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Nuclear España

THE MAGAZINE OF NUCLEAR SECTOR PROFESSIONALS

sne

INTERVIEW:
Rosa GONZÁLEZ GANDAL and Patricia CUADRADO.
Presidents of the Organizing Committee and the Technical Committee of the 48th Annual Meeting of the SNE


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48th ANNUAL MEETING OF THE SNE

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EDITORIAL

WHAT IS THE REASON FOR CLOSING NUCLEAR POWER PLANTS?

Stable operation and generation practically 90% of the hours of the year, 20% of the electricity consumed in production and 20 million tons of CO2 less in emissions. 54,275.01 GWh with an installed power of 7,117 MW, only 5.71% of the total generation park. This is the summary of the compelling operating data of the seven nuclear reactors that we currently have in operation in Spain. These are the data and in them you can hardly find the answer to the question: What is the reason for closing nuclear power plants?

We are talking about a guarantee of supply and stability due to its operating balances, of electrical energy that contributes to the fight against climate change and of a not inconsiderable 20.34% of net electrical production. All these arguments, which we professionals in the nuclear industry defend with perseverance, were also evident in the Annual Meeting that, once again, was organized by the Spanish Nuclear Society, this time in Toledo, with the participation of more than 700 professionals from all areas of industry and nuclear science.

The Spanish nuclear industry and the professionals who work in it ask that, without further delay, the closure schedule of the Spanish nuclear power plants be reconsidered. We are not the only ones to say it, but whether it falls on deaf ears or not, we will not tire of doing it either.

The safety of nuclear power plants, with stable operation practically 24 hours a day every day of the year and with the permanent independent supervision of the Nuclear Safety Council, has not been a reason for doubt for a long time. Its viability has been endorsed by its owners and social perception, although mostly still against these facilities, has clearly been turning in recent years towards a “yes” to continuity in operation.

The supposed dichotomy between renewable energies and nuclear energy is just a mantra for those who are running out of other arguments since both sources of generation complement each other perfectly and allow us to move robustly towards a decarbonized future. The management of spent fuel is an issue technically resolved from the beginning of the operation of these facilities (the fuel used is being stored in the plants themselves since they came into operation) and the only debate about its future model is played out in the political field. and the need for decision-making by the responsible Administration.

With everything written up to this point, one can defend in any forum the continuity of the operation of the Spanish nuclear power plants whose maintenance and improvement is carried out scrupulously with an annual investment that can be established at €30M per year on average per reactor. These facilities are also led by human teams prepared and trained to continue operating them well beyond 2035.

As if all this were not enough, most European countries have already opted for the long-term operation of their reactors and the construction of new reactors and that is why we are left very alone on a path in which Only Germany has preceded us with results that are far from being exemplary or a benchmark.

We are generators of green electrical energy, we provide stability and guarantee of supply and our facilities and our professionals are prepared to continue being part of the energy basket of this country.

The nuclear closure is throwing overboard a more than valuable resource for all the citizens of this country, losing technology and knowledge and condemning many jobs without there being a reason, beyond outdated ideological approaches, to do so.

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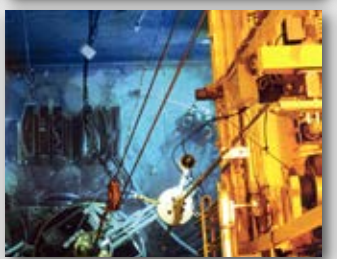


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Rosa GONZÁLEZ and Patricia CUADRADO

CHAIRPERSONS OF THE ORGANISING COMMITTEE AND THE TECHNICAL COMMITTEE OF THE 48TH ANNUAL MEETING OF THE SNE

Texts: MATILDE PELEGRÍ Photos: Grupo SENDA

The Palacio de Congresos El Greco in Toledo, a city internationally renowned for its monuments and history, was the setting chosen for the 48th Annual Meeting of the Spanish Nuclear Society (SNE), which took place from 2 to 6 October. This event, which took place from 2 to 6 October, served as a meeting for the different Commissions to share their activities and the balance of the work carried out during the year. We learned all the meeting details from Rosa González and Patricia Cuadrado, chairpersons of the Organising Committee and the Technical Committee, respectively, of the 48th Annual Meeting of the SNE.

What reasons led the SNE to choose Toledo as the venue for the Annual Meeting?

Rosa González: The Spanish Nuclear Society (SNE) and Naturgy, as host company, looked for a city that met the needs of an event like ours. Toledo was chosen because it perfectly met all the requirements. Another attraction was that it was the first time that the Annual Meeting was held in that city. In addition, the Palacio El Greco has the infrastructure to accommodate around 700 congress participants, with an exhibition and congress area. It is a well-connected city, which facilitated the arrival of attendees from different parts of Spain and Europe. And finally, it is a town with a historical, cultural, artistic, and gastronomic environment that is perfect for all those present to enjoy their free time.

What was the response of regional and local authorities and institutions such as the University?

R.G.: The response from the University of Castilla-La Mancha and Toledo City Council was very positive. They provided us with facilities to carry out all the informative activities open to the city, which we held throughout the week (STEM workshops, Mentoring, introductory course for Young Nuclides (JJ NN) or WiN conference), as well as space for the poster that was painted on the occasion of the 50th anniversary of the SNE that we will celebrate in 2024. In addition, they also participated in

PROFESSIONAL PROFILE

Rosa González holds a degree in Physical Sciences from the Complutense University of Madrid and a Master's in Environmental Engineering and Management from the EOI.

She is a Solidarity Administrator and project manager at Naturgy Ingeniería Nuclear S.L.

Since 2019, she has been WiN Treasurer, and in 2021, she joined CORA as Chair of the 48th Annual Meeting.

"WE ARE AT A TIME WHEN THE NEW EUROPEAN ELECTRICITY MARKET IS BEING DEFINED, AND NUCLEAR ENERGY HAS AN ESSENTIAL ROLE IN ENERGY TRANSITION DISCUSSIONS"

the initial press conference at the opening session, as well as in the inauguration of the exhibition, giving visibility to the Meeting and the Spanish Nuclear Society in the media.

How did the media respond to the SNE's invitation to cover the congress?

R.G.: We are at a time when the new European electricity market is being defined, and nuclear energy has an essential role in energy transition discussions.

This, together with the support of the institutions, has been reflected in the high level of media interest throughout the Annual Meeting.

And what were the overall attendance figures?

This year, probably due to the current context in which the nuclear sector finds itself, has had the highest attendance at the Meeting, with 706 congress participants.

NEW TECHNICAL CONTENT

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

Patricia Cuadrado. All the sessions aroused much interest, but I would like to highlight the three plenary sessions, the Nuclear Technology workshop, and the new Youth and Digital Poster sessions. .

Where is the technical program evolving to?

P.C.: Every year, we try to introduce something new, and on this occasion, we incorporated the Youth Session with Networking, a new format that puts students and young professionals from the nuclear field in contact with companies in the sector to exchange interests. Another novelty this year was the Digital Poster Session, where authors presented their posters on digital screens with the help of a presenter.

The plenary sessions provide an opportunity to analyze current issues in the sector. This year, Europe and the electricity sector were the focus of the plenary sessions.
What aspects would you highlight from these sessions?

P.C.: This year, the three plenary sessions were related to the subject matter. We started by analyzing the developments that have impacted the oil and gas market,

the renewable deployment strategy, and the outlook for nuclear energy to understand how the European energy landscape has been reshaped.

The second session then discussed how the ever-changing rules of the game are shaping the European nuclear industry. It addressed key issues, from constructing new nuclear power plants to waste management and the nuclear fuel market in Europe.

Finally, and focusing more on Spain, we had as protagonists three electricity companies that own Spanish nuclear power plants, highlighting the critical contribution of nuclear energy to society as a whole, especially relevant in the current context.

How do you rate the participation of international speakers?

P.C.: Having international speakers is very positive, and the companies in the sector always support us. This year, we were able to count on the presence of high-level speakers representing the leading nuclear companies in Europe, such as Framatome, General Electric Hitachi, and Westinghouse. In addition, Raquel Heredia, Programme Leader in the Leadership and Capacity Building Department at the World Nuclear Association, participated as moderator.

You have been the chair of the Technical Committee of the Annual Meeting for the last six editions, including the virtual one in 2020, and before that, you were vice-chair. What has this responsibility meant for you personally and professionally?

P.C.: Working with such a dedicated and talented team has been a real honor. I am very grateful to Empresarios Agrupados for proposing me to be part of this group, to Westinghouse for allowing me to continue, and to SNE for their support. Each CTRA member has made a unique contribution to the success of each Annual Meeting. We have all worked together to achieve our goals and have done so with passion and commitment. I will fondly remember the times we shared and hope our friendships will continue.

What advice would you give to the person representing you at the next Annual Meeting?

P.C.: They continue to work passionately and create a unique working atmosphere.

"THE NUCLEAR TECHNOLOGY WORKSHOP, ORGANIZED BY JÓVENES NUCLEARES (JJNN), ONCE AGAIN SURPRISED THE AUDIENCE WITH THE LATEST TECHNOLOGICAL ADVANCES PRESENTED BY LEADING COMPANIES IN THE NUCLEAR SECTOR"

PROFESSIONAL PROFILE

Patricia Cuadrado holds a degree in Chemistry from the Universidad Autónoma de Madrid.

He works as the Principal Project Manager at Westinghouse.

She has been a member of the Technical Committee of the SNE Annual Meeting since 2013, first as a member and since 2018 as chair.

Patricia has been an active member of WiN Spain and the Board of Directors since 2017. She was chair of the Technical Committee of the WiN Global World Congress in Madrid in 2019.

Since December 2019, she has been Secretary General of WiN Spain.

A MEETING FOCUSED ON SOCIETY

The interest in bringing nuclear science and technology closer to society is increasingly reflected in the Annual Meeting through the activities organized by Jóvenes Nucleares and WiN Spain. In addition, some of these initiatives also have a technological component for congress participants, such as the JJNN technology sessions or the young people's session with networking. What aspects of these initiatives stand out?

P.C.: The Nuclear Technology workshop, organized by Jóvenes Nucleares (JJNN), once again surprised the audience with the latest technological advances presented by leading companies in the nuclear sector, while the Special Poster Session, a new feature of the 48th Annual Meeting, was very well received by the audience, who were able to listen to the poster presentations from their authors in a much more dynamic, entertaining and attractive format. We also had the presence of **Alice Cunha da Silva**, from Westinghouse, who acted as presenter.

For its part, the Youth Session with Networking, another of the novelties of the 48th Annual Meeting of the SNE, created a space for informal and relaxed communication between students and young professionals in the nuclear field in Spain and companies in the sector looking for new talent to incorporate into their teams.

Do you think that such activities should be encouraged at annual meetings?

P.C.: Of course. In the first two days (Monday and Tuesday), there were multiple outreach activities aimed at the society of the city chosen to hold the Annual Meeting, while in the remaining three days (Wednesday to Friday), the activities were focused on the congress participants. Throughout these three days, the congress participants enjoyed an intense Technical Programme, complemented by the collective participation of the attendees in social and cultural events in emblematic places of the city.

DATA

- Attendees (congresistas + acompañantes): **706**
- Number of Presentations: **278**
- Exhibitors: **20**
- Sponsoring and collaborating companies: **34**
- Participation in sessions: **high/very high**

What relevance do activities such as STEM workshops have in this objective of communicating to society?

R.G.: On the one hand, one of the most important objectives of the Spanish Nuclear Society is the dissemination and knowledge of nuclear Science and Technology, and on the other, we are facing an ever-increasing demand for technological profiles. Both circumstances mean that activities such as the STEM workshops, in which more than 300 young people, who are the future, learn first-hand and in a practical and fun way about the importance of Science and Technology in our society, are of great importance.

Are these initiatives helping to introduce younger professionals to the sector?

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R.G.: Of course. I want to stress at this point.

Another essential activity of the Spanish Nuclear Society. This is the Mentoring activity of the Employment Committee, which also plays a vital role in the annual meeting. The aim is to transmit the value of the nuclear sector to the new generations, attracting talent by attracting it and disseminating and building it through the Mentoring program.

BUSINESS SUPPORT AND PROMOTION

The trade exhibition at the 48th Annual Meeting is one of the main meeting points for companies and professionals. What has been the response from companies this year?

R.G.: The response has been very positive, and I would like to take this opportunity to thank them and the SNE because, without this participation in number and involvement, it would not be possible to organize an event like this. In organizing the meeting, I had the opportunity to learn from the inside about the companies' significant participation, willingness, and collaboration to ensure that everything went as smoothly as possible. And this is one of the secrets to the success of this meeting every year.

The Yearly Meeting's activities are increasingly present in the host society. What aspects of the communication actions at the Yearly Meeting stand out?

R.G.: The Communication Plan for the 48th Annual Meeting is based on promoting the dissemination of the program, both open to Toledo society and the meeting itself. Likewise, the aim is to reach a consensus on the arguments that will enable media visibility to be achieved to transmit positive messages about the SNE and the professionals who form part of it. In this sense, a press release was issued to publicize the activities open to the city, and a press conference was held to inform the annual meeting and the SNE. Both actions were actively promoted on social networks. These were also present throughout the reunion, from the communication commission and the congress participants, who used #NuclearesEnToledo.

This year, we launched #nucleares, a new space where the Commissions could present what we do differently, bringing the SNE closer to all the congress participants who visited the exhibition, which was very well received.

RECREATIONAL AND SOCIAL PART

In addition to a high level of technical content, the annual meetings are also a meeting point for professionals in the sector. How do you rate the social program?

R.G.: Following up on previous years and taking advantage of the fact that Toledo is home to the Primate Cathedral of Spain, we organized an evening visit as a cultural event.

97% of the congress participants rated this activity very positively, as it combined the architectural wonder of this monument with a different way of visiting it, thanks to professionals who spectacularly guided the visit.

What about the activities organized for accompanying persons?

R.G.: The program designed for the accompanying persons was intended to provide an overview of Toledo's most emblematic tourist attractions. A complete program was carried out during the three days, including a panoramic visit to the city, a day at *Puy du Fou*, and a morning tour of Toledo of the three cultures.

THE COMMITTEES, HAND IN HAND

Leading the organization of an event that has brought together 700 people, where almost 300 technical papers have been presented, is not easy. How has the work of the Organising and Technical Committees developed?

P.C.: Regarding the Technical Committee of the Annual Meeting, each one is assigned one or several activities according to their specialty, and they know each other's activities to support us. The committee understands the sector well, and I am fortunate to have a very dedicated and professional team. We are very well coordinated, and the tremendous support of the Organising Committee and the Board of Directors makes organizing this event easy.

R.G.: In the Organising Committee, following the experience of other years, a planning and responsibility matrix was established so that everyone knew from the start the scope of their contribution to the Committee. I want to commend and congratulate both this and the Technical Committee for the impressive involvement and responsibility of the whole team in organizing the meeting. This means that when unforeseen events arise, they react quickly and remedy what is needed as far as possible. It has been a luxury to work with them.

How has the relationship with the Board been?

P.C./R.G.: This year, everything has been made more accessible, and thanks to them, the organization has been a success.

In conclusion, what were the final impressions and lessons learned that you consider most important to pass on to the 2024 Committees?

R.G.: According to the results of the attendees' survey, a large majority of congress participants rated the 48th Annual Meeting between good and very good. Therefore, the standard it sets is difficult to surpass. However, improvements are always to be made, which have been compiled in a lessons-learned report and will be considered in future editions.

P.C.: Regarding the technical program, I would say that we could work more on organizing the Youth and digital poster sessions, which were new this year.

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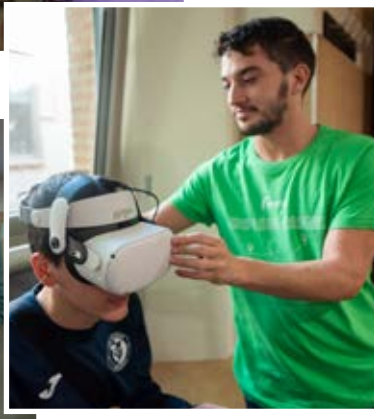
THE SNE WITH THE YOUNG PEOPLE OF TOLEDO

STEM PROGRAMMES

With the aim of promoting STEM (Science, Technology, Engineering, and Mathematics) education among young students, the Spanish Nuclear Society is facilitating STEM workshops as part of the 48th Annual Meeting in Toledo. This is an open and free event aimed at Secondary Education Institutes (IES) students in their last two years (3rd and 4th of ESO).

The SNE wants to add value to its Annual Meeting by informing and training ESO students in general technical and scientific concepts related to science and technology, particularly nuclear energy.



TECHNOLOGICAL CAMPUS OF TOLEDO´S FACTORY OF ARMS. CASTILLA-LA MANCHA UNIVERSITY

The workshops given were::

1. Training for CCNN operators (EMPRESARIOS AGRUPADOS EAG)

2. Sustainable chemistry (ENDESA)

3. Escape Box: “El Cabril Mission” (ENRESA)

4. Magic to disseminate science (FORO NUCLEAR)

5. Nuclear 360 (IBERDROLA)

6. Holograms DiY (JÓVENES NUCLEARES)

YOUTH SESSION NETWORKING

Patrocinado IDOM

The 48th annual meeting of the Spanish Nuclear Society marked a milestone by introducing the innovative 'Youth Session', a space designed to promote interaction between young people in the nuclear sector and companies interested in attracting new talent. This novel format, part of a series of changes to make the annual event more dynamic, seeks to facilitate the transition of students and young professionals into the nuclear workplace. This session has been sponsored by IDOM Consulting, Engineering, Architecture S.A.U., showing its support for the young talents of the sector, which is committed to inserting our young promises in the labor market.

The 'Youth Session' served as a strategic meeting point where young participants could present their technological developments and share experiences and perspectives with companies in the sector. The session was structured in two parts: a first part where students briefly shared their work, including technical presentations with oral presentations, and a second part dedicated to networking with representatives of the companies attending the session, providing participants with the opportunity to interact more informally. This space served not only to exchange ideas but also as a platform for sharing CVs and making valuable contacts.

The presence of technology companies added a practical employment component, offering participants the chance to explore job opportunities in a highly specialized sector. In addition, exceptional profiles were highlighted, including the awards winners for the best Master's Thesis and the students with the most outstanding records. The three best teams of the Innovatom competition were also recognized, consolidating the 'Young Session' as a showcase for emerging talent.

The new Youth Session has introduced a fresh and dynamic format. It has fulfilled its objective of being an adequate space for meetings between young professionals and companies in the sector, which has aroused great interest, with the participation of more than 29 young people and the presence of several companies, fostering the exchange of knowledge and facilitating the employment of new talent in the nuclear industry. In short, this is a new format that the Technical Committee wishes to establish and continue to perfect to become one of the most important events at future annual meetings.

SOCIAL EVENTS

OPENING COCKTAIL

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CULTURAL EVENT

Sponsored by enusa tecnatom

This year the Cultural Event consisted of a guided afternoon tour of the Primate Cathedral of Toledo.

COCKTAIL and OFFICIAL DINNER

Cocktail Sponsored by: coapsa

The official dinner of the 48th Annual Meeting was held at "La Quinta de Amando" and was preceded by a cocktail party sponsored by COAPSA. The Official Dinner is the most important social event of the SNE Annual Meeting, where congress participants and accompanying guests enjoyed the gastronomic excellence of Toledo and where the Society's distinctions were presented, as shown on the following pages.

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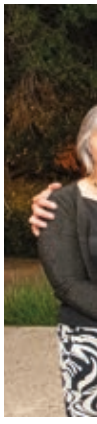


#NuclearesEnToledo

CLOSING COCKTAIL

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ANNUAL AWARDS OF THE SNE

The official dinner was, for another year, the setting for the presentation of the Spanish Nuclear Society's distinctions, which are awarded by unanimous decision of the Board of Directors.

Carlos Sánchez del Río Award in recognition of the scientific and technical contribution to the development of nuclear energy.

Awarded to **SAMA BILBAO Y LEÓN**, Director General of the World Nuclear Association. Raquel Heredia collected the award.

Diploma of the SNE, in recognition of its extraordinary collaboration with the SNE and aims.

Awarded to **ANTONIO GONZÁLEZ,** Director of Studies and Technical Support of the Spanish Nuclear Industry Forum. González thanked all the people who, throughout his career, have supported him in developing personally and professionally and contributing to the activities of the SNE. He especially remembered the directors and presidents of Foro Nuclear and his work colleagues, and he has a special memory for his family. He concluded with the conviction that nuclear energy will continue to contribute to the wealth and well-being of Spanish society.

Honourable Mention, recognition of the valuable participation and longstanding collaboration with the SNE and its aims.

He was awarded to **LOURDES BORONDO**, head of the Licensing and Safety Unit at the Cofrentes nuclear power plant, who acknowledged that she was proud to belong to this group of atomic professionals who have an excellent capacity for commitment and involvement, who work as a team, joining forces to multiply and achieve the objectives set by

the SNE and which extend to the sector. He referenced the excellent outreach work carried out by the Society, conveying that nuclear energy is critical to reversing climate change and providing the necessary supply guarantee. He ended by offering the award to all the members of the SNE "who are ambassadors of nuclear energy."

José María Otero Navascués Award, in recognition of the communication work in nuclear energy, contributes to its knowledge and dissemination.

They are awarded to the SNE COMMUNICATION COMMISSION. All the members of this Commission, chaired by Montse Godall, shared this Award, which bears the name of the man who can be described as the father of nuclear energy in Spain.

SNE Medal, in recognition of work for the development of nuclear energy and contribution to the aims of the SNE.

Awarded to **HÉCTOR DOMINGUIS**, former president of the Spanish Nuclear Society and CEO of GDES, who acknowledged that receiving this recognition is a great joy, but having worked with so many professionals in the sector, so many motivated people who strive every day for this Society to function and continue to be successful has been a real honor. In this sense, he thanked all the people who make up the Society for this recognition and wanted to share it with all the people who make up the Society, with all the commissions, their members and presidents, the Board of Directors, and all the collaborators, who allow the SNE to continue adding successes year after year.

The official dinner also included the presentation of the prizes awarded by WiN Spain and Jóvenes Nucleares.

WiN Spain Award, for its work in disseminating nuclear energy and its continuous support for WiN Spain's initiatives.

She was awarded to **ELVIRA ROMERA**, advisor to the Nuclear Safety Council. In her speech, she acknowledged that it is an honor to receive this award from an organization that does magnificent work in search of female talent, organizing activities in which she has participated on different occasions to promote young women's interest in STEM training.

Juan Alberto González Garrido's" Nuclear Youth Award, for supporting the PROCAT team of the Nuclear Youth in Catalonia.

They were awarded to **LLUIS BATET,** director of the nuclear master's degree program at the Polytechnic University of Catalonia. This award, in his words, helps to maintain the memory of Juan Alberto González Garrido, an example of courage and bravery, just like the Young Nuclear Professionals, whom he admires for their defense of nuclear energy and for their talent and knowledge, which augurs a bright future for nuclear power.

