarro Gamón** from the Universitat Politècnica de València. It described the use of Physically Informed Neural Networks (PINNs) to solve the neutron transport equation, which is essential for determining the power distribution within a nuclear reactor.

An application of neural networks to the neutron diffusion equation was presented for criticality problems in basic one-dimensional and two-dimensional geometries.

The seventh and final presentation was delivered by **María Ortiz de Zúñiga** from Fusion for Energy. It was a highly engaging presentation describing the use of artificial intelligence to automate and validate data acquisition in the ultrasonic testing of welds in the ITER vacuum vessel sectors, ensuring the quality of these welds. The work addresses the development and validation of an automatic tool for the early detection of valid and invalid acquisitions in phased array ultrasonic testing (PAUT) applied to the ITER Vacuum Vessel, a key component in nuclear fusion energy generation. The methodology identifies common features in defective acquisitions and incorporates them into automatic validation software, complemented by an artificial intelligence model to detect defects and determine their location within the weld. The results show that the system drastically reduces validation and analysis time, improving both efficiency and accuracy in the manufacturing process and contributing to the optimization of the ITER project.

The session concluded on schedule. All presenters were thanked for the high quality of their presentations and for adhering to the allotted time.

SESSION 5 QUALITY, SUSTAINABILITY AND HUMAN FACTORS (I)

Within the framework of continuous improvement in the nuclear sector, different organizations have developed methodological approaches to strengthen safety, quality, and operational efficiency. This account presents four initiatives that illustrate how regulatory and technical principles are applied to address specific challenges in nuclear facilities. The “graded approach,” defined by the IAEA, adapts the rigor of safety measures according to the risk and potential consequences, optimizing requirements without compromising safety. Recognized in the IAEA Fundamental Safety Principles and in the ISO 19443 standard, this principle allows proportional criteria to be applied throughout the lifetime of facilities. GD Energy Services has developed a methodology based on this approach to define elements of its quality management and nuclear safety system, such as documentation, inspections, suppliers, equipment, software, and competencies, including practical examples according to the risk level of each project.

In view of the increase in trips at Almaraz Nuclear Power Plant, in 2023 a multidisciplinary group was created to identify improvements that would reduce the risk of SCRAMS. After two sessions analyzing recent events, three key areas were identified: the human-machine interface in work on SPV and critical components, the quality of procedures and work packages, and the supervision of relevant tasks. Actions were proposed to improve identification, training, procedure drafting, and awareness of supervisory personnel, with the aim of strengthening plant operability and avoiding undesired transients.

Standard UNE 73401:1995 establishes quality assurance principles for nuclear facilities, from design to final shutdown, including key safety-related components. It requires a quality program with defined procedures for all activities. Naturgy Ingeniería Nuclear S.L., since 2019, has adapted its quality system to this standard for projects in operation and decommissioning. Its presentation describes the work carried out, in-



Lourdes Guzmán
PRESIDENT



Ana Belén Saez
COORDINATOR

cluding technical procedures for organization, communication, documentation, design, procurement, audits, and training, seeking to comply with the standard and obtain acceptance from the Supplier Evaluation Group (GES).

In 2022, UNE ratified in Spain the ISO 19443 standard, which adapts ISO 9001:2015 for suppliers in the nuclear sector, facilitating a common communication on quality between nuclear facilities and the general industry. Nucleonova proposes a practical and affordable methodology to implement this standard through a four-phase roadmap: training, diagnosis, implementation, and validation. Each stage uses pre-developed human and material resources to accelerate the process, adjusting the level of support to the needs of each organization.

These initiatives reflect a firm commitment to operational excellence and safety in the nuclear sector. The integration of regulatory principles with tailored methodologies makes it possible to address technical challenges with effective solutions, strengthening the reliability and sustainability of facilities.

SESSION 6 DECOMMISSIONING AND WASTE MANAGEMENT (I)

The first Technical Session of the 51st Annual Meeting in the area of decommissioning and nuclear waste management was successfully held, both in terms of attendance and interaction between speakers and the audience. Five different organizations took part in the session, presenting highly interesting projects at both national and international levels.

The session was initially focused on the management of spent nuclear fuel, particularly on the design, construction, and licensing of dry storage facilities at national nuclear power plants. It began with the enlightening presentations by Empresarios Agrupados (**Blanca Martínez**, “ATI 100: new spent fuel storage facility. Interaction with the current one”), Iberdrola Generación Nuclear (**Fernando Turión**, “ATI-100 Project at Cofrentes NPP”), and Ingecid (**Javier Alonso**, “Design modification for the expansion of the ATI-SMG”), who outlined the challenges associated with the required capacity expansions of these storage facilities, and how each plant has had to overcome challenges specific to its site and inventory.



Tomás Recio
PRESIDENT



Javier García
COORDINATOR

Subsequently, **Javier Alonso** participated again, also presenting Ingecid’s experience in the design of the temporary

spent fuel storage facility for the Koeberg plant (South Africa), which involved different specific challenges and very interesting ad hoc solutions. The session continued with ENSA's proposal (**Jesús Fernández**, "Optimization of dry storage for the PWR spent fuel inventory"), which presented and justified a management proposal that would allow optimization of spent fuel cask requirements, on-site dose levels, and decommissioning timelines.

Finally, there was a change of focus by the Polytech-

nic University of Madrid (**Gonzalo García**, "Generation and management of radioactive waste in the decommissioning of proton therapy centers"), presenting a detailed analysis of the generation and management of concrete activated by irradiation fields in proton therapy facilities.

All participants properly respected their allotted speaking times, and enriching interactions were maintained between attendees and speakers. Due to the Annual Meeting schedule, the debate had to be brought to a close and the session was concluded.

SESSION 7 SECURITY AND LICENCE (II)

The session brought together six presentations offering an overview of industry activities related to Nuclear Safety in its different aspects, ranging from Probabilistic Safety Analyses to Cybersecurity.

Antonio Félix Sánchez Portillo from ENUSA delivered his presentation entitled "CYBERSECURITY IN THE NUCLEAR SECTOR: CHALLENGES AND STRATEGIES FOR A SECURE ENVIRONMENT." The speaker highlighted how digital integration in the nuclear sector has improved automation and efficiency, but has also increased vulnerability to cyber threats, making cybersecurity essential. He reviewed real cyberattacks such as Stuxnet and BlackEnergy, analyzed common attack vectors, and described ENUSA's defensive strategies, such as network segmentation, access control, and supply chain protection. He also emphasized the layered security architecture, the challenges posed by legacy systems, incident response plans, and continuous staff training to strengthen resilience and foster a strong cybersecurity culture.

Alberto González Vega from Westinghouse, in his presentation "CURRENT STATUS OF THE PROBABILISTIC RISK ASSESSMENT FOR EVINCI MICROREACTOR," highlights that microreactor technology, such as Westinghouse's eVinci™, is emerging as a key alternative to traditional nuclear power plants due to its small size, simple design, and rapid installation. The paper explains how a Probabilistic Risk Assessment (PRA) is being developed to support the design, licensing, and operation of the eVinci, following modern methodologies such as the NEI-18-04 program and the ASME-ANS RA-S-1.4-2021 standard for non-LWR reactors. The main objective is to ensure safety by limiting radiological consequences and to comply with regulatory requirements through the use of risk-informed information.

Héctor Hernández Escolano from ANAV, in his presentation "ADAPTATION TO THE RESULTS OF THE SEISMIC ITC AT VANDELLÒS II NPP: IMPLEMENTATION PROGRAM FOR IMPROVEMENTS DERIVED FROM THE SHORT-TERM STUDY," explains that a seismic analysis was carried out at Vandellòs II NPP following the post-Fukushima action plan to ensure that critical systems can withstand earthquakes with twice the intensity considered in the original design. The study defined design and scheduling improvements to maintain safety in the event of a prolonged loss of power. In addition, difficulties in implementing a reinforced tank were



Mariano Carreter
PRESIDENT



Sofia Arfinengo
COORDINATOR

addressed, adjusting the scope of the modifications accordingly.

Francisco Hernán Justel Pizarro from Westinghouse, in his presentation "BASES OF TECHNICAL SPECIFICATIONS: A CRITICAL COMPONENT IN THE LICENSING OF NEW NPPs," highlights that the Technical Specification Bases (TSB) are essential for the operation and licensing of Generation III/III+ nuclear reactors, which incorporate passive safety systems and new risk scenarios. Their development involves challenges such as advanced simulations, uncertainty validation, and international regulatory alignment, with high initial costs. Despite this, the standardization and modularity provided by the TSB improve safety, reduce costs, and position these reactors as key elements in the transition toward energy decarbonization.

Tomás Villar Sánchez from Iberdrola Generación Nuclear, under the title "INTEGRATED VALIDATION OF A PSA SCENARIO," explains that a critical PSA scenario was validated at Almaraz NPP to verify that, even with loss of equipment and instrumentation, the procedures allow the plant to be maintained in safe conditions. The full-scope simulator confirmed the feasibility of the maneuvers and the proper coordination between the control room and local actions. The results will be used to improve the PSA model and the representation of human actions.

José David Canal from UPM, in his presentation entitled "BEPU LBLOCA ANALYSIS IN ZIRLO, FECRAL AND ZRY CLADDINGS WITH CR COATING," states that an adapted

version of the TRACE5P6 code was developed to simulate advanced fuels (ATF) with FeCrAl cladding and Cr-coated Zry cladding in PWR LBLOCA sequences. The BEPU analysis

showed that these fuels provide higher safety margins compared to conventional Zry fuels, reinforcing their potential to improve response under severe accident conditions.

SESSION 8 COMMUNICATION AND TRAINING (II)

During the session, several initiatives were addressed that reflect the evolution and dynamism of the nuclear sector in Spain. The Spanish Nuclear Industry Forum shared its experience in updating its corporate image, emphasizing the importance of modernizing without losing identity. The process included a restyling of the logo, the preparation of a brand identity manual, and the renewal of physical and digital materials. The need for visual coherence, clear communication, and respect for the brand's history was highlighted, offering useful recommendations for organizations facing similar changes.

Econucleares, the country's first pro-nuclear environmental association, presented its strategy to bring nuclear energy closer to young people through social media and audiovisual content. In 2024, it organized an unprecedented visit to the Vandellòs II nuclear power plant with three influential science communicators, whose videos exceeded one million views. This experience demonstrates the potential of digital tools to improve the social perception of nuclear energy.

For its part, WiN Spain is undergoing a stage of renewal with new branding, more than 400 members, and activities that combine networking, soft skills workshops, mentoring, and cultural initiatives. It has led international events such as the first European Regional Flagship Event and is strengthening outreach in schools and fairs, with the aim of making female talent visible and promoting diversity in a more inclusive sector.

The Spanish Nuclear Society consolidates its outreach model at fairs such as Madrid es Ciencia, where more than 3,000 visitors per edition enjoy immersive experiences: models, visual analogies, storytelling, and games. This playful and emotional approach facilitates the understanding of complex concepts and fosters STEM vocations.



Beatriz Liébana
PRESIDENT



Raquel Escamilla
COORDINATOR

Likewise, the initiative Salvemos Almaraz, promoted by Jóvenes Nucleares, seeks to extend the operation of the plant beyond 2027, highlighting its role in energy security, the regional economy, and emissions reduction. Through media campaigns, courses, and technical visits, it promotes an informed debate in the face of a social perception that associates the closure with political reasons.

Finally, Westinghouse, in collaboration with Nebrija University, is launching an online master's degree in nuclear technology. The 10-month program combines e-learning, masterclasses, and internships in companies, covering key areas such as reactors, safety, and project management. Its objective is to connect academic training with industrial reality and respond to the growing demand for specialized talent.

SESSION 9 ENGINEERING, DESIGN AND INNOVATION (II)

Technical Session 9 on engineering, design and innovation placed special emphasis on the monitoring, optimization and digitalization of processes in operating nuclear power plants. The session featured six presentations of high technical level, delivered by professionals with extensive experience in the sector.

First, **David Martínez Veciana**, Head of Plant Engineering at ANAV, opened the session with the presentation "Implementation of an online vibration monitoring system for rotating machinery at ANAV," a development that enables more effective surveillance and improved predictive maintenance, enhancing operational reliability at the Ascó and Vandellòs

plants. His more than two decades of experience in the sector provided a practical and well-established perspective on the project.

Next, **Javier Orive Soto**, nuclear design engineer at ENU-SA, presented the very interesting paper entitled "Optimization of reload schemes with NeutroneT: experience and multi-objective function," in which he detailed the use of genetic algorithms to improve the efficiency of fuel reload cycles, integrating technical and economic criteria.

Ángel Peinado Pérez of Iberdrola Generación Nuclear addressed optimization in the monitoring of the heater train at the Cofrentes plant. His presentation showed how im-

proved monitoring of this equipment directly contributes to thermal efficiency and plant reliability.

Marc Suñé Blanch, from ANAV, presented “Implementation of SOLCEP, a performance monitoring system in ANAV power generation plants.” His paper highlighted the importance of having digital solutions that facilitate operational analysis and data-driven decision-making in real time.

Luis Rejas López, on behalf of Westinghouse, presented “Modernization of the alarm system for Krsko: ground fault detection system.” The presentation addressed the straightforward technological upgrade of an alarm system with the aim of reducing fault detection time and minimizing the impact on plant operation.

Mateo Ramos Ramos, also from Westinghouse, closed the session with “Expected real value provided by a digital twin in the development of the eVINCI™ microreactor.” The concept of a digital twin applied to the design and development of the eVINCI™ microreactor was presented, highlighting its potential to accelerate innovation and reduce risks in advanced nuclear projects.

The session was held with great interest and strong at-



Manuel Sáinz
PRESIDENT



Nuria Doncel
COORDINATOR

tendance from the audience, who participated with technical questions and reflections on the practical application of the solutions presented. The papers reflected the nuclear sector’s commitment to continuous improvement, the application of new technologies, and the pursuit of sustainable and safe solutions.

SESSION 10 THERMOHYDRAULICS AND NEUTRONICS (I)

In this session, six papers were presented: two from the MEDASEGI group and one from the ISIRYM institute, both from the Universitat Politècnica de València; one from Westinghouse Electric Company; and two from the Universidad Politécnica de Madrid.

In the first paper, the application of a BEPU analysis to an extended SBO accident in a three-loop PWR reactor was presented, where the recovery of the offsite power supply was not considered. The results of the simulations carried out and the evaluations obtained using the Wilks method were presented.

In the second, the development and implementation of a model and the results related to the simulation of experiments C2.3 and B1.1 corresponding to the ATLAS experimental facility of KAERI located in Korea were presented. The model simulations are capable of adequately predicting the behavior of the main parameters of interest during the transient, stabilizing the water levels in the secondary circuit until reaching a new steady-state condition.

In the third, the study focused on the LSTF (Large Scale Test Facility) and ATLAS (Advanced Thermal-Hydraulic Test Loop for Accident Simulation) facilities, which have the Tsuruga II reactor (Westinghouse PWR) and an APR1400 as references, respectively. The objective was to analyze the scaling distortions between both facilities. The study was carried out on a counterpart SBO experiment with SBLOCA and nitrogen intrusion.

The fourth presentation addressed the validation of operating procedures in the CN Trillo simulator. After an analysis by a team of experts in KWU modeling and technology and using proprietary technology, the variables on which it was necessary to act in the case study were identified, implying an extension of the simulator’s scope, whose validation process was presented.



Sebastian Martorell
PRESIDENT



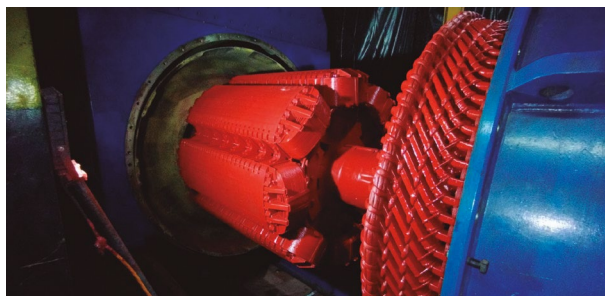
Francisco Álvarez
COORDINATOR

In the fifth, the results of the simulation work of the ATLAS C2.1 test using a model developed with the TRACE code were presented. The sequence consists of an SBLOCA with simultaneous breaks at the upper and lower parts of the reactor pressure vessel and aims to investigate the behavior of the Passive Emergency Core Cooling Systems (PECCS). The comparison between the simulated results and the experimental data showed their consistency in reproducing plant behavior.

In the sixth, different accident sequences in a BWR reactor were analyzed using the MELCOR code, considering different advanced fuel technologies, such as FeCrAl or SiC. The main objective was to evaluate the current capabilities of the MELCOR code and explore its application to other fuels, such as SiC or Cr cladding. Preliminary results show that certain types of fuels delay core degradation and reduce hydrogen generation and oxidation rates, offering potential advantages in accident mitigation.



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SESSION 11 NUCLEAR MEDICINE AND RADIATION PROTECTION (I)

The technical session was held, in accordance with the scheduled program, on Wednesday, September 24 at 3:00 p.m., chaired by Dr. María Luisa Estupiñán (coordinator of the Nuclear Medical Group and head of Health Surveillance at CN Trillo) and coordinated by Mr. Oliver Marcos (Framatome).

Four papers of a high technical level were presented, which aroused great interest and high participation among the attendees.

The first was delivered by **Dr. José Francisco Benavente Cuevas**, PhD in Physical Sciences and senior scientist at CIE-MAT, where he works in the Radiological Protection Unit. The title of his paper was "Simulation of the luminescent response of ionic crystals applied to dosimetry," aiming to reproduce the behavior of crystalline materials used in thermoluminescence in order to evaluate the quality of the models used in the analysis of experimental results.

The second was presented by **Dr. Daniel García García**, PhD in Physical Sciences, Head of Radiological Protection at the Juzbado factory (ENUSA Industrias Avanzadas) and head of the internal dosimetry service. The title of this paper was "Assignment of occupational dose at the Juzbado factory using JCP/MS." The study aims to evaluate the incorporation of uranium isotopes in 24-hour urine samples prior to the assessment of internal doses, in order to obtain a reliable contribution to the internal dose.

The third paper was presented by **Mr. Adrián Díaz Comече**, graduate in Physics, Master's degree in Nuclear Safety and Radiological Protection, and predoctoral student at the Universitat Politècnica de València. Its title was "Calculation using Monte Carlo simulations of the neutron dose distribution in Pencil-Beam Proton Therapy." The results obtained make it possible to determine the neutron distribution in proton ther-



Mª Luisa Estupiñán
PRESIDENT



Oliver Marcos
COORDINATOR

apy facilities for the dosimetry of this technique and to verify them with real data from previous experiments obtained with different types of detectors.

The final paper was presented by **Ms. Sara Abad Jiménez**, Nuclear Physicist, who works at IDOM developing Monte Carlo simulations. The title of the paper was "Generation of dose maps in proton therapy." The work makes it possible to evaluate the radiological impact of individual treatments not considered in the facility's safety study, having been validated with the safety studies of Ion Beam Applications. It can be experimentally validated at the proton therapy unit of the Hospital Universitario La Paz.

The session concluded within the scheduled time, being a highly participative session that prompted numerous questions from the attendees to the speakers.

SESSION 12 DECOMMISSIONING AND WASTE MANAGEMENT (II)

Within the framework of the 51st Annual Meeting of the Spanish Nuclear Society, a comprehensive technical session dedicated to the decommissioning of nuclear facilities and waste management was held. Experiences and results from highly relevant national and international projects were presented, with a large attendance that highlights the significant interest currently generated by this topic.

The day opened with the intervention of **Santiago Cabanillas** (Grupo Cobra), who presented the progress of the decommissioning project of the José Cabrera nuclear power plant, highlighting the technical challenges faced and the milestones achieved in one of the benchmark projects in Spain.

Next, **Ana Alonso**, from the Westinghouse Electric Company team, addressed the importance of chemical decontamination of systems within the framework of decommissioning. Her presentation emphasized the benefits of these techniques in reducing residual radiation, improving work safety, and optimizing materials management.

The session continued with the participation of **Diego Vicente Gumiel** (MARSEIN), who presented the site restoration



Carlos Iturregui
PRESIDENT



Cristina González
COORDINATOR

plan at José Cabrera, focused on waste management and site release. Subsequently, **Nuria Van-Baumberghen** and **Enrique Van-Baumberghen** (both from MARSEIN) offered

a complementary perspective by presenting the final figures of the José Cabrera decommissioning, which marked a milestone in the history of nuclear facility management in our country.

Regarding Vandellòs I, **Gonzalo Medinilla** (Westinghouse) presented the facility characterization plan, underlining the importance of this phase for the proper planning of decommissioning and the future management of waste. This project constitutes one of the greatest challenges in Spain in terms of nuclear closure.

The session concluded with the international perspective provided by **Roberta Gargiulo** (GD Energy Services), who

shared her experience in the decommissioning of the steam generators of the Latina nuclear power plant in Italy. The presentation allowed for the comparison of practices and approaches in different regulatory and technical environments.

Overall, the session highlighted the high level of technical knowledge achieved in Spain in the field of nuclear decommissioning, as well as the relevance of collaboration among public bodies and national and international companies. The papers demonstrated progress in innovation, safety, and efficiency in waste management and site restoration, helping to strengthen our country's position as a benchmark in this strategic field.

SESSION 13 SECURITY AND LICENSING (III)

The session brought together seven papers offering an overview of industry activities related to Licensing and Nuclear Safety in its different aspects, ranging from Probabilistic Safety Analyses and severe accident scenario analysis to issues related to climate change.

Álvaro Gómez Escorial from Westinghouse Electric Company, in his paper "CLIMATE CHANGE: EUROPEAN PSR COMMON APPROACH," highlighted that European nuclear power plants must consider increasing external hazards, including those derived from climate change, in their Periodic Safety Reviews (PSR) every 10 years. There is currently no common approach, so each plant addresses it according to its regulator. A standardized method is proposed that includes: (a) identification and classification of climate risks; (b) deterministic evaluation and probabilistic analysis (PRA) to detect vulnerabilities; and the definition of strategies and possible modifications to maintain or improve safety.

Sara Carrasco from ANAV, in her paper "ADAPTATION TO THE RESULTS OF THE SEISMIC ITC AT CN VANDELLÒS II: ANALYSIS OF ALTERNATIVES TO THE REFUELING WATER STORAGE TANK IN THE SHORT-TERM STUDY," explained that a seismic re-evaluation was carried out at CN Vandellòs II following the post-Fukushima action plan, using the EPRI methodology. Due to difficulties in implementing a seismically reinforced refueling tank within the scheduled timeframe, alternative measures based on emergency procedures were defined to ensure safety in the event of earthquakes and prolonged loss of power, until completion of the improvements during refueling outage VR27 (October 2025).

Mario Redondo Navarro from EAG (EA-GHESA), in his paper "CIRCUIT ANALYSIS AND CABLE ROUTING. FIRE PSA," addressed two key tasks of the Fire Probabilistic Safety Analysis (PSA): (a) circuit analysis, which identifies cables and dependencies whose failure due to fire would affect critical functions; and (b) cable routing, which determines the location and plant routing of those cables, correlating conduits, trays, and initial/final points. Both tasks generate essential databases for the subsequent PSA quantification.

Diego Caro García from Westinghouse Electric Company, in his paper "LICENSING OF THE DECOMMISSIONING AND RADIOACTIVE WASTE MANAGEMENT OF A NEW NUCLEAR



Alberto Guillén
PRESIDENT



Alejandro Taboada
COORDINATOR

POWER PLANT," emphasized decommissioning as a critical phase in plant life management and in ensuring proper radioactive waste management. Historically, it was not included in the Safety Analysis Report (SAR), but today the European IAEA guide SSG-61 is compared with the U.S. NUREG-0800, analyzing differences in requirements, the structure of Chapter 21, and how incorporating decommissioning affects design and licensing, including temporary on-site facilities for waste management.

Nuria García Herranz from the UP, in her paper "FLEX-CORE PROJECT MID-TERM HIGHLIGHTS ON REACTOR PRESSURE VESSEL FLUENCE," presented progress of the FLEXCORE project (2023–2026), which aims to improve the evaluation of neutron fluence in reactor pressure vessels through advanced simulation and uncertainty analysis. Achievements include: (a) incorporation of core-follow capability into the COBAYA4 simulator for pin-level calculations; (b) development of a Python tool to convert core outputs into source terms for Monte Carlo codes (MCNP, SCALE, OpenMC, PHITS); and (c) validation against international benchmarks (H.B. Robinson-2) with promising preliminary results. Advances in sensitivity studies and encouraging comparisons with nuclear data libraries were highlighted.

Jorge Sánchez Torrijos from NFQ, in his paper "DEVELOPMENT OF A FUEL SAFETY EVALUATION METHODOLOGY

GY TO COMPUTE THE FUEL RODS PROBABILITY OF FAILURE UNDER TRANSIENT CONDITIONS: APPLICATION TO A LBLOCA IN A PWR CONSIDERING E-ATF MATERIALS,” proposed an advanced methodology (FSEM) to evaluate fuel safety during a LBLOCA in a generic PWR, combining TRACE and TRANSURANUS codes. Configurations with conventional fuels and evolutionary Accident Tolerant Fuels (ATF) were analyzed, assessing failure probability due to cladding rupture and the benefits of ATF. Results show that ATF significantly reduces risk in average rods, although the impact on hot rods is limited.

Finally, **Giacomo Tinfena** from the Università di Pisa, in his paper “UNCERTAINTY QUANTIFICATION OF CORIUM PROPERTIES IN SBO SCENARIO,” explained that during a severe accident in a nuclear plant, molten corium interacts with concrete (MCCI), generating combustible gases and increasing pressure, which threatens containment integrity. The study analyzes how uncertainties in corium properties (density, conductivity, viscosity, etc.) affect critical variables (pressure, gas composition, ablation) in a Station Blackout scenario, using MELCOR and BEPU analysis. Preliminary results show that pressure is the most sensitive variable, with variations ranging from -17% to +30%.

SESSION 14 FUEL (I)

The session brought together seven papers providing an overview of industry activities related to nuclear fuel, from its fabrication to its management after irradiation, with special attention to Independent Spent Fuel Storage Installations (ISFSI).

Eva Salas, from Iberdrola, presented the specific features of the HI-STORM/HI-TRAC FW system for storing spent fuel in the new ATI-100 at Cofrentes. The design of the loading plans, aimed at emptying the Spent Fuel Pool (SFP) within three years, faces challenges due to the variety of the inventory in the SFP, its high decay heat loads, and the additional constraints of the HI-TRAC module for horizontal transport.

Ana Isabel Casado, from CIEMAT, analyzed the formation of secondary uranium phases under Deep Geological Repository (DGR) conditions. These phases, induced by radiolysis of water potentially infiltrating the container, could act as protective barriers, reducing radionuclide release. They are characterized using techniques such as Raman spectroscopy, X-ray diffraction, and SEM-EDX.

Sergio Fernández-Carretero, also from CIEMAT, presented a study on the fabrication of non-radioactive analogues simulating different burnup levels of nuclear fuel, in order to study how the radial distribution of porosity and fission products affects the microstructure and mechanical properties of irradiated nuclear fuel. The results confirm the similarity of the analogues to real irradiated fuel for certain applications.

Héctor Hernández, from ENUSA Industrias Avanzadas, presented the PWR fuel assembly manufacturing process, from line preparation and skeleton assembly to rod loading, inspection, cleaning, and packaging. He emphasized the importance of station metrological controls and inspections at the different stages of the process to ensure quality and compliance with specifications before shipment to nuclear power plants.



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Francisco Feria
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Lluís Batet, from the Universitat Politècnica de Catalunya, addressed the emptying of spent fuel pools while minimizing schedule, number of containers, and residual heat, using heuristic and metaheuristic optimization tools. The cases of Ascó and Vandellós II were analyzed, comparing these tools with Mixed Integer Linear Programming.

Miguel Ángel Rodríguez, from Naturgy, and Alejandro Alonso, from Nexus5, presented a tool (HVP) to plan the emptying of pools at CN Almaraz, optimizing the fuel distribution within the minimum number of HI-STORM FW containers. Based on the SFP inventory and its decay heat values, the HVP tool generates an ordered loading sequence between reactor shutdown and a given time horizon.

Finally, Javier **Alonso Sanz**, from INGEICID, presented COATI, a tool for managing spent nuclear fuel in ISFSIs. This tool is capable of calculating the source term, planning the emptying of the SFP, and calculating dose rates at the ISFSI.

SESSION 15 ENGINEERING, DESIGN AND INNOVATION (III)

The technical session on Engineering, Design and Innovation III was of great interest and was developed through six papers that generated considerable interest and resulted in a large attendance. The speakers strictly respected the allotted time, which made it possible to have sufficient time to generate an interesting debate on the topics addressed in each presentation.

First, **Ana Belén Merino Fernández**, from Westinghouse Electric Spain, presented her paper entitled “Design of Transition Boxes to Achieve a Closed Configuration According to IEEE 384,” in which she proposed the design of transition boxes with the following objectives:

- To help achieve a closed configuration that allows reducing the physical separation distances required by the standard.
- To limit the risk of possible failure conditions to an acceptable level.

Secondly, **José Javier Peláez Moreno**, from ANAV, delivered a presentation entitled “Proactive Obsolescence Management in ANAV as a Smart Investment,” in which he explained the current systematic approach established to carry out efficient obsolescence control, describing the initial needs, the actions undertaken, and the achievements obtained.

Next, **Miguel Allegue Arcones**, from EAG (Empresarios Agrupados – GHESA), gave a presentation entitled “The Specimen and Its Seismic Qualification Test. 6.6 kV EPS (Emergency Power Supply) TB13 Cells – ITER.” He presented the analysis of the different phases and the design of a series of tests on a specimen to qualify the system to which it belongs (6.6 kV cells) with the objective of its integration into the plant (the ITER complex), under the RCC-E code framework, as well as full compliance with ITER regulations.

Subsequently, **Álvaro Iniesta López**, also from EAG (Empresarios Agrupados – GHESA), presented the topic “Seismic Qualification of Electrical Equipment in a Nuclear Power Plant,” analyzing the seismic qualification process, whose objective is to demonstrate that these systems, which are important for



Javier Garrido
PRESIDENT



Patricia Cuadrado
COORDINATOR

plant safety, are capable of performing their safety functions in the event of an earthquake, as well as under other associated dynamic loads.

Jaime Lamas Navas, from EAG (Empresarios Agrupados – GHESA), addressed the “Adaptation of the Main Transformer Cooling System at CN Trillo According to the Recommendations of EPRI Guide 100293 Power Transformer Maintenance and Application Guide.” He explained that the main objective of this modification is to improve thermal management by optimizing the circulation of the cooling oil through a new distribution of the air-cooler groups and more efficient temperature control.

As a closing highlight to this outstanding technical session, **Juan Antonio Muñoz Tirado**, from Nucleonova S.L., delivered an interesting presentation entitled “Development of Capabilities for Electronic Card Repair,” addressing the analysis of specialized electronic boards from the perspective of their maintenance, repair, and replacement of defective components.

SESSION 16 THERMOHYDRAULICS AND NEUTRONICS (II)

In this technical session, dedicated to the area of “Thermal-Hydraulics and Neutronics,” six papers were presented related to neutronic and thermal-hydraulic analysis of advanced reactors and PWRs.

The first paper, presented by **Vicente Bécares** from CIE-MAT, addressed the development of a neutronic model of the FHR reactor and the performance of sensitivity and uncertainty analyses using the SUMMON tool, identifying the nuclear data that generate the greatest uncertainty in reactor parameters.

The second paper, also delivered by Vicente Bécares (CIE-MAT), dealt with the neutronic design of the future n_ACT@BDF facility at CERN, aimed at taking advantage of the neutrons from the BDF project to perform nuclear data measurements and applications in nuclear physics and advanced systems.



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Cristian Garrido
COORDINATOR

Juan García Bueno (CIEMAT) presented the third paper, focused on the reuse of experimental data from the DON project to validate, using modern tools, models and techniques applicable to transmutation systems such as ADS, which are essential for the management of irradiated fuel and the reduction of radiotoxicity.

The fourth paper, delivered by **Iñigo Gayo** de León from the Universidad Politécnica de Madrid, presented the implementation and validation in SEANAP of the TVA Watts Bar Unit 1 reactor model, as a basis for future fluence analyses and uncertainty quantification regarding the lifetime of reactor pressure vessels.

The following paper, presented by doctoral student **Eva Romero** from the Universitat Politècnica de València, de-

scribed a methodology to generate cross-sections and neutronic parameters of PWR reactors using the POLARIS and CASMO codes, validating their accuracy for core simulations and transient analyses.

The final paper, delivered by Professor **Rafael Miró** from the Universitat Politècnica de València, presented the optimization of PWR core loading pattern design using a multilayer neural network metamodel, capable of predicting multiple key parameters and drastically reducing simulation times without compromising accuracy or safety.

Despite being the last session of the day, it had a numerous and participative audience, with contributions both from attendees and from the coordinators, resulting in a session of high scientific level.

SESSION 17 NUCLEAR MEDICINE AND RADIATION PROTECTION (II)

In order of presentation, the first paper (**I. Gómez et al.**) addressed the implementation of the water safety plan for the water supply of the C.A. El Cabril nuclear facility. The necessary resources and documentation required to license this plan were described. This makes it possible to optimize water management in compliance with Royal Decree 3/2023 and to guarantee workers' health by reducing diseases related to water ingestion.