PHOTOGRAPHY CONTEST

BEST PHOTOGRAPHS GENERAL CATEGORY

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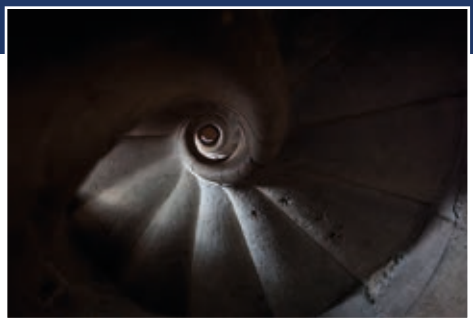
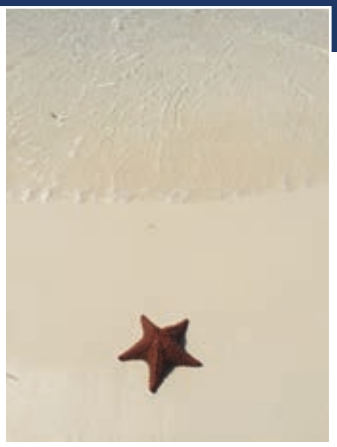
MIRADA - Marc Altés Soler



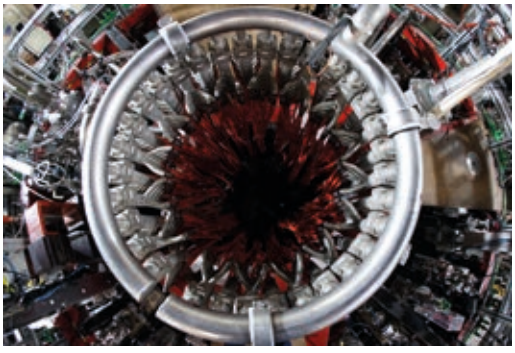
Second prize:
ESCALERA DE CARACOL, DEL SIGLO XVI, EN EL MONASTERIO CISTERCIENSE DE SAN PEDRO DE CARDEÑA - Manuel Muñoz García



Third prize:
ESTRELLA DE ARENA - Juan Oliden Gómez

BEST PHOTOGRAPHS ENERGY CATEGORY

First prize:
OVILLO Y LUZ
Ricardo Luna López

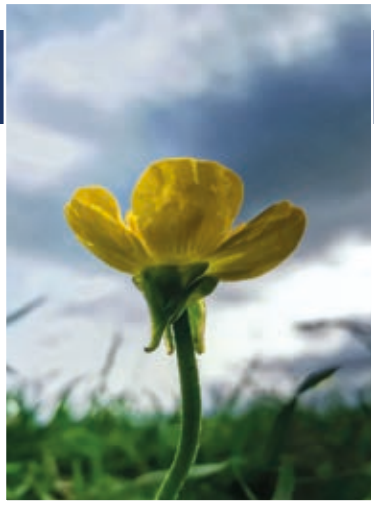


Second prize:
EL SOL EN LA TIERRA
Enrique de la Fuente Prieto

Third prize:
CORRIENDO POR NATURALEZA VIVA
Juan Antonio Muñoz Muñoz

BEST PHOTOGRAPHS POPULAR JURY

First prize:
SOMOS ELEMENTOS
Saroa Rozas Guinea



Second prize:
ANTES DE LA TORMENTA
Eva María Celma González-Nicolás

Third prize:
SCHLAFEN SNE
Enrique de la Fuente Prieto

ALMARAZ TRILLO

Una alternativa limpia, segura y competitiva

En continuo proceso de mejora, actualización y modernización

OPENING SESSION

CARLOS VELÁZQUEZ

CARLOS VELÁZQUEZ
MAYOR OF TOLEDO

Carlos Velázquez opened the 48th Annual Meeting of the Spanish Nuclear Society (SNE) by thanking Emilio Mínguez, President of the SNE, for the work he has been doing, "work that will bear fruit," the President of the Organising Committee, Rosa González Gandal, for having chosen the city of Toledo. The Rector of the University of Castilla-La Mancha, José Julián Garde, highlights the beginning of a new collaboration stage between the City Council of Toledo and the University of La Mancha. The Mayor of Toledo wanted to emphasize the importance of distancing ideology when dealing with issues such as energy policy. "I am concerned about the well-being of today, but I am also concerned about the well-being of tomorrow." He stressed that in a scenario like the current one, we know that almost 500 new nuclear power plants have been approved worldwide. "Spain cannot be left behind; it cannot be an energy hostage of any other country. Spain has to have a serious energy policy because that is a responsibility, and that is what we in local government are asking our leaders at the national level because we in local councils are also suffering from rising energy costs, we are also suffering from being held hostage to other third countries on which we depend to supply energy to homes and businesses and to generate welfare. Indeed, if we have prosperity today, it is also due to past decisions, and if we make the right decisions today, we will generate prosperity in the future".

Likewise, and emphasizing the suitability of choosing Toledo as the venue for the 48th Annual Meeting of the SNE, Carlos Velázquez stressed the importance of talking about nuclear energy, "an energy that has been proven to be safe and, fundamentally and above all, clean, that does not emit carbon dioxide or pollutants into the atmosphere, and that is also proving to be safe, especially with the latest scientific and technological advances, which was one of the main criticisms that could be made of this type of energy until a few years ago." For this reason, the Mayor of Toledo took advantage of this event to call on Spanish politicians to get rid of their complexes, to remove ideology from the decisions that form part of the future well-being of all Spaniards, assuring that there are many of us who "have public responsibilities which are going to be there, to exercise our competencies responsibly." Finally, the Mayor of Toledo once again thanked all the attendees for their presence in Toledo, highlighting conference tourism as a generator of wealth and encouraging them to lose themselves among the monuments of a world heritage city that opens its doors to people from all over the world.

ROSA GONZÁLEZ GANDAL

ROSA GONZÁLEZ GANDAL
COMMITTEE PRESIDENT ORGANIZER

Promoting meeting points for professionals was one of the main objectives when designing and working on the innovative program of the 48th Annual Meeting of the SNE, as expressed by the president of its Organising Committee, Rosa González Gandal, during her speech at the event's opening.

"Outreach is part of the society's DNA, and that is why we have had several activities organized by Young Nukes and Women in Nuclear open to Toledo," she said.

González Gandal highlighted the figures and the main activities of the meeting, stating that "we are around 700 congress participants, 300 presentations, 26 stands, three plenary sessions, one monographic session, the Nuclear Technology Workshop with ten stands that will present us with future challenges and, as a novelty, we have incorporated several activities such as the youth session with networking to attract the talent of the youngest". He also wanted to highlight #nucleares, a new space in which the committees of the nuclear society presented their activities attractively.

Regarding the technical program, the president of the Organising Committee highlighted the change to the digital format of the poster session, minimizing the use of paper and contributing to the sustainability of the congress.

Not forgetting the social program, both for the congress participants and those accompanying them, which allowed them to get to know this city and its magnificent heritage better.

González Gandal ended his speech by thanking the Toledo City Council, the UCLM, and the collaborating companies (Palacio de Congresos, Catering La Pizca, and Meraki) for all their support. It is a luxury to have your help. And, of course, to all the exhibitors and sponsors without whom the annual meeting would not be possible", he assured.

LUIS ZARAUZA

LUIS ZARAUZA
NATURGY'S DIRECTOR OF CONVENTIONAL GENERATION

Luis Zarauza, Director of Conventional Generation at Naturgy, began his speech by expressing his great satisfaction at being, once again, the hosts of the 48th Annual Meeting of the SNE, "a tradition that has been with us for many years now." Zarauza emphasized that the success of this meeting is the best measure of the interest in the sector at present, which is also attributed to the different sessions prepared by the meeting Organising Committee, without forgetting the attraction of Toledo and the excellent reception received by its institutions. "The current situation of the sector is one of the most interesting subjects that can be discussed in terms of energy policy, both in Spain and Europe. The anticipated success of this event is also due to the extraordinary participation of professionals from all areas of the sector, from all the institutions, companies, and organizations that form part of one of the most powerful industrial sectors we have in our country. It is also one of the sectors where the professionals that make it have the highest scientific, technical, professional, and personal quality. It is, therefore, to all the professionals in the sector that I would like to express my special thanks for their presence, their contribution to this Annual Meeting and their work, their dedication, and their commitment to advancing the nuclear sector in Spain in their daily work", he added.

JOSÉ JULIÁN GARDE

JOSÉ JULIÁN GARDE
UNIVERSITY RECTOR OF CASTILLA LA MANCHA

The opening ceremony was also attended by the Rector of the University of Castilla La Mancha, José Julián Garde, who described it as a "real luxury" to be able to participate in the 48th Annual Meeting of the SNE, as well as to have been able to contribute to the development of the conference, mainly in the previous sessions. In his speech, he congratulated the Spanish Nuclear Society and the Organising Commit-

tee, referring to the event's success and highlighting the activity carried out during the two previous days, both for its quality content and target audience, among which he emphasized the importance of a young audience.

"As a university, we are open to any collaboration with the Spanish Nuclear Society and all companies and public institutions. And we are open in our three main dimensions: research, knowledge transfer, and our teaching, educational and training mission". In this sense, José Julián Garde highlighted the University's impetus to lifelong learning à la carte, highlighting the value of its first dual master's degree in collaboration with companies. Garde concluded his speech by suggesting visiting the Fábrica de Armas Campus. "It is very worthwhile and is a clear example of the effort made by a university to transform an arms factory into a talent factory. Moreover, this transformation allows the factory to be open to society in general".

EMILIO MÍNGUEZ

EMILIO MÍNGUEZ
PRESIDENT OF THE SPANISH NUCLEAR SOCIETY

"Esteemed local, academic, and business authorities with me, dear congress participants; good morning, and welcome to the 48th Annual Meeting of the Spanish Nuclear Society.

First of all, on behalf of the Board of Directors, I would like to thank all those who have worked to make it possible for us, once again this year, to bring together the professionals of the Spanish nuclear industry in this magnificent city, a cultural reference point.

This organization is thanks to our organizing and technical committees, sponsors, exhibitors, speakers, and all the congress participants. Thanks also to the City Council, the university, and all the local and regional institutions that have been providing us with all the necessary support over the last year to be able to present you today with this congress, which, both in its technical and social aspects, will live up to the expectations that, year after year, we maintain at a very high level. And, of course, thanks to our host company, NATURGY.

I want to begin by conveying my perception that we live through a moment of change and transcendental transformation in the world energy panorama, even more so in Spain. Society, especially the youngest members of society, have taken on board the concern for climate change for the future we are going to live in and are awaiting, as a few other times in history, decisions and measures to be taken to achieve the objective of decarbonization or, at least, to reduce the impact of our activity on the planet and to do so in a short period.

In addition to this climate awareness, there is also the reality that we have come face to face with in recent times: the cost of energy for families, citizens, and companies in our country. The war in Ukraine and the high prices of all products have made many people aware of the importance of the electricity generation system.

We are seeing how we are being talked about as 'nuclear' in many forums where we have never been considered before. The debate surrounding us is still contaminated by perceptions and ideologies far removed from reality and the technical basis. Still, we are there, with many countries that have dared to take the step forward, a European Commission that has included us in the non-greenhouse gas emitting energies, and designs for new reactors that are already much more than a technical projection.

We are convinced of this, as nuclear is the only primary energy source that addresses both concerns and is the only one that guarantees a constant supply to the electricity system at all times of the year and is not subject to the geopolitical fluctuations that can affect other energy sources to a greater extent.

We have said this many times, and as nuclear professionals, we will never tire of saying it to anyone who will listen, even those who will not....

Nuclear energy does not emit CO2; it is viable and competitive, and we are an energy of the future as long as the regulatory and fiscal framework is stable and adequate, as is the case in other countries around us. Many countries in Europe and the world are firmly committed to nuclear power generation as a sustainable, independent, and competitive energy source. We look outwards with a certain amount of envy, as in our country, we still have a plan establishing that the last reactors will be shut down in little more than ten years. When this happens, we will be missed; we are convinced of that, but our wish is that 2035 will be just one more year of operation for our seven reactors.

As nuclear professionals, we cannot remain silent, so this year, we wrote and distributed a Manifesto reflecting our feelings. We are calling for the operating period of the current plants to be extended, and we are fully committed to quality and responsibility. With the continuity of the active fleet, it will be possible to guarantee supply, reduce the cost of electricity tariffs, and meet, or at least come close to, the decarbonization objective by 2050. At the same time, following the Company's communication and dissemination policy, we continue to make a considerable effort to disseminate information, and we have robust material in the form of five programs that can be seen both on our website and on our YouTube channel, which I encourage you to pass on to all those close to you, to all those people who still see and

judge us from the distortion of many years of falsehoods and misinformation.

We look to the future, and we should be proud to see in this room and at this congress many young people with excellent training and enthusiasm, who are the best proof of the generational change that has already taken place in the nuclear sector in this country. We are also the proud heirs of the pioneers of this industry, of those who started, and for this reason, throughout 2024, we will be celebrating 50 years of our company, and we want this anniversary to allow us to celebrate where we have come from and where we want to go.

As nuclear professionals, we are witnesses and actors in a sector that is a mark of excellence and quality, a world reference, highly specialized and technologically advanced, that has been producing electricity since 1968, reaching levels of over 30% of generation in some periods, currently standing at 21%, and that our work reaches millions of people and homes every day.

This knowledge of years and the interest of all these young people here today cannot and must not be wiped out by erroneous political decisions, and we will not tire of saying so.

Suppose we shut down the seven nuclear reactors that remain in operation in Spain. In that case, we will lose a lot: green, sustainable, and affordable energy, a high level of technological know-how, the development of our technology, an industry that adds value to GDP and has an international projection, quality jobs, and in exchange, we leave a vacuum that, however hard they try, cannot be hidden.

To anyone who will listen to us and those who perhaps will not, we must remind them that there is a need for rigorous, scientific reflection, far removed from dogmatism, to analyze the future of nuclear energy. All of us here, all nuclear professionals, are convinced we are part of the solution.

For all these reasons, I would like to address a message to the future government of Spain on behalf of all the professionals in the sector to demand the continuity of the nuclear fleet in our country because we want to continue to provide sustainable electrical energy that we generate in our safe, reliable and future-proof facilities, convinced of the scientific and technological need that nuclear energy contributes to the electricity system.

The Spanish nuclear power plants and the people who work directly and indirectly in them are a strategic asset for our country. This young and fit resource is in perfect condition to continue giving its all. We want to continue doing so unless political stubbornness leads us to total closure, loss, and nothingness without an equivalent alternative.

I will end my speech by highlighting this sector's brilliance and strength. We are committed to the future. This annual meeting brings together almost 700 nuclear professionals, demonstrating the potential of our industry and the capacity to continue to count on nuclear energy in Spain's energy strategy.

Let us enjoy these days of reunions, learn from all the knowledge and experience we have accumulated in this small space, and, above all, feel proud of our road. Let us get a head start on the road ahead.

Thank you very much.

INAUGURAL CONFERENCE

"HIDDEN TOLEDO"

ARTURO RUIZ TABOADA
PHD IN GEOGRAPHY AND HISTORY AND LECTURER IN THE DEPARTMENT OF PREHISTORY, ANCIENT HISTORY AND ARCHAEOLOGY AT THE COMPLUTENSE UNIVERSITY OF MADRID

Arturo Ruiz Taboada holds a PhD in Geography and History and is a lecturer in the Department of Prehistory, Ancient History and Archaeology at the Complutense University of Madrid. With his experience and knowledge as director of numerous excavations in the city, he focused his inaugural lecture on buildings, tunnels, and sewers to uncover stories and secrets to experience Toledo of different eras from a pretty unique point of view. A journey through the hidden heritage of the city of Toledo. Ruiz Taboada's main lines of research are prehistory, the archaeology of architecture, and the archaeology of death. He is also the author of six books and a hundred scientific articles.

As the title of the Inaugural Conference, "Hidden Toledo," Arturo Ruiz Taboada focused his speech on bringing a different Toledo to the audience. He did so by summarizing the historical importance of the city and the hidden Toledo that is always discussed. He stressed that Toledo is always in the main forums of scientific debate at all levels, both archaeological and historical, and even referred to the magical trajectory that can be attributed to cities like this one.

Ruiz Taboada wanted to focus exclusively on empirical data, what has been preserved, and the possibilities of interpreting this remaining material. To this end, he briefly introduced historical Toledo and spoke about the city of the dead and present-day Toledo. And he did so by recalling that "as an archaeologist, I am interested in the past but above all in the present. The present is the fruit of our past, and of course, we are condemned to repeat a history that does not favor us as humanity if we do not learn from that past".

To illustrate his lecture, Ruiz Taboada used images, but not before recalling El Greco, the universal painter who lived in Toledo throughout the 16th and 17th centuries. Through an aerial view, with easily recognizable elements in the painter's paintings, the archaeologist referred to the Alcántara and San Martín Bridges, as well as the monumental access gates of Bisagra, Cambrón, and Vado, without forgetting two symbolic elements, the Cathedral, and the Alcázar. He stated that "it is a fairly complete city from a monumental and architectural point of view, but complicated to understand, as its past dates back 2,000 years, to Roman times, from which it is complicated to identify this hidden Toledo. I add the image of Indiana Jones as the Hollywood archaeologist, who more or less represents the profession, without representing it, as archaeologists have nothing to do with this character".

To convey to the audience what Toledo has to offer, Ruiz Taboada referred to its Roman circus, insisting that it is a city that maintains more or less intact the footprint of time fossilized in its architecture, with the Roman circus being the oldest, most surprising, most hidden and least known element.

"Generally, someone thinks that we talk about the hidden from an archaeological point of view, buried, unseen. But this Roman circus remains hidden because it is little known to the general public, to the tourist who comes to Toledo. These hidden treasures perhaps describe the city's complex history, which we can deduce or infer on the basis of the materials that are still buried there. Numismatic materials, for example, constantly remind us of those 2,000 years of history and tell us about the complex historical trajectory of a city like Toledo".

Referring to these hidden spaces in Toledo, Ruiz Taboada gave some emblematic examples, such as the caves of Hercules, "a fascinating system of buried vaults that evokes a mysterious, occult, even magical past, which many researchers have tried to interpret in the occult sciences, in necromancy. But, from an archaeological point of view, it is straightforward to describe. Archaeology, insofar as it is empirical, is based exclusively on interpreting

what exists. An archaeologist interprets these types of spaces in a real way. For example, they are cisterns reused as other structural elements for Roman buildings. But if we were to read something about the history of these caves of Hercules, we would see how for 2,000 years they have been shrouded in mystery, in treasure hunts, in necromantic practices, in magic, in the concealment of a society that wants to go unnoticed".

The specialist stated that similar spaces can be found in other fossilized architectures that conserve traces of their passage or ancient origin. At this point, he showed the image of the only material evidence of a Visigothic basilica in the peninsula's interior. "Recent excavations, three years ago, uncovered this magnificent space that could be reinterpreted thanks to the excavation we carried out there and which we have now added to that complex catalog of Toledan monuments dating back to the Visigothic period, the prelude to what would later become the Muslim invasion, of which we do have enough material evidence, represented, today, in two mosques that remain standing. Today, we can learn about this hidden past simply by observing the monuments we have preserved in this magnificent city.

He also went on to refer to the Mosque of Las Tornerías, "perfectly preserved and which has in its interior remains of Toledo's convulsive past, including a fire that took place at the end of the 15th century, known generically as the Magdalena Fires, and which razed part of the city from the Cathedral to the Alcázar". He also mentioned the Mosque of Cristo de la Luz, "a veritable architectural manual, as it preserves the original layout of the Andalusian mosque and a Christian extension to transform it into a church. Romans, Muslims, and Christians in the same space, a concentration that defines very well what the Toledo of the three cultures is". Referring to the Jews, as the third of the dominant religions in the city, Ruiz Taboada also mentioned two synagogues, that of El Tránsito and that of Santa María la Blanca, without failing to highlight the large number of preserved churches, some more than a thousand years old, which show the passage of time, and the readaptation of the different people who lived in a city as historic as Toledo.

It was at this point in his speech that the archaeologist spoke of the hidden Toledo, of things that cannot be seen but which exist and are more difficult to trace. Among them, he gave some striking examples. "What we find in Toledo, every time we demolish a house, are the preserved remains of that past. For example, a pack of cards dating from the 16th century is a concealment that appears hidden in the niche of a house when it is being chopped down. This deck of cards tells us a lot about this hidden Toledo, about a city in which gambling was the favorite activity of its inhabitants. It tells us about a period in the 15th century, when, among other things, gambling was forbidden in Toledo".

A second magnificent example shown by Ruiz Taboada was a 300-year-old love letter. "Another concealment that also appears in a house and gives us an idea of something as important, or almost as important, as the preserved material record, that is to say, of the people who live in this type of city. Toledo, without its people, is a dead city," he said.

Another document found hidden in a Toledo house is a fragment of the Sefer Torah, a Jewish bible in Hebrew. "It is a concealment of a fundamental biblical passage such as the song of Moses, which speaks of the flight from Egypt to Elim, the content of which is passionate. It speaks of the enemies of Yahweh, the enemies of the Jewish people, so that we can relate it to the Inquisition. Toledo is the center of various activities that characterize medieval and modern Spanish history. It is a magnificent document. The fourth concealment shown during the inaugural conference, less striking because it is in Spanish, according to Ruiz Taboada, is a biblical text that teaches how to process the Catholic faith and whose study is also fascinating.

"Toledo is always in the main scientific debate forums at all levels, not only archaeological, but also historical"

In short, "Toledo offers this and much more. It is a city where we can find multiple messages, such as death. It is necessary to talk about the city of the dead, which is not so striking or well-known. Wherever we go, whatever church we enter, we will always find the Last Judgement present as a reminder that we are here, but we will soon cease to be so. In the medieval world, this conception of death was a pragmatic one. The medieval world remembers specifically what we are here for. And we are here only to live and to die. The actual material record complements this kind of fascinating imagery. These visions of death remind us again of who we are. What is clear is that our end is going to be the same for all of us, whatever we do. These reminders are impressive and shocking. They are samples of that cult of the dead in which Toledo has quite a material record," he said.

Returning to the present, and after showing images of present-day cities, Ruiz Taboada argued that "the only thing we have to do is to understand what those cities were to understand ourselves, to know who we are. Therefore, These images introduce the present-day town, which is not very different from those that have succeeded one another over time. The only thing that changes is the context.

Finally, Ruiz Taboada concluded his speech by encouraging the audience to go beyond the tourist image of the city and try to discover the hidden city that was the title of his inaugural lecture.

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REFERENCES

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- Vandellós 1 & 2 NPP
- Ascó 1 & 2 NPP
- Sta. Mª de Garoña NPP
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SENDA

In the photograph from left to right Óscar Larrosa, director of the Nuclear Technical Area and Project Director at IDOM; Mateo Ramos, manager of Operations and Control Rooms at Tecnatom; Valentín Fernández, project director of the TMSR-500 molten room reactor, and Pau Aragón, member of the Board of Directors of Jóvenes Nucleares and who served as moderator in this session.

MONOGRAPHIC SESSION

SPAIN'S NUCLEAR INDUSTRY IN THE NUCLEAR RACE

During the next decade, a boom in new technologies that continue and break with conventional light water reactor design is foreseen. The Spanish nuclear industry plays an essential role in these new developments. The monographic session provided insight into the participation of various Spanish companies in the development of the nuclear reactors of the future, with the experience of three high-level speakers.

Óscar Larrosa, Director of the Nuclear Technical Area at IDOM, gave a detailed presentation on IDOM's contribution to the molten salt reactor developed by Moltex. Mateo Ramos, Head of the Digital Operation and Asset Management Division at Tecnatom, highlighted Tecnatom's role in the development of different reactors, both fission and fusion, focusing primarily on its support for the licensing of the Xe-100, a high-temperature gas reactor designed by X-energy. Finally, Valentín Fernández, Project Manager at Empresarios Agrupados - GHESA, highlighted the experience and resources of Empresarios Agrupados in making ThorCon's vision of the molten salt reactor a reality.