Next, two papers related to the development of systems to improve the quality of computed tomography medical images obtained with few projections were presented, with the aim of reducing the doses received by patients. To achieve this, neural networks were employed (**J. Arnal et al.**) and different algebraic image reconstruction algorithms were used (**V. Vidal et al.**). The results are promising, and the authors will continue working along these lines.

In the fourth paper (**S. Oliver**), the Monte Carlo design of an eye shield for the eyelids of patients treated with Total Skin Irradiation (TSI) was presented. The results are promising, allowing a significant reduction in the dose received by this organ due to backscattering of primary electrons.

The fifth paper (**G. F. García et al.**) presented a plausibility assessment of the role of ionizing radiation in the so-called "Curse of Tutankhamun," reported by R. Fellowes in the Journal of Scientific Exploration (2024). Several dosimetric models were discussed in the environments suggested by the author (Aswan granite, uraninite vessels, and vessels containing nuclear waste), and it was concluded that the only relevant ex-



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Gonzalo García
COORDINATOR

posure to ionizing radiation could be due to radon exposure, with annual internal radon doses ranging from 23 to 819 mSv.

The sixth paper (**B. Juste**) presented the results of a factorial experimental design to examine the influence of four parameters (pH, turbidity, total organic carbon, and electrical conductivity) on radon-in-water measurements using liquid scintillation in samples obtained from real scenarios such as caves. It was concluded that there is no correlation between these variables within the studied ranges, which correspond to their variability in real cases, except perhaps for the pH/turbidity relationship, which requires further study. Consequently, these parameters do not affect radon-in-water measurements.

SESSION 18 DECOMMISSIONING AND WASTE MANAGEMENT (III)

In Technical Session 18, four papers were presented addressing relevant developments in radioactive waste management and in the application of advanced materials in nuclear facilities.

The first paper, led by **Eva M. Márquez** from CIEMAT, focused on the evaluation of different matrices for the immobilization of irradiated graphite from nuclear reactors. Conventional and alternative materials were compared, assessing their

graphite incorporation capacity and their physical-mechanical behavior. The study made it possible to establish selection criteria for their use in conditioning and final disposal processes, in collaboration with ENRESA.

The second paper, presented by **José L. García-Siñeriz** from Amphos 21, addressed the development of a friction-based sealing plug concept using shotcrete, aimed at barrier confinement in specific geological contexts. Structural

and design aspects were analyzed through numerical modeling and full-scale testing, with the objective of validating its load-bearing capacity and operational feasibility under representative conditions.

The third paper, presented by **Alejandro Gardel** from Westinghouse Electric Spain, dealt with the preparation of a radiological inventory in the context of the chemical decontamination of systems at a nuclear power plant undergoing decommissioning. The study compared scenarios with and without the application of decontamination, demonstrating a significant reduction in the radiological category of the waste. It also estimated the generation of secondary waste derived from the process, proposing conditioning and management strategies in accordance with the technical criteria established by ENRESA.

The fourth paper, delivered by **Olivier Lemaire** from Westinghouse Electric France, presented a set of industrial applications of resins specifically designed for nuclear environments. These solutions include uses in non-destructive inspection, surface decontamination, protection against chemical and corrosive agents, component sealing, waste recovery, and leak repair. The developed resins are characterized by their high adaptability, thermal resistance, and durability, and have



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Jorge Cabezón
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been successfully implemented in various international facilities.

Overall, these contributions reflect continuous progress in waste management technologies and industrial maintenance, as well as the commitment of the nuclear sector, including the active participation of ENRESA, to safety, operational efficiency, and innovation in materials.

SESSION 19 SECURITY AND LICENSING (IV)

Technical Session 19 on Safety and Licensing addressed key advances in nuclear safety from diverse approaches, reflecting the sector's commitment to continuous improvement, technological innovation, and operational safety. The papers covered topics such as new reactor design, irradiated material management, risk assessment, and fire protection, all within the framework of the energy transition and regulatory evolution.

Cristina Domingo Jiménez, from Westinghouse Electric Company, presented the development of the Probabilistic Risk Assessment (PRA) for the AP300 modular reactor. This Generation III+ SMR is based on AP1000 technology and incorporates passive safety systems. The PRA methodology combines previous studies, technical reviews, and regulatory criteria to ensure a robust evaluation.

Raquel Velasco Ramírez, from ANAV, described the participation of Spanish nuclear power plants in the second European Topical Peer Review on fire protection. Coordinated with ENISS and the Consejo de Seguridad Nuclear, the work included preparation of the national report and representation at international workshops. Good practices at several plants were highlighted, and improvements were identified in the use of operational databases, with a view to a national action plan in 2025.

Antonio Roig Andreu, from Westinghouse Electric Company, presented the adaptation of the Probabilistic Safety Analysis (PSA) model of Vandellós II to assess seismic risk. Through automated tools, seismic failures were integrated into the existing model, optimizing its efficiency and enabling identification of critical equipment for future improvements.

Raúl Pampin García, from Fusion for Energy, addressed the impact of impurities in irradiated materials in ITER, emphasizing the need to control elements such as Co, Ta, Nb, and Ni



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Javier Pelegrina
COORDINATOR

to ensure radiological safety. The compilation of certified data improves nuclear analysis models and facilitates licensing.

Yago Martínez González, PhD candidate at the Universidad Politécnica de Madrid, presented a study on the behavior of the NuScale reactor under Loss of Coolant Accident (LOCA) scenarios, validating its robustness through simulations using the TRACE code.

Kostadin Ivanov, from North Carolina State University, shared international initiatives to improve the assessment of pressure vessel integrity, highlighting collaboration among organizations such as the NEA/OECD and the use of advanced simulation models.

The session demonstrated the technical dynamism of the nuclear sector, which is advancing on multiple fronts to strengthen safety and contribute to global sustainability goals. International cooperation and methodological rigor are consolidating as pillars for the future of the industry.

SESSION 20 FUEL (II)

During the 51st Annual Meeting of the Spanish Nuclear Society, the second technical session on fuel was held, bringing together four papers focused on spent nuclear fuel management. The works presented addressed topics ranging from fuel inspection and characterization to safe storage and criticality safety analysis, reflecting the sector's commitment to innovation and continuous improvement.

1. Leak Tightness Inspections with IN-CAM SIPPING Equipment

Speaker: **Roberto Rodríguez Cebriano** (ENUSA Industrias Avanzadas)

The results of ten spent fuel leak tightness inspection campaigns using the SICOM In-Can Sipping system were presented. A total of 904 fuel assemblies were inspected, detecting 10 non-leaktight elements. Kr-85 proved essential in identifying leaks in elements with long cooling times. Leakage patterns related to burnup, enrichment, and cooling time were observed, highlighting the anomalous case of element 9.

2. Design and Construction Challenges of ISFSIs at CN Ascó and Vandellòs II

Speaker: **José Manuel Pereiro Rodrigo** (ANAV)

The ATI-100 dry storage construction project was presented, prompted by the anticipated saturation of the spent fuel pools. Technical challenges were detailed, including extreme seismic design requirements at Vandellòs II and ground improvement at Ascó using Deep Soil Mixing techniques. The HI-STORM FW storage system was selected for its robustness and safety.

3. Dimensional Characterization of Spent BWR Channels

Speaker: **Pablo de Tena-Dávila Sarmentero** (ENUSA Industrias Avanzadas)

The campaign carried out at the Central Nuclear de Santa María de Garoña used the SimCHAD equipment to measure bowing and bulging deformations in 195 BWR channels. A 3D model was applied to estimate deformations and select the most representative elements. The results will enable op-



Julián Gómez
PRESIDENT



Joan Josep Jaimot
COORDINATOR

timization of container loading strategies and enhancement of storage safety.

4. Criticality Analysis in the Fuel Building: Modeling Criteria

Speaker: **Laura Encinas Reguero** (Iberdrola)

The methodology to ensure safety in fresh and spent fuel storage was presented, complying with national and international regulations. Conservative models using the SCALE code were applied, validated through benchmarks, along with the analysis of accidental scenarios and non-standard configurations.

Session Conclusions

- Current inspection techniques enable accurate detection of fuel assembly leaks, even in cases without visible defects.
- Early planning of dry storage facilities is essential to ensure continued plant operation.
- Dimensional characterization of BWR fuel is fundamental to ensuring its structural integrity and facilitating safe management.
- Criticality analyses must remain updated and conservative, incorporating advanced tools and rigorous validation.

SESSION 21 ENGINEERING, DESIGN AND INNOVATION (IV)

Session IV brought together seven papers reflecting the vitality and progress of research and innovation in the Spanish nuclear sector, addressing topics ranging from advanced modeling and simulation to safety, sustainability, and materials and waste management.

José Francisco Benavente Cuevas from CIEMAT opened the session by addressing Monte Carlo simulation of extended sources of natural radionuclides. His work integrated experimental measurements and numerical simulations to improve the radiological characterization of affected sites, contributing to radiological and environmental protection, and highlighting the importance of combining numerical modeling and experimental validation to optimize radiological management.

Next, **Virginia Madrazo Cuevas** from Equipos Nucleares S.A. (ENSA) presented the COSME project, which proposed an innovative methodology based on the ASME XI code and experimental material characterization for the structural assessment of spent fuel containers. This approach enhances reliability and safety in waste management and strengthens the international position of the Spanish nuclear sector.

Roberto García Sainz from Westinghouse Electric Spain presented tests on aluminum honeycomb-type materials for impact limiters in nuclear transport, optimizing simulation models and ensuring safety in reactor transport—an essential aspect for logistics and nuclear material protection. His results contribute to improving the reliability of transport and storage systems.

Alejandro Costa Cardona from ENUSA Industrias Avanzadas presented an advanced approach for determining the design limit CLEN in PWR reactors, using Monte Carlo methods and efficient sampling. This approach improves uncertainty evaluation in thermal-hydraulic analysis and reinforces safety in reactor design, providing a more robust and representative view of safety margins.

In the field of safety, **María González Alvear** from the Universidad de Cantabria (GIDAI Group) presented a stochastic methodology to select Maximum Expected Fire Scenarios (MEFS) in nuclear power plants. By combining rapid and detailed simulations, the approach strengthens the robustness of fire safety analyses and optimizes risk management.

José Antonio Miras Martínez from Westinghouse Electric Company presented the NTR eVinci Simulator, a simulation tool for microreactors that integrates physical and logical models, enabling design validation and operator training prior to commissioning new reactors. His work underscores the importance of simulation in innovation and operational safety.

Finally, **Carlos Olmos Alonso** from the Universidad Politécnica de Madrid analyzed the potential of Small Modular Reactors (SMRs) to decarbonize the chemical industry in Spain. Through a simulation model, he demonstrated that SMRs could be competitive with natural gas cogeneration



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Marta García
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under certain carbon and gas price scenarios, thereby contributing to climate neutrality and the energy transition of the industrial sector.

These papers demonstrate the Spanish nuclear sector's commitment to technical excellence, safety, and sustainability, as well as its capacity to address present and future challenges.

SESSION 22 THERMOHYDRAULICS AND NEUTRONICS (III)

The session brought together more than 20 professionals and featured the notable participation of four doctoral students, demonstrating the vitality and generational renewal in the field of nuclear engineering. The six papers addressed highly relevant issues for the safety, design, and operation of nuclear power plants, with special emphasis on advanced modeling and the application of state-of-the-art simulation codes.

In the first presentation, **Impact of Containment Cooling Systems on Hydrogen Combustion Risk**, by the Universidad Politécnica de Madrid (UPM), Forschungszentrum Jülich (FZJ), and the Consejo de Seguridad Nuclear (CSN), the influence of containment cooling systems (spray and CAS) and mitigation systems (PAR and FCVS) on thermohydraulic and flammability conditions following an LBLOCA accident in a Westinghouse PWR was analyzed. The study, carried out with the GOTHIC 8.3 code within the framework of the CSN INTERCON3D project, demonstrated that cooling systems accelerate depressurization and cooling; however, steam condensation requires the implementation of PAR systems to prevent flammability risks.

In the second paper, also from UPM, FZJ, and CSN, **Study of the Impact of Polydisperse Droplet Distribution in the Spray System**, the efficiency of the spray system in mitigating hydrogen combustion risk under severe accident conditions in PWRs was analyzed. Using the GOTHIC-3D code and experimental data from the OECD/NEA HYMERES 2 project, monodisperse and polydisperse droplet models were compared. The results concluded that polydispersion enables a more realistic evaluation of system behavior and thermohydraulic variables relevant to containment safety.



Ferran Tarrassa
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Alberto Escrivá
COORDINATOR

From UPM, FZJ, IGN, and CNAT, the paper **Sensitivity Analysis for an LBLOCA Transient with the Almaraz Containment Model in GOTHIC 8.3** was presented. It described the results of a sensitivity analysis performed on the three-dimensional containment model of the Central Nuclear de Almaraz. The study highlighted the influence of parameters such as initial pressure, free volume, and break location on pressure and temperature evolution. The use of 3D models allows identification of variables with the greatest impact and refinement of assumptions to improve the reliability of safety analyses.

In the fourth communication, **Reproduction of Operational Transients at CN Trillo with RELAP5**, presented by IGN and CNAT, progress was shown in adapting in-house simulation

tools (RELAP5 and TRACE) for deterministic analysis of transients and accidents at CN Trillo, under the conditions defined in the Final Safety Analysis Report. The results show good agreement with the reference methodology (FRAMATOME), validating the capability of internal models to support training, engineering, and probabilistic risk analysis.

In the fifth paper, presented by IDOM with the participation of ANAV, **RELAP5 Calculations of Steam Generator Tube Rupture in a Three-Loop PWR**, the response of the pressurizer relief valve (PORV) to a steam generator tube rupture was studied, considering realistic scenarios and operator actions. The analysis concludes that a single PORV actuation is sufficient to depressurize the primary system and stop the leak, and that the modeling of protection signals and the break location are decisive in the transient evolution.

Finally, from the Universitat Politècnica de València (UPV), **VALKIN-PATHS Coupling for Multiphysics Simulation in SMRs** was presented, describing the development and in-

tegration of the VALKIN (neutronics) and PATHS (thermal-hydraulics) codes for the analysis and design of Small Modular Reactors (SMRs). The coupling enables bidirectional exchange of critical variables and allows more accurate simulations in both steady-state and transient conditions. The modularity of the tool facilitates future integration with higher-detail codes such as TRACE and adaptation to different core configurations, laying the foundation for coupled simulations oriented toward SMR design and operation.

The session demonstrated the high technical level and innovative capacity in the field of thermal-hydraulics and neutronics. The participation of young researchers and collaboration among universities, companies, and regulatory bodies such as the CSN reinforce excellence and commitment to nuclear safety, radiological protection, and the continuous improvement of analysis and simulation methodologies. Moreover, at the end of each presentation, questions and clarifications were raised that deepened discussion of several of the topics addressed.

SESSION 23 QUALITY, SUSTAINABILITY AND HUMAN FACTORS (II)

During the second technical session on Quality, Sustainability and Human Factors, which brought together 25 attendees, four papers were presented.

Joaquín Navajas, from CIEMAT, presented “Integrating Context into Safety Culture Self-Assessment.” He highlighted the importance of social debate on the future of the nuclear sector in strengthening safety culture through a proactive analysis of organizational, technological, and human challenges in times of change. He introduced a new methodology aimed at identifying emerging challenges in uncertain contexts, based on a self-led safety culture assessment carried out at the Central Nuclear de Cofrentes. This participatory methodology supports safety-related decision-making, fostering collective learning and improved communication within the organization.

Eulalia Badia, also from CIEMAT, presented the paper “Cultural Fit in Decommissioning Processes,” addressing organizational culture in facilities that have transitioned to decommissioning. She analyzed how the shared culture of workers influences the safe management of nuclear installations and presented a study on the interaction between the culture of staff from an operating plant and the structure responsible for decommissioning. The analysis revealed significant differences in how both groups perceive aspects of organizational culture, which must be carefully managed to facilitate integration between entities with different backgrounds. Cultural management was identified as crucial for successful transitions in the nuclear sector, helping preserve and strengthen the best elements of each organization’s culture.

Andrés Hernández, from Iberdrola Generación Nuclear, spoke about the Field Leaders Program at the Central Nuclear de Cofrentes, which promotes best practices to ensure plant safety and reliability. The program requires initial theoretical and practical training, followed by refresher training every two years. Training includes real-time supervision of leaders



Pilar Almeida
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Cristina Pablos
COORDINATOR

at work, where they receive feedback and learn new leadership techniques in the nuclear sector. This approach enhances leaders’ interaction with staff and deepens their understanding of processes, avoiding routine and promoting greater leadership effectiveness.

Finally, **Raquel Escamilla**, from Naturgy Ingeniería Nuclear, explained the transition from PENGUA to RADIOCAM at the Central Nuclear José Cabrera, describing how nuclear emergencies are managed at two levels: internal and external. She detailed that the decommissioning of the plant is nearly complete, enabling its exclusion from the External Nuclear Emergency Plan and its inclusion in the Radiological Plan of Castilla-La Mancha (RADIOCAM). She described the process of adapting the Internal Emergency Plan and its linkage with RADIOCAM, emphasizing the importance of coordinating the actions of both emergency plans to ensure an effective response.