The monographic session, moderated by Pau Aragón, Vice-President of Jóvenes Nucleares, concluded with an enriching round of questions and a call for optimism: the future is unclear, and the professionals of the Spanish nuclear industry are and will continue to be critical to the progress of this technology towards the achievement of the climate objectives.

PLENARY SESSION I

EUROPE CHANGES ITS ENERGY PARADIGM

The first plenary session of the annual meeting aroused great interest among the congress participants. The El Greco conference center auditorium was jam-packed, and the audience actively participated with questions and comments via the online application.

During this session, the events that have impacted the oil and gas market, the strategy for implementing renewable energies, and the outlook for nuclear energy were analyzed. After two years of geopolitical instability, Europe is reconfiguring its energy strategy, with a commitment to renewable energies as the most effective measure for decarbonization. However, it remains divided over the use of nuclear power.

The speakers who joined us for this session were:

Javier Revuelta, Senior Principal at AFRY Management Consulting, specializes in the technical and economic management of the energy sector. He leads the market and regulatory modeling work for the Electricity practice and advises on M&A processes and new developments. He is an expert in the field and an active communicator in specialized energy media.

José Antonio Gago, with a distinguished career in the representation of the nuclear sector, has been Director General of ANAV and held leadership roles in nuclear associations at both regional and international levels.

José Maria González Moya, is the Director General of APPA Renovables, an association of companies and entities committed to using renewable energy sources in all their forms.

Manuel Fernández Ordóñez, Business Development Manager at Tecnatom, moderated the session. He has a long career in disseminating information on nuclear energy.

During the session, several topical is-

JAVIER REVUELTA

JOSÉ ANTONIO GAGO

sues were discussed, including concerns about high gas prices, which are not expected to fall shortly and are not only due to the war situation in Ukraine.

Numerous renewable projects are currently under development, mainly in photovoltaic and wind energy, especially after the recent success in obtaining Environmental Impact Declarations. The Spanish energy system continues its decarbonization process at a good pace, having installed 70.5 GW of renewable generation sources, representing 59.2 % of the total installed capacity.

However, the high number of projects under development poses challenges in terms of the profitability of PV investment, as energy prices could drop during sunny hours. José María González pointed out, "We are ready to face the challenges of a massive deployment of renewables, but there are risks and uncertainties."

On the other hand, high gas prices are expected to remain high for several years. This has led to decreasing dependence on this energy source across Europe and moving towards decarbonization to combat climate change.

In this context, containing energy costs has become one of the main concerns for both companies and citizens. In addition, energy independence, security of supply, and the fight against climate change are gaining special relevance in the public debate. José Antonio Gago stated that "Europe, faced with this scenario, is clearly changing its perception of Nuclear Energy and already sees its strategic role in the ecological transition."

The speakers agreed that prices and the stability of the distribution grid and final energy supply could be seriously compromised if the nuclear power plant closure plan decided in the National Integrated Energy and Climate Plan (PNIEC) is implemented. In 2022, nuclear power plants contributed 20.26% to the Spanish electricity system and 31.75% of carbon dioxide-free energy (CO).2

This National Plan was an important point of debate, as it foresees growth in installed renewable power capacity and the development of storage technologies by 2030, which, so far, are far from being achieved. The plan also includes necessary improvements to the electricity grid and new interconnections with France, which are also not progressing as planned. Javier Revuelta said, "The PNIEC is a political objective with too many uncontrollable variables, and I believe it will not be fulfilled.

The three speakers agreed that it is important to reduce dependence on gas in the European electricity mix and increase the presence of renewables and storage without ruling out nuclear energy. At present, it is prudent and reasonable to delay the closure of nuclear generation in Spain.

At present, storage (through batteries, pumped storage, hydrogen, etc.) does not play a predominant role in our system, so it is crucial not to break this balance. Price is an essential component in the electricity system, but the security of supply is even more critical. Appropriate value must be placed on technologies that provide robustness and enable system management, and nuclear energy is one such technology.

To conclude the session, the available nuclear fleet can continue to operate in the long term with full safety guarantees. Its contribution to the generation mix, its firm capacity in the face of renewables' variability, and its status as a non-CO2 emitting energy source are necessary elements to ensure that the energy transition takes place without compromising the security of supply.

JOSÉ MARÍA GONZÁLEZ MOYA

MANUEL FERNÁNDEZ ORDOÑEZ

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PLENARY SESSION II

EUROPE'S NUCLEAR GAMBLE

On Thursday, 5 October, the high-profile Plenary Session II, entitled "Europe's nuclear gamble", occurred. Against a backdrop of nuclear resurgence and new game rules driven by geopolitical and energy changes, the session explored the prospects for the European nuclear industry. It was attended by three giants of the global nuclear sector: **Jacques Besnainou** of Westinghouse Electric Company, **Rafael Ledesma** of GE Hitachi Nuclear Energy, and **Lourdes Guzmán** of ENUSA Industrias Avanzadas. **Raquel Heredia** of the World Nuclear Association was the moderator.

Jacques Besnainou addressed the critical importance of nuclear energy as a guarantor of the security of the global energy supply. He highlighted the crucial moment in the sector, urging them to answer the call and seize the current opportunity. He emphasized the need to maximize the efficiency of existing nuclear power plants, stressing that small increases can match the output of a new plant. Besnainou also detailed Westinghouse's new reactor designs, such as the AP1000 and AP300, positioning them as ideal solutions to meet the challenges of the new paradigm.

JAQUES BESNAINOU

WESTINGHOUSE

Rafael Ledesma highlighted GE Hitachi Nuclear Energy's significant contribution globally, underlining its expertise in BWR reactors, fuel design, reactor internals, and comprehensive services. He focused on the BWRX-300 design, a safer SMR reactor based on proven technology, highlighting its simplicity and ability to address licensing successfully and quickly. Ledesma outlined how this design aligns with carbon neutrality targets set by international organizations, offering an efficient and safe solution for the energy transition.

Lourdes Guzmán of ENUSA Industrias Avanzadas, an SNE Board of Directors member, explored the importance of nuclear fuel and resilient procurement. She highlighted the need to respond robustly to the growing demand for nuclear fuel, crucial

RAFAEL LEDESMA

GENERAL ELECTRIC

in the transition to greenhouse gas emission-free electricity production. Guzman reviewed the fuel cycle, focusing on ENUSA's supply chain and procurement model. With more than 50 years of reliability, the company presents itself as a strategic asset in Europe, committed to sustainability and customer orientation.

LOURDES GUZMÁN

ENUSA

This plenary session offered a comprehensive view of the nuclear industry from the perspective of three key leaders. From the security of energy supply to operational efficiency and resilience in fuel supply, the speakers highlighted the importance of nuclear energy in the context of current changes. Distinctive

RAQUEL HEREDIA

WORLD NUCLEAR ASSOCIATION

approaches, solutions, and strategies to drive the industry toward a sustainable future were presented. This plenary session provided a valuable forum to understand the European nuclear landscape and anticipate challenges and opportunities in energy transformation and global challenges.

PLENARY SESSION III

THE STRATEGIC VALUE OF NUCLEAR POWER FOR SPAIN

The plenary session III of the 48th Annual Meeting of the Spanish Nuclear Society, entitled "The strategic value of nuclear energy for Spain", was attended by the companies that own nuclear power plants in Spain. The session took the form of a round table discussion and dealt with a wide range of issues related to the strategic situation of nuclear energy and its position within the European nuclear framework.

The speakers who debated in this session were:

- **Francisco Lopez**, General Manager of Iberdrola Generación Nuclear
- **Luis Zarauza**, Naturgy's Director of Conventional Generation
- **Gonzalo Carbó**, Endesa's General Manager for Nuclear Energy
- Moderator: **Emilio Mínguez**, President of the SNE.

The first topic discussed was related to the benefits of nuclear energy in Spain, what it means for the business and institutional structure, and the strategic value it has at this time. **Francisco López** commented that in energy analysis, it is always a question of resolving a "trilemma": security of supply, environmental protection, and the economics of each energy generation source. In nuclear generation, he pointed out, it is also necessary to talk about technological development and its contribution to the regions where it is implemented. Within this framework, nuclear generation is the one that contributes most in this pentagon: technology with lower CO_2 emissions, constant supply regardless of climatic conditions, and competitive intrinsic costs.

Luis Zarauza referred to the nuclear sector as a powerful sector capable of implementing all its actions on a large scale and being a driving force for the energy transition. He highlighted the value of knowledge and the excellent technical capabilities of the sector's professionals.

Gonzalo Carbó stressed that the population demands abundant, relia-

FRANCISCO LÓPEZ

GENERAL MANAGER OF IBERDROLA GENERACIÓN NUCLEAR

marSein

SERVICIOS NUCLEARES

- Descontaminación
- Gestión de lavanderías
- Tratamiento de residuos
- Desclasificación de materiales y terrenos
- Servicio Técnico de Protección Radiológica
- Unidad Técnica de Protección Radiológica (UTPR)

MANTENIMIENTO

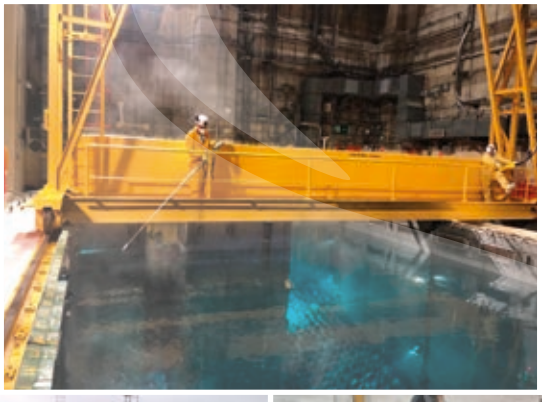
- Limpieza industrial y servicios auxiliares
- Mant. mecánico
- Mant. de obra civil
- Mant. de pintura industrial
- Montaje de andamios y plataformas de trabajo
- Mant. de inspecciones de barreras contraincendios

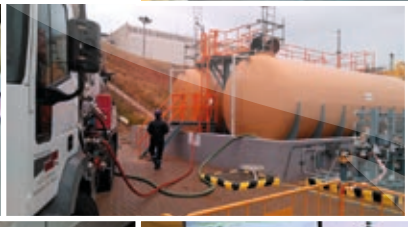
CONSTRUCCIÓN

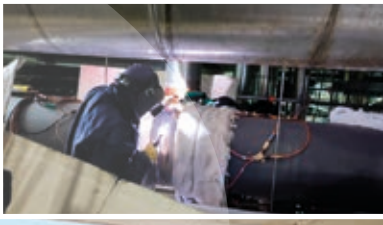
- Obra civil
- Edificación
- Promoción

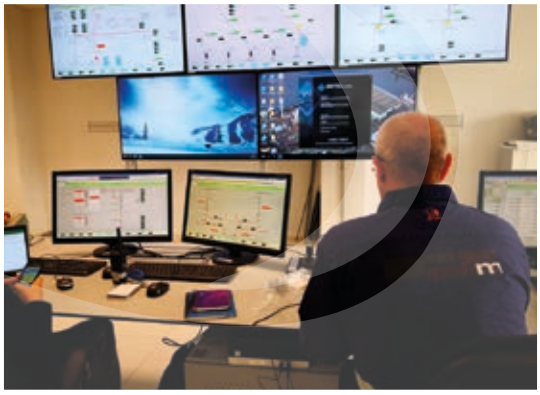
TELECOMUNICACIONES

- Diseño
- Ingeniería de detalle
- Suministro
- Pruebas FAT y SAS de sistemas
- Procedimientos y supervisión
- Cursos de formación O&M



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ble, non-emitting, and cheap energy, evidenced by the COVID-19 pandemic and the war in Ukraine. He commented that nuclear power is available, intrinsically inferior, and produces almost 20% of the energy generated in this country, demonstrating its enormous contribution to the costs and security of the system. It is considered indigenous because it has a lot of operational autonomy and diversified suppliers in non-conflict countries, so uranium supplies can be secured with a certain degree of peace of mind.

The second block referred to the economy and whether nuclear is cheap energy for companies. If nuclear power were to be shut down, it was questioned whether taxes would be diverted to other energies. **Luis Zarauza** pointed out that there is currently a great debate about the economic value of nuclear energy. In his speech, he detailed the value of nuclear energy on customers' bills in Spain and how replacing nuclear energy with other energy sources would affect electricity bills. He explained that the change in the final price would be calculated, at least, as the sum of the current savings between the actual cost of energy sold by companies versus the average electricity market price, added to a saving simulating the situation of the pool price with the replacement of nuclear energy by other means, and a

LUIS ZARAUZA

NATURGY'S DIRECTOR OF CONVENTIONAL GENERATION

GONZALO CARBÓ

ENDESA'S GENERAL MANAGER FOR NUCLEAR ENERGY

total current saving equivalent to 1% of GDP would be reached. "The debate is whether this value will be maintained, replaced, or lost."

Gonzalo Carbó stated the objective of eliminating the production of Oil and Gas with renewable energies to decarbonize. He pointed out that taxes, incentives, and subsidies must be aimed at decarbonization and electrification, trying to reach 0% oil and gas without subsidized, regulated tariffs for this energy source and with incentives that modify demand towards electrification.

Francisco López alluded that nuclear energy offered at zero price is necessary to stabilize and reduce the average price per KWh. Nuclear production is sold in the long term to marketers at a fixed price, very close to the total costs of the technology, so changes would be necessary so that in the future, the companies do not have to be the ones to take charge in more difficult times, with low prices in the wholesale market, such as the pandemic situation.

The third block referred to the challenges to be faced by the EEPPs so that the continued operation of nuclear power plants can be accepted. **Gonzalo Carbó** spoke of the difficulties of not having nuclear power plants in operation. He explained that the current problems of meshing of the distribution and transmission grids must be solved and that it is necessary to increase the power and security of supply in the cities where most of the consumption occurs. In addition, he assumed that it is essential to improve the digital management of the grid, improve its capacity, and reduce its interruption times: a system that, in general, needs to be more interconnected on the supply side with the generation units and on the demand side with increasingly electrified customers. At the same time, he commented, it must be borne in mind that only seven years are left to meet the 2030 objective of the National Energy Plan. Therefore, there is minimal time with a massive volume of investment and an increasingly expensive debt cost. If the nuclear plants were to close, an asset currently fundamental to the functioning of the electricity sector would cease to exist. Therefore, Extending their life

EMILIO MÍNGUEZ

PRESIDENT OF THE SNE

is a free option that the government should consider. "The challenges to continue are exclusively that there is a will on the part of the Administration and that no relevant technical difficulties appear in the future for the continuity of the plants."

Luis Zarauza explained that these are matters of energy policy decisions at the highest level in Europe, and the value of nuclear is one of the fundamental pieces that must be fitted into the future regulatory framework. In

addition, there is the major challenge of grid stability; the new PNIEC variables in the system are of "an extraordinary magnitude," it is necessary to see what effect the introduction of all these new technologies would have on the grid.

Francisco López commented that all the companies have compelling investment plans to reinforce this infrastructure and build new renewable generation and storage. Still, not all 100% is in the hands of the companies: he alluded to the fact that the projects are delayed, and obtaining authorizations is a considerable difficulty because the procedures are very complex. There is little time to carry out the projects.

Finally, the speakers discussed the group of European countries that make up the pro-nuclear forum, whether Spain should be a member of this group, and what it would mean to lose all this strategic value. In this respect, the general manager of Iberdrola Generación Nuclear pointed out that Spain is, has been, and should continue to be a point of reference for the whole of Europe "in many aspects related to nuclear energy," such as its regulatory bodies or its nuclear industry, and could lose all that 40 years of effort. We are in all the decision-making and participation bodies where our capabilities are recognized. "We have shown enormous initiative and capacity.

Luis Zarauza adds that it is a fact that Spain is the second nuclear power in the European Union, and we are at one of the most exciting moments in terms of these decisions. "These are decisions that are taken with an adequate awareness of the path we want to take, but in such an important matter, we must be confident that they will have the weight, the reason, and the correct arguments, whatever direction is taken.

For his part, **Gonzalo Carbó** stated that even if the National Energy Plan proposes the closure of the plants in our country, Spain should be part of the nuclear program as an industry or as support for the industry. "In all European countries, with few exceptions, a revolution of new reactors and SMRs is taking place, and all countries, if they want to decarbonize quickly, "need to maintain the current plants or even build more plants in their countries," which is why, in his opinion, at this time we must be in all forums "that can bring us positive things."

Finally, and in conclusion, the president of the SNE advocated not giving the battle but "scientific, technological and economic arguments for continuing to be able to have all the plants in operation and to think, as happens in other countries, about having the possibility of having some more plants, but for the moment maintaining the current ones in the face of problems of supply, instability and fuel dependence."

CLOSING SESSION

EMILIO MÍNGUEZ
PRESIDENTE DE LA SNE

Emilio Mínguez, president of the Spanish Nuclear Society (SNE), took the floor to begin the closing day of the 48th Annual Meeting of the SNE. He took the opportunity to thank all the attendees who did not want to miss the event for their participation and the work done in the different presentations. He also thanked the event's Organising and Technical Committees, not forgetting the figure of the moderator and presenter. And above all, thank José Manuel Redondo, Yolanda Benito, Tomás Lozano, and Juan Carlos Lentijo for their presence. "We simply hope that it has been a pleasant place for you, that you have enjoyed not only the technical but also the recreational part. We look forward to seeing you next year!

EMILIO MÍNGUEZ

TOMÁS LOZANO
DIRECTOR DE IBERDROLA GENERACIÓN NUCLEAR

Tomás Lozano, vice-president of the SNE and director of Iberdrola Generación Nuclear, began his speech at the closing ceremony of the 48th Annual Meeting of the SNE, adding to the words of the president Emilio Mínguez in thanking all the congress participants and nuclear professionals for their support for the meeting.

After recalling the record figures for the meeting, 700 participants, 276 papers, and 44 sessions, and once the video summary of the Meeting had been broadcast, Lozano highlighted the excellent work of all the SNE committees in its organization, as well as the role of the chair of the Organising Committee, Rosa González, and of the Technical Committee, also

TOMÁS LOZANO

thanking the sponsors. "The numbers are truly spectacular, but the most significant thing is the quality of the presentations, all the activities in general, and the affection with which everyone works at this conference, which is the same as in the Nuclear Society itself."

Tomás Lozano also wished to highlight the traditional photography competitions and prizes, congratulate Cristina Trull on her award for the Best Master's Thesis and Final Projects and the other finalists, Jorge Salgado and Alfonso Cerviño, and mention the prizes for the best papers "of extraordinary quality."

Next, focusing his speech on the upcoming 50th anniversary of the SNE, Lozano said, "It is a source of enormous joy to be able to communicate what is going to happen in 2024. It will be an extraordinary year because all the institutions are celebrating their 50th anniversary, which is something to be proud of and celebrate as it deserves". In this sense, Lozano highlighted the legacy left by the founders of the Society, referring, in this way, to the work of all his predecessors and members of the different Boards of Directors and Commissions. "There have been many colleagues who have made the Nuclear Society grow and brought us to where we are today. That is why the 50th-anniversary celebration will be a tribute to all our predecessors".

The SNE vice-president also wanted to emphasize the need to continue building the future with the same collaboration, passion, and enthusiasm as today, highlighting, at this point in his speech, the importance of commissions such as the Young Nuclear and WiN commissions. "In our Society, there is a lot of passion, enthusiasm, and excitement, which, in my opinion, comes from the fact that we are proud of what we do because we are aware of the value we contribute to society."

Before concluding his speech, Lozano wanted to mention the work carried out by the 50th anniversary organizing committee, the fruits of which include the anniversary logo and the mural created during the annual meeting itself. "The foundation of the Nuclear Society is knowledge of science, rigor, and innovation. And who better than Albert Einstein to represent us? Both symbols, the logo, and this mural will accompany us throughout the year, during which many activities will be carried out for all profiles of our members. I invite you to participate in all of them, to support the 50th anniversary, and to continue working to make our voice heard".

Tomás Lozano concluded his speech by revealing one of the great enigmas of each Annual Meeting, the venue of the 50th Annual Meeting: Córdoba.

YOLANDA BENITO, DIRECTORA GENERAL DEL CIEMAT

Allow me to make a few comments from the perspective of CIEMAT as a research center.

We are living through an exciting period for nuclear research at the European and global levels. On the one hand, we observe that there are countries where nuclear power generation technology is a consequence of the need for baseload generation without increasing greenhouse gas emissions during the transition to more sustainable generation. On the other hand, there is a significant proliferation of countries and private industrial initiatives that, building on current advanced designs (Generation 3+) and SMR concepts of different technologies, seek to implement

YOLANDA BENITO

solutions based on Nuclear Fission:

- In countries without nuclear generation.

- In optimizing nuclear generation in nuclear countries that have to renew nuclear generation partially.

- In generation for industries/companies that are large consumers.

- And to open up new applications in addition to electricity generation.

The European Commission, aware of these trends and of the need to boost the European nuclear sector to compete in SMR development and applications with other regions, is promoting a pre-partnership for researching and developing various SMR concepts. In addition, essential initiatives with significant financial backing exist in countries such as Canada, China, France, the United States, the United Kingdom, Russia, and others.

In the last twelve months, we have also witnessed the launch of EURATOM projects and proposals for the previous two calls (2021-2022 and 2023-2025) in which, along with the classic elements such as support for nuclear safety, waste management, and radiation protection or fusion, new elements are appearing.

Artificial Intelligence appears in the calls as a new tool that, in addition to achieving more effective solutions in several aspects and areas of nuclear research, makes this R&D more attractive to younger generations of researchers.

Alongside competitive projects, the calls include a high proportion of funding managed collaboratively by partnerships (PPPs) that seek to welcome institutions representing all interested member countries with an inclusive policy but with the challenge of not renouncing excellence. In addition, these projects with longer durations and the intention of continuation allow for the coordination of long-term R&D programming. Three partnerships stand out in Fission:

- In PR (PIANOFORTE).

- In Waste (EURAD-2).

- And in Materials (ORIENT) (this one proposed to be coordinated by CIEMAT).

Implementing global instruments for access to infrastructures of any discipline, including those needed for nuclear R&D, with the OFFERR project managed by a group of institutions on behalf of SNETP, is also necessary. More than 150 facilities are open to proposals, and more than EUR 7 million from EURATOM is available for these experiments. Complementarily, there is also a mobility project for students and young professionals, ENEN++, for nuclear research and training operated by a set of institutions on behalf of ENEN.

Finally, I would like to mention that, together with ITER, nuclear fusion research concentrates efforts and objectives around the DONES project led by Spain, including significant national, regional, and EURATOM financial contributions and a necessary scientific and technical development effort with substantial contributions from all regions of the world.

Finding formulas to facilitate and enable a high degree of participation in these R&D opportunities is essential to maintaining the Spanish nuclear sector's competitiveness and competencies by attracting new talent. From CIEMAT, we try to be involved in all these initiatives and, in combination with CEIDEN, support the rest of the national R&D actors to facilitate their access to them.

It is also essential to involve universities in these projects to train students who can be incorporated as young researchers in research centers and international projects and who, in the end, are perfectly prepared to join other companies in the sector.

Before concluding, allow me to congratulate you on the organization and the quality of the presentations at this annual meeting.

JOSÉ MANUEL REDONDO

JOSÉ MANUEL REDONDO
SUBDIRECTOR GENERAL DE ENERGÍA NUCLEAR DEL MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

As is traditional in my interventions at this Conference; I will try to report on the actions that have been carried out since the last Annual Meeting at the Subdirectorate General for Nuclear Energy.

To begin with, I must refer to the publication in the Official State Gazette of 21 December of Royal Decree 1029/2022, of 20 December, approving the Regulation on health protection against the risks arising from exposure to ionizing radiation, which is the primary regulation transposing Directive 2013/59/Euratom, on health protection against ionizing radiation.

This Regulation replaces the Regulation approved in 2001. Also, it repeals Royal Decree 413/1997 of 21 March 1997 on the operational protection of external workers at risk of exposure to ionizing radiation due to intervention in a controlled area.

Work on the approval of this Regulation began in 2014, and its approval has been, we could say, "complicated" because its scope of application extends, in a more demanding manner than hitherto in the Spanish regulations, to areas other than those in which the regulations on radiological protection have traditionally been applicable, i.e., nuclear and radioactive facilities.

This new Regulation lays down increased requirements about workplaces where naturally occurring radioactivity is present, such as industries using or managing naturally occurring radioactive materials, or workplaces where high radon levels may be current, such as spas, tourist caves, etc., as well as in some dwellings.

This has meant that, besides the Nuclear Safety Council, several ministries and the Autonomous Communities that have transferred competence in the matters over which the radiological protection measures deriving from Directive 2013/59/Euratom are to be established have had to participate in its processing.

This situation has led to a "bottleneck" in the transposition of Council Directive 2013/59/Euratom of 5 December 2013, which laid down basic safety standards for protection against the dangers of exposure to ionizing radiation. This prompted the European Commission, in June 2022, to bring an action against Spain before the Court of Justice of the European Union.

As a result of this lawsuit, on 7 September, the Court issued a judgment declaring that the Kingdom of Spain had failed to fulfill its obligations under Council Directive 2013/59/Euratom by failing to adopt all the laws, regulations, and administrative provisions necessary to comply fully with the Directive within the prescribed period (it should have done so by 6 February 2018).

It should be pointed out that, of the nine provisions whose approval requires the transposition of this Directive, three have yet to be approved: the Royal Decree approving the Regulation on nuclear and radioactive facilities and other activities related to exposure to ionizing radiation; the National Radon Plan; and the Royal Decree on radiologically contaminated soil.

As regards the Regulation on nuclear and radioactive facilities and other activities related to exposure to ionizing radiation - which will replace the one familiarly known in the sector as "RINR" - we are currently in the last phase of the review of the project by the Ministry and the Nuclear Safety Council, to take into account the 400 comments received during the public information and stakeholder consultation processes, which took place between 25 October and 22 November.

Subsequently, this draft will be sent for report to the ministries concerned. No one is unaware that, in the current situation, it is difficult to predict when this draft might be approved. Still, initially, we aimed to support this Regulation before the end of this year.

The adoption of this new RINR is necessary following the adoption of the new Regulation on health protection against risks arising from exposure to ionizing radiation and the adoption in 2018 of the Regulation on nuclear safety in nuclear installations to complete the regulatory framework related to nuclear energy coherently.

As far as the National Radon Plan is concerned, which is the responsibility of the Ministry of Health, according to the information available, it is in the final stages of processing.

Finally, the purpose of the future Royal Decree on radiologically contaminated soil or land will be to adopt the procedures and criteria for declaring radiologically contaminated soil and soil with restrictions on use and establish the list of activities potentially contaminating the soil for radiological reasons.

I would remind you that, to provide a legal basis for some of the provisions to be included in this Royal Decree, it was necessary to amend Law 25/1964 on nuclear energy, which was done employing the first final provision of Royal Decree-Law 6/2022, adopting urgent measures within the framework of the National Response Plan to the economic and social consequences of the war in Ukraine.

Changing the subject, I would now like to refer to the modification of Law 12/2011, of 27 May, on civil liability for nuclear damage or damage caused by radioactive materials, carried out by Law 11/2023, of 8 May, on the transposition of European Union Directives on the accessibility of certain products and services, migration of highly qualified persons, taxation and digitalization of notarial and registry proceedings, published in the Official State Gazette on 9 May.

The need to amend this 2011 Law stemmed from the fact that, in the process of adapting to the new liability regime that has been carried out since its approval, different aspects of it have been identified whose practical application would be problematic or incompatible with the government established by the Paris Convention of 29 July 1960 on civil liability in the field of nuclear energy and the Brussels Convention of 31 January 1963, complementary to the former,

whose last amendment entered into force on 1 January 2022.

Although, for the most part, these are technical issues to facilitate the interpretation of Law 12/2011 in the event of a nuclear accident, which will guarantee a better adaptation of its provisions to those of those mentioned above revised international Conventions in a way that provides more guarantees for potential victims, there are two issues in this legal amendment that I would like to highlight.

- The first is that it is established that, in any claims procedure, the Nuclear Safety Council will be responsible for drawing up a mandatory technical report on the nuclear accident, its causes, and effects, which will have to be requested ex officio by the competent Court, as part of its proceedings.

This remedies the oversight that occurred when this Law was passed in 2011. A reference to the role of the Nuclear Safety Council in the judicial procedure for claiming compensation in the event of an accident was omitted, a function that was previously contemplated in Law 25/1964 on nuclear energy and which was assigned to the Nuclear Energy Board.

- The second issue that I would like to highlight is that this legal modification has made it possible to solve the difficulties that arose in the private insurance market following the increase in the amount of liability from 700 M € to 1,200 M €, when it came to finding the necessary insurance capacity to provide separate cover for two installations that, while belonging to the same owner, are located on the same site, as in the case of the Ascó I and Ascó II plants.

Without this modification, the operator of Ascó I and Ascó II would have to continue to rely on the Consorcio de Compensación de Seguros's reinsurance to comply with the provisions of the Law and the Conventions.

On another matter, on 29 March, Order TED/295/2023 of 23 March was published in the Official State Gazette, modifying Order IET/458/2015 of 11 March, which regulates the allocations to municipalities in the vicinity of nuclear facilities, charged to the Fund for the financing of the activities of the General Radioactive Waste Plan.

Among other objectives, this amendment aims to encourage the implementation of area projects, understood as those that form part of a strategic development program for the area in which the municipality is located, to enable the extension of co-financing for those projects that have already obtained it and have shown potential in the region, and to make project management more flexible to take into account possible eventualities that may arise during their implementation.

On the other hand, to reinforce Enresa's special relationship with the municipalities in the vicinity of nuclear facilities, the company is empowered to enter into agreements with those municipalities in whose municipalities nuclear facilities are located in which works are carried out in the execution of the General Radioactive Waste Plan, providing them with a source of financing for the execution of activities aimed at promoting their socio-economic development, preserving their environment and facing the demographic challenge.

Outside the regulatory sphere, the Sub-Directorate General has been working on processing the 7th General Radioactive Waste Plan. This processing began in March 2020, with Enresa submitting a proposal to the Ministry; subsequently, between April 12th and June 16th, 2022, the initial version of the 7th GRWP, along with the Strategic Environmental Study and the Non-Technical Summary submitted by Enresa, was submitted for public information and consultation with the affected public Administrations and interested parties.

Subsequently, the resulting new version was submitted to the Nuclear Safety Council and the Auton-

omous Communities for a report, and the last procedure carried out was the formulation of the Strategic Environmental Statement by the Directorate General for Environmental Quality and Assessment on 14th July. In other words, the only remaining step is the approval of the final version of the 7th GRWP by the Council of Ministers.

The approval of the 7th GRWP will comply with Directive 2011/70/Euratom, establishing a Community framework for the responsible and safe management of spent nuclear fuel and radioactive waste, which requires each Member State to notify the European Commission of its national program for the implementation of spent nuclear fuel and radioactive waste management policy, bringing its content into line with the requirements of this Directive.

Given that the current 6th GRWP was approved in June 2006, it does not comply with this Directive, and Spain should have submitted a new GRWP to the European Commission by 23 August 2015. Having failed to do so, the European Commission sent Spain a Letter of Formal Notice on 18 May 2018 and a Reasoned Opinion on 28 November 2019.

As regards the dismantling of Garoña, following the publication of Order TED/796/2023, of 13th July, authorizing the transfer of ownership of the Santa María de Garoña nuclear power plant from the company Nuclenor, S.A. to Empresa Nacional de Residuos Radiactivos, S.A., S.M.E., and authorizing phase one of the dismantling of this plant, on 18th July, Enresa assumed responsibility for the dismantling of this plant, to Empresa Nacional de Residuos Radiactivos, S.A., S.M.E., and authorizing phase one of the dismantling of this plant, on 18th July, Enresa assumed this ownership to undertake the first phase of its dismantling.

This initial phase is scheduled to last three years. Its principal activities will be disassembling the turbine building's systems, structures, and components and conditioning it as a new Auxiliary Dismantling Building. Simultaneously with this work, the spent fuel will be removed from the pool and transferred to the plant's Individualised Temporary Storage Facility.

To carry out this work, Enresa has a team made up of more than 30 Enresa employees, and some 70 Nuclenor employees, who will be joined by personnel from other specialized companies contracted to collaborate in the process. During the first phase of dismantling, some 350 direct jobs will be created.

In the second phase, for which Enresa must obtain new authorization, the project will be completed with activities such as the final dismantling of the radiological buildings, decontamination, declassification, demolition work, and finally, the restoration of the site.

The estimated timeframe for this decommissioning is ten years: 3 for the first phase and 7 for the second, and the cost is estimated at 475 M€. Likewise, the estimated cost of spent fuel storage at the plant's ATI is €183 million. This cost includes the construction, design, licensing, and supply of the casks and fuel loading. The cost of maintenance of the ATI is estimated at around €0.6 M/year.

In addition, in the first quarter of 2024, Enresa is expected to initiate the administrative processing of a

support facility for this plant's ATI. This facility, like the facilities to be built at the other ATIs, will be responsible for the maintenance and inspection of the casks and activities relating to the management of their ageing.

In other words, this support facility will allow for so-called "cask level" intervention. I would remind you that, as envisaged in the final version of the 7th GRWP, one of the nuclear sites will have to have a facility with a hot cell that allows "fuel assembly level" intervention, which will meet the fuel recoverability requirements established in the Regulation on nuclear safety at nuclear facilities, approved by Royal Decree 1400/2018, of 23 November, and in the technical instructions of the Nuclear Safety Council.

As regards the El Cabril disposal facility, it should be pointed out that with the low and intermediate-level waste disposal capacity that this installation currently has, with a total of 28 cells located on two platforms, it does not have sufficient capacity for the disposal of wastes of this type foreseen to be generated in Spain. For this reason, it is necessary to have new cells for this type of waste by 2028 to avoid affecting the plant operation and dismantling planning and to be able to continue with the usual disposal of these radioactive wastes.

The expansion project, which is currently undergoing the environmental assessment process, consists of building a new platform with 27 storage cells. The platform will be developed in two phases: 12 cells will be built in the first phase and 15 in the second.

The final version of the 7th GRWP contemplates the availability of a full-capacity IWT (IWT-100) at all nuclear power plant sites for the temporary storage of spent fuel. The sites that do not yet have this capacity are those of the Vandellós II, Ascó I and Ascó II, Cofrentes and Almaraz, Units I and II plants.

The licensees of these plants have submitted both the request for authorization for the execution and assembly of the modification that this installation implies, which must be granted following a report by the Nuclear Safety Council, and the request for the corresponding Environmental Impact Statement, to be issued by the Directorate General for Environmental Quality and Assessment.

This involves the adoption of a homogeneous storage system to be used at all the sites, based on HI-STORM FW technology. It consists of a welded metallic capsule with a concrete casing. Enresa has awarded the supply of this system to the ENSA-Holtec joint venture, which will be responsible for the design, licensing support, manufacturing, and supply of the storage and transport systems.

Finally, regarding the Trillo nuclear power plant, on 27 March, its owner submitted to the Ministry a request for renewal of the current operating permit for a period of 10 years, i.e., until November 2034, as provided for in the Protocol signed between ENRESA and the owners of the plants in March 2019. This request was submitted to the Nuclear Safety Council for its mandatory report.

Last year, in a "routine" and "discreet" way, nuclear energy supplied just over 20% of the electricity consumed in Spain. And I say "routine" because I believe it is vital for society to know that, since 2010, there have only been four years in which nuclear energy has not been the source that has contributed most to the electricity system. It has always been among the top three, which should be valued for supplying emission-free energy and providing stability to the electricity grid.

When I also say discreet, it is because experience has shown us that the best thing to do is to make as little noise as possible. Unfortunately, on most occasions, when nuclear energy is discussed, it is not usually to highlight the role that this energy has traditionally played in the safe supply of electricity.

I want to acknowledge the professionals in the Spanish nuclear sector who, year after year, through their work, knowledge, and dedication, have contributed to ensuring that nuclear energy maintains, under safe conditions, the vital role it has been playing in our society, not only in a strategic sector in which we are highly dependent on foreign countries, such as energy but also in other highly relevant areas, such as health and research.

I want to conclude by congratulating the Organising Committee and the Technical Committee, as well as all those who have participated in the different sessions held over these three days. With their effort and dedication, they have contributed to the success of this 48th Annual Meeting of the Spanish Nuclear Society.

JUAN CARLOS LENTIJO, PRESIDENTE DEL CONSEJO DE SEGURIDAD NUCLEAR

This meeting, now in its 48th edition, is a classic in the sector. It is an event where the latest developments are shared and where not only the industry but also academia, suppliers, and regulators, among other essential players in the nuclear sector, meet.

It is, therefore, a pleasure for me to be with you in Toledo, a World Heritage City, but above all, a historic meeting place where different cultures have lived together as an example of tolerance and respect.

It is a city of encounters that had the opportunity to welcome the double Nobel Prize winner Maria Sklodowska-Curie, as you have had to recall in one of your lectures. Marie Curie visited Toledo in 1919 as part of the first of her three trips to Spain. On this occasion, I participated in the 1st National Congress of Medicine held in Madrid. The scientist and her daughter Irène visited the Fábrica de Armas. This institution significantly contributed to the Medicine and

Hygiene Exhibition held in Madrid as a complementary activity to the congress.

As I said, at the CSN, we believe these dialogue spaces are fundamental. Not only because they are a magnificent meeting point to get together again, but above all to carry out a task that sometimes goes unnoticed: that of listening.

Listening to each other and sharing our concerns, projects, and needs helps us better understand our daily lives. We live in an age in which information moves at a dizzying pace, and it is in this context of over-information, even intoxication, that it is even more valuable to stop to talk and listen to each other.

Our sector is particular, and we often assume the words and interests of those with whom we share this space. But that should not make us relent in our interest in understanding the parties to ensure the safety of citizens, workers, and the environment. As we like to say when we talk about safety culture, an environment with dialogue and openness between the parties is much safer than one without it.

If I spoke earlier about the speed of information, the speed at which events that change how we understand the world are moving is not far behind either.

At last year's closing event, I mentioned Russia's invasion of Ukraine, and we are now 600 days into the year. I am reluctant to normalize this execrable act of war in which we are all immersed. It has altered the world's rhythm and turned economic, energy, and geopolitical forecasts upside down, forcing all governments and institutions to react and adapt to this new reality.

From the CSN, through the international organizations of which we form part, we try to do our bit to ensure that the safety of several nuclear power plants in Ukraine does not pose a risk to people and the environment on the European continent. Let me use this forum to express our strongest condemnation as nuclear safety professionals.

JUAN CARLOS LENTIJO

On the other hand, on a different subject, you know that the body I have the honor of presiding over, the Nuclear Safety Council, has been working for 43 years to ensure nuclear safety and radiation protection for workers, the public, and the environment.

That is our role as a regulatory body, and the nuclear industry works with us to achieve that goal from its responsibility in the different stages of the life cycle of the installations. It is our common task. Safety first and foremost.

At the CSN, we work to fulfill our mission. As you are well aware, in recent years, the Council has issued favorable reports for the renewal of the operating permits of the Almaraz and Vandellós plants in 2020 and of Ascó and Cofrentes in 2021, in addition to the commissioning of the individualized temporary storage facility (ITS) for the latter plant. In total, we have thoroughly reviewed the activities of six reactors.

As future milestones, I would like to announce that in 2024, we will issue the evaluation of the request for renewal of the Trillo operating permit; the authorizations for the execution and assembly of the ATIs of the Vandellós II, Ascó, Almaraz, and Cofrentes plants; as well as the licensing of the request for construction and assembly of the design modification of the El Cabril waste disposal facility, relating to the southeast disposal platform for the final disposal of low and intermediate level radioactive waste; and the monitoring of the dismantling of the Santa María de Garoña plant.

We are entering a new and challenging phase as a regulator: the coexistence of nuclear power plants in long-term operation (LTO) and actions aimed at the cessation of operation and decommissioning of other plants.

During this week, in addition to the workshops aimed at young secondary school students as part of STEM training or the mentoring workshops for secondary school girls, more than 240 papers were presented, technical and monographic sessions were held, and another young people's session with networking was held.

This fills this type of meeting with content and interest, and what society demands of us: to face the future by anticipating future challenges. Because preparing for the future is the best guarantee of doing things well. Progress, undoubtedly, has a lot to do with preparation, research, and hard work. Thus, this congress has been an excellent forum to continue preparing ourselves for these new scenarios, which are increasingly complex and demanding from the perspective of nuclear safety.

The Fábrica de Armas Campus library plaque commemorates Curie's visit with one of the statements, "The road to progress is neither quick nor easy."

I want to thank, in general, the Spanish Nuclear Society as a fundamental agent in our country for promoting knowledge of nuclear science and technology. In particular, I would like to congratulate the Organising Committee and the Technical Committee for this new edition of your annual meeting and the work carried out to develop such an organized, dynamic, and open program.

WORKSHOP

NUCLEAR TECHNOLOGY

A workshop was organized by Jóvenes Nucleares, where leading companies in the nuclear sector made it possible to see and touch the latest technologies.

Coordinated by Alejandro Carrasco (ENUSA y JJNN/CTRA) and Laura Martín Huete (IDOM y JJNN).
Companies that participated: ALISYS, ANAV, AZISA, BOOST4PRO, EMPRESARIOS AGRUPADOS, FRAMATOME, GDES, SIALI y TECNATOM

On 5 October, at the prestigious Palacio de Congresos El Greco in Toledo, as part of the Annual Meeting of the Spanish Nuclear Society, a workshop entitled "NUCLEAR TECHNOLOGY" was held.

This workshop aimed to explore how new technologies transform the nuclear sector and influence our evolving society.

This event brought together nine leading companies from the nuclear sector, including ANAV, TECNATOM, BOOST4PRO, Empresarios Agrupados, Azisa, and GDES.

These companies brought their experience and expertise to provide a comprehensive overview of the innovations shaping the sector.

What made this workshop outstanding was the active participation and keen interest of many congress participants.

There was a lively dialogue and many questions, reflecting a hunger for knowledge and a desire to understand how these technologies are changing the face of nuclear energy.

The companies not only presented innovative projects but also shared their vision of how these technologies are currently being used or are expected to be used in the future within the nuclear sector. This gave attendees a solid perspective on the industry's future.

This workshop was about acquiring information and served as a platform for innovation. It fostered collaboration, motivation, and unity in pursuing progress in the nuclear sector. It reminded us of the importance of constantly moving forward and learning.

We would like to express our sincere thanks to all the congress participants who took part in this event and to the companies that made it possible. Their contribution and enthusiasm were fundamental to the workshop's success.

We are pleased to announce that we will meet again in Córdoba next year with the promise of even more exciting projects and opportunities to explore. We look forward to another enriching and collaborative event!

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Image © Santa María de Garoña

TECHNICAL SESSIONS

SESSION 1 NUCLEAR MEDICINE AND RADIATION PROTECTION (I)

The session included seven presentations covering a wide range of RP-related aspects. From analytical studies related to the risk of exposure to Radon, through the optimization of Radiation Protection in IINN, radioactive effluents, the impact of updating dose coefficients, to the development of a thermal neutron field based on a graphite pile.

Roberto Méndez Villafañe from CIEMAT presented the work on designing the new thermal field based on a graphite pile in the CIEMAT neutron standards laboratory.

This work, developed in the framework of the LPN extension project, presents the design of the graphite stack in which a study has been carried out by varying the main parameters of the graphite block and the position and emission rate of the Am-Be neutron source to determine the thermal flux rates that can be reached at various points in the stack, its thermal component and its homogeneity.

Belén Martínez Carmona, from Empresarios Agrupados, presented the work evaluating the impact of updating the dose escalation coefficients. Specifically, the change in the skin equivalent dose and effective dose coefficients concerning the previous ones are analyzed. Specifically, the differences in the dose coefficients between the sexes are evaluated. The change in the energy-dependent dose-passage factors for photons and neutrons and their impact on the doses are also studied.

José Luis Cormenzana of Empresarios Agrupados details the studies on the models developed for the HI-STORM FW storage system and the analysis of options that can reduce the dose rates that the ATI-100 will cause to the plant's property fence: construction of a concrete wall between the ATI and the property fence, placement of the capsules with the lowest gamma and neutron sources in the rows closest to the wall and use of the regionalized loading scheme for the MPC-37 capsules. These results will help optimize the design and loading plan of the ATI-100 and minimize the dose rates to the public.

Cristina Trull Hernandis from the Universitat Politècnica de València explains in her paper the relationship and possible proportionality between the radon concentration in water and its pH. This correlation, if applicable, could be used in areas of public use such as spas as an indicator that, based on quick and simple pH measurements, could indicate radon variations. The pH variations on water in the presence and absence of a radon source are analyzed using uranium ores (pitchblende) as the source.

Alba Valls Palma from Amphos 21 Consulting summarised results obtained from the development and implementation in the Ecolego software of a compartmental model that defines the entire radioactive effluent release system (discharges to the environment, transport of radionuclides in the environment, and dose estimation). In the case of atmospheric discharges, the transport of radionuclides in the atmosphere has been carried out with the AERMOD software, and the concentration of radionuclides in the atmosphere was implemented as an input to the Ecolego compartmental model.

Borja Bravo from EPRI Europe DAC presents EPRI's research on combining advanced automated and remote data management/transmission technologies and advanced radiation measurement technologies applicable to radiation monitoring of plant areas, workers, effluents, or environmental monitoring. The objectives include improving information for workers, optimizing work processes from a radiological point of view, and automating radiation protection tasks during operations and emergencies.

Trull Hernandis from the Universitat Politècnica de València presented the work carried out on different nuclear techniques used in natural radioactivity measurements of volcanic products from other parts of the world to create a general image of the presence of radon gas in these environments and to study the areas from which risk of exposure for the health of the population can derive.

Óscar González
PRESIDENT

Ana González
COORDINATOR

SESSION 2 FUEL (I)

The first technical session on fuel was devoted to different aspects of fuel fieldwork, design, operation and management.

In the first presentation, **Patricia Isla**, Project Manager at ENUSA, discusses the design and manufacture of a European fuel for VVER-440 reactors by ENUSA and Westinghouse. This initiative is part of the European security of supply strategy for the 30 VVER plants in the EU and Ukraine. ENUSA will have a VVER-440 fabrication line operational during 2024.

Younes Benarafa, International Business Manager at NUVIA, presents a system for the remote handling of spent fuel at the Ignalina power plant (Lithuania). It consists of one piece of equipment (FBHE) for loading RBMK fuel into stor-

age containers and another (FIHC) capable of retrieving fuel from the container, taking it to a hot cell for inspection, and storing it back in a container.