SESSION 24 DISMANTLING AND WASTE MANAGEMENT (IV)

At the 51st Annual Meeting of the Spanish Nuclear Society, nuclear waste management was a central theme in many papers and posters, reflecting the importance of addressing the progressive shutdown of nuclear power plants and the need to comply with safety and sustainability standards. A clear example was Technical Session 24 on Decommissioning and Waste Management (IV).

Mireya Gimeno and Luis Cano, from Empresarios Agrupados, explained how a new workshop for the management of operational waste (GRO Project) is being implemented at the Central Nuclear de Almaraz as one of the conditions required to transfer ownership to ENRESA, in accordance with the General Radioactive Waste Plan (PGRR). The workshop has been designed to be flexible and safe, allowing cutting and decontamination activities that facilitate waste reclassification and reduce both costs and the final volume destined for El Cabril. In addition, a segmentation plan has been developed defining the equipment needed to treat large components and contaminated materials, optimizing storage and adapting to space constraints.

Continuing with Almaraz, **Miguel Ángel Rodríguez**, from Naturgy Ingeniería Nuclear, presented the 20 most significant challenges faced by the plant in managing historical waste and materials with deteriorated packaging. The proposed solutions have required reconditioning and new characterization methodologies to gain acceptance by ENRESA. A scrap declassification plan has also been authorized, and management pathways have been identified for specific wastes such as oil sludge and out-of-service detectors.

In the field of technological innovation, **Daniel Carrasco** explained how ENUSA Industrias Avanzadas and Equipos Nucleares S.A. (ENSA) have developed the portable IPRE facility, a modular container-based solution that enables the treatment of operational and decommissioning radioactive waste at different sites. This installation is autonomous, easy to transport and assemble, and is expected to be available in 2026. Meanwhile, **Patricia Pérez** presented the SISCAREN-RBBA system, developed by ENUSA and CIEMAT, which automates the radio-



Raúl Orive
PRESIDENT



Álvaro Fernández
COORDINATOR

logical characterization of large volumes of very low-level waste, streamlining processes and generating automatic reports.

Susana Gutiérrez also presented three key projects launched by Iberdrola Generación Nuclear at the Central Nuclear de Cofrentes: one focused on optimal management of operational waste, another addressing special waste through segregation and volume reduction techniques, and a third aimed at the complete emptying of the spent fuel pools, all in line with current regulations and decommissioning requirements.

Finally, from the R&D field, **Sergio Gómez** from ENWESA Operaciones S.A. reported on an international project for the treatment of tritium in radioactive water, applying Spanish technology in Fukushima. The project has demonstrated the effectiveness of an adsorption process that significantly reduces tritium levels and generates solid waste with low environmental impact, positioning Spain as a benchmark in advanced solutions for the nuclear industry.

It is a pleasure to note that all speakers captured the attention of the audience, who actively participated by raising relevant questions, in a room that remained full for most of the session.

SESSION 25 SECURITY AND LICENCE (V)

In this technical session, six (6) papers were initially scheduled; however, two of them could not be presented due to the absence of their authors and co-authors. The speakers are professionals with very demanding agendas, and such situations can occur. Nevertheless, we had the opportunity to attend four (4) excellent papers covering diverse topics, which could broadly be defined as focusing on the analysis of different types of risk and, consequently, on nuclear safety and, in one particular case, on licensing.

César Hevia Loredó presented a study on the impact of various phenomena on Large Early Release Frequencies (LERF) in modes other than full-power operation. Events such as valve failures, steam explosions, corium-concrete interaction, and filtered venting were evaluated, showing how small variations can significantly alter the results of probabilistic analyses.



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Tomás Villar
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Gonzalo F. García Fernández discussed the authorization process for new proton therapy facilities in Spain, in line with the updated guidelines of the Consejo de Seguridad Nuclear (June 2024). With thirteen units planned, the use of the PHITS code was highlighted to justify radiological calculations, including activation and damage to electronic equipment. A standardized documentation structure was proposed to streamline the licensing process.

Fernando Rastellini addressed the seismic assessment of nuclear structures using three-dimensional finite element models. The dynamic response of the soil–structure system was studied, considering interface sliding and soil variability. The results indicate that sliding acts as a seismic isolation mechanism, reducing accelerations and improving accuracy in safety evaluations.

David Calvo Romero emphasized the importance of plant-specific data for calculating Human Error Probabilities (HEP) in Probabilistic Safety Assessments (PSA). Using the EPRI HCR/ORE correlation, it was shown that cognitive time and standard deviation (sigma) strongly influence the results; therefore, increasing simulator observations is recommended to improve the reliability of calculations.

Attendance at the session was very good, with the room fully occupied. Additionally, the reduced number of papers, their subject matter, the quality of the speakers, and the curiosity of the attendees fostered engaging debates that further enriched the session.

SESSION 26 FUEL (III)

The session addressed key advances in the field of nuclear fuel, with special emphasis on Accident Tolerant Fuels (ATF), fuel behavior modeling under accident conditions, and operational management in real scenarios. Active participation from attendees, through numerous questions, made the session particularly dynamic.

1. Modeling of Thermal Creep in Coated Claddings (OperaHPC – OFFBEAT)

The extension of the OFFBEAT code to simulate thermal creep in Cr-coated Zry-4 claddings under LOCA conditions was presented. Validation against experimental tests showed good agreement in representative scenarios, although deviations were detected in isothermal tests, attributed to phenomena such as Cr diffusion and substrate hardening. It was concluded that the model qualitatively reproduces the strengthening effect of the coating.

2. Licensing of the SVEA-96 Optima3 Design

The licensing process of the new mechanical fuel design for the Central Nuclear de Cofrentes was detailed, including validation of the GIRALDA methodology. The simulations and validations performed showed satisfactory results under steady-state and transient conditions, confirming the compatibility of the new design with operational and safety requirements.

3. Core Management with Failed Fuel

The strategy followed at the Central Nuclear de Cofrentes after detecting an incipient failure in a fuel assembly was presented. The flux-tilt maneuver made it possible to identify suspicious cells, and measures were implemented to prevent secondary degradation. Radiochemical monitoring and a shimming campaign enabled successful replacement of the failed element.

4. Validation of OFFBEAT in PCMI Modeling

The capability of OFFBEAT to simulate Pellet–Cladding Mechanical Interaction (PCMI) during power ramps was evaluated using data from the Risø III project. Two-dimensional simula-



José Melara
PRESIDENT



Rafael Sánchez
COORDINATOR

tions qualitatively reproduced cladding deformation, although a systematic underestimation during base irradiation was observed. Parametric studies highlighted the model's sensitivity to the fuel relocation recovery fraction and the number of radial cracks.

5. Oxidation of Irradiated Fuel by Raman Spectroscopy

An in situ measurement protocol was developed to monitor oxidation of irradiated UO_2 . The study revealed a delay in U_3O_8 formation at the pellet periphery, attributed to higher local burnup and fission product accumulation, with relevant implications for dry storage.

6. Influence of Defects in ATF Claddings

The impact of machined defects in chromed ATF claddings was investigated. After autoclave corrosion and isothermal burst tests, it was concluded that defects do not significantly affect oxidation or burst pressure, although they do modify the geometry of the failure zone by concentrating deformation.

SESSION 27 ENGINEERING, DESIGN AND INNOVATION (M)

The session consisted of seven presentations and drew a large audience, with the room at full capacity throughout. Attendees showed strong interest and actively participated during all interventions.

Maite Pérez Lagares, from *Empresarios Agrupados (EAG)*, opened the session with “IMPLEMENTATION OF AN AUXILIARY STEAM BOILER AT CN ALMARAZ: CHALLENGES, DIFFICULTIES AND ACHIEVEMENTS.” She detailed the need to ensure steam production at nuclear power plants regardless of reactor status, emphasizing the importance of an auxiliary steam boiler capable of operating independently from the turbine, replacing the original unit currently out of service. After preliminary studies, technical and economic alternatives were analyzed, and a new diesel-fired boiler was ultimately selected for installation in the former pretreatment area. Basic and detailed engineering designs were carried out with multidisciplinary technical participation. Once completed, on-site works and fabrication of the boiler and auxiliary systems proceeded in parallel, concluding with installation and commissioning.

Luis García Delgado, from *Iberdrola Generación Nuclear*, continued with “EVALUATION OF A PROLONGED REDUCED-POWER OPERATION SCENARIO.” He explained that in recent years, for various reasons, the Central Nuclear de Cofrentes has operated for days or weeks at approximately 78% of nominal power—a condition defined as reduced-power operation, which is safe, well understood, and covered by operational documentation and procedures. As additional support, the engineering team conducted a comprehensive review using internal expertise and EPRI documentation. The conclusion was that no adverse effects are expected from prolonged operation at 78% of nominal power.

Jorge López Tanco, also from *Empresarios Agrupados*, presented “AIR TREATMENT SYSTEMS FOR THE NEW CUTTING AND DECONTAMINATION WORKSHOP FOR OPERATIONAL WASTE MANAGEMENT AT CN ALMARAZ.” He described the design of an HVAC and filtration system to ensure optimal temperature and humidity conditions for personnel and equipment, while filtering potentially contaminated air through staged filtration, reversible heat pumps, and an air supply system equipped with frequency converters regulated by differential pressure signals. This independent and specialized facility enables safe management of operational waste, ensuring worker safety and environmental protection.

Álvaro Pérez-Salado Kamps, from *Westinghouse Electric Germany GmbH*, presented “INNOVATIVE LONG-TERM CONTAINMENT COOLING SYSTEM FOR VVER-440.” Managing long-term containment pressure in VVER reactors during severe accidents remains a critical challenge, particularly following lessons learned from the Fukushima accident. In response, Westinghouse initiated an innovation project in 2016 and developed and patented a Long-Term Containment Cooling System (LTCCS) to support Severe Accident Management strategies at VVER-440 plants, particularly those implementing an In-Vessel Melt Retention strategy. A key



Antonio Igareda
PRESIDENT



Juan Antonio Muñoz
CCOORDINATOR

component is the Reactor-Turbine-Sump Pump (RTS Pump), engineered for continuous operation exceeding six months under severe accident conditions. The pump underwent extensive qualification testing following IAEA recommendations and international standards, confirming reliable performance.

José Ignacio Alutiz Ruisánchez, from *ANAV*, presented “DIGITAL TRANSFORMATION AT ANAV.” He outlined ANAV’s digital transformation strategy, the processes, tools, and platforms used, as well as the technical and leadership challenges faced. Since launching its first digitalization plan in 2019, ANAV has developed 31 digital initiatives contributing to continuous improvement through process optimization. Cybersecurity was highlighted as a fundamental pillar, integrated from the design phase of each initiative to ensure protection of critical systems and data.

Cristina Corrales Quirós, from *Electric Power Research Institute (EPRI)*, closed the session with two presentations. In “ANALYSIS OF OPERATIONAL EXPERIENCE WITH DIGITAL CONTROL SYSTEMS,” she addressed modernization projects undertaken by nuclear plants to extend their operating life, transitioning from original analog systems to digital control systems while maintaining high standards of reliability, safety, and availability. To support the industry, EPRI is developing guidance documents and conducting a multi-year operational data analysis project. The latest report documents systematic categorization and analysis of over 2,300 records, presenting graphical insights linking initiating events, causes, impacts, lessons learned, and best practices.

Her second presentation, “DIGITAL SYSTEMS ENGINEERING FRAMEWORK – CONTEXT AND OVERVIEW,” described EPRI’s Digital Systems Engineering Framework as an integrated set of guides and methods designed to manage lifecycle activities of modern control technologies in nuclear plants. The framework addresses emerging complexities in control systems to ensure safe and reliable plant operation, covering key technical topics related to functional safety, protection, and reliability of digital systems.

SESSION 28 THERMOHYDRAULICS AND NEUTRONICS (IV)

In the fourth technical session dedicated to “Thermal-Hydraulics and Neutronics,” a total of six papers were presented, three of them focused on the use of artificial intelligence techniques applied to nuclear engineering—clear evidence that our field is not immune to this technological revolution.

In the first paper, **Jesús Saiz de Omeñaca** from Equipos Nucleares S.A. (ENSA) analyzed the sensitivity of dose rates in ENUN 52B spent fuel containers to the design of aluminum profiles, optimizing their inclination angle after neutronic analyses performed with the SCALE code system.

The second paper, presented by **Miriam Vázquez** from Empresarios Agrupados (EAG), described participation in an international exercise promoted by the Working Party on Nuclear Criticality Safety of the OECD Nuclear Energy Agency on burnup credit loading curves for PWR fuel. Following the NUREG/CR-6698 guide and using the SCALE system, results consistent with those of other participants were obtained, confirming the robustness of the applied methodology.

The third and fifth papers, delivered by **Rafael Miró and José M. Gozávez** from the Universitat Politècnica de València (UPV), shared a common focus on optimizing PWR core reload design using neural networks and optimization techniques. After training three-variable surrogate models with PATHS/PARCS, simulated annealing optimization proved more efficient than Monte Carlo methods. The number of variables was later expanded from 3 to 24, concluding that individual neural networks provided better predictions than grouped models, enabling multi-objective optimization within the Pareto frontier.

In the fourth paper, **Roberto Miguélez** from the Universidad Politécnica de Madrid (UPM) presented metamodels based on



Nuria García
PRESIDENT



Rafael Miró
COORDINATOR

deep neural networks trained with TRACE simulations, capable of rapidly predicting critical variables during a Large Break Loss of Coolant Accident (LBLOCA) in a PWR. Their potential to complement thermal-hydraulic codes when immediate results are required was highlighted.

Finally, **Alejandro Marro**, also from UPM, analyzed the impact of neutron source definition in Monte Carlo calculations applied to reactor dosimetry. Using the H. B. Robinson 2 Benchmark (SINBAD, NEA/OECD), he demonstrated the importance of detailed modeling down to the fuel rod level to accurately estimate vessel fluence in long-term operation scenarios.

The session gathered a numerous and engaged audience, fostering a rich exchange of ideas and comments.

SESSION 29 NUCLEAR MEDICINE AND RADIATION PROTECTION (III)

The third of the sessions dedicated to MEDICINE AND RADIOLOGICAL PROTECTION featured four presentations, covering a broad range of topics.

The first presentation, entitled “²¹⁰Po in Environmental Matrices and NORM Waste,” was delivered by **Yeray Pallás-Tamarit**, from the Environmental Radioactivity Laboratory, MEDASEGI Research Group, at the Universitat Politècnica de València. The aim of this presentation was to present the development and validation of a robust methodology for the determination of ²¹⁰Po in environmental matrices (water, soils, sediments, and biota) and in NORM materials, the added value of this method being its versatility for application to different types of complex samples.

Next, **Víctor Manuel Expósito-Suárez**, from the Environmental Radioactivity and Radiological Surveillance Unit of CIE-MAT, presented the paper entitled “Soil-Plant Transfer Factors of Natural Radioactive Series, ⁷Be and ¹³⁷Cs in a Semi-Arid Climate,” in which soil-to-plant transfer factors (TF) of natural radionuclides (²³⁸U, ²²⁶Ra, ²¹⁰Pb) and anthropogenic radi-



Andrés Felipe Martínez
PRESIDENT



Óscar Martínez
COORDINATOR

onuclides (¹³⁷Cs) were determined in semi-arid soils, as well as studying the incorporation pathways of ⁷Be and ²¹⁰Pb in plant species typical of semi-arid climates.

The third presentation was entitled “STUDY OF DIFFERENT MATERIALS AS BARRIERS AGAINST RADON FROM PHOSPHOGYPSUM,” and was delivered by **Belén García-Gimeno**, from the University Institute for Industrial, Radiophysical and Environmental Safety (ISIRYM) of the Universitat Politècnica de València. This presentation addressed the study of the effectiveness of different materials as anti-radon barriers against phosphogypsum generated in the phosphate industry. The study was carried out based on an experimental setup in which pure polymeric materials (PP, PVC), laminated waste (multilayer packaging), and wallpapers were tested.

Concluding the session, **Roberto Méndez**, from CIEMAT, presented the paper “Neutron Spectrometry in the RA-6 Re-

actor at the Bariloche Atomic Center.” The objective was to describe the studies carried out in the RA-6 reactor, located at the Bariloche Atomic Center – Argentina, using the Bonner sphere spectrometer belonging to the Neutron Standards Laboratory (LPN) of CIEMAT. Through these studies, positions around the reactor were characterized, and the versatility of the CIEMAT-BSS system was verified.

In summary, the session was attended by a large number of conference participants, so that the room was practically full. All speakers delivered their presentations within the allotted time and with a high didactic level; all were of great interest, which led to numerous questions and discussions among the attendees.