In his presentation, Mario Tolentino, Quality Engineer at ENUSA, describes each fuel rod's manufacturing and certification process at the Juzbado plant. This involves the sintering of UO pellets2, their insertion into zircaloy sheaths, welding end caps, filling with helium, and sealing. After visual inspections, UT, RX, ET, and testing of the active column in a gamma scanner, certification ensures compliance with all requirements and characteristics of the drawings and specifications.

Lluis Batet, Director of the Master's Degree in Nuclear Engineering at the UPC, presents a collaborative project with ANAV to optimize the emptying of irradiated fuel pools after cessation of operation. The objective is to minimize the cost of this operation and limit the dose to workers using a mixed integer linear programming model. The problem is subject to constraints on the thermal power of the elements and others that have yet to be considered in the first approximation. The technique is valid in this case but only with some constraints.

Andrea Alario, Planning Engineer at ENUSA, describes the complexity of stockpiling and stock management in the current context, with supply restrictions due to the war in Ukraine, logistical difficulties, price increases, and other problems that are overcome thanks to risk analysis and preventive countermeasures.

Ángel Ramos Gallardo, Industrial Technology Engineer at ENUSA, describes the automatic character and voice recognition system developed to verify the fuel pool map. Applied to the audio and video recordings, it allows an initial check of the results to be carried out, and in the future, it can be used online in the plant.

Marta Berrios, Nuclear Design Engineer at ENUSA, presents a methodology to perform a fuel pool criticality analysis automatically with the SCALE package. Reducing user and machine time allows us to consider axially detailed power and burnup histories for each element (burnup credit), improving the margins at the limits of the analysis.

From this session, it can be concluded that new challenges for designing, operating, and managing nuclear fuel are being addressed using different state-of-the-art techniques.

Rafael Falquina
PRESIDENT

Pilar Ortego
COORDINATOR

SESSION 3 ENGINEERING, DESIGN AND INNOVATION (I)

The first of the six papers in this session was presented by **Rafael-Bibiano Torrealba** of Empresarios Agrupados. Entitled "New well to control the lowering of the water table at the U2 of Almaraz NPP", the presentation detailed the project for executing this action to improve the control of the water table in extreme events. Jose Maria Arias of Empresarios Agrupados gave the second presentation, "Plant support engineering." He described the organization and multidisciplinary scope of the Empresarios Agrupados work team for CNAT, with a volume of activity of around 130 design modifications per year (scheduled and unscheduled) and a total of 5742 since the start-up. The following presentation, entitled "Actions to minimize the impact of Ebro macrophytes on the operation of Ascó NPP," was given by **Miriam Villareal**. She described the different measures implemented to control the proliferation of macrophytes, including Improvements to the plant's grating systems, mechanical removal and mowing of retained macrophytes, surveillance systems with AI cameras, and periodic population monitoring. With these measures, it has been possible to reduce the impact generated at the Ascó NPP by increasing the presence of macrophytes. Cristian Prieto gave the following presentation from Empresarios Agrupados Internacional under the title "Adaptation to ASME N511 of the fans of the extraction system of the CAF building at Almaraz NPP". The work describes the design modification to replace the VA-X-FN-85A/B fans and their necessary adaptation to the ASME N511 standard. The work points out the actions carried out, from the specification and acquisition of suitably instrumented equipment, support reinforcements, electrical and instrumentation engineering, and an extensive program of acceptance tests at the factory and plant. The fourth paper, entitled "Mitigation of vibrations in motor fans of HVAC units related to safety," was presented by **Juan José Jaimot** from ANAV. As a result of a problem of high vibrations in new motor fans of safety-related HVAC units, ANAV carried out a study that determined that the new motor fans purchased were not suitable for installation in the conditions indicated by the manufacturer and decided to make an alternative motor fan design. A prototype is manufactured and tested per the applicable regulations and, subsequently, is installed temporarily and exhaustively

Javier Alonso Chicote
PRESIDENT

Gema Alcalá
COORDINATOR

tested in the plant with acceptable results well above the minimum required by the rules. In the sixth and final paper, **Lucas Rodriguez** from WEC, entitled "Steel-Concrete Composite (SC) Walls: Comparison of AISC N690 vs. SCI P414 Design Guidance", presents a comparison between both standards, applicable to steel and concrete composite walls. This sandwich construction technique with steel plate connected and filled with concrete is booming because it is well suited to modular fabrication, requires fewer on-site resources, and has improved stiffness, strength, and flexibility compared to traditional techniques.

The presentations were high quality, exciting, and on time, after which all participants had a good question and answer session.

SESSION 4 QUALITY & HUMAN FACTORS (I)

Seven papers were presented during the first technical session of the Quality and Human Factors area, which 20 people attended.

Juan Antonio Muñoz (Nucleonova) presented "The challenge of implementing the UN-EN-ISO 19443:2022 standard", created by the nuclear industry to control quality throughout its supply chain. This standard considers aspects of great relevance for the sector, such as the dedication of components, the control of counterfeit materials, leadership, and the acquisition of a nuclear safety culture in the company's processes. In his presentation, he gave guidelines to facilitate the implementation of the standard based on his experience in implementing quality systems.

Jesús Iglesias (Tecnatom) spoke on "Organisation and sizing for the operation of an AP1000TM reactor", in which he summarised the study carried out for the sizing of the organization in charge of the operation and maintenance of this type of reactor for the case of a reactor built on a site on which other reactors of previous generations are already in operation. He stressed the importance of considering the planning and sizing of the staff required to ensure operation and maintenance from the early stages of design and construction to avoid compromising the reliability, performance, and competitiveness of the plant's operation.

Robert Ventura (ANAV) presented the paper "Independent supervision of reloads in ANAV. Integration, corporate approach, and operational experience," in which he detailed the integrated approach to various processes (auditing, field supervision, documentary review), especially in refueling, allows the Corporate Quality Assurance units of Ascó NPP and Vandellòs II NPP to unify and homogenize their systems, enriching the knowledge and experience of a more stable and prepared supervisory team. This integration makes it possible to offer common transversal diagnoses to the organization and optimize practices.

Ángel Holguera (CNAT), in his presentation "Inventory of Experts (or how to anticipate risks in knowledge management)," detailed the experience carried out at Almaraz to identify the map of knowledge and inventory of experts in two sections of the plant. The loss of expert knowledge is a concern, even more so in the nuclear sector. So, having tools to anticipate and make decisions on training, overlapping periods, recruitment, and outsourcing is vital.

The presentation by **Francisco José Ruiz** (Tecnatom) dealt with "Future Knowledge Management," in which he detailed the activities carried out in a joint project with ENSA-ENUSA, in which various activities have been set in motion aimed at capturing critical knowledge related to the services provided to the nuclear power plants in the handling of fuel.

Gregorio Socorro (Naturgy) presented his "Analysis of risks and opportunities of the Naturgy Nuclear Engineering Quality Assurance System" based on creating two matrices: one for risks and the other for opportunities. First, the concepts of risk and hazard are distinguished, and the possible risks are analyzed systematically. The opportunities matrix identifies aspects such as the adaptation and improvement of working conditions or improvements in the management system.

Finally, **David Abarca** (Tecnatom) presented his paper on "Complex Problem Solving in the Search for Safety." Taking as a premise that for most complete systems, there is a simple solution that is almost always wrong, Tecnatom's safety management area has begun to use the CPS (Complex Problem Solving) approach to address the processes in which there is the most significant uncertainty. This set of concepts, techniques, and values makes it possible to address problems outside the safety field in the nuclear sector. An "explorer" rather than an "expert" approach, as classical safety consultancy may require this complement in changing environments such as the current one.

Pilar Almeida
PRESIDENT

Ana Belén Sáez
COORDINATOR

SESSION 5 NUCLEAR SAFETY & LICENSING (I)

The 5th technical session of the meeting, being the first on Nuclear Safety and Licensing, was of particular interest to the audience, some 40 people on average, due to the high technical level of the five papers presented. In

this case, the papers presented focused on severe accident analysis.

Joan Fontanet (Ciemat) began by presenting "EFFECT OF SEVERE ACCIDENT MANAGEMENT ACTIONS ON THE COMBUSTIBLE GASES EVOLUTION IN A PWR CONTAINMENT," where, based on a series of accident analysis sequences that produced in containment, a high generation of hydrogen and carbon monoxide, the combined actions of the different safety systems and their effect on the concentration of the gases considered are analyzed and quantified. Next, **Cesar Serrano** (Iberdrola Generación) presented "ANALYSIS WITH MAAP5 OF THE SAWA STRATEGY IN SEVERE ACCIDENT MANAGEMENT FOR COFRENTES NPP," where he showed us that by regulating the flow rate provided on the relocated debris after the failure of the vessel, the pressure relief capacity is preserved, optimizing the source term released. Then **Elena Redondo** (UPM), with her paper entitled "MANAGEMENT OF DEBRIS SEQUENCES WITH HPIS FAILURE IN VVER-1000/V320 REACTORS", informs us of the particular interest in the analysis of accidents in this type of reactors and shows us that the response of her model to this specific failure, generated with TRACE, allows inventory to be injected into the reactor cooling system with a wide safety margin. Next, **Francisco Beltrán** (Belgar Ingenieros Consultores), under the title "ON THE NECESSARY SEISMIC STRENGTH IN A NUCLEAR INSTALLATION," presents a procedure for obtaining the appropriate seismic margin for a nuclear installation based on the acceptable performance goal for the installation and the specific seismic hazard of the site. **Francisco Feria** (Ciemat) with the paper entitled "THE EU-SEAKNOT PROJECT: ON THE WAY TO SET A ROADMAP FOR SEVERE ACCIDENT RESEARCH" in the path of severe accident analysis (SAs) presents the SEAKNOT project (SEvere Accident research and KNOwledge managemenT for LWRs), launched in the framework of EURATOM Horizon Europe in October 2022. Coordinated by CIEMAT and involving 17 organizations, the project is developing a roadmap to effectively address short- and medium-term needs in the field of ES to enable nuclear technology to maintain and further improve its current level of safety while adapting to upcoming technological changes (WC-SMR and ATF in the near term). Closing this session, **Mónica García** (Ciemat), with the paper "Bringing BEPU into Severe Accident Analysis: the EC/MUSA Project," emphasizes estimating uncertainties for source term prediction. The overall objective of the HORIZONTE-2020 project on "Severe Accident Management and Uncertainties (MUSA)" is to quantify the uncertainties of comprehensive severe accident codes by modeling reactor and spent fuel pool accident scenarios of second and third-generation reactor designs for the prediction of the radiological source term.

The session was closed by thanking the speakers for their participation and the attendees for their presence.

Gonzalo Jiménez
PRESIDENT

Javier Gutiérrez
COORDINATOR

SESSION 6 THERMALHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION (I)

This session included six presentations; the first three were related to simulators in nuclear power plants and training activities, and the other three were associated with the simulation of radiation fields in complex facilities, visualization of dose maps, and a methodology for uncertainty and sensitivity analysis.

The first presentation featured a web application developed by Tecncatom, TeamSave, which automates the periodic tests and validations on the simulators. These tests are necessary to guarantee the reliability of the simulators. With this tool, it has been possible to change from a manual mode of work to automated work, thus reducing time, guaranteeing data integrity, and minimizing the probability of errors; the second presented how virtual panels have been introduced in the training simulators, both in the control room and the back panels, as well as remote or local panels. These virtual panels, called Glasstop, allow realistic operation, extending the Interactive Graphic Simulators (SGIs) capacity with features close to the Total Scope Simulators (SAT) with virtual panels instead of physical ones.

The physical fidelity analyses, where the differences between the simulators and the control room are detected, represent a significant amount of monotonous work. The third presentation included an application developed by Tecnatom that, using segmentation, object detection, and optical character recognition (OCR) algorithms based on deep learning, automates the comparison of equipment and detection discrepancies with multi-alphabet functionality.

The new nuclear and radioactive facilities being developed, mainly on the road to nuclear fusion, have a complexity that requires further advances in computational simulation to be sufficiently accurate. In the fourth presentation, a system of simulation codes developed by the TECF3IR research group of the UNED was presented. These systems are currently used in the design of the ITER reactor.

The uncertainty and sensitivity analysis code SUMMON, developed by CIEMAT to provide a flexible tool complementary to several Monte Carlo codes, was presented in the fifth presentation. SUMMON uses a deterministic meth-

odology and only needs sensitivity profiles and covariance matrices to propagate uncertainty. A verification exercise of SUMMON has been performed using SANDY from CEN SCK with good results.

In radiological shielding calculations with SCALE, dose rate maps are used, which are of great value when it comes to an understanding the behavior of radiation in the surroundings of a source, but often large data files are handled, and the tools included in the SCALE package are insufficient. In the sixth presentation, a visualization system (GesMT) with C# code developed by ENUSA was presented, which makes it possible to handle binary files of dose rate maps, allowing operations to be performed on them to visualize the maps or dose rate profiles quickly and to locate maximums, minimums, and averages in specified areas.

Sebastián Martorell
PRESIDENT

Amparo Soler
COORDINATOR

SESSION 7 DISMANTLING AND WASTE MANAGEMENT (I)

Session seven was held on 04/10/2023, chaired by José Campos (Enresa) and coordinated by Tomás Recio (Tecnatom).

Five papers were presented, of which only three were eligible for the prize for the best paper in the thematic area of "decommissioning and waste management."

The first of the presentations, "Decommissioning and final state of remaining containment structures. Analysis of the US experience," was presented by **Álvaro Fenoy** (Naturgy) and showed some of the strategies used for the management of remnant containment structures in some North American reference facilities.

Carlos Puras (Westinghouse) then presented "Dismantling and remediation of discharge channel structures. Analysis of the US experience", which identified the alternatives used for the restoration of the discharge channel in different facilities and their applicability to the case of the José Cabrera Nuclear Power Plant.

The third of the presentations was given by **Manuel María Alberola** (Westinghouse), entitled "Engineering services project for the decommissioning of the RBMK reactors at Ignalina NPP. It showed the "multi-criteria decision" methodology to identify the best options for the decommissioning of the reactor area.

Subsequently, **Miguel Ángel Rodriguez** presented the results of the "study of the effect of the attenuation of different materials during the characterization of radioactive waste for conventional management," showing that the design of the commissioning tests with the ISOCS equipment for the measurement of deficient levels of activity were valid, using different radioactive sources and with real ones in physical models and calculations with Microshield.

Finally, **Eduardo Gallego** presented the work "Evaluation of the dismantling of proton therapy centers based on the selection of shielding materials in the construction stage of the installation." The behavior of different concretes under the effect of neutron activation is analyzed.

The room had a whole house for the entire session, which had the technical support of Alejandro Mendoza (Framatome) as a technical committee member responsible for the session.

José Campos
PRESIDENT

Tomás Recio
COORDINATOR

SESSION 8 OPERATION & MAINTENANCE (I)

Álvaro Rodriguez Prieto

"Dedication by method 3. Manufacturing supervision of single mechanical components made of materials from multiple suppliers".

The dedication certifies and accepts that a commercial-grade component is valid in safety-related applications.

Dedication Method 3 is based on verification at the supplier's premises. This method is appropriate for infrequently used components.

This methodology has been applied to the dedication of mechanical compensators at the Trillo Nuclear Power Plant.

This novel dedication methodology was presented by Álvaro Rodriguez, who holds a PhD in advanced manufacturing engineering, is a Project Coordinator at SGS Tecnos, and a lecturer at the UNED.

In his presentation, the scientific interest and the way of communicating it should be highlighted.

Francisco Javier Hernáez Delgado

"Analysis with the APT of the functional test of the relief valve and isolation valve of the Trillo NPP pressure relief valve."

At Trillo NPP, using the plant analyzer (APT) based on the RELAP5/Mod3.3 calculation code, the plant dynamics have been estimated against a bizarre scenario in which the valves are stuck open during the functional test of the relief valve and isolation valve of the pressuriser relief valve which is carried out with the plant at 40 bar pressure in the RCS.

From the estimation, it is concluded that, with the test valves open, the pressurizer and relief tank pressures balance without reaching the rupture set-point of the tank rupture discs (14 barrels.), but the primary pressure drops sufficiently to generate a bubble in the vessel head, which, added to the loss of the primary pumps, compromises the proper cooling of the core by natural circulation.

This modeling carried out at Trillo NPP was presented by Francisco Javier Hernáez, Industrial Engineer from the Polytechnic University of Madrid at Naturgy Ingeniería Nuclear. I consider the modeling of this incident to be of particular operational interest for the response of the control room team to the actual situation analyzed.

Alfonso Laín Fernández

"Process automation in the ultrasonic inspection of baffle bolts."

Scientific and professional presentation on inspecting the "baffle bolts" in Westinghouse PWR reactors. The presentation will combine technological innovation and advances in artificial intelligence with non-destructive testing (NDT) using ultrasound with an optimum result.

The presentation was given by Alfonso Laín, an Industrial Engineer at the UPM who is developing his professional career in Tecnatom, communicating very clearly the objectives of the same.

Jose Miguel Gallego Montero

"Monitoring of Crosby 6M6 PSVS in Westinghouse type power plant pressurisers".

Presentation of great scientific interest consists of monitoring the pressurizer safety valves (PSVS) during heating and pressuring the RCS for thermal conditioning of these safety valves.

Through this monitoring, real-time measurements of the PSVS stress state AND the evolution of the non-condensable gas bubble are obtained, providing information that can alert of a stress state that exceeds the admissible ones provided by Crosby for its valves, as well as of the possible existence of micro-leaks in the seat of the valves.

She was presented by Jose Miguel Gallego Montero (Head of Diagnostics Service, Empresarios Agrupados-GHESA), as well as the results and conclusions of the same for application to Westinghouse-type pressurizers, amply fulfilling the objectives of the same.

Susana Merino Oviedo

"Stress corrosion in nuclear power plant components. Implication and scope for plant operation".

Presentation with attractive scientific value and results based on the review of the SCC (Stress Corrosion Cracking) mechanism, as well as some examples of failure analysis carried out by the CIEMAT's Materials of Energy Interest Division on a defect in a waste heat evacuation system pipe and the failure of a socket weld, using the CLSCC (Chloride Stress Corrosion Cracking) and TGSCC (TransGranular Stress Corrosion Cracking) processes.

Susana Merino Oviedo, senior scientist at CIEMAT, presents them on results obtained at the ANAV nuclear power plants.

Alberto García Lopez

"Improving Reliability and Optimising Maintenance with Digital APM Solutions."

The presentation deals with the use of digital Asset Performance Management ("APM") solutions aimed at improving reliability and optimizing the operation and maintenance ("O&M") of assets in nuclear power plants.

The objective of digital APM solutions is to have all data sources available to simplify the decision-making process and automate it, taking into account the risks and opportunities associated with it and to be able to execute reliability plans so that daily O&M work can be prioritized or the scope of maintenance to be performed during annual refueling can be defined.

Paper not submitted on time and presented by Alberto García, Industrial Engineer at GE Digital.

Jorge Martínez
PRESIDENT

Aitor González
COORDINATOR

SESSION 9 NUCLEAR MEDICINE AND RADIATION PROTECTION (II)

Session 9: Nuclear Medicine and Radiation Protection (II) took place on Wednesday 4 October at 15:30h with the presentation of six papers presented by researchers from the Polytechnic University of Valencia (UPV) in five of them and from the Polytechnic University of Madrid (UPM) in the remaining one. The papers in this session can be grouped into three themes.

The first of the topics analyzed various methods for processing and filtering medical images and applying Monte Carlo methods, specifically MCNP6, to simulate proton therapy heads. This group included the work of **Celia Tendero Delicado**, from the UPV, with whom we began the session and who explained the "Efficient implementation of

a two-phase fuzzy method for medical image filtering." We continued with the "Study of the head of a proton therapy machine using the Monte Carlo method" by **Sandra Oliver Gil**, also from the UPV. Next, **Miriam Magela Peña Acosta**, also a researcher at the UPV, defended two papers on using the Monte Carlo code GEANT4 Application for Tomographic Emission, known as GATE, in PET scanners. The first was entitled "Analysis of the Image Quality of a PET Scanner Sparse Module Configuration with Monte Carlo," and the second was entitled "Study of PET Scanners with an Extended Axial Field of View Using GATE."

We change the subject, and in this case, various techniques for determining radon concentrations from building materials were analyzed with the presentation of the following paper by Aina Noverques Medina from the UPV entitled "Estimation of radon exhalation rate in building materials: comparison of different techniques."

We ended the session by changing the subject to focus on Radiation Protection in space, using Monte Carlo techniques employing the PHITS code to perform dose estimates and shielding analysis in space. On this occasion, Eduardo Gallego, from the UPM, who replaced Lenin Cevallos Robalino, presented the work entitled "Dose and shielding calculations during a manned space journey."

Roberto Méndez
PRESIDENT

Julian Gómez
COORDINATOR

SESSION 10 FUEL (II)

The second session dedicated to Fuel in which a total of eight papers were presented with the speakers divided between the Universidad Politécnica de Madrid and Ciemat. The number of attendees was acceptable, between twenty and twenty-five, considering the time of the session and the fact that sessions in the other thematic areas were being held simultaneously.

A session devoted mainly to ATF fuel, simulation of its behavior in the event of accidents, and progress in analysis models. Except for two papers dedicated to spent fuel and presented by Ciemat. The first session was devoted to the behavior of spent fuel in dry storage, which showed the development of a predictive methodology that focuses on the characterization of the sheath by radial reorientation of hydrides. The sixth session presented a statistical approach to assess the safety of spent fuel in accidents during transport.

Among the papers presented dedicated to ATF fuel, most of them focused on the analysis of the behavior of sheaths coated with different alloys in LOCA or Station BlockOut accident conditions, establishing in some of them comparisons between the various alloys currently in use. In addition, different calculation methodologies and codes were shown when evaluating the behavior of the other alloys associated with the loss of coolant in these accident conditions.

One of the papers presented, the fifth of the session, offered a different approach since, while research has typically focused mainly on normal operating conditions or in cases of loss of coolant accidents, there is little data on the behavior of these sheaths after operation in the reactor. This work presented an experimental study in which defects were generated and controlled in samples of Cr-coated ATF sheaths.

Finally, it should be noted that one of the papers in this session won an award in the thematic area of fuel. Pau Aragon Gabriel from Ciemat presented the paper: "*Progress in modeling advanced technology fuel: The Cietmat footprint.*"

Carmen Paredes
PRESIDENT

Francisco Javier Núñez COORDINATOR

SESSION 11 ENGINEERING, DESIGN AND INNOVATION (II)

Session 11 "Engineering, Design and Innovation (II)" hosted four exciting presentations on engineering and innovation applied to nuclear power plants covering various aspects of electrical and emergency installations.

The session began with a presentation by **María Paz Gómez González**, from Empresarios Agrupados Internacional (EAI), on the studies carried out to validate the possible modification of the structure of the generation switchgear building at Cofrentes Nuclear Power Plant (CNC) to adapt it to the new Hitachi HEC9 model. The presentation

showed that the analyses carried out under multiple load scenarios have concluded that reconfiguring the building by removing pillars is feasible.

David Ochoa Rubio, from EAI, then gave a presentation on arc flash protection measures in LV and MV cabinets in nuclear facilities. His presentation showed that, based on the IEEE 1584 of 2018 and NFPA 70E standards, it is possible to identify risks and quantify the maximum energy level expected in the cabinets' environments, making it possible to establish protection measures and appropriate personnel training.