SESSION 30 DISMANTLING AND WASTE MANAGEMENT (V)

On Thursday, September 25, Session 30 on Decommissioning and Waste Management (V) took place, during which six presentations were delivered.

The first addressed the development of an application to automate gamma isotopic measurements of radioactive samples using the Genie2000 software, in compliance with regulations such as CSN Safety Guide 1.4. The determination of critical limits according to ISO-11929 was discussed, optimizing processes and reducing human errors. Automation has resulted in improved efficiency in obtaining detection limits (LID) and in radiological control.

The second presentation described the commissioning of a NaI detector for the clearance of ISO containers used for the transport of radioactive waste containing exclusively Cs-137. ENRESA implemented this system in 2022 to minimize radioactive waste, automating measurements by means of a robot. Tests were carried out with real containers and simulated models. The results confirmed the suitability of the NaI detector to characterize and clear these containers.

The third presentation introduced a study on the quantification of the maximum aluminum content in packages and storage units for low- and intermediate-level radioactive waste (LILW) at El Cabril. Aluminum may pose non-radiological risks, such as corrosion and hydrogen generation. At the request of the CSN, the behavior of aluminum embedded in Cabril-type mortar was investigated, and a calculation methodology was developed to establish an Acceptance Criterion limiting the aluminum content in packages, thereby ensuring the safety of their storage.

The fourth presentation analyzed the feasibility of characterizing and managing low- and intermediate-level radioactive waste from the Krško Nuclear Power Plant. The Acceptance Criteria were reviewed, a physical, chemical, and radiological characterization program was designed, associated costs and risks were assessed, and recommendations were made to improve the criteria. The objective is to ensure efficient and safe management of the stored waste.



Rosa González Gandal
PRESIDENT



Amparo Soler
COORDINATOR

The following presentation examined the use of Raman spectrometers to monitor radionuclides such as neodymium and europium in nuclear fuel separation processes. Their effectiveness was evaluated under normal and simulated conditions, using the extractant TODGA. The results show that this technique enables non-invasive, rapid, real-time analysis, improving operational control and efficiency, making it a promising tool for advanced nuclear fuel reprocessing.

Finally, the use of four-dimensional (4D) simulation tools was presented to study decommissioning and waste management scenarios and to support the development of remote handling tools. A case study was presented using the FlexSim software in the decommissioning of the Fessenheim Nuclear Power Plant. The results made it possible to correct the estimation of containers required for waste conditioning and to adjust the human resources needed for waste management.

I would like to convey the gratitude of the session coordinator and myself to the speakers, who adhered to the allotted time while delivering presentations of excellent quality, originality, and effective use of resources on a topic that generates great interest among conference participants.

SESSION 31 SECURITY AND LICENCE (VI)

The session brought together five presentations offering an overview of industry activities related to Licensing and Nuclear Safety in its different aspects, ranging from Probabilistic Safety Analyses to numerical analyses of severe accident scenarios.

Andrea Serrano Cosafreda from Westinghouse, in her presentation “LEVEL 1 INTERNAL FLOODING PSA REVIEW AT ASCÓ NPP,” highlighted that the fifth revision of the Level 1 Internal Flooding PSA at Ascó Nuclear Power Plant incorporated state-of-the-art methodologies for flooding frequency estimation, uncertainty evaluation, and human reliability analysis. Key updates include the adoption of EPRI Revision 5 for pipe break frequencies, expanded system coverage, updated failure rates, and migration to the HRA Calculator, which significantly reduced human error probabilities. Although these changes increase the Core Damage Frequency (CDF), the overall risk impact is mitigated, and the uncertainty analysis suggests that some conservatism could be optimized using alternative approaches within the same revision.

Mario Quintana Prieto from ANAV, in his presentation “SHARED USE OF OE BETWEEN PLANTS TO STRENGTHEN THE FLEET MANAGEMENT CONCEPT,” emphasized that ANAV’s operational experience approach has evolved towards corporate management of operating experience, integrating lessons learned from internal and external events to improve safety and efficiency. New systematic approaches and tools such as GesPAC have been implemented to optimize applicability analysis and leverage synergies between the Ascó and Vandellòs II plants. This approach promotes continuous improvement and operational excellence in nuclear power generation.

Javier Pelegrina Cortés from Westinghouse, in his presentation “WESTINGHOUSE PROCEDURE FOR RISK ANALYSIS OF HIGH-ENERGY LINE BREAKS,” explained that Westinghouse applies a regulated methodology to analyze the risks of high-energy pipe breaks, identifying potential break locations and evaluating their dynamic effects on structures and systems. The objective is to ensure that safety-related systems maintain their capability to bring the plant to a safe condition following a break. This analysis is performed both during the design phase and in modifications to operating plants.



Miguel Barreiro
PRESIDENT



Ignacio Arana
COORDINATOR

Ignacio Hermana Mendioroz from Iberdrola Generación Nuclear, in his presentation “OVERVIEW OF PSAs AND THEIR APPLICATIONS AFTER COMPLETION OF THE STUDIES REQUIRED BY IS-25,” addressed the level of implementation of Safety Instruction 25, which established in 2010 the criteria for conducting PSAs at Spanish nuclear power plants, covering internal risks, fires, and flooding across different operating modes and levels. After fifteen years of work, all plants now have comprehensive studies that allow operation to be optimized while prioritizing safety. The presentation provides an overview of risk at Cofrentes, Trillo, and Almaraz, showing current and future applications aligned with international practices.

Abderraouf Dahmani from UPCT, in his presentation “MESH SENSITIVITY ANALYSIS FOR NUMERICAL LAB-SCALE COMBUSTION,” explained that computational fluid dynamics (CFD) is key to analyzing hypothetical severe accidents in nuclear power plants, although it entails high computational cost. The OpenHyComb project is developing an efficient solver to simulate the combustion of gaseous mixtures under prototypical nuclear safety conditions, validated with experimental data from specialized facilities. The study includes a mesh sensitivity analysis to optimize element size and ensure reliable results in large-scale simulations.

SESSION 32 OPERATION AND MAINTENANCE (I)

During the 51st Annual Meeting of the Spanish Nuclear Society, held in Cáceres, I had the honor of chairing Technical Session 32, focused on Operation and Maintenance (I), together with Ana Izquierdo as session coordinator. The session brought together seven speakers who presented significant advances in asset analysis, digitalization, monitoring, and inspection techniques, demonstrating the vitality and development of the Spanish nuclear sector.

The session began with a presentation by **Álvaro Rodríguez Prieto** on the valuation of industrial assets through the modeling of material degradation mechanisms. His approach integrates corrosion-based wall thickness loss models, depreciation functions adjusted for age and maintenance, and qualitative risk analysis. This methodology makes it possible to quantify the depreciation of systems, structures, and components of a nuclear power plant and to estimate the investment required for their upgrading, providing a solid tool for strategic and maintenance decision-making.

Next, **Antonio Valverde** presented the management of critical activities related to reactor vessel opening and closure during fuel outages at Almaraz NPP. He highlighted the risks associated with working at height, handling heavy loads, and radiation exposure, as well as the measures implemented to mitigate these risks through shift planning, reinforced quality controls, and retraining programs. The presentation emphasized how operating experience and lessons learned from other facilities can be integrated to improve the safety and reliability of these operations.

Rubén Caballero and Antoni Vidal presented the digitalization of processes at ANAV, describing the transition from paper-based work orders to mobile tools integrated into the plant management system. Digitalization enables the centralization of information, optimization of workflow, and reduction of downtime in clearance verification, facilitating decision-making based on real-time updated data.

Alfonso Lain described the advanced 3D positioning system for underwater ROVs used in reactor vessel inspections. Positioning accuracy, even under radiation and at depths of up to 20 meters, is achieved through computer vision and artificial intelligence, ensuring traceability and reliability in critical inspections.



Adrián Jaime Custodio
PRESIDENT



Ana Izquierdo
COORDINATOR

Rubén Mariblanca presented maintenance monitoring at power operation through Power BI at Trillo NPP, detailing how interactive dashboards allow supervision of ongoing tasks, installed clearances, and preventive maintenance activities nearing their deadlines, thereby optimizing planning and plant data analysis.

Roberto Hassen concluded the technical part with a presentation on the inspection of concrete structures, describing systematic protocols to assess cracks, corrosion, and other structural damage, as well as the classification and implementation of phased corrective actions to ensure the service life and safety of the facilities.

Finally, **Cristina Corrales** presented EPRI guidelines and tools for Monitoring and Diagnostics (M&D) programs, showing how these solutions integrate condition monitoring with preventive maintenance and allow the identification of issues in systems and components before they affect plant operation.

Session 32 demonstrated that nuclear operation and maintenance in Spain is not merely a routine activity: it is a field in which innovation, technology, and experience converge to ensure long-term safety and efficiency. It leaves us with an open question: what new developments will drive the next generation of nuclear maintenance in our country?

SESSION 33 ENGINEERING, DESIGN AND INNOVATION (VI)

In this session, various topics related to the use of artificial intelligence were addressed.

Ignacio Artal, from Almaraz NPP, and Inti Abbate, from Innumerics, explained in their presentation “Trend Analysis Using AI” that one of the elements contributing to the safety and efficiency of a nuclear power plant is the organization’s ability to learn from experience and to identify improvements through a non-conformance and incident management system arising during operation. The use of AI makes it possible to analyze,

classify, and correlate large volumes of data efficiently, eliminating biases inherent to human interpretation.

Beatriz Liébana, from Iberdrola Generación Nuclear, presented “Transforming Work: Practical Applications of AI,” describing how AI can transform daily work—improving efficiency and productivity—through practical applications and useful guidance on the use of tools such as Copilot. She analyzed the added value it provides, offering a detailed view of its impact and benefits.

David Calvo, from Vandellós II NPP, presented “AI for Work Request Pre-Prioritization,” explaining that, with the aim of improving efficiency, an AI system based on machine learning has been designed and implemented for the automatic pre-prioritization of work requests at ANAV’s two plants. Using a model trained on data from the past ten years, the system automatically pre-prioritizes and classifies information related to the responsible department, type of work (corrective, deficiency, or others), priority, need for shutdown, urgency, etc., enabling error reduction and saving approximately 80–100 man-hours in management processes.

Idoia Aguirregabiria, from Westinghouse, presented “GenAI Applied to the Nuclear Sector: Experiences and Best Practices,” describing Westinghouse Electric Company’s experience in deploying and using GenAI internally. This includes the combined use of a commercial solution as a personal assistant alongside the development of a sector-specific application created by Westinghouse: bertha. The implementation of these solutions has been made possible through joint efforts among developers, users, IT, and Global Trade Compliance & Legal teams to ensure compliance with all applicable regulations and standards.

Guillermo Rius, from NFQ Advisory Services, presented “Generative AI for Nuclear Documentation: Automated Accuracy in Technical and Regulatory Comparison,” introducing an automated system based on generative artificial intelligence specifically designed to optimize comparisons between technical specifications, reference regulations, and bid documentation. The tool quickly and accurately identifies discrepancies,



Antonio González
PRESIDENT



Marian Morán
COORDINATOR

reducing review times, improving traceability, and increasing the reliability of the technical evaluation process. In this way, it seeks to prevent undetected discrepancies between client requirements and supplier bids that could lead to operational risks, cost overruns, or non-compliance.

From these five outstanding presentations, the session concluded that AI is becoming increasingly important in both current and future technical and non-technical activities within the nuclear sector. However, it must remain a working tool and not replace human work, as people must ultimately validate the results obtained through its use.

SESSION 34 ADVANCED REACTORS AND FUSION (II)

This technical session focused on the challenges of developing new nuclear reactors, with more than 100 designs at different stages of development and construction and with diverse purposes, bringing together established experts and young talents from the sector. In a dynamic format, the speakers clearly and precisely shared the results of their research and technological developments, the outcome of years of collaborative work.

During the session, advances in key areas of nuclear engineering were addressed. Studies were presented on pressure measurement in fluoride salt systems in molten salt reactors, as well as thermal simulations using CFD applied to conductive porous media in equilibrium for microreactors. The validity of scaling methods to evaluate passive cooling systems in small modular reactors (SMRs) was also discussed, along with the management of advanced fuel waste and economic assessments of fuel cycles in new designs. Other relevant topics included the retention of fission products in pools during severe accidents in integral pressurized water reactors (IPWRs), as well as the impact that the treatment of uncertainties in nuclear data has on the results of neutronic and thermohydraulic transients in sodium-cooled reactors.

The high level of participation during the question rounds reflected the interest generated by the presentations. The open debate made it possible to delve deeper into technical, methodological, and operational aspects, enriching the exchange of knowledge.



Pablo Rey Alonso
PRESIDENT



Mamen Salas
COORDINATOR

The organizers sincerely thank the speakers and attendees for their commitment. Their contribution strengthens the dissemination and consolidation of knowledge in the Spanish nuclear sector, especially in an area that requires a high level of specialization.

In a global context of nuclear energy expansion, the demand for qualified professionals is growing. The development of advanced reactors will be key to the decarbonization of the planet, an essential objective in light of the increasingly evident scenario of climate change.

SESSION 35 NUCLEAR MEDICINE AND RADIOLOGICAL PROTECTION (IV)

Session 35 on Nuclear Medicine and Radiological Protection (IV), held on Thursday, September 25, consisted of six presentations:

1. The first presentation addressed the Demonstration of the Use of Digital Twins in Radiological Protection Operations and Personal Dosimetry and was delivered by **Mr. Borja Bravo Pérez – Tinao**, Principal Technical Leader at EPRI Europe. This digital twin technique could have numerous applications in radiological protection and preliminary assessments through advanced modeling.

2. The second presentation, delivered by **Mr. David Blázquez Pérez**, Head of Laboratories at ENUSA, entitled “Past and Future of Testing Methods for the Analysis of Uranium and Its Isotopes at ENUSA,” presented advances in measurement and determination techniques for these isotopes, with improvements in precision and process efficiency.

3. “The Effect of Using ICRP 116 Effective Dose Rate Conversion Factors on Calculated Dose Rates for the ISFSI at Cofrentes NPP,” delivered by **Mr. Luis Cormenzana López**, Senior Radiological Protection Engineer at Empresarios Agrupados-GHESA, comparatively established the impact of the referenced regulation on calculated dose rates.

4. **Ms. Mireia Pérez-Baeza**, PhD Researcher at the Environmental Radioactivity Laboratory of the Universitat Politècnica de València (LRA-UPV), presented “Spectral Deconvolution for the Rapid Determination of Alpha and Beta Emitters,” showing how these techniques allow precise determination with considerable time savings, facilitating decision-making.

5. The fifth presentation addressed the “Characterization of



Víctor Rivas
PRESIDENT



Amaia Rodríguez
COORDINATOR

a Neutron Personal Dosimetry System Based on Track Detectors” and was delivered by **Roberto Méndez Villafañe**, responsible for the commissioning and operation of the Neutron Standards Laboratory at CIEMAT. This system represents an improvement over those previously used.

6. The session concluded with **Carmen Marina Mullor Martínez**, Head of the Radiological Protection and ALARA Section at Trillo NPP, who presented “Remote Supervision in Radiological Risk Environments.” The use of cameras enables remote visualization, facilitates task supervision, recording, and potential improvement of performance, and minimizes personnel dose.

SESSION 36 DISMANTLING AND WASTE MANAGEMENT (VI)

During Technical Session 36 of the 51st SNE Annual Meeting, held on Thursday, September 25, and dedicated to decommissioning and radioactive waste, six presentations were delivered.

In the first presentation of the afternoon, **Telmo Gabarain Astorqui** presented “Nuclear Waste versus Renewable Waste,” addressing the differences between the generation and management of radioactive waste and the waste generated by renewable energy sources in Spain.

Next, **Luis Osorio Pereira** (Empresarios Agrupados Internacional) and **Víctor Rojas Moreno** (Centrales Nucleares Almaraz Trillo) presented “Preparation for the Shutdown of a Nuclear Power Plant: Adaptation Process of Engineering Studies and Analyses of the Project,” focusing on preparations for plant closure, aimed at adapting engineering studies to optimize resources and ensure safety during the final stage of operation.

Irene García Nuño (Empresarios Agrupados-Ghesa) presented “Methodology for the Classification of Hazardous Waste in Preparation for the Shutdown of a Nuclear Power Plant,” explaining the methodology used to classify the types of hazardous waste generated at a nuclear facility, whose removal may involve the release of potentially dangerous substances.



Gregorio Socorro
PRESIDENT



Enrique Van-Baumberghen
COORDINATOR

The following presentation was delivered by **José Carlos Sáez Vergara** (CIEMAT), entitled “Clearance of Uranium-Contaminated Materials in SuperMUM,” describing a facility that measures radiation in uranium-contaminated materials in order to classify them properly and facilitate their handling.

The fifth presentation, also delivered by **José Carlos Sáez Vergara**, was “MiniBOX System for the Characterization of

Radioactive Waste Packages,” which discussed the development of an automated system using gamma spectrometry to measure drums, big bags, and metallic packages with special detectors and movable tables that allow samples to be analyzed from different angles and weights.

Finally, **Miguel Ángel Rodríguez Gómez** (Naturgy Ingeniería Nuclear) presented “Characterization of Special Waste at Almaraz NPP,” outlining the nature of certain waste stored in the plant’s spent fuel pool for which no management route has yet been defined, as well as different possible approaches for their characterization.

SESSION 37 DISMANTLING AND WASTE MANAGEMENT (VII)

Below is a brief summary of the six presentations delivered during the session:

1. The first presentation was delivered by **Celia Estévez** (E.A.G.) and addressed the “Methodology for the Preparation of the Official Shutdown Documents of Almaraz NPP for Obtaining the DCEX.” The preparation of these documents is essential to justify before the CSN and MITECO that the plant can operate safely during the cessation period, a necessary requirement to obtain the Declaration of Cessation of Operation and initiate its decommissioning.

2. The second presentation was given by **Roberto Plaza** (IDOM) and analyzed the potential radiological effects derived from chloride-induced stress corrosion cracking (CISCC), as a consequence of a hypothetical loss of confinement in welded canisters (SCS). These canisters are used for the storage of spent nuclear fuel in Independent Spent Fuel Storage Installations (ISFSIs).

3. The third presentation was delivered by **José A. Ridao** (KIT), who presented the DORADO project, conceived as a continuation of the PLEIADES project (2020–2023). The latter developed a nuclear ontology and a digital platform validated in real cases. Building on this foundation, the DORADO project (2024–2027) integrates into a single platform BIM technologies, digital twins, AI, robotics, and sensors, with the aim of optimizing costs, reducing risks, and standardizing nuclear decommissioning across Europe.

4. The fourth presentation was given by **Félix de la Fuente** (Marsein) and described the project for the clearance of buildings and surfaces at CIEMAT within the framework of the PIMIC plan. The current objective is to declare these areas suitable for conventional use (reuse), applying the MARSSIM methodology and ensuring that residual radiation does not exceed the limits established by the EU.

5. The fifth presentation was delivered by **Julio del Pino** (E.A.G.), who presented the creation of a BIM model of Al-



Mª Jesús Marijuan
PRESIDENT



Antonio Fernández
COORDINATOR

maraz NPP as part of the preparatory activities for its decommissioning. Based on technical documentation, 3D scans, and inventories, a detailed digital model was developed integrating all plant disciplines. This tool offers multiple applications in training, operation, maintenance, and shutdown planning, contributing to inventory optimization and improved waste estimation.

6. The sixth presentation was delivered by **Javier Barbero** (E.A.G.) and presented the physical inventory of Almaraz NPP, which includes more than 350,000 components and 90,000 structures. The information was integrated into an initial BIM model, enabling the systematization of previously dispersed data and the generation of useful tools for operation and decommissioning. This inventory constitutes a key resource both for daily operation and for future decommissioning, although it requires continuous updating to remain valid.

SESSION 38 OPERATION AND MAINTENANCE (II)

In this technical session, six presentations were delivered, summarized below.

The session began with **Rosaura Miret Gabriel** (ANAV), who presented the paper entitled “BEYOND THE LEAK. IFUG as a Driver of Awareness and Excellence in Leak Management at Vandellós II NPP.” The presentation was based on the Leak Management Program (FLM Program) developed

by EPRI. This program has been implemented at Vandellós II NPP under the name “iFUG,” enabling the improvement of the program by setting objectives and focusing efforts on more effectively managing leaks within the plant.

Rafael Bibiano Torrealba Heredero (EAG), in his presentation “THE CLOUD FACTORY. Inspection and Maintenance of the Cooling Towers at Trillo 1 NPP,” described the

development of a comprehensive maintenance, monitoring, and inspection schedule for the cooling towers at Trillo NPP, applying multiple increasingly innovative and efficient methodologies, such as the use of drones.

Enrique Navarro Ponce (UPV) presented “ESTIMATION OF THE HEALTH STATUS AND REMAINING USEFUL LIFE OF MONITORED EQUIPMENT,” describing the development of a tool capable of accurately assessing equipment health status and predicting its Remaining Useful Life (RUL). The presentation highlighted how RUL prognosis supports intervention planning, thereby improving maintenance management, among other applications of the tool.

Susana Merino Oviedo (CIEMAT) presented “Effect of Hydrogen on Susceptibility to SCC in PWR Internals.” The presentation showed which types of alloys are more susceptible to hydrogen-induced stress corrosion cracking (SCC), analyzing the effect of plastic deformation due to welding or alloy forming processes (cold work, CW), microstructure, and surface finish, and comparing experimental results with data from specialized literature.

Juan Antonio Muñoz Tirado (Nucleonova) presented “Tackling Obsolescence in the Nuclear Industry.” In his presentation, he explained the problems associated with obsolescence and the challenges that arise when an item is no longer manufactured, not available in stock, or absent from industry surplus—especially when there is an upcoming demand for the part. The presentation discussed how to help identify such problematic components so that nuclear power plants can prioritize them for site engineering actions.

Finally, **Mario Fabregas** (ANAV) and **José Ignacio Roselló**



Adrián Gonzalvo
PRESIDENT



Roberto Diego
COORDINATOR

(GDES) presented “Automated Compensatory Fire Surveillance.” The presentation addressed the open innovation work carried out by ANAV in collaboration with GDES in developing a prototype device, already technically and functionally validated against UNE and NFPA standards, compliant with cybersecurity criteria, and capable of integration into the fire protection (FPP) and TETRA wireless communication systems of Ascó and Vandellós II NPPs. This system enables the transmission of alarms and alerts for early fire detection.

After each presentation, a brief question-and-answer session was held. It should be noted that all presentations were of great interest and high quality, highlighting the speakers' expertise in their respective fields.

SESSION 39 ENGINEERING, DESIGN AND INNOVATION (VII)

Session 39, “Engineering, Design and Innovation (VII),” included six outstanding presentations addressing various aspects of engineering and innovation in nuclear power plants. These presentations covered topics related to nuclear fuel manufacturing as well as operational procedures in nuclear facilities.

The session began with the presentation by **Eutimio Fernández Montoya** (ENUSA), entitled “OPTIMIZATION IN THE RECOVERY OF GROUND FUEL PELLET POWDER.” The presentation detailed improvements made to the powder recovery system during fuel pellet grinding, achieving increased collection efficiency, reduced dust accumulation in filters, minimized system losses, and improved maintenance of ducts and filters.

Next, **Adrián Castilla Marcos Carlos** (ENUSA) presented “ULTRASONIC CLEANING OF NUCLEAR FUEL.” This presentation described enhancements made to the nuclear fuel cleaning process through the use of ultrasonic technology, resulting in increased process efficiency, reduced operator dose, and savings in the final manual cleaning stage.

The following presentation, entitled “SOLUTIONS FOR THE



Vicente Alvarado
PRESIDENT



Asunción Gálvez
COORDINATOR

RECOVERY OF OBJECTS IN NUCLEAR FUEL AND IN THE CORE OF PWR REACTORS,” was delivered by Vicente Peinado Ibáñez (ENUSA). The presentation focused on the development of new tools for the recovery of foreign objects in the

reactor cavity during reactor opening periods for fuel refueling. New suction-based tools and various accessories have been developed to recover objects of different sizes from the reactor cavity.

Subsequently, **Rafael Antonio Torres Márquez** (Westinghouse) presented “TECHNOLOGICAL UPDATE OF THE RV COMPONENT OF THE RELOAD MACHINE IN THE ATUCHA I SIMULATOR.” The presentation described improvements to the virtual reality models of the reload machine simulator at Atucha II. The new VR version provides greater realism, uses open standards to avoid dependencies, and improves long-term maintainability, representing a technological advancement of the product.

The fifth presentation was delivered by **Joan Romeu Alfonso** (GDES), entitled “MOBILE DEVICE FOR HIGHLY BORATED WATER INJECTION.” This presentation described the features of a mobile unit designed for the safe and effective injection of highly enriched boric acid, serving as key

support to the fixed reactor dosing system of the Flamanville 3 EPR. This mobile solution is safe and innovative in addressing B-10 depletion.

Finally, **Miriam Jiménez Sánchez** (GDES) presented “PROVISIONAL MOBILE BORATION DEVICE (DPMB).” The presentation described solutions to address the need to increase boron concentration in the spent fuel pool and in various primary system circuits, due to the introduction of new URE and MOX-type nuclear fuels in P4 and PP4 reactors within the French nuclear fleet. The DPMB equipment is a modular and autonomous solution capable of temporary integration into the plant, ensuring solution homogeneity, preventing crystallization, and guaranteeing traceability of operations at all times.

The presentations were of high quality and interest and adhered to the scheduled time. A question-and-answer session followed each presentation, allowing for a fruitful exchange of ideas among all participants.

SESSION 40 ADVANCED REACTORS AND FUSION (III)

The third session on Advanced Reactors and Nuclear Fusion was dedicated to nuclear fusion. Of the five presentations delivered, three were given by engineers from Empresarios Agrupados · Ghesa (EAG), while the other two were presented by universities. Overall, there was a balance between engineering-focused content and research-oriented contributions.

The first speaker, **Jaime Valverde Hernández**, from the Universidad Politécnica de Madrid (UPM), presented a comparative study, carried out in collaboration with CIEMAT, on the performance of once-through steam generators and U-tube steam generators (OTSG and UTSG, respectively). The study involved modeling a WCLL (water-cooled lead-lithium) breeding blanket using MELCOR under loss-of-flow and loss-of-power scenarios. The simulations showed that temperatures in the first wall remain within acceptable limits and that the UTSG design provides better results.

Next, **Javier Gallo Carrasco** (EAG) presented “Results of the DONES-EVO Project, Future Applications in the IFMIF-DONES Particle Accelerator.” The project, funded by CDTI and coordinated by Empresarios Agrupados Internacional, involved the participation of seven companies. Its objective was to reduce critical risks associated with the construction and commissioning of IFMIF-DONES. Key areas of work included tritium migration in lithium handling systems and the assessment of IFMIF-DONES’ potential for the production of medical radioisotopes.

The following presentation was delivered by **Manuel Perezagua Aguado** (EAG), responsible for the manufacturing of the Normal Heat Flux (NHF) elements of the Japanese JT-60SA reactor. In his talk, he outlined the significant challenges involved in manufacturing these components and the technological advances that make it possible to address them. The continuous evolution of designs and technologies requires constant adaptation of manufacturing processes to ensure compliance with strict quality criteria.



Lluís Batet
PRESIDENT



Alberto Guillén
COORDINATOR

Laura María Ruesga Gómez (EAG), author of the fourth presentation, presented the final design of the operator console for the ITER Nuclear Safety Control System (SCS-N). The presentation emphasized the importance of a detailed analysis of safety functions and ergonomics to ensure reliable and safe operation. As a result, the console combines a hardwired panel for Class 1 and 2 subsystems, and PLC-based programmed logic with a touchscreen interface for Class 3 subsystems.

Finally, **Dr. María Urrestizala de Andrés** (University of the Basque Country), with remarkable conciseness, presented within the allotted time a summary of her doctoral thesis entitled “Study of the Isotopic Effect on Hydrogen Transport Parameters in Structural Materials for Fusion Reactors.” Her work addresses the relationship between hydrogen isotopes to predict tritium behavior, validating the classical permeability ratio between protium and deuterium in AISI 316 and Eurofer-97, and providing a solid basis for future research in nuclear fusion.

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A company for the future

A solid green vertical bar on the left side of the page.

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SESSION 41 QUALITY, SUSTAINABILITY AND HUMAN FACTORS (III)

The session day was structured into two blocks, grouped around the themes of quality and human factors.

In the first block, a presentation was delivered from a predictive oversight perspective, explaining the use of low-level non-compliance data to anticipate and prevent incidents through a process of monitoring and acting on trends. This approach enables early detection of deviations and promotes a more proactive culture. It was complemented by another presentation outlining a quality operations management approach, demonstrating how the use of portable IT tools improves and optimizes processes, facilitating usability and traceability in quality supervision activities.

In the human factors block, a human factors simulator developed for the decommissioning activities of the Garoña Nuclear Power Plant was presented. Its purpose is to improve human performance in order to minimize human errors. The simulator focuses on expected behaviors and allows participants to learn, in a simulated environment, the main techniques aimed at reducing the occurrence of human errors.

This was complemented by the presentation of the E+C ≈ CS Plan (Expectations + Behaviors ≈ Safety Culture), which seeks to strengthen safety culture. It was explained how concepts and messages should be clearly conveyed to trainees, actively involving them in the content by allowing them to ex-



Juan Antonio Muñoz
PRESIDENT



Fernando Alarcon
COORDINATOR

perience the concepts firsthand. Each step was presented in a practical and engaging manner, using ingenuity and real-life case examples.

Finally, the session addressed how nuclear experience in human factors training can be transferred to the petrochemical industry, using simulators and INPO-standard methodologies to reduce errors and improve risk perception.

SESSION 42 DISMANTLING AND WASTE MANAGEMENT (VIII)

Technical Session 42 took place on Friday, September 26, from 09:30 to 11:00.

The session was chaired by **José Campos** (Enresa) and coordinated by Susana Gutiérrez (Iberdrola).

Five presentations were delivered, covering various topics of interest related to the decommissioning of nuclear facilities and the safe management of radioactive waste.

The session began with a presentation by **Olga Riba** (Amphos 21), who presented the work carried out using a spent fuel leaching database and the correlation between uranium release and fission products. The objective of this work is to compile the large amount of experimental data obtained from spent fuel leaching experiments conducted under different conditions.

Subsequently, **Elena Fraile** (Amphos 21) presented the model developed for application at Onkalo (Finland), entitled “Modeling Groundwater Flow and Transport Impacts from Construction of Onkalo Spent Nuclear Fuel Repository – Finland.”

The third presentation was delivered by **José Luis Revilla** (CSN), addressing the experience of the CSN and lessons learned in the regulation of nuclear facility decommissioning in Spain, analyzing the regulatory challenges posed by the decommissioning processes carried out in our country.



José Campos
PRESIDENT



Susana Gutiérrez
COORDINATOR

Next, **Manuel Mingarro** (CIEMAT) gave an interesting presentation describing the adsorption of Cs-137 in different types of clays of interest for radioactive waste repositories.

To conclude the session, **Agustín Cerezo** (Amphos 21) presented “Leaching of Cemented Ion Exchange Resins: Data Analysis from Real Samples.”

SESSION 43 YOUTH SESSION WITH NETWORKING

Sponsored by

IDOM

The Young Session was once again held within the framework of the 51st Annual Meeting of the Spanish Nuclear Society, consolidating itself as an essential space to promote interaction between young professionals and representatives of the leading companies in the nuclear sector. In this edition, held in Cáceres, the format was renewed with the aim of enhancing opportunities for connection and direct dialogue between both parties.

Unlike previous years, the session moved away from technical presentations, already integrated into other moments of the congress, to focus entirely on professional exchange. The event was structured into two clearly differentiated parts, designed to encourage both initial interaction and deeper subsequent dialogue.

During the first part, participants took part in rapid group exchange rounds, in which small groups of young professionals and company representatives rotated periodically to get to know each other and discuss different proposed topics. These dynamics fostered a participatory environment and helped break the ice, allowing all attendees to interact with most of the company representatives.

In the second part, the session evolved into an open conversation space, accompanied by a breakfast for attendees, which served as a relaxed setting to revisit topics of interest and deepen the conversations initiated earlier. This more informal format fostered a close and enriching environment of great value for those seeking to join or continue developing within the nuclear sector.



The event was attended by NUCLEONOVA, Ringo, Naturgy, DMIM, Framatome, Empresarios Agrupados, GDES, Nuvia España, ANAV, MARSEIN, Westinghouse, and IDOM, the latter acting as the event sponsor.

With this edition, the Young Session reaffirms its role as a key meeting point for generational renewal in the nuclear sector, adapting to the current needs of young professionals and strengthening ties between academia, research, and industry.

SESSION 44 POSTER SESSION

Sponsored by

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The poster session of the 51st Annual Meeting of the Spanish Nuclear Society (SNE) brought together 15 research works, all presented by their authors in a digital format that enabled concise and dynamic presentations. The posters were displayed on screens throughout the three days of the congress, and the session was attended by around 30 people, creating a space for the exchange of ideas and networking.

The works addressed a wide range of topics relevant to the nuclear sector: from water chemistry in PWR reactor cooling circuits, studies on corrosion in bentonite, and leaching analysis of cemented resins, to innovative projects such as DE-COMPLEX for complexity management in decommissioning, thermohydraulic simulation using TRACE V5, and the use of digital technologies in European decommissioning projects. Advances were also presented in neutron imaging, additive manufacturing applied to reverse engineering, and proposals for educating new generations of nuclear engineers, together with communication initiatives such as Salvemos Almaraz: the young voice for the energy future.