Subsequently, **Daniel Alcaraz Pieters** of GD Energy Services (GDES) presented the first mobile device to prepare a boric acid solution and its continuous supply to a nuclear power plant in an emergency. The presentation described this device, which, collected in a standard container, is qualified and patented and can supply the treatment and cooling system of the deactivation pool with boron water to maintain the boron concentration above the critical core boron concentration.

Finally, **Juan José González Solorzano**, from IBERDROLA Generación Nuclear, shared the progress of the construction of a Photovoltaic Plant located within the site of the Cofrentes Nuclear Power Plant (CNC). In his presentation, he highlighted that the plant, with a nominal power of 2 MW, will operate under the Self-consumption regime with surpluses without compensation, in the modality of producer and consumer nearby, located in the same cadastral reference, as the consumer-associated with the Plant is an office building of the Power Plant (EICO building).

In conclusion, the session, supplemented by questions and comments from the audience, presented developments in various fields that have taken place in the last year and gave an idea of the approach taken by the nuclear industry to safety and the contributions that can be made from design and engineering.

Jaime de la Cruz
PRESIDENT

Patricia Cuadrado
COORDINATOR

SESSION 12 ADVANCED REACTORS AND FUSSION (I)

Technical session 12 of the 38th Annual Meeting of the Spanish Nuclear Society held in Toledo on 4 October 2023 at 15:30 was entitled Advanced Reactors and Nuclear Fusion (I). It consisted of five presentations in the area of nuclear fusion.

The first of these, "FMEA of DEMO's WCLL-DB system," was given by **Ciro Alfonso Cerviño**. The objective of the work was to determine whether the changes associated with the simplification in manufacturing of DEMO's new fertile blanket design (WCLL-DB) also improved the system's safety for the previous design. To this end, the FMEA methodology was applied by failure mode and effects analysis, and the plant breakdown structure (PBS) was developed by identifying the different elements that make up the system. The possible failure modes of each component were then analyzed, as well as their causes and consequences, and possible methods for detecting these failures and recommendations for their prevention and/or mitigation were proposed. As a result of the analysis, both a decrease in the failure rate due to fluid leakage from the system inside the vessel and a considerable reduction in the probability of interaction between water and PbLi were observed.

Pilar Cano Megías then took the floor to present her work entitled "Optimisation of Future Nuclear Fusion Reactor Power Plants based on the Characterization of Plasma Properties." Pilar's work focused on the research she carried out to develop a technique for plasma diagnostics by direct characterization of the temperature of deuterium called "Charge Exchange Recombination Spectroscopy (CXRS) diagnostics." During her presentation, Pilar explained the CXRS technique's operation principle and the main challenges and results obtained in the first measurements. Finally, the speaker discussed the integration options for power-producing fusion reactors, as well as possible applications of nuclear fusion other than electricity production.

The third presentation was "Stellarator Reactor Concept based on Centrifugal Molten Salts inside Cylinders" by **Vicente Queral**. Throughout his slides, the author presented a completely innovative conceptual design of a Stellarator reactor with a particular magnetic configuration called "high-mirror quasi-isodynamic," where molten salts are in motion in the space between irregularly shaped cylinders, with the function of producing tritium as well as protecting the walls and extracting the generated thermal power. The preliminary design would require further analysis to demonstrate its technological feasibility.

Next, the paper by **María Urrestizala de Andrés** entitled "Experimental isotope ratio of protium and deute-

Raquel Ochoa
PRESIDENT

Patricia González
COORDINATOR

rium permeability in structural steels for fusion reactors: EUROFER and SS316" shows the study carried out by the speaker where she tests the classical theory to predict the isotope ratio existing between the permeabilities of protium and deuterium, with the experimental results obtained in different steels of interest. It is concluded that other factors must explain the deviation from the results obtained with the theory.

Finally, the paper by **Jorge Salgado Fernández entitled "Analysis and Design of the Central Stack for the Smart Tokamak"** focused on the design of the SMART Tokamak being built at the University of Seville. The work describes the design of the central stack and its mechanical validation through a multi-physics finite element evaluation. By coupling the electromagnetic calculation with the automatic calculation, it is concluded that the presented main column design would meet the physical requirements established in phase 2 of SMART.

At the end of the presentations, there was a short question-and-answer session where an interesting discussion took place, and all the questions raised by the audience were answered.

SESSION 13 NUCLEAR SAFETY & LICENSING (II)

The 13th technical session, the second on Nuclear Safety and Licensing, was of particular interest to the audience, an average of 35 people, due to the high technical level of the five papers presented. A wide range was covered, from a global view of risk in a nuclear power plant to the detailed modeling of digital systems, including some of the advances made by our internationally renowned researchers or the proposal for using residual energy from spent fuel by master's degree students. The first paper, presented by ANAV, was entitled "Participation of Ascó NPP as a pilot plant in the PWROG project PA-RMSC-0607 R3 aimed at standardizing digital system modeling methodologies in the PSA", in which the methodology for evaluating common cause failures of the software was especially valued and the interest in continuing to participate in the initiatives of the owners' group was highlighted. Iberdrola then presented "Almaraz full scope PSA. An overall view of risk," which showed the historical evolution of risk at the plant, with the successive scopes of the PSA, and discussed the significant contribution of internal fires. The third presentation, entitled "Ion Shell," covered the conceptual design of a cask and auxiliary systems that would allow, while maintaining shielding, the waste heat present in the irradiated fuel to be recovered in energy terms, including an estimate of the cost-benefit of the application. Finally, CIEMAT presented two research papers on estimating and characterizing uncertainties in the evolution of a severe accident in a nuclear power plant as part of the MUSA project. Their titles were "*Uncertainty and Sensitivity Analyses of Source Term Estimates during an Unmitigated SBO Sequence in a PWR-1000 Reactor*" *and "Assessment of Uncertainties Effect on Accident Progression and fission product release in a Spent Fuel Pool*"; they presented the combination of simulations with the MELCOR 2.2 Code with the DAKOTA tool for statistical treatment; in general, a reasonable estimation of the uncertainty in the magnitude of the emission and more excellent dispersion in the time at which it occurs were obtained.

At the end of the session, in addition to the appropriate clarifications and questions, there was an open discussion between the audience and the speakers, which added to the value of the session.

Mariano Fiol
PRESIDENT

Ángela Cortés
CCOORDINATOR

SESSION 14 THERMALHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION (II)

The 14th technical session was dedicated to "Thermohydraulics and Neutronics: Simulation and Experimentation (II)", with Alberto Concejal from Iberdrola as Chairman and Alberto Escrivá from the UPV Coordinator.

The large group of speakers came from the UPM, Iberdrola, and the UPV. A total of 6 papers were presented in the simulation field with numerical codes and experimentation.

The first ones were related to the containment simulation using the GOTHIC code. The first compares the results of the Almaraz NPP containment model for GOTHIC version 8.3 with the new version 8.4. It shows that the latest version can simulate liquid flow between compartments, but the calculation time increases significantly.

The following paper studied the effect of different novelizations of the containment of a PWR-W on the simulation results of an LBLOCA accident. Although very similar, the results seemed to indicate that the result was better with a higher number of volumes.

In the third presentation, the PARUPM code was first presented to simulate the behavior of a PAR (Passive Auto-Catalytic Recombiner). Then, the GOTHIC code was

used to simulate the THAI installation under conditions where the PAR operates and compared with the experimental results.

The following paper presented the RELAP/GOTHIC coupling methodology and its applicability in containment analysis, presenting the main differences when comparing the results of uncoupled and coupled models.

The fifth presentation showed an analysis of the signals from the in-core instrumentation system in a PWR-KWU reactor with the TRACEv5p5/PARCSv3.2 coupled code.

The last presentation was dedicated to the experimental facility JEBEA of the IIE of the UPV. This facility conducts gas discharge tests in a swimming pool with stagnant and subcooled water.

The high number of papers and their high technical level indicate the excellent health of thermal-hydraulic simulation and experimentation in the country and allow us to be optimistic at this time of generational change.

It should be noted that the speakers kept to the time available for each presentation so that those attending this session, around 20, had time to ask various questions and discuss different aspects related to the work presented, which contributed to enriching this session and clarifying aspects that there was not enough time to go into in depth in the presentations given.

Alberto Concejal
PRESIDENT

Alberto Escrivá
COORDINATOR

SESSION 15 DISMANTLING AND WASTE MANAGEMENT (II)

This session featured six presentations of very high technical and speaker quality. The attendance was very high, even exceeding the room's capacity, showing interest in the subject matter. The session went smoothly, leaving enough time for the audience to ask questions for the final part, sometimes leading to a lively and exciting debate.

The subject matter was very diverse, although research work predominated. Below is a brief description of each of them:

Manuel Mingarro Sainz-Ezquerra from Ciemat presented "Influence of isosaccharinic acid (ISA) on the diffusion of Ni-63 in degraded cement", in which, with the tests carried out, it was deduced that the presence of ISA decreases the sorption capacity of the cement and increases the diffusion coefficient, increasing the mobility of nickel.

The presentation by **Carla Fernández García** from the Eduardo Torroja Institute dealt with the study of the physicochemical stability of magnesium phosphate matrices for the safe storage of metallic materials, such as aluminum, as it erodes in matrices commonly used in high-alkalinity Portland cement.

Nieves Rodríguez Villagra from Ciemat presented the paper "Fuel oxidation tests and thermo-mechanical analysis. OCATS Project". This paper focused on the oxidation of the UO matrix2 to U O38 during the temporary dry storage of the fuel, obtaining the variables for the formation of U O38.

Marta López García from Amphos presented the development of a database (SDB & TSMDB) containing experimental and thermodynamic sorption data. This will allow for comprehensive and easily searchable management of the information available for sorption processes in deep geological storage.

The presentation by **Olga Riba** from Amphos, under the title "1D model of carbon steel corrosion integrating water and chlorine radiolysis by gamma radiation". This model has been applied to simulate different data sets that conclude that gamma radiation's effect promotes the corrosion of carbon steel.

Eva María Márquez Franco from Ciemat presented the paper "Study of the thermal treatment of irradiated graphite from Vandellós I." This work studies the possibility of selectively separating 14 C from the rest of the waste without significantly affecting the initial matrix utilizing thermal treatment.

Miguel Ángel Rodríguez PRESIDENT

Raquel Escamilla
COORDINATOR

SESSION 16 OPERATION & MAINTENANCE (II)

En this technical session we have had the opportunity to enjoy six excellent presentations on different subjects, which we could define globally as presentations focused, on the one hand, on maintaining the state of health of our

facilities and, on the other hand, on the modernisation of management and inspection processes.

The first of the presentations focused on nuclear power plant aging management programs as a critical tool to guarantee a safe operation in the long term and how the measurement of their effectiveness becomes, consequently, a matter of great interest. In this presentation, we were provided with information on how to measure the effectiveness of aging management programs, which can be applied worldwide, and the main guidelines for their application.

In the second presentation, the EVEREST was presented, an equipment developed for verifying thicknesses in pipes of the auxiliary cooling systems in CCNN by sweeping the lower areas of pipes affected by the phenomenon of micro bacterial degradation. This way, a larger sweeping surface is obtained while reducing the number of passes to be carried out.

A third presentation focused on a very relevant equipment in our industry, the power transformer. The speaker updated us on simple-to-implement monitoring solutions that help users of this equipment reduce capital and operating expenses, extend the life of their transformers, and help reduce their carbon footprint.

The fourth presentation presented a vision of the Spanish industry's current situation to provide a solution to the needs derived from managing obsolescence through committed national manufacturers and expert agents in the nuclear sector. It is necessary to be prepared to maintain the current plants' activity and for a hypothetical extension of the useful life of the existing fleet.

The penultimate of the presentations presented a project to modernize the management of discharges through the use of a digital tool called InGEN. The software optimizes the process to provide agility, improve traceability, and reduce potential errors. The implementation of the software is accompanied by the deployment of a network of wifi points and the use of mobility devices on the site.

We could not close the session without mentioning Artificial Intelligence, and it finally arrived in an application focused on improving efficiency and accuracy in detecting defects in welds. A tool that represents a significant advance in the automatic detection of defects in welds and offers an efficient and robust solution for inspecting and evaluating welds in the nuclear sector, opening the door to its improvement by implementing innovative Artificial Intelligence and Machine Learning methods.

The session was very well attended, with a whole house. In addition, the small number of presentations, their subject matter, and the quality of the speakers allowed for interesting debates that enriched the session.

Rafael Martín López
PRESIDENT

Andrea Cárdenas
COORDINATOR

SESSION 17 ENGINEERING, DESIGN AND INNOVATION (III)

In the thematic area of Engineering, Design, and Innovation, session 17 on Engineering, Design and Innovation took place on Wednesday, 4 October, chaired by L**uis López Álvarez** and coordinated by **Germán Domínguez González.**

The first presentation was given by **Víctor García Álvarez**, from Empresarios Agrupados, who detailed the development of spare parts management at the Almaraz and Trillo nuclear power plants in recent years, as well as the main lines of work for the future, such as proactive obsolescence management.

Secondly, **Emma Huete García**, also from Empresarios Agrupados, presented the optimization work in classifying safety-related spare parts, describing the procedure that has significantly reduced the time spent on this classification.

Maita Morales Prieto, from Nucleonova, then gave a very informative presentation on the principles of the dedication process by which a commercial component can reach the "nuclear" category, describing entertainingly the different phases involved in the dedication of spare parts and components.

The fourth presentation of the session was defended by **Álvaro Iniesta López** from Empresarios Agrupados and dealt with the Ageing Analysis as a Function of Time (AEFT) at the Almaraz Nuclear Power Plant and the Qualified Life Extension for electrical equipment, focusing on the impact of environmental conditions (temperature, doses...) on aging and the tools for its estimation.

Finally, **Abel Romero Magallanes**, also from Empresarios Agrupados, addressed the dedication process in Spanish nuclear power plants, reviewing the different aspects related to the qualification of spare parts and components and the various optimization methods implemented in recent years.

Luis López
PRESIDENT

Germán Domínguez
COORDINATOR

A question and answer session was opened at the end of this last presentation. A lively debate started among the attendees, focused on defining the critical parameters for the dedication of a component when it is being designed through reverse engineering.

SESSION 18 COMMUNICATION & TRAINING (I)

In this session, five papers were presented, the themes of which could be grouped into knowledge management, nuclear training, and communication. About 30 people attended.

The first presentation, "ENEN2PLUS: vocational training offer in the nuclear field", was given by **Christian Schoenfelder.** In 2022, the European Nuclear Education Network (ENEN), with a consortium of more than 50 European education and training institutions, industries, and networks, launched the ENEN2plus program. One of its work packages is dedicated to developing a coherent and sustainable EURATOM vocational education and training (VET) program to address the fragmentation of nuclear training opportunities in the EU and to prioritize areas with a shortage of training offers.

The first task was identifying, collecting, categorizing, and evaluating existing VET offers in the nuclear field in the EU States. Relate these to the HR needs of the European nuclear industry, research, safety, security, waste management, and non-energy applications to identify critical jobs in the nuclear field, which will specify the VET needed to help address these critical issues.

In the second presentation, "Knowledge management in radioactive waste management. Application and evolution in European projects", **Alba Valls** (Amphos21) summarised the different initiatives in management, dissemination, and transfer of knowledge developed in multidisciplinary, multinational European projects with a large number of participating organizations in the various EURATOM framework programs (FUNMIG, RECOSY, First-Nuclides, CEBAMA, etc.). As well as the current strategies developed at the European level: the Joint European Radioactive Waste Management Programme (EURAD) and the project related to activities before the definitive disposal of low and intermediate-level waste (PREDIS), to generate a continuous line in knowledge management and training throughout the radioactive waste management cycle.

The following presentation by **Diana Cuervo Gómez**, entitled "Participation of the UPM in GREAT PIONEER, a European project for educational innovation in nuclear engineering," presents the work carried out in the project dedicated to new teaching methodologies Graduate Education Alliance for Teaching the Physics and Safety of Nuclear Reactors (Great Pioneer). He explains the innovative pedagogical approach proposed, based on the use of a flipped classroom methodology and the development of course material for the courses: "Nuclear Data for Energy and Non-Energy Applications," "Core Modelling for Core Design," and "Core Modelling for Transients" developed by the UPM. These materials include manuals, webcasts, and quizzes for the asynchronous sessions and presentations, practical exercises, and active quizzes for the synchronous sessions. All the developed material was delivered, supervised, and graded through the SOUL Learning Management System, a Moodle-based platform that Tecnatom designed and made available to the project. Courses offered in 2022 and 2023 and whose participation was highly satisfactory, reaching 50 students/course, 15 on-site, and the rest by distance learning. The completion rate of the initial participants was 57%, and that of qualified participants for the synchronous sessions was 80%. The asynchronous phase lasts four weeks, and the synchronous phase lasts five consecutive days.

The presentation "UPC Master's Degree in Nuclear Engineering and European Master's Degree in Nuclear Energy: connecting talent with Industry" by **Lluis Batet** of the UPC reminds us of the trajectory of the two master's degrees in which they participate, the European Master's Degree in Nuclear Energy (EMINE), taught by KIC InnoEnergy under the auspices of the European Institute of Innovation and Technology (EIT), and the UPC's Master's Degree in Nuclear Engineering (MNE), supported by Endesa and integrated into the first one. These are consolidated educational projects with strong industrial participation in joint and emphasize innovative learning methods and the acquisition of skills by students. As a novelty within EMINE, several transversal projects are carried out with funding from the EIT through InnoEnergy: the development by ESADE of a case study based on Seaborg Technologies, the design of a didactic module on programming skills for nuclear energy, and the organization of a new course on the role of social sciences in nuclear power. In MNE, the implementation of project-based learning activities and the participation of students in competitions organized by the SNE should be highlighted.

And finally, **Alejandro Carrasco**, president of JJNN, with the presentation: "JJNN: Divulgando sobre Ciencia y Tecnología Nuclear," updated us on the activities of the Commission during 2023, its increase in RRSS, conferences, talks in bars, seminars, and a long list of other activities. Since February, 58 activities have taken place, involving more than 2200 people (online and face-to-face), with a large majority of face-to-face attendees.

Susana Falcón
PRESIDENT

Belén Hermosa
COORDINATOR

SESSION 19 ENGINEERING, DESIGN AND INNOVATION (IV)

On Wednesday, 4 October 2023, at 15:30 H, the 19th technical session of Engineering, Design, and Innovation, dealing specifically with Engineering Studies and Analysis, took place. The session was chaired by **Javier Garrido** (Framatome) and coordinated by **Stella Zamudio** (GE HITACHI).

The technical session was well attended by the public and developed around a lively debate. The dynamics of the session allowed for a question and answer session after each presentation and a final space for discussion and debate on the most essential points of each presentation and the state of the art in general.

The first of the speakers, **Carlos Gonzalvo** from the University of Girona, gave a magnificent presentation on the architecture of the first Spanish nuclear power plants, focusing on the period from 1963 to 1972. From this privileged point of view, Carlos offers us the possibility of approaching the beauty immersed in the conception of the first-generation plants: José Cabrera (Guadalajara), Santa María de Garoña (Burgos), and Vandellòs I (Tarragona). Thanks to this exhibition, we have observed the transformation of an industrial facility into a beautiful architectural ensemble through the eyes of the three architects responsible for making the desire for beauty a reality.

The speaker, **Daniel Martín-Moreno de Blas** from Empresarios Agrupados, brilliantly explained the development of the project that has led the Trillo 1 Nuclear Power Plant to comply with the new R.D. 487/2022, which establishes the health requirements for the prevention and control of legionellosis. Those attending the technical session had the opportunity to increase our knowledge of the factors that can cause the presence of legionella and its consequences, how the transition to compliance with the new regulations has been tackled at Trillo 1 NPP, through methods, but also through an exhaustive analysis of the risks of the process and the strategies to mitigate them; and a look at the future and the following steps to be taken.

Finally, **Cristian Garrido** from IDOM gave an impeccable presentation on the IDOM SHIELDING OPTIMIZATION TOOL (ISOT). By observing the feasibility of implementing nuclear reactors in merchant ships, which is an opportunity to test the tool in a real problem, we were able to see how the tool works and its strengths. The process, from defining the objectives to concluding, involves introducing data, parameters, and restrictions, the choice of algorithms, obtaining results, and their analysis.

Javier Garrido
PRESIDENT

Stella Zamudio
COORDINATOR

SESSION 20 ADVANCED REACTORS AND FUSSION (II)

The 20th session of the 48th Annual Meeting of the SNE was devoted entirely to NUCLEAR FUSION. The following four papers were presented at the session:

Igor Peñalva, from the Polytechnic University of the Basque Country, presented the paper ADVANCES IN THE EXPERIMENTAL MEASUREMENT OF HYDROGEN SOLUBILITY IN THE EUTHETIC LEAD-LITHIUM ALLOY THROUGH ABSORPTION-DESORPTION TECHNIQUE. The presence of hydrogen in the Pb-Li alloy is vital due to its ability to react with lithium, forming lithium hydrides that can affect the mechanical and thermophysical properties of the alloy. Therefore, it is crucial to understand and control the hydrogen solubility in the alloy and take appropriate measures to minimize the adverse effects this solubility could have on the operation and lifetime of the system. Igor showed us the high dispersion of results in the solubility and diffusivity of hydrogen isotopes in the Pb-Li eutectic alloy. He showed us the recent advances in this field made at the Fusion Materials Laboratory (LMF) of the UPV.

Vicente Bécares, from CIEMAT, presented the paper PLANNING THE USE OF THE JULES HOROWITZ REACTOR. Vicente presented the capabilities of the JHR as well as the plan developed within the JHOP22040 project for research on materials, testing of nuclear components and fuels, production of radioisotopes, and evaluation of responses of some nuclear safety systems, taking into account the interests and needs reported by the member countries/organizations. Vicente informed us of the significant delays accumulated by the project, provided us with a tentative schedule for the completion of the project, and warned us that the current funding scheme does not cover the operational costs of the facility, so this will be one of the crucial issues to be resolved in the future by the members who want to make use of the facility.

Jon Azkurreta, Igor's colleague at the Polytechnic University of the Basque Country, presented the paper INVERSE PERMEATION AS AN OPTION FOR THE CHARACTERISATION OF HYDROGEN TRANSPORT PARAMETERS. Jon contextualized his work by informing us of the limitation currently existing in the market that the pressure controllers available only allow direct permeation tests to be carried out with constant loading pressures of the order of several tens of Pa. Reverse permeation reduces the loading pressure during the test, which will become non-constant as reverse permeation occurs, requiring specific mathematical development for this permeation model.

Finally, **Ronni Rives** from the Polytechnic University of Catalonia presented the paper INVESTIGATION OF THE HELIUM BUBBLE GROWTH PROCESS IN LITHIUM LEAD AUTHENTIC. The accumulation of helium bubbles on the contact surfaces between the structure and the Pb-Li alloy leads to a reduction of heat transfer and tritium permeation and, consequently, the impact on the fuel self-sufficiency characteristics of the reactor will depend on the hydrodynamics and the size, concentration, and stability of the bubbles. Ronni presented simulations performed with the CFD code OpenFOAM, testing different correlations describing the interfacial mass transfer in rising He bubbles in the alloy in several scenarios. The results indicated that none of the correlations studied could generalize bubble growth. Still, some can predict the behavior with relatively acceptable deviations in specific cases.