A highlight of the session was the vote to select the favorite poster, which was awarded to Fernando Rastellini Canela,



from CIMNE, for his work "Numerical Simulation of Nuclear Buildings under Seismic Conditions." The session took place in a relaxed atmosphere, accompanied by a light breakfast that encouraged interaction between attendees and presenters.

WOMEN IN NUCLEAR

WIN ACTIVITIES AT THE 51ST RA SNE IN CÁCERES

WIN Spain once again had a strong presence at the Annual Meeting, with a diverse and participatory agenda that reflected the essence of our network: learning, inspiring, and connecting. Throughout the week, WIN's activities combined outreach, training, and creativity, solidifying its own space within the program, which attracts more professionals and students each year.



STEM WORKSHOPS "EnergyLab: the power that moves the world"

The week began with STEM workshops, one of the most anticipated initiatives for schools. Under the theme "The Power That Moves the World," students participated in various activities to discover firsthand how energy is generated and transformed. Through experiments and prototypes, they reflected on the energy mix and the role of nuclear energy in a sustainable future.



This year, the event also included the participation of West WIN, the women's group



from the Almaraz nuclear power plant, who collaborated as mentors and role models. Their involvement provided a first-hand perspective on working in the industry and reinforced the message that science is also built on values such as collaboration and diversity. ■

MENTORING WiN – EPRI – OECD-NEA

On Tuesday morning, we held another edition of the International Mentoring Workshop, **“The Adventure of Discovering the Scientist Within,”** organized by WiN Spain in collaboration with the OECD-NEA and sponsored by EPRI. This activity has become one of the most anticipated events of the Annual Meeting and a cornerstone of our outreach efforts.

During the day, students and professionals shared experiences and reflections in a welcoming environment designed to inspire careers and showcase the diverse career paths offered by the nuclear sector. Equipped with PPE and guided by WiN volunteers, participants completed a course full of challenges, games, and activities that helped them “discover the scientist within.”

Mentoring once again demonstrated its strength as a bridge

between generations: a space where experience and the future engage in dialogue, where a conversation can awaken a vocation, reinforce confidence, or open a door that seemed distant. ■



WIN THEATRE: “Helen of Troy. Six voices. One story. The woman behind the myth”



On Tuesday afternoon, the WiN Theatre Group offered a different experience at the San Francisco Cultural Complex with the performance of “Helen of Troy. Six voices. One story. The woman behind the myth”, directed by Inés Gallego,

industrial engineer and former president of WiN Spain.

Inspired by Miguel del Arco's "Trial of a Fox," the play was reinterpreted by six women from the nuclear sector, who gave voice to Helena at different stages of her life. The bold and moving staging combined music, text, and emotion to reflect on science, communication, and society from a unique perspective: that of art and sensitivity.

The reception was extraordinary, with a full auditorium and an enthusiastic audience. As Inés Gallego pointed out, “mentoring and theater share something essential: they are bridges.” And that is precisely what this initiative achieved: building a bridge between technique and

emotion, between reason and words.

The day concluded with Spanish wine, which allowed for continued sharing of impressions in a friendly and participatory atmosphere. ■



WiN Talk: "WiN Spain: Energy that drives, talent that transforms"

On Wednesday, WiN participated in the technical program with the presentation "WiN Spain: Energy that drives, talent that transforms," a forum to share the network's evolution, its

new lines of work, and the value of diversity as a driver of innovation. It was an inspiring event that showcased how collaboration and shared leadership are transforming the culture of the nuclear sector.



Committee Space WiN

On Thursday morning, WiN Spain participated in the SNE Committee Area, which has become one of the most dynamic and engaging spaces at the congress. Our stand became a meeting place where we could share experiences, make connections, and strengthen our network.

The most symbolic moment was the traditional WiN group photo, which each year reflects the unity, visibility, and commitment of everyone in our community. For us, being present at the SNE area is an opportunity to showcase female talent, inspire future careers, and continue building a positive impact within the industry.



In addition, this year we launched a creative contest for younger visitors: to imagine a new adventure companion for Alara and Isótopo, our children's outreach characters. This initiative, which combined imagination, education, and energy, was a great success with visitors.



WiN Spain Award 2025

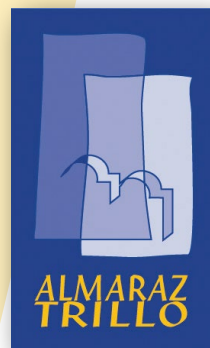
The week culminated in one of the most moving moments of the Annual Meeting: the presentation of the WiN Spain 2025 Award, held during the Spanish Nuclear Society's gala dinner.

The award was given to María Eugenia Vega Antolín, of Equipos Nucleares S.A., S.M.E. (ENSA), in recognition of her professional example, her commitment to equality, and her contribution to increasing the visibility of women in the nuclear sector.

The award symbolizes the spirit of WiN: recognizing and celebrating talent that inspires, paves the way, and contributes, through excellence and conviction, to building a more diverse, innovative, and humane sector.

With this set of initiatives, WiN Spain reaffirms its commitment to training, outreach, and personal and professional development, demonstrating that the energy driving the nuclear sector also comes from the people who make it possible.





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de mejora,
actualización
y modernización**



YOUNG NUCLEARS

ACTIVITIES DURING THE 51ST ANNUAL MEETING

STEM WORKSHOPS

No Annual Meeting is complete without STEM workshops, and this 51st edition was no exception. These educational activities are designed to introduce nuclear science and technology to students who will be the future generation of the sector. Through interactive activities, participants explore key physics and engineering concepts, fostering critical thinking, scientific curiosity, and promoting vocations in STEM disciplines.

Young Nuclear Professionals, the organizers of this initiative, held the STEM workshop entitled "Programming Without Computers," an activity that allowed more than one hundred students from Cáceres to explore the fundamentals of computational logic in a practical and fun way, without the need for electronic devices.

This workshop introduces students to the fundamentals of programming through a hands-on, engaging activity. Working in teams, participants program instructions for a human-like

"robot" to create shapes using plastic cups. This dynamic fosters logical thinking and collaboration, while also developing communication, time management, and problem-solving skills. Through play, students face increasingly complex challenges, strengthening their ability to work as a team. It is an innovative and accessible way to introduce computational and scientific thinking to students. ■



TALK AT THE UNIVERSITY FOR SENIORS OF EXTREMADURA



As part of the activities of the Annual Meeting, Young Nuclear Professionals organized an informative talk for students of the University for Seniors of Extremadura. The talk, entitled "Introduction to Nuclear Energy and Nuclear Power Plants," aimed to introduce the field of nuclear energy, dispelling myths

and providing factual information in an engaging and interactive environment.

The talk provided a basic introduction to topics such as nuclear fission, nuclear power plants and their safety, and the future prospects of nuclear energy, among others. Undoubtedly, the highlight was the Almaraz nuclear power plant itself, which was mentioned repeatedly for its extremely high safety standards and its role as an economic driver for Extremadura. As the attendees were students from this autonomous community, it was a topic of great interest to them.

The talk concluded with a question and answer session where the audience could delve deeper into topics of interest and engage in dialogue. The "Yes to Almaraz" platform made a brief intervention to highlight the importance of the power plant and advocate for its long-term operation. ■

SCIENCE IS AWESOME

On September 23rd, Jóvenes Nucleares (Nuclear Young Professionals) celebrated another edition of our now-traditional "Science is Awesome" event, as part of the program for the 51st Annual Meeting in Cáceres. The event, sponsored by Aseguradores de Riesgos Nucleares A.I.E. (Nuclear Risk Insurers Association), brought together young professionals and science enthusiasts in a relaxed atmosphere, where outreach and learning took center stage.

During the day, our speakers guided us on a fascinating journey through the origins of nuclear science and technology, exploring everything from the development of the Soviet program

to current advancements. We learned to assess nuclear risks, discovered how the periodic table was completed throughout history, and explored the many uses of radioisotopes in fields as diverse as medicine, industry, and space exploration. The session was a unique opportunity to introduce nuclear energy to young people, foster the exchange of ideas, and reinforce a passion for science in a friendly, engaging, and inquisitive environment.

Without a doubt, "Science is the best" once again established itself as an essential meeting point for nuclear energy enthusiasts. ■



STAND #nucleares

The experience of Young Nuclear Professionals at the #nucleares stand was a resounding success, focused on networking. One of the highlights was "Nuclear Bingo." Nuclear Bingo? Yes, you read that right. "Nuclear Bingo" is a creative and thematic adaptation of the traditional game, designed to test knowledge in a fun way. The mechanics are very simple: each participant receives a bingo card.



The main difference is that these cards don't contain random numbers; instead, the squares are occupied by elements from the periodic table, arranged randomly on each card. Specifically, the atomic numbers range from 1 (Hydrogen, H) to 99 (Einsteinium, Es) are used.

This fun activity served as an incentive for active interaction. Beyond the main event, the stand acted as a hub for dialogue and the exchange of ideas. In this way, Young Nuclear Professionals fostered a welcoming environment, strengthening the community of the new generation of nuclear professionals and reinforcing their sense of belonging to the sector. ■



BASIC COURSE IN NUCLEAR SCIENCE AND TECHNOLOGY

Young Nuclear Professionals continued its outreach work with the popular Basic Course on Nuclear Science and Technology. The activity, sponsored by Tamoin, took place at the Polytechnic School of the University of Extremadura and brought together students from various technical degree programs interested in learning more about the nuclear field.

Throughout the course, our speakers offered a comprehensive overview of the nuclear sector, covering everything from the fundamentals of radiation and the operation of nuclear power plants to fuel, safety and radiation protection, radioactive waste management, and the development of future power plants. We also explored technological applications beyond electricity generation, as well as the contribution of nuclear energy to the energy mix in the face of climate change challenges and the achievement of sustainable development goals.



The course was an excellent opportunity to introduce the sector to the university community and concluded with a question-and-answer session in which attendees actively participated, demonstrating their curiosity and interest in the content. It was a day that not only provided an opportunity to learn, but also to debate and reflect on the role of nuclear energy in the well-being of society and in the future of energy. ■

NUCLEAR TECHNOLOGY WORKSHOP



The Nuclear Technology Workshop: Mission LTO was one of the highlights of the 51st Annual Meeting. With over 150 participants, this edition reinvented the traditional format of technical workshops, opting for a gamified and interactive experience that brought nuclear technology closer to the public in a dynamic, visual, and engaging way.



The objective was clear: to break the myth that nuclear energy is not at the forefront of technology. And it succeeded. Through a tour of six stations, attendees were able to explore firsthand the innovations that make Long-Term Operation (LTO) of nuclear power plants possible: from robotics and seismic simulation to augmented reality, industrial communication, and remote inspection.

The carefully designed space invited visitors to discover and participate. Each visitor received a mission map with which they had to complete activities and get their progress stamped at each station. At the end, those who managed to complete the entire course received a small prize.

The event brought together some of the leading compa-



nies in the sector, such as Framatome, ENSA, Westinghouse, MARSEIN/MANSERVA, ANAV, and the Structural Mechanics Group (CIMNE). They all showcased technologies currently used in Spanish and European nuclear power plants: robots for fuel handling, advanced communication systems, earthquake simulations of structures, and demonstrations with HoloLens that allow users to "see" inside equipment without opening it.

The atmosphere was exceptional: professionals, students, and visitors of all ages came to learn how innovation and precision engineering are the foundation of daily operations at a modern nuclear power plant. Laughter, questions, and curiosity filled the space throughout the day.



The workshop concluded with very positive feedback from attendees, who highlighted its interactive nature and the engaging demonstrations. It was a unique initiative that successfully brought nuclear technology to a wider audience and showcased the talent and innovation that characterize the sector. ■

SAVE ALMARAZ COMMUNICATIONS

In 2024, Jóvenes Nucleares launched the Save Almaraz initiative, with the aim of advocating for the continued operation of the Almaraz nuclear power plant beyond 2027. From the outset, a multidisciplinary communication strategy was designed to convey the growing concern about the socio-economic and environmental consequences that its closure would entail.

During the 51st Annual Meeting, we presented a summary of the numerous actions undertaken over the past year to bring this message closer to both the public and institutions. Through an oral presentation at the Communication Session

and a poster presentation, we highlighted interviews with national and international media, technical visits to the plant, courses delivered in educational centers, and participation in outreach events. We also emphasized the incorporation of innovative communication formats, such as setting up an information table on the street in the center of Madrid, achieving broad reach and significant public participation.

Bringing these presentations to Cáceres, where the Almaraz nuclear power plant is located, gave a special meaning to the initiative, as reflected in the words and enthusiasm of the attendees. ■



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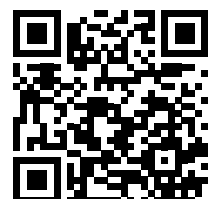
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BEST PRESENTATIONS

BEST PAPERS PRESENTED AT THE 51ST ANNUAL MEETING

At the 51st Annual Meeting, in accordance with the criteria established for selecting the best presentation, it was determined that the best presentations and posters submitted were as follows:

QUALITY AND HUMAN FACTORS Area

- 05-03 **JOURNEY TO ZERO SHOTS (MTZSP)**
Ángel Holguera Llamazares. CNAT

ENGINEERING, DESIGN AND INNOVATION Area

- 03-04 **ADAPTATION TO THE RESULTS OF SEISMIC ITC AT CN VANDELLÒS II: DESIGN OF A SEISMICALLY REINFORCED RECHARGE WATER STORAGE TANK**
David Martínez Verdú
Asociación Nuclear Ascó-Vandellòs II
- 21-04 **CLEN DESIGN LIMIT WITH COBRA-TF AND MONTE CARLO METHODS**
Alejandro Costa Cardona
ENUSA Industrias Avanzadas S.A., S.M.E.
- 27-01 **IMPLEMENTATION OF AN AUXILIARY STEAM BOILER AT ALMARAZ NPP. CHALLENGES, DIFFICULTIES AND ACHIEVEMENTS**
Maite Pérez Lagares. EAG (EA-GHESA)

OPERATION AND MAINTENANCE Area

- 32-04 **ADVANCED 3D POSITIONING SYSTEM**
Alfonso Lain Fernández. Westinghouse

FUEL area

- 26-01 **OPERAHPC PROJECT: MODELLING OF COATED CLADDING HIGH-TEMPERATURE CREEP WITH OFFBEAT**
Francisco Feria. CIEMAT

NUCLEAR SAFETY AND LICENSING Area

- 01-05 **IMPACT OF THE MODELING OF HIGH ENERGY ARC FAULT FIRES ACCORDING TO NUREG-2262 ON THE PSA OF VANDELLÒS II NPP**
Álvaro Fernández Romero
Westinghouse Electric Spain
- 19-05 **ANALYSIS OF LOCA SEQUENCES IN NUSCALE WITH THE TRACE SYSTEM CODE**
Yago Martínez González
Universidad Politécnica de Madrid

THERMOHYDRAULICS AND NEUTRONICS Area: SIMULATION AND EXPERIMENTATION

- 10-05 **THERMAL-HYDRAULIC ANALYSIS OF PASSIVE SAFETY SYSTEMS PERFORMANCE IN ADVANCED KOREAN REACTORS DURING SBLOCA SEQUENCES USING THE TRACE CODE**
Antonio Dies Beneytez
Universidad Politécnica de Madrid

ADVANCED REACTORS AND NUCLEAR FUSION Area

- 04-07 **ARTIFICIAL INTELLIGENCE FOR THE AUTOMATION OF DATA VALIDATION AND ACQUISITION IN THE ULTRASONIC TESTING OF WELDS IN THE MANUFACTURING PROCESS OF THE ITER VACUUM VESSEL**
María Ortiz de Zúñiga López-Chicheri
Fusion for Energy

DECOMMISSIONING AND WASTE MANAGEMENT Area

- 12-05 **VANDELLÒS I CHARACTERIZATION PLAN**
Gonzalo Medinilla Téllez
Westinghouse Electric Spain SAU
- 24-05 **PORTABLE RADIOACTIVE WASTE MANAGEMENT FACILITY – IPRE**
Daniel Carrasco Baltasar
ENUSA Industrias Avanzadas S.A., S.M.E.
- 37-01 **METHODOLOGY FOR THE PREPARATION OF THE OFFICIAL OUTAGE DOCUMENTS OF ALMARAZ NPP FOR OBTAINING THE DCEX**
Celia Estévez Fernández.
EAG (EA-GHESA)

NUCLEAR MEDICINE AND RADIOLOGICAL PROTECTION Area

- 29-03 **SOIL-TO-PLANT TRANSFER FACTORS OF THE NATURAL RADIOACTIVE SERIES, 7BE AND 137CS IN A SEMI-ARID CLIMATE**
Víctor Manuel Expósito Suárez. CIEMAT

COMMUNICATION AND TRAINING Area

- 02-03 **SOLIDARITY IN ACTION: THE RESPONSE OF THE NUCLEAR SECTOR TO THE 2024 VALENCIA DANA**
Lucía Gómez Sanchis
GD Energy Services, S.A.

POSTER SESSION Area

- SP-2 **NUMERICAL SIMULATION OF NUCLEAR BUILDINGS UNDER SEISMIC LOADING**
Fernando Rastellini Canela. CIMNE

COMMERCIAL EXHIBITION

Once again, the commercial exhibition brought together the most representative companies in the sector, which had the opportunity to present their products and services to the congress participants. For three days, the exhibition area served as a professional meeting point, as well as a place for personal encounters that are renewed each year.

The 51st Annual Meeting featured the following exhibiting companies:

ADEMI
AHLBERG CAMERAS
AMARA
AMPHOS 21
CIEMAT
CIMNE
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EMPRESARIOS
AGRUPADOS
ENSA-ENWESA
ENDESA
ENRESA

ENUSA
EUROFINS
FRAMATOME
GD ENERGY
SERVICES
IBERDROLA
KONECRANES
MARSEIN
NATURGY
RINGO VALVULAS
SGS-TECNOS
SNE COMISIONES
WESTINGHOUSE





During the 51st Annual Meeting of the Spanish Nuclear Society, **EAG (Empresarios Agrupados – GHESA)** once again demonstrated its commitment to the development of nuclear energy and its support for young talent, actively participating in the various technical and informative sessions held in Cáceres.

Of the 50 EAG (Empresarios Agrupados – GHESA) professionals who attended the event, nearly 30 took part as speakers, and three of their presentations were recognized with the following awards:

Best Presentation Award in “Engineering, Design and Innovation”: Maite Pérez Lagares, for her work on Implementation of an auxiliary steam boiler at Almaraz NPP. Challenges, difficulties and achievements.

Best Presentation Award in “Decommissioning and Radioactive Waste Management”: Celia Estévez Fernández, for her presentation on Methodology for the preparation of the official outage documents of Almaraz NPP for obtaining the DCEX.

Best Paper Award in “Master’s Theses and Final Projects of the SNE”: Alexia Onieva Bascón, for her presentation on Analysis of tritium permeation in a radioactive gas treatment system.

The directors and heads of various engineering departments, Luis Cerrada Duque, Jorge López Tanco and Luis Osorio Pereira, took part in the Young Session, an initiative aimed at bringing emerging talent closer to the sector and

providing young professionals with a space to present their work and contribute to the dissemination of knowledge.

EAG (Empresarios Agrupados – GHESA) was also present at the mentoring workshop, represented by Laura Ruesga Gómez, with the aim of offering young people the opportunity to join the companies that are part of the SNE through internship programs and job opportunities. The participation of Pilar López Fernández and Mamen Salas Cortés in the workshop organized by Women in Nuclear (WiN) also stood out. ■

endesa

ENDESA, the leading nuclear operator in Spain, was represented at the 51st Annual Meeting of the Spanish Nuclear Society (SNE) by a distinguished delegation of professionals, led by its General Manager of Nuclear, Gonzalo Carbó.

The event, which brought together 700 delegates in Cáceres and was supported by 50 companies, served to further strengthen the defense of nuclear energy as a reliable, safe and emission-free source, highlighting its crucial role in the stability of the electricity system and in containing electricity prices.

In a context marked by the resurgence of nuclear energy at the international level and the national debate on the extension of the operating lifetime of the nuclear power plants currently in operation, Endesa’s professionals actively participated in the development of the meeting, where the contribution of nuclear technology to decarbonization, to the economic development of the local communities where plants are located, and its importance in meeting the expected increase in electricity demand were emphasized.

Javier Gutiérrez and Manuel Leal were part of the Organizing Committee of the 51st Annual Meeting, at which 300 technical papers were presented, addressing the future challenges of the sector.

Likewise, Endesa was present at the congress commercial exhibition with a stand that highlighted the importance of nuclear energy as an essential vector in the energy transition and in the company’s trajectory, which has celebrated 80 years of history. ■



ENUSA strengthens its leadership in the nuclear sector through its outstanding participation at the SNE Annual Meeting

ENUSA once again demonstrated its commitment to innovation, knowledge and excellence in the nuclear field during its participation in the Annual Meeting of the Spanish Nuclear Society (SNE), held in the city of Cáceres, in the region of Extremadura. The company had a notable presence both in the commercial exhibition and in the technical sessions of the event.

ENUSA's stand, inaugurated by the President of the SNE, Paulo Domingues Santos, became a strategic meeting point for the exchange of ideas, the presentation of projects and the strengthening of relationships with clients and organizations within the sector. Throughout the exhibition, companies and institutions showcased their latest technological advances and developments, and ENUSA once again positioned itself as a benchmark in the Spanish nuclear landscape.

One of the highlights was ENUSA's active participation in the technical sessions, in which thirteen company professionals addressed a wide range of key topics for the sector:

- Antonio Félix Sánchez-Oro Portillo: Cybersecurity in the nuclear sector: Challenges and strategies for a secure environment
- Javier Orive Soto: Optimization of refueling schemes with Neutronet: Experience and multi-objective function
- Daniel García García: Occupational internal dose assignment at the Juzbado Plant using ICP/MS
- Héctor Hernández García: Description of equipment commissioning and PWR fuel manufacturing
- Roberto Rodríguez Cebriano: Experience in leak-tightness inspections of fuel stored in pools using the Sicom In-Can-Sipping system
- Pablo De Tena-Dávila Sarmentero and Patricia Pérez Martín: Automated radiological characterization of waste in large containers
- Alejandro Costa Cardona: Clen design limit with Cobra-TF and Montecarlo methods
- Daniel Carrasco Baltasar: Portable radioactive waste management facility – IPRE
- David Blázquez Pérez: Past and future of testing methods for the analysis of uranium and its isotopes at ENUSA



- Vicente Peinado Ibáñez: Solutions for the recovery of objects in nuclear fuel and in PWR reactor cores
- Eutimio Fernández Montoya: Optimization in the recovery of ground pellet dust
- Adrián Castilla Marcos: Ultrasonic cleaning of nuclear fuel

Special mention should be made of the presentations by Daniel Carrasco and Alejandro Costa, who were recognized with the Best Presentation Award in their respective thematic areas: "Decommissioning and Waste Management" and "Engineering, Design and Innovation." This recognition highlights the technical expertise and professionalism of both experts.

The Annual Meeting also served as a platform to promote the nuclear sector's social commitment. On the day prior to the event, the association WIN Spain organized mentoring sessions aimed at 4th-year secondary school students. ENUSA joined the initiative through its Director of Environmental Business, Esther Sánchez, who shared her professional experience with the young participants, helping to inspire vocations in the scientific and technical fields.

With this participation, ENUSA once again demonstrates that talent, experience and innovation are key elements of its corporate identity, reaffirming its role as a strategic player in the development of the nuclear sector in Spain. ■



GDES actively participated in the 51st Annual Meeting of the Spanish Nuclear Society, held in Cáceres from 22 to 26 September, together with more than 700 professionals from the sector. Our presence stood out for the high technical level of the papers presented and for our commitment to innovation and sustainability.

Among the most relevant contributions, Roberta Gargiulo presented the steam generator decommissioning project at Latina NPP; Miriam Jiménez introduced the Mobile Temporary Boron Injection Device; and Joan Romeu presented the highly borated water injection system for EPR reactors. José Ignacio Roselló collaborated in the paper on automated fire surveillance, and Julián Mendoza introduced a methodology for applying the graded approach to nuclear quality and safety requirements.

Lucía Gómez was recognized with the Best Presentation Award in Communication and Training for "Solidarity in Action," which described the nuclear sector's response to the March 2024 DANA.

In addition, GDES took part in the coordination of technical sessions and in the Young Session, strengthening ties with new talent. Our stand showcased the latest innovations, international projects and our commitment to promoting the platform "Yes to Almaraz, Yes to the Future."

The next edition will be held in A Coruña, where GDES will once again be present, fostering dialogue and technical excellence in the nuclear sector. ■



Iberdrola Generación Nuclear played a prominent role as host company at the 51st Annual Meeting of the Spanish Nuclear Society, where it was once again represented by a broad delegation of professionals led by its Director, Tomás Lozano.

In addition to assuming the presidency of the Organizing Committee, Iberdrola once again had a notable participation at the Annual Meeting. As

in previous editions, its professionals chaired and coordinated several technical sessions and delivered presentations focused on initiatives aimed at improving operational efficiency and strengthening safety at its nuclear facilities, thus reaffirming the company's commitment to safety and innovation in the nuclear field.

Iberdrola also maintains a strong social and economic commitment to the communities that host its facilities, promoting local development and sustainability in their surroundings, with full respect for the environment. An example of this is the EMAS III certification obtained by the Cofrentes nuclear power plant, which accredits compliance with the highest European environmental management standards. Cofrentes was the first Spanish nuclear power plant to obtain this distinction, reinforcing Iberdrola's leadership in integrating responsible and sustainable practices within the energy sector.

The Iberdrola Generación Nuclear stand at this Congress featured the Almaraz nuclear power plant as its main focus, an emblematic facility for the Spanish electricity system. Located in the province of Cáceres, Almaraz represents one of the fundamental pillars of base-load power generation in Spain, contributing decisively to the stability of electricity supply and to the reduction of greenhouse gas emissions. ■



MARSEIN enthusiastically participated in the 51st Annual Meeting of the Spanish Nuclear Society, held in Cáceres. This event, one of the most relevant in the sector, once again allowed us to showcase our closeness, professionalism and commitment to the Spanish nuclear industry.

Our stand became a meeting point for clients and collaborators, where we shared conversations, projects and ideas over coffee and traditional

sweets from our region. This simple yet highly appreciated gesture reflects the essence and hospitality that characterize MARSEIN.

The company brought nearly 20 professionals to the event, including directors, project managers and technical specialists, demonstrating the strategic importance of the meeting for our organization.

MARSEIN participated with three technical presentations, which were a source of pride due to the quality and soundness of their content, as well as with the coordination of a technical session that stood out for its professionalism and rigor.

The activity was complemented by strategic meetings and discussions with clients, in an atmosphere of collaboration and shared vision regarding the sector's challenges.

We would especially like to thank the SNE and the organizing team for their support and professionalism, which enabled our participation to run smoothly.

The Cáceres edition has been one of the most outstanding for MARSEIN, consolidating our role in the sector and strengthening our future outlook. ■



Once again, **NATURGY** has played a prominent role in the Annual Meeting of the Spanish Nuclear Society, held in the city of Cáceres, actively participating with the presentation of five technical papers in various thematic areas, as well as chairing and coordinating five technical sessions and taking part as an exhibitor in the commercial exhibition. This involvement reinforces its commitment as a benchmark in the energy sector, firmly supporting innovation and technical excellence.

During the event, NATURGY took part in different technical sessions where key issues were addressed to meet the current and future challenges of the sector. In addition, NATURGY took the opportunity to establish synergies with other stakeholders in the sector. Its commitment to the energy transition is reflected in its focus on projects that contribute to decarbonization and improved energy efficiency, aligning with the Sustainable Development Goals and the demands of today's society.

At the meeting, the company reaffirmed its business model, centered on value creation and commitment to the sustainable development of society, ensuring a competitive, secure and environmentally friendly energy supply.

Finally, NATURGY announced its role as host company of the 52nd Annual Meeting, which will be held from 7 to 9 October 2026 in the city of A Coruña. ■



In this particularly special year, in which **Ringo Válvulas** celebrates its 25th anniversary, the company once again had the honor of participating in the 51st Annual Meeting of the Spanish Nuclear Society, held in the city of Cáceres. This event, consolidated as one of the most relevant gatherings in the sector, brought together the main players in the Spanish nuclear industry: plant operators, supplier companies, regulatory bodies and research institutions. This year's edition once again highlighted the importance of nuclear energy for energy security, the stability of the electricity system and decarbonization, at a time when the debate on the future of the national nuclear fleet remains open.

As every year, Ringo Válvulas actively participated with its stand, consolidating its role as a meeting point with clients and collaborators, and reaffirming its commitment to technical excellence, quality and nuclear safety. The company continues to focus on innovation and continuous improvement in order to offer more efficient,



safer and more sustainable products, thereby strengthening its role in the transition towards clean and stable energy.

During 2025, Ringo Válvulas has continued to provide support and supply services to all Spanish nuclear power plants, delivering valves, spare parts and technical assistance to Almaraz, Trillo, Cofrentes, Ascó and Vandellós. This commitment ensures the safe and efficient operation of facilities that are critical for the country and highlights the value of nuclear energy in industrial competitiveness and emissions reduction. The continuity of this sector is essential to preserve technical

knowledge, skilled employment and the stability of the national electricity system.

At the international level, the company has strengthened its presence with outstanding projects around the world. These include the supply of DN300 globe and gate valves with electric actuator for Forsmark (Sweden) and four DN600, class 600#, check valves for Rivne (Ukraine), specially designed for turbine system protection. Supplies were also made of 30" 150# butterfly valves with ebonized bodies for Columbia (USA), suitable for demanding service conditions, and four 8" 900# check valves for Bruce Power (Canada), reinforcing the confidence of North American operators in the reliability and quality of SAMSON Ringo products. In addition, deliveries of diaphragm, globe and check valves were completed for Tihange (Belgium), as well as collaborations with Westinghouse on projects for Krsko (Slovenia) and Koeberg (South Africa), reaffirming the company's presence in the main international nuclear markets. ■



Westinghouse highlights its technological leadership at the 51st Annual Meeting of the Spanish Nuclear Association

Westinghouse Electric Company actively participated in the 51st Annual Meeting of the Spanish Nuclear Association, held at the Conference and Exhibition Centre of Cáceres. The event brought together more than 800 professionals from the nuclear sector, consolidating its role as a key forum for the exchange of knowledge, innovation and collaboration among companies, institutions and experts in the energy field.

Westinghouse was represented by a multidisciplinary team from various business units of the company. At our commercial stand, we presented

advanced solutions for the long-term operation of nuclear power plants, as well as innovative technologies such as the eVinci™ microreactor and the AP300™ small modular reactor. Our experts delivered 34 technical presentations, addressing strategic topics such as nuclear safety and licensing, operation and maintenance, decommissioning and waste management, and the use of generative artificial intelligence applied to the nuclear sector through our HIVE™ system.

In addition, Westinghouse took part as a speaker in two of the three plenary sessions, focused on the relationship between data centers and nuclear energy, and on long-term operation strategies, reinforcing our commitment to sustainability and the digitalization of the sector.

As part of outreach activities, our teams collaborated in science, technology, engineering and mathematics (STEM) workshops aimed at more than 280 secondary school students from the region, fostering interest in these areas through hands-on experiences linked to the nuclear industry. We also participated in two initiatives organized by WIN, including a mentoring workshop and a theatrical performance promoting equality and the visibility of women in the scientific field.

The SNE Annual Meeting has been an excellent opportunity to strengthen ties with the Spanish nuclear community, share technological advances and reaffirm our commitment to the responsible development of nuclear energy. We thank all Westinghouse professionals who contributed to this outstanding participation, which reflects our dedication to driving the energy future through innovation, safety and talent. ■



The 52nd Annual Meeting of the Spanish Nuclear Society will take place in the city of A Coruña.

SPONSORS, PARTNERS AND EXHIBITORS





52nd ANNUAL MEETING SPANISH NUCLEAR SOCIETY

A Coruña October 5-9, 2026





GE VERNOVA

Reactor Pressure
Vessel Forging

HITACHI

CONCEPT BECOMES REALITY

As global energy demand grows and nations seek out lower-carbon, more secure power supply, next-generation nuclear can play an important role.

On the north shore of Lake Ontario, Canada, Ontario Power Generation (OPG) and GE Vernova Hitachi Nuclear Energy (GVH), along with other collaborators, are laying the groundwork for the first of four BWRX-300s, a group of small modular reactors (SMRs) that will reliably and safely scale up the country's grid with 1.2 gigawatts of 24/7 carbon-free power.

HISTORY IS BEING MADE HERE

History is being made here at the Darlington nuclear facility: When construction of that first BWRX-300 is completed in 2029, **it will be the first SMR in the western world.**



Darlington New Nuclear Project Site



TECHNOLOGICAL CAPABILITIES FOR THE DEVELOPMENT OF COMPLEX PROJECTS

With our **engineering services**
and **EPC**, we bring quality
and experience to **power**
generation projects.

+65,000

MEGAWATTS



+1,400

PEOPLE



+250

PROJECTS



80

COUNTRIES



NUCLEAR

Fission and Fusion.

CONVENTIONAL THERMAL

Coal, fuel oil, gas in open or combined cycles.

RENEWABLE ENERGIES

Parabolic solar, concentrating tower solar,
photovoltaic solar and wind power.

EAG



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