The questions asked at the end of each presentation allowed for a deeper insight into the development of each work. They provided a vision for the continuity of the work shortly. It is essential to thank the speakers for generally adapting to the time allotted. The session was closed by thanking the speakers for their participation and the participants for their presence and the attention given during the session.

Raúl Orive
PRESIDENT

Marcos Sánchez
COORDINATOR

SESSION 21 NUCLEAR SAFETY & LICENSING (III)

The session began with a presentation by **Imanol Zamora** (ANAV) describing the adaptation of the deterministic flooding and sprinkler risk analyses for safe shutdown in the event of internal flooding at ANAV based on revision 3 of BTP-3-3/3-4, concluding that the design of the plants, both at Ascó NPP and Vandellós II NPP, is robust and can mitigate the consequences of the postulated pipeline ruptures, allowing the safe shutdown of these plants.

The following presentation was given by **Javier Ruiz** (Iberdrola), describing the impact of recent design modifications at Cofrentes NPP on risk. The initiating events that have seen their core damage frequency (CDF) reduced were the SBO (implementation of the Seismic PCI subsystem) and ATWS (improvement in inhibition logic). The third significant design modification was the installation of the Containment Filtered Venting System (post-Fukushima requirement), which, in this case, reduced the Level 2 Large Release Frequency (LRF).

Subsequently, **Laura Garcia** (Westinghouse) provided significant disclosure and definition of the Key Safety Functions (KSF) in case of fire in shutdown conditions during high-risk Plant Operational States (POS). High-risk EOPs were described considering boiling time and inventory conditions. Subsequently, the equipment and supports involved in fulfilling the FCSs to ensure that the fuel is maintained in a stable and safe condition are identified. It was highlighted that non-compliances could be resolved in those areas with vulnerabilities by adopting additional defense-in-depth measures, depending on the potential damage that may occur.

Finally, the session concluded with a presentation by **Sebastián Martorell** (UPV) with excellent communication on the application of metamodels for the determination of risk measures in PSA applications, where he explained that one way to increase flexibility in modeling and improve the realism of PSA models is the use of tools such as surrogate models or metamodelling. In this approach, the PSA code is replaced by a surrogate model to obtain the risk measures of interest (e.g., NDF).

Vicente Nos
PRESIDENT

Pedro Díaz Bayona
COORDINATOR

SESSION 22 THERMALHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION (III)

The session started promptly at 17:00 and lasted until 18:00 with the presentation of 4 papers.

The order and content of the presentations during the session were as follows:

22-1. **Luis Serra López**, a researcher at the Department of Energy Engineering of the ETSII-UPM (Nuclear Engineering area), presented:

VALIDATION OF CONTAINMENT FOAM-9 USING THAI EXPERIMENTS ON HYDROGEN RECOMBINATION

This paper has presented the simulation results of a series of hydrogen recombination cases from THAI experiments for incorporation into the ContainmentFOAM validation matrix.

22-2. **Rubén Matías** of ENUSA, presented:

VALIDATION OF CFD THERMAL ANALYSIS OF SPENT NUCLEAR FUEL IN CASKS USING SUB-CHANNEL CODES

This paper presented the validation results using the COBRA-SFS sub-channel code of the CFD (Computational Fluid Dynamics) analysis of the HI-STORM container presented at last year's annual meeting.

22-3. **Miguel Prieto Palomera** of Empresarios Agrupados Internacional, presented:

CFD ANALYSIS OF LOCAL THERMAL-HYDRAULIC PHENOMENA APPLICABLE TO TCWS IN RELATION TO THERMAL FATIGUE

A separate Fluid-Structure Interaction (FSI) approach based on CFD and FEM analysis with ANSYS Fluent and ANSYS APDL has been developed to evaluate HCTF phenomena in different systems. Simulation results were obtained for the fluctuation of the temperature field at the fluid/solid interface in various configurations and the associated cyclic mechanical stresses and fatigue.

22-4. **Sofía Arfinengo del Carpio**, researcher at the Universidad Politécnica de Madrid, presented:

SCOPING CALCULATIONS FOR HYDROGEN RISK EXPERIMENTS IN THE PANDA FACILITY

This work has focused on calculations for the P1A3 series of experiments (with two interconnected compartments) in one of the PANDA vessels. The simulations have been performed with GOTHIC8.3, using a mesh adapted to deal with a multiphase problem and with a strong interaction between the fluid and the vessel walls.

Carlos Gómez
PRESIDENT

Sergio Gallardo
COORDINATOR

The session went smoothly in developing the presentations, with a short question and answer session (5 minutes) after each. The time spent by the speakers was within the established 10 minutes and was followed with great interest by the attendees, with a lively debate following the different presentations. Attendance varied throughout the presentations, with an estimated average of around 30 attendees.

The equipment and facilities were adequate, and the technical level of the session was high, with all speakers meeting the quality requirements and expectations of the content of the presented papers.

SESSION 24 OPERATION & MAINTENANCE (III)

In this technical session we have three presentations where we are given an overview of different works at the Almaraz NPP and another related to developing sensors for monitoring electrical systems.

The first presentation, by **Jaime de la Cruz** (EA-GHESA), shows the proposed solution to protect the equipment for extensive damage mitigation strategies inside a tent. Due to the different characteristics that the tent had to meet, without central pillars, anti-seismic, etc., the design process was quite complex. The result was a successful design, manufacturing, and assembly process regarding organization, time, and result.

Carlos Molina (Schneider Electric España S.A.U.) then presents the solutions for incorporating sensors focused on electrical distribution in both low and medium voltage. The parameters that can be monitored include environmental and operational conditions and can measure temperature, humidity, gases, ultrasound, and a long, etc., as external. Relating all the information provided by these sensors is vital to extract trends and behaviors of the assets that will enable preventive and predictive maintenance to be enhanced in distribution networks such as those of nuclear power plants, thus extending the life cycle of the equipment and reducing its environmental impact.

Finally, **Andrés Bermejo** (EA-GHESA) describes the reactor opening and shutdown work during refueling at Almaraz NPP. The different maneuvers and tasks carried out for the opening of the reactor are highlighted, such as the disassembly of the reactor cover vent, assembly of the sealing ring, distension of bolts, and subsequent transfer and treatment of the bolts and all the maneuvers necessary to be able to extract the fuel from the core—a

Jesús García Vargas
PRESIDENT

Juan Rodríguez
COORDINATOR

very detailed exposition with a multitude of essential precision work to meet the deadlines in a refueling.

There were many attendees filling the room to capacity, and with only a few presentations in this session, there was time for very detailed questions and answers from the speakers.

SESSION 25 NUCLEAR MEDICINE AND RADIATION PROTECTION (III)

The session began at 9:05 on Thursday, 5 October, as scheduled in the program, with the round table chaired by Dr. Oscar Martínez, head of Health Surveillance at the Cofrentes plant, and Dr. María Luisa Estupiñán, head of Health Surveillance at the Trillo plant. The event was attended by people interested in the latest advances in medical treatments based on nuclear medicine, as well as in the protection of workers in different areas of activity and nuclear emergencies, ending with a lively exchange of questions and answers:

1. Retrospective descriptive epidemiological study on the morbidity of ENRESA workers following acute infection with COVID-19, presented by Dr. **Francisco Miguel Castillejo**, head of the Occupational Health Unit of ENRESA, and Ms. Inmaculada Gómez, Occupational Health Nurse of said Unit.

The objective of this study was to monitor the follow-up and evolution of workers infected with COVID-19 at ENRESA. This retrospective epidemiological study has been extended over the years 2020, 2021 (the year with the highest number of severe cases), 2022 (the year with the highest number of confirmed cases, with 47.7%), and 2023 (up to March). Of the total number of confirmed infections with positive PDIA, nine processes were considered severe (with hospital admission and supplementary oxygenation), 1 case was regarded as Long COVID, and no deaths.

2. Study the dose distribution in Lu-177 treatments using Monte Carlo simulation, presented by **Sandra Oliver Gil**, PhD student at the Institute of Industrial Safety, Radio Physics and Environment of the Polytechnic University of Valencia (UPV).

Therapy labeled Lu-177, called Prostate-Specific Membrane Antigen (PSMA), is a novel therapy increasingly applied to patients with metastatic prostate cancer.

This work has aimed to carry out personalized dosimetry to determine the effectiveness of the treatment in an individualized manner and the toxicity in healthy organs, optimizing and personalizing the activities injected into patients.

3. The brachytherapy planning system is based on Monte Carlo simulations with MCNP6, presented by **Sandra Oliver Gil**, PhD student at the Institute of Industrial Safety, Radio Physics and Environment of the Polytechnic University of Valencia (UPV).

Brachytherapy treatments are planned with dosimetric models that are sometimes less accurate than those provided by Monte Carlo (MC) methods. The study shows the accuracy obtained in the calculation of doses using these methods compared to MC methods with MCNP6 code, which, in addition to offering greater accuracy, keep computation times very affordable for the clinic, maintaining the doses prescribed to the patient, and thus being able to incorporate it into a planning system.

4. Improvement in the assessment of internal doses received by workers in the ceramics industry, presented by **Ms. Marina Sáez-Muñoz**, Doctor in Chemical Engineering and researcher in the Environmental Radioactivity laboratory at the Polytechnic University of Valencia (UPV).

The study deals with NORM (Naturally Occurring Radioactive Materials) materials such as zirconium sands used by the ceramics industry, which contain small traces of radioactive isotopes (U-238 and Th-232), with activities above the exemption limits, which, according to regulations, require the measurement of internal doses received by workers. The environmental radioactivity laboratory of the Polytechnic University of Valencia has developed a new methodology, which has improved the method for estimating this internal dose by isotopic separation of the radioisotopes contained in the personal filters and their corresponding measurement utilizing alpha spectrometry. With this new method, a more realistic calculation has been achieved, demonstrating that the workers' exposure is much lower than the annual dose limit of 1 mSv.

5. Emergency response to a confirmed internal contamination with Lu-177 through an injury in the CIEMAT Body Radioactivity Counter, presented by **Juan Francisco Navarro Amaro**, head of the CIEMAT Body Radioactivity Counter laboratory.

The paper presents a new method for the in vivo measurement of internal contamination in wounds using germanium detectors (BEGe) and its application in a confirmed case of a worker (from a company outside CIEMAT) who suffered a finger puncture when handling a vial of Lu-177.

Two germanium detectors (BEGe) from the CIEMAT laboratory were used with the calibration methodology validated by the IRSN and efficiency curves by ISO 28218. Once the method had been applied, measurements were taken on the whole body and the wound. With the results obtained, using the biokinetic model of Lutetium for injection, a hand dose of 8.8 mSv and a committed effective dose of 0.23 mSv were obtained.

Mª Luisa Estupiñán
PRESIDENT

Óscar Martínez
COORDINATOR

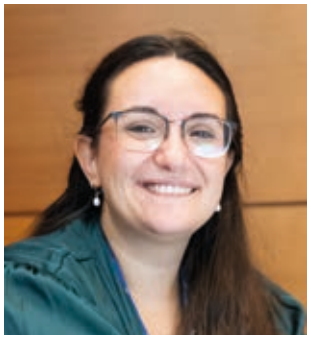
SESSION 26 COMMUNICATION & TRAINING (II)

During session II on Communication and Training, seven presentations were made in different areas related to both fields, giving way to an exciting and participative exchange of opinions among the attendees. Regarding communication, the session included other contents, such as the insurance of nuclear facilities beyond the closure date, in the presentation by **Ana González Felgueroso**; the situation of women in the Spanish nuclear sector, presented by the president of WiN Spain, **Susana Falcón**, and the debate on the extent to which the objectives of the Integrated National Energy and Climate Plan are realistic, by **Telmo Gabarain**. There were also exciting approaches to nuclear communication, its future challenges, and the possible levers of change to face this permanent sector challenge from new perspectives, such as the vision presented by **Olga Marcos**. On the other hand, in the thematic area of training, the proposals of new tools such as the knowledge communities by **Rafael Mendizábal**, the Soul platform presented by **Eliana Guillén**, or an approach in six dimensions for communication/training to move more fluidly in organizations both internally and externally, illustrated by **Ana de la Torre**, stood out.

It is worth noting that, in many of the projects presented during this session, from different approaches, the focal interest in people as the central element of the action described by the speakers stood out. In the case of communication, it is the strategic public to be reached, and in the case of training or human teams, because of the strategic value that people represent for organizations.

Finally, the session was rounded off with an open and very participative discussion focused mainly on the existing training models and the difficulty of successfully reaching the student. Despite the availability of increasingly better and more diverse communication channels to support this training, integrating the knowledge imparted into professional activity was highlighted as one of the keys to success. Concerning communication, the importance of this tool for achieving social acceptance, which is fundamental in the nuclear sector, was once again highlighted, and work should be carried out with this perspective, given the long-term operation of nuclear power plants in Spain.

Montse Godall
PRESIDENT



Elisa Gil Crespo
COORDINATOR

SESSION 27 ENGINEERING, DESIGN AND INNOVATION (V)

Seven papers took up this session and can be grouped into two blocks: simulation/modeling and experimentation. Both will be developed later on.

Not classifiable in these groups is the work of the IIT of the Pontifical University on the problem of voltage maintenance in the electricity transmission grid, an easy issue to manage when talking about a constant supply of electricity to the grid but which, due to the intermittent entry of renewables, has required modifications in the procedures that regulate it with an impact on nuclear generation.

In the simulation/modeling block, it was presented:

- The HVACTT programme, from Empresarios Agrupados. Tool for the analysis of temperature transients in rooms based on factors such as wall composition, thermal loads of equipment and piping, ventilation, openings... The evaluation of the temperature transient in the RHR pump room and the feedwater turbo-pump room was shown.
- EcosimPro is a simulation and modeling tool for complex systems from Empresarios Agrupados. Open source can generate specific external calculation applications in multidisciplinary fields such as engineering, chemistry, physics, mathematics, and even biology.
- ENUSA presented the development and application of neural networks for DNBR estimation. These checks are made with licensed codes and are performed by reload. The advantage of using these tools is their speed of calculation.
- A proposal based on using LiNO3 salts as an energy storage medium thanks to the highly exothermic-endothermic nature of its physical state change. This PCM TES system is proposed as an alternative to the flexible operation associated with the compatibility of nuclear generation with other renewable generation sources.

Cristina Muñoz-Reja
PRESIDENT

Araceli Domínguez
COORDINATOR

The experimental block dealt with the following:

- cosmic radiation on the hardware and software used in systems running complex and massive computational calculations as a source of errors. Thanks to this type of study carried out by CIEMAT, managers of supercomputing facilities can determine plans to counteract the potential sources of error caused by this effect.
- the critical advance in neutron capture determinations and practical sections of 239Pu carried out at CERN's n-TOF and based on the time-of-flight technique in which the neutron energy is determined through the time delay between beam production and beam detection. CIEMAT's responsibility in this project has been to develop and design the new flat fission fragment detector.

SESSION 28 ADVANCED REACTORS AND FUSSION (III)

Industrial participation in the ITER project was the focus of the third technical session on Advanced Reactors and Nuclear Fusion. The session started on time, with a presentation by Gema Donoso Rosa (Empresarios Agrupados Internacional, EAI) on GAP analysis of the non-PIC components of the doors of the ITER Tokamak building. Non-PIC components do not perform safety functions, so it is only necessary to ensure that they can withstand normal operating environmental conditions. The analysis allows components to be selected with guarantees that they will pass the ITER tests.

In the second presentation, **Paula Chiarvetto Peralta** (Empresarios Agrupados, EA) presented an optimization of the control of the ITER Shielding and Confinement Doors, whose original design was over-conservative. The proposed design leads to savings in equipment and more straightforward operation.

The following presentation was given by **Jaime de la Cruz Coello** (GHESA Ingeniería y Tecnología, S.A.). The presentation dealt with the provision of a computerized project management system for the Fusion Business Leadership consortium, adapted to its contract with Fusion for Energy (F4E) to provide a batch of first wall panels and oriented to the objectives of this project.

In the fourth session presentation, **Beatriz Martínez Manzanares** (EAI) explained the structure and management models of the Instrumentation and Control projects within the scope of the European agency F4E's contribution to ITER.

Ana María Hernández Almería (AIE), the fifth speaker, gave a pleasant presentation on a topic that was, a priori, dense. The presentation dealt with designing specific software for the ITER nuclear safety control system. With the digitalization of nuclear power plant instrumentation and control systems, these will have to guarantee the same level of safety as analog systems.

Laura María Ruesga Gómez (EA) then presented the functional test process as part of the environmental qualification of the equipment chosen for the ITER Central Security Control System - Nuclear. Through available tests, it is necessary to verify that the components can perform their functions under usual and accidental environmental conditions.

In stark contrast to the other papers in the session, the penultimate speaker, **Ciro Alfonso Cerviño** (EAI), presented his final master's thesis, Target Accuracy Requirements for MYRRHA, which aimed to determine the maximum uncertainties allowed in the JEFF-3.3 and JEFF-4T0 nuclear databases to meet the uncertainty requirements of the MYRRHA reactor. This research work was carried out at the Belgian nuclear research center SCK-CEN.

Finally, **Francisco Javier Gallo Carrasco** (EAI) closed the session with a presentation on the three MISSIONS projects in which EAI participates, which aim to reduce the risks on the road to nuclear fusion energy.

The speakers kept to the stipulated time so that, despite the number of papers presented, the audience had time to ask a couple of questions about each presentation.

Lluis Batet
PRESIDENT

Luis Cerrada
COORDINATOR

SESSION 29 NUCLEAR SAFETY & LICENSING (IV)

During the fourth of the technical sessions devoted to Nuclear Safety and Licensing, eight papers were presented. As usual, the safety and licensing papers presented a wide range of topics, including

The session started with about 35 attendees and began with the presentation by **Raquel Velasco** (ANAV): "Study of the extinguishing capacity of the BIE of Ascó NPP in the scope of equivalent compliance with IS-30". She presented a fire extinguishing analysis methodology for each of the fire sources considered in the detailed fire PSA analyses, confirming that the water flow rate required to kill the largest fire in each fire area is lower than the flow rate guaranteed by design in the Ascó NPP hose manifolds.

Next, **Alvaro Fernández Romero** (Westinghouse) presented "PRELIMINARY ANALYSIS OF THE SENSITIVITY OF THE FIRE NDF TO THE METHODOLOGY USED IN THE

DISTRIBUTION OF THE GENERIC FIRE FREQUENCY IN THE MAIN CONTROL ROOM FIRE FREEDOM" where under the assertion that the Core Damage Frequency (CDF) in case of fire in a nuclear power plant is usually dominated by the fire scenario analyzed. A specific methodology compares the methodology presented in Volume 2 of NUREG-2178 with a more simplified one described in Appendix L of NUREG/CR-6850.

Next, **Miguel Ángel del Barrio** (Iberdrola Generación), with his presentation entitled "IMPLEMENTED IMPROVEMENTS AT CONFERENCES NPP FOLLOWING THE RENEWAL OF THE OPERATING AUTHORISATION," informed us of the current status of the action plan for the implementation of the improvements proposed by the plant and of the requirements established by the CSN, to increase the safety levels of the plant during the next operating period.

Next, **Gonzalo Jiménez Varas** (UPM), under the title "AMHYCO project - overview and first outcomes," makes a global review of the studies carried out and committed to the project, from an exhaustive bibliographic review to the development of generic models that allow complete simulations.

Fernando Cebriano Abad (Westinghouse), with the paper entitled "Belleville's External Flooding PRA," presents a methodology to determine and model possible accident scenarios during external flooding generated where the equipment necessary for the safe shutdown or cooling of the spent fuel pool would be affected. The final quantification of the scenarios allows an assessment of the frequency and potential impact on plant safety due to each failure.

Next, **Julia Herrero Otero** (EAG-GHESA), in her paper entitled "SIMULATOR TRAINING AND FEEDBACK WITH THE PSA OF HUMAN ACTIONS SIGNIFICANT TO THE CN ALMARAZ RISK," presents how the interrelation between the PSA and the plant is developed considering, on the one hand, the correct characterization of human actions and, on the other hand, the inclusion of these in the training programs and training of the operators.

Next, **Sara Carrasco** (ANAV), under the title "ANAV ADAPTATION TO THE PWROG TCA/TSA PROGRAMME," presents the methodology used in ANAV to identify, validate, monitor, and document the actions of the operator with a time constraint as well as the benefits and difficulties associated with this project. Finally, the current status of the project is explained.

Closing this session and following on from the previous presentation, **Pedro Díaz Bayona** (IDOM) with the presentation entitled "IDENTIFICATION AND CHARACTERISATION OF CRITICAL AND TIME-SENSITIVE ACTIONS FOR ASCÓ NPP AND VANDELLÒS II NPP" emphasized the work carried out to extract the relevant information for the validation of the methodology, requiring among others: the review of various plant documentation, consultations with plant engineering, and the use of virtual tools for consulting the location of equipment.

Sergi Milá
PRESIDENT

Joan Fontanet
COORDINATOR

SESSION 30 THERMALHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION (IV)

The 30th technical session was dedicated to "Thermohydraulics and Neutronics: Simulation and Experimentation (IV)," with **Juan José Serna Galán** from ENUSA as Chairman and **David Soro Sánchez** from ANAV as Coordinator.

The large group of speakers came from the UPV, EAG, Iberdrola, and the UPM. A total of 6 papers were presented in the simulation field with numerical codes and scaling.

The first paper presented a comparative study of the heating of a pipe in a steam line using the ECOSIMPRO, RELAP5, and TRACE codes, showing the difficulty of simulating this transient.

In the following one, a sensitivity study of an ESBO-type accident in a 3-loop PWR reactor was performed using the TRACE code. For this purpose, the i4.2 test of the PKL installation was simulated.

The third presentation showed improvements to the Cofrentes Nuclear Power Plant model for TRAC-BF1/BE. The improvements focused on the containment model, the feedwater system, and the main steam lines.

Juan José Serna
PRESIDENT

David Soro
COORDINATOR

In the following presentation, the results of a reproduction of a steam line rupture accident with a TRACE code passive cooling system, specifically the PAFS system of the ATLAS experimental facility, were presented.

The fifth presentation showed the analysis of SBLOCA sequences coincident with SBO in APR1400 reactors, simulating the C4.1 experiment carried out at the ATLAS facility with the TRACE code.

The last paper compared results between the FSA and H2TS scaling methodologies in a small LOCA, showing good scalability between the analyzed installations. However, some terms that presented a specific scale distortion were detected, but the phenomena were not crucial for the transient.

The high number of papers presented and their high technical level reflects the excellent health of thermal-hydraulic simulation, which allows us to be optimistic in this stage of generational change.

Notably, the speakers kept to the time allotted for each presentation, which allowed the approximately 20 attendees in this session to raise questions and discuss various aspects of the papers presented. This enriching exchange helped clarify issues that could not be addressed in detail during the presentations and improved the overall session quality.

SESSION 32 OPERATION & MAINTENANCE (IV)

The session was opened by **Francisco Javier de la Morena**, from Tecnatom, who presented the Development of Phased Array Ultrasonic Techniques (PAUT) as a replacement for Conventional Ultrasonic Techniques in Nuclear Power Plant Welds. These new inspection techniques allow for improvements in the planning and start-up of the inspection system, resulting in shorter inspection times and more excellent equipment reliability. This also contributes to reducing the doses received during inspections.

Next, **Andrés Blanco**, from Empresarios Agrupados, gave a presentation on applying the Digital Twin to CNAT's Inspection of Equipment and Structures. Andrés explained how the digital representation of the installations improves the efficiency and productivity of the preparation of works and the optimization of the inspection works. This, in turn, reduces the doses received and reduces occupational hazards. It also supports training activities and knowledge of the facilities.

After this, **Juan Rodriguez Gil**, from ENUSA, presented improvements in Occupational Prevention tools by implementing a LOTOTO Methodology (Lock Out, Tag Out, Try Out) in the Juzbado factory for maintenance interventions. The presentation described the phases into which the project was divided and the milestones achieved.

Next, **Natalia Ramírez**, from Empresarios Agrupados, presented a paper on the Methodology and Results of the Inspection of the Structure of the Natural Draft Cooling Towers of the Trillo Nuclear Power Plant with the use of a Drone to validate inspections by this methodology and to be more efficient and effective in the future, additionally reducing the occupational risks associated with the inspection of this type of structures.

The following presentation was given by **Francisco Javier Campaña**, from Tecnatom, on updating Methodologies for the Validation of Non-Destructive Testing used in In-Service Inspections at Nuclear Power Plants.

Subsequently, from EPRI, **Cristina Corrales** presented a paper on reviewing the Operational Experience in the Instrumentation and Control Area being carried out by EPRI.

Finally, **Raul Pozo** and **Albert Nievas** from ANAV presented the documents to coordinate work during refueling outages at ANAV. Referring to three fundamental tools in the nuclear sector, such as operational experience, work management processes, and continuous improvement, they presented three documents to share working practices during refueling in the industry. These documents are a dossier on the entry of materials into containment, a dossier on the central containment scaffolding, and an online program to improve the tracking and execution of refueling outages.

Antonio Martinavarro
PRESIDENT

Ángel Luis Ferrer
COORDINATOR

SESSION 33 ENGINEERING, DESIGN AND INNOVATION (VI)

The session was enjoyable and highly productive, with a large attendance. The six speakers maintained a delightful interaction with the attendees at all times, as the topics presented were of great interest, generating an attractive, professional, and highly motivating debate in the technological field. From the first

to the last presentation, the attendees asked multiple questions, thus enriching the experience beyond the initial ten minutes of each speaker's presentation. This allowed all those present to extract valuable learning and encourage the growth of each one of them. Undoubtedly, the most outstanding presentation was the one related to Machine Learning techniques, which generated an enriching debate among the attendees. Beyond this exceptional presentation, all the presentations showed a marked interest, and the speakers stood out for their clarity and effective communication.

Maita Morales
PRESIDENT

Ignacio Hermana
COORDINATOR

SESSION 34 QUALITY & HUMAN FACTORS (II)

The 2nd technical session on Quality and Human Factors was held with excellent presentations, both in terms of the quality of the speakers and the content.

The session began with a presentation on the "Evolution of Human Factors Engineering in CNA," presented by **Sofía Gómez** from Empresarios Agrupados - Ghesa, in which she described, in the case of Design Modifications (DM), the applicability of Human Factors Engineering (HFE), through the classification of ordinary and extraordinary DMs, leading to improvements in procedures, resulting in appreciable results in the implementation of DMs.

Fernando González Gómez presented the paper prepared jointly by Ars Factum and Tecnatom for ENRESA on the work performed on the "Design of the human factors simulator at Santa María de Garoña" as a tool for the promotion of a continuous safety culture. Considering the type of personnel with no experience in the nuclear sector that will intervene in the decommissioning process, the simulator is intended to help homogenize the cultures of the organizations and engineering companies participating in the decommissioning process and to internalize it. The simulator has been designed to maintain its validity in setting up temporary stations and using virtual reality to train in standard tasks.

With skill and didactic skills, **Fernando Moragas** from ANAV presented us with the paper on "Audio reporting," a new way to optimize the leadership programs in the plant, referring to the management of observations, fundamentally focused on the management levels of the organization, showing how audio reporting increases the effectiveness and efficiency of the plant presence programs, improves quality without incurring additional costs.

Borja Hervás, from Tecnatom, then gave a presentation on "Multi-stage validations of human factors engineering for plant modifications," in which he presented the methodology developed for human factors engineering validations, explaining the characteristics of each type of evaluation depending on the maturity of the design and going in-depth into aspects such as the evaluation conditions, the fidelity of the environment to be simulated, the design of the test and the scenarios to be performed.

Eva Orejuela presented "Support in the homologation/homologation of ANAV suppliers," detailing the process carried out for supplier evaluation, from the audit, report, monitoring of deviations, and verification of effectiveness. The typology of deviations detected in the suppliers with the highest incidence was shown.

Juan Mendoza from GEDES presented the paper "Safety II in the nuclear sector: analysis of results after the first year of implementation," describing the company's Safety Culture approach. He gave a masterly description of the methodology used, identifying the results of the cultural group's commitments, the difficulty in achieving them, and the validity of the commitments to determine expectations and continue moving forward.

Juan Antonio Muñoz
PRESIDENT

Jesús Iglesias
COORDINATOR

SESSION 35 ENGINEERING, DESIGN AND INNOVATION (VII)

The 35th technical session on Engineering, Design, and Innovation (VII) included five engaging presentations on technological innovations applied to improve nuclear power plant operation and maintenance. Empresarios Agrupados presented a series of three papers related to using digital twins, point clouds, and simulation tools to optimize various processes.

First, **Manuel Sainz Martínez** explained the principles and strategies that work for the use of digital twins in the life cycle of a nuclear facility. **Vanesa Muñoz Portela** then

translated these general strategies into specific cases of using point clouds from laser scans to facilitate the planning and executing design modifications in nuclear power plants. The possibilities offered by 3D models on point clouds for planning maneuvers, correction of theoretical models, adjustment of connections, and identification of interferences in substitutions, modifications, and movement of components were very interesting. Finally, **David de Castro García** presented the monitoring and simulation work with EcosimPro of the Almaraz and Trillo NPP Secondary Circuit, demonstrating how introducing these models and tools favors and improves the preventive maintenance of the systems.

The second part of the session focused on the digitalization activities carried out by ANAV to automate control room procedures and work packages.

Marian Morán Criado and **José Manuel Saura Piñán** shared with the attendees their Digitised Procedures in ANAV's control rooms, demonstrating the advantages of using them to facilitate real-time monitoring and tracking of their execution, access to associated documentation, document management, paper and time savings, etc.

Finally, **David Gil Ollé** presented the project for the design, development, and implementation of the electronic work package at ANAV, sharing in great detail the transition from a traditional process to a digital one, which is integrated and more efficient in managing work packages.

The session was extraordinarily well attended, with more than 20 people without seating space crowding the room. There was time for numerous questions and open discussions, demonstrating the industry's interest in innovation and continued commitment to the safe and efficient operation of our power plants in the future.

Xavier Jardí
PRESIDENT

Mónica Moreno
COORDINATOR

SESSION 36 NUCLEAR SAFETY & LICENSING (V)

During the fifth of the technical sessions devoted to Nuclear Safety and Licensing, six papers were presented.

Some 25 people attended the session, which began with a presentation by Víctor Domingo from Iberdrola Generación Nuclear on developing and implementing the specific fire scenarios to be trained in the Cofrentes NPP Control Room Simulator by the operating shifts. Data collection and analysis of results by human reliability specialists of the PSA group are being used to provide feedback for the human action models in the fire PSA.

Sergio Courtin, from the Department of Energy and Fuels of the Polytechnic University of Madrid, continued with the presentation on risk reduction in pressurized water reactors using the so-called Flexible and Diverse Strategies (FLEX). These FLEX strategies have a positive impact on plant safety not only beyond design basis events but also for other accident conditions.

The third presentation, given by **José Ignacio Alonso** from Westinghouse, presented the updated method for selecting the human actions of the PSA at Ascó and Vandellós to create simulator training scenarios based on the criteria of the PWROG project "Time Critical Actions" (TCA).

Marta Zancada, from Empresarios Agrupados, presented the process for the safety assessment of design modifications at nuclear power plants: Preliminary Analyses, Safety Assessments, and Safety Analysis. These analyses and assessments follow Safety Instruction IS-21 and Safety Guide 1.11.

In the fifth presentation, **Agustín Tanarro**, from Tecnatom, described the process of developing the Severe Accident Management Guidelines (SAMG) for the Spanish PWR plants. The lessons learned from the Fukushima accident promoted the development of more in-depth revisions of the generic reference guides of the Westinghouse owners' group, and the latest revision of the generic guides has also entailed a significant change in the structure and rules of use about all the previous revisions.

The session ended with a presentation by **David Lázaro**, from the University of Cantabria, on the evaluation of the feasibility of developing a model based on neural networks that reliably predict the consequences of a fire in a typical scenario of a nuclear power plant in real-time, which can be used to support decision-making in emergencies. The results have demonstrated a good approximation of the model.

The questions at the end of each presentation made it possible to go into more detail and hold the ensuing debate. The willingness of the speakers, who generally kept to the limited time available, is worth noting.

The session was closed by thanking the speakers for their participation and the attendees for their presence.

Pascual Cámara
PRESIDENT

Álvaro Fernández
COORDINATOR

SESSION 37 THERMALHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION (V)

Technical session 37 was devoted to "Thermohydraulics and Neutronics: Simulation and Experimentation (V)," with Enrique González from CIEMAT as Chairman and Andrés Felipe Martínez from UPV Coordinator.

The speakers in this session come from Enusa, the Polytechnic University of Valencia, and the NFQ Group. Iberdrola and the UPV. A total of 4 papers were presented in the simulation field with numerical codes and experimentation.

The first paper presented the development and feasibility study of a thermo-hydraulic model of a PWR reactor core. Specifically, the model was developed with the two-phase CTF code with an optimized meshing for studying the Nuclear Boiling Limit (DNB).

The following paper showed the development of a reduced order model with neutron thermal-hydraulic coupling to analyze the dynamics of light water nuclear reactors, using Matlab ®, in the time domain. This model has been used to simulate different scenarios in a PWR plant during regular operation.

The third presentation presented the thermohydraulic model of the NuScale Small Modular Reactor (SMR) and the core neutron models for different combinations and possibilities of gadolinium fuel rods.

The last paper was dedicated to modeling coast-down conditions for a BWR using GenPMAXS-PARCS. The results showed that PARCS could not adequately predict the 3D power distributions because GenPMAXS could not adequately parameterize the practical sections.

It should be noted that the speakers kept to the time available for each presentation so that those attending this session, around 30, had time to ask various questions and discuss different aspects related to the work presented, which contributed to enriching this session and clarifying aspects that there was not enough time to go into in depth in the presentations given.

It is important to note that the speakers kept to the time allotted for each presentation during this session. As a result, the approximately 30 attendees had the opportunity to ask a wide range of questions and discuss various aspects of the presentations. This exchange enriched this session and clarified aspects that could not be addressed in detail during the presentations.

Enrique González
PRESIDENT

Andrés Felipe Martínez
COORDINATOR

SESSION 39 ENGINEERING, DESIGN AND INNOVATION (VIII)

The session 39, "Engineering, Design and Innovation (VIII)," hosted four exciting presentations related to nuclear power plant fuel management covering various aspects of the design and licensing of spent fuel containers and their characteristics, as well as fuel handling cranes.

The session began with a presentation by **Yolanda Gutiérrez Diego** on the dynamic studies carried out by Westinghouse for the design of a new SENTRYTM dry storage container, considering various scenarios of vertical fall and overturning, proving compliance with the regulatory requirements in all cases.

Francisco Álvarez Velarde then presented the studies being carried out by CIEMAT within the framework of the European EURAD Horizon 2020 project to analyze the possibility of reaching criticality conditions under accident scenarios in PWR and BWR casks, identifying the conditions that could specifically cause them. Subsequently, the analyses performed at the Ascó and Vandellós II plants were presented to ensure compliance with the requirements applicable to fuel-building cranes concerning the handling of spent fuel casks.

Fernando Ortega
PRESIDENT

Eduardo Serra
COORDINATOR

Jesús Aldariz Martín presented the completed studies' scope and the actions planned to ensure compliance with the requirements at both plants.

Lastly, **Sergio Sadaba Cipriani** shared the studies carried out at IDOM concerning the behavior of the fuel handling crane when subjected to a safe shutdown earthquake. The different regulatory criteria have been verified through various series of transient analyses and representing the non-linearities of the system.

In summary, the session, animated by various questions and comments from the audience, showed different experiences developed in other areas over the last year, reinforcing the maturity with which the nuclear industry approaches fuel management.

SESSION 40 COMMUNICATION & TRAINING (III)

The nuclear sector, at the technological forefront in the training of its professionals

The Spanish nuclear industry is characterized by its capacity building, high technology, and innovation, which it applies to all its services, products, and processes, and which it also applies to the training and education activities it develops for its employees.

E-learning courses, virtual reality, the use of video games, and, more recently, artificial intelligence have been added to the traditional training of nuclear professionals. This was confirmed at the 3rd Communication and Training Session held on 6 October at the 48th Annual Meeting of the Spanish Nuclear Society (SNE), where four experts in nuclear training explained the latest developments in these fields.

Specifically, the presentation "IS-38 applied to the José Cabrera nuclear power plant in the dismantling phase" by **Raquel Escamilla** from Naturgy showed the training actions that are carried out in the correct training of the people involved in the transport of radioactive material by road. In her speech, the speaker assured that personnel training is one of the fundamental elements for safety in transporting this type of material and stressed the importance of initial training and continuous training.

For his part, **Antonio Cruzado** of Tecnatom presented "Adaptive learning in the nuclear industry," intending to personalize the training contents according to the needs and aspects to be reinforced and strengthened by each worker, adapting the classes to the student. In his presentation, the speaker summarised this learning in three steps: an initial test, personalization of content according to each student, and content study.

"The development of a specific radiation protection training plan for the staff of proton therapy facilities" was presented by **Gonzalo Felipe** from the Polytechnic University of Madrid. In his presentation, he showed the need to periodically train professionals who work or will work in proton therapy facilities by combining classroom and digital training with on-site practices in laboratories and early therapy centers.

Artificial intelligence (AI) had its turn in the presentation entitled "Virtual instructor based on AI to improve the learning process," which, although prepared by **Berenguer Briquez** of Tecnatom, could not be given by **Francisco José Sánchez** of the same company. During his presentation, he explained the development of training activities applying artificial intelligence with virtual representation of trainers through an avatar, which is used in online courses to accompany student learning. In short, this was a session dedicated to the ongoing training of workers in the nuclear industry, whether in medical applications or electricity production and decommissioning of power plants, which reflected the nuclear sector's commitment to applying innovation and new technologies in learning processes.

Laura Escribano
PRESIDENT

Mateo Ramos
COORDINATOR

SESSION 41 ENGINEERING, DESIGN AND INNOVATION (IX)

The technical session comprises four presentations on various topics related to engineering, design, and innovation in the UN.

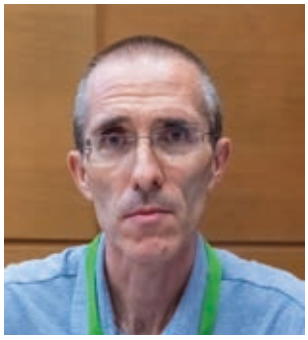
The first session consisted of the presentation of a testing and maintenance procedure developed by Empresarios Agrupados Internacional for the diagnosis of the motorized valves at Almaraz NPP to meet the requirements of Appendix III of the ASME O&M code (Ed. 2017), which came into force in April 2023, in terms of the control mechanisms for establishing the revision periods for active motorized valves (MOVs). Implementing the baseline procedure at the plant has advantages, such as facilitating maintenance

tasks, improving diagnostic planning times, and ensuring that the plant's information on each motorized valve is kept up to date.

The second session explains the project for the improvement of lighting in areas of Cofrentes NPP where human actions are carried out that are important for safety in emergencies; this project is framed as part of the actions associated with the recent Renewal of the Operating Permit of the plant. The project was approached in several phases, from the inventory of human actions contemplated in the Extensive Damage Mitigation Guidelines and the emergency operating procedures through lighting measures with the existing lighting, such that a multidisciplinary team from the plant itself assessed the conditions for carrying out each action, which made it possible to define and implement the measures to reinforce the emergency lighting.

The third session presents the exhaustive study carried out by Empresarios Agrupados for the Trillo power plant on the casing rupture valves, an additional safety measure for the main shut-off and isolation valves of the primary circuit, both in regular operation and in the event of an accident. Thus, in the event of a pressure or temperature transient outside the design of the lines where the main valves are installed, the fluid can be relieved to an auxiliary drainage system for proper treatment. In addition, it must be taken into account that in the start-up or shutdown phases of the plant, these valves and their corresponding relief valves can withstand additional stresses due to the expansion and consequent displacement of the main valves.

The last session explores the differentiating elements of the AP1000® plant, a Generation III+ reactor with passive safety systems, modular construction, and reduced construction footprint, from the point of view of the configuration and physical layout of its buildings and plant configuration compared to other plants of similar power. It can be seen that some physical differentiating aspects are related to construction economics, while other differences are due to the innovative systems licensed for the AP1000® reactor.



Raúl Muñoz
PRESIDENT

Antonio Fernández
COORDINATOR

SESSION 42 ADVANCED REACTORS AND FUSSION (IV)

In this technical session, four high-quality papers on different topics were presented, which can be divided into research works, technological developments, and improvements, all related to advanced reactors and Artificial Intelligence.

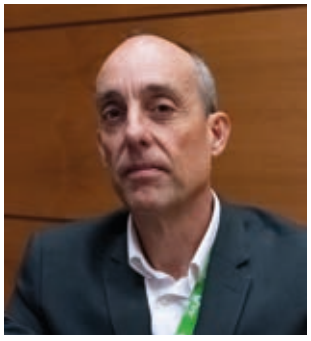
The technical session started with the presentation by **Alejandra de Lara** (University of Cambridge) of the research work entitled "COMPARATIVE STUDY OF PELLET-CLAD INTERACTION FOR STAINLESS STEEL AND HASTELLOY-N CLADDING IN AN AGR-LIKE FHR." The AGR-Like FHR is a fourth-generation reactor design currently under development in the UK. Preliminary results presented in this work indicate that Hastelloy-N allows for more significant deformation without rupture, allowing for a more expansive design space. The knowledge developed by this research can be used to design new nuclear fuel for the future evolution of molten salt reactors.

Pedro Martinez Moreno (CIEMAT) then presented the paper "ANALYSIS OF EUROPEAN FUEL CYCLE SCENARIOS WITH FLEXIBILITY FOR THE GENERATION IV FLEET," in which he showed CIEMAT's contribution to the European PUMMA project "Plutonium Management for More Agility," the objective of the PUMMA project being to examine the different alternatives offered by the Gen-IV reactors and to evaluate their influence on Pu management.

Sergio Díaz Aguado (Westinghouse) presented "WESTINGHOUSE INNOVATIVE REACTORS AND SOLUTIONS" to give an overview of Westinghouse's portfolio of innovative solutions to provide a safe, reliable, and environmentally responsible source of CO-free energy2. He presented a wide range of technologies, such as the eVinciTM microreactor, AP300TM SMR, and Lead Fast Reactor (LFR) technology. Finally, it offered an innovative thermal storage system (PTES).

Finally, **Gumersindo Verdú** (Universitat Politècnica de València) presented "IMPROVEMENTS IN NEW ARTIFICIAL INTELLIGENCE TECHNIQUES FOR THE DETECTION OF ANOMALIES IN NUCLEAR REACTORS," where the development of deep learning tools for the deconvolution of reactor transfer functions from sources of neutron noise induced with disturbances was proposed. A first approach

Adrián Gonzalvo
PRESIDENT



David Zaragoza
COORDINATOR

to using Convolutional Neural Networks for detecting and characterizing disturbances was presented.

The session went smoothly in developing the presentations, with a short question and answer session after each.

SESSION 43 NUCLEAR SAFETY & LICENSING (VI)

The sixth and last technical sessions on nuclear safety and licensing featured three presentations.

The session started with the presence of about 25 attendees, which was not bad for closing sessions and began with the presentation by **Elisabet Marcos** (Westinghouse), who presented the paper entitled "Determination of the frequency of large early releases (FGLT) for PSA applications of Ascó NPP" in which she described and determined the source term categories (STC) to be included in the frequency of significant early releases (FGLT) for PSA level 2 applications of Ascó NPP. The analysis results determining the source term categories according to the results of the PSAs mentioned above were presented.

Rafael Bocanegra Melian (IDOM) then presented "DC-Current Availability Analysis with MELCOR: Insights on SBO in a 3-Loop PWR-W NPP". Extended loss of AC power (ELAP) conditions are evaluated and weighted to whether the existing batteries can operate sufficiently to support core cooling. A generic 3-loop PWR is modeled with MELCOR, and the objective is to evaluate the effect of battery capacity during an SBO scenario. A total of six cases have been analyzed, varying the DC power duration from 4 to 24 hours. The sensitivity analysis showed that the DC power supply is critical to manage the heat sink properly.

Closing this session, **Rafael Caro** (Tecnatom) with the paper entitled "I PULSAR PROJECT: CAPACITIES AND LIMITATIONS OF SUPPORT SYSTEMS IN NUCLEAR EMERGENCY PREPAREDNESS AND RESPONSE. NATIONAL EXPERIENCE WITHIN THE FRAMEWORK OF THE IAEA COORDINATED RESEARCH PROJECT CRPJ15002" introduces the national research project PULSAR "Potential Use and Limitations of Nuclear Emergency Response Support Systems," for the improvement of the knowledge and use of these tools, whose results have been shared at international level within the IAEA CRP J15002. It also presents the work and results obtained in this national project and our contribution to the complementary activities organized under the CRP that include preparedness and response exercises for practice and comparison purposes.

Eduardo Gallego
PRESIDENT

María Asunción Gálvez
COORDINATOR

SESSION 45 DISMANTLING AND WASTE MANAGEMENT (VI)

The session proceeded normally. It should be noted that of the four papers that had been announced, only three were finally presented.

FIRST PRESENTATION. Status and trends in nuclear power plant decommissioning

The results of the IAEA-led project, which aimed to analyze the status of nuclear decommissioning activities worldwide until 2020 and their future evolution, were presented.

Political and economic factors, maintenance and refurbishment costs, and electricity market conditions were identified as critical in making decisions on nuclear plant decommissioning. In particular, it was pointed out that there is no simple relationship between the age of a plant and the timing of permanent closure. The document also states that activity will increase significantly shortly and that new technological advances will be needed to optimize the processes and safety of decommissioning and waste management activities.

SECOND PRESENTATION. New opportunities for nuclear decommissioning 4.0

The different wireless systems implemented at José Cabrera NPP during its decommissioning, such as the

Esther Sánchez
PRESIDENT

Manuel Leal
COORDINATOR

surveillance and supervision system and the fire detection system, were presented during the presentation. In addition, different proposals were submitted to implement the functionalities offered by new technologies and Industry 4.0 in dismantling projects to optimize processes without losing reliability and safety during their execution.

THIRD PRESENTATION. Current status of the analysis of alternatives for decommissioning Vandellos I NPP.

The various studies performed for dismantling the graphite core, its support structures, and the reactor box were detailed during the presentation. As the most relevant conclusion, it was indicated that dismantling these reactors would require Dismantling Systems whose design, installation, and operation complexity goes beyond that found in PWR or BWR reactor scenarios. Hence, collaboration between the different agents involved is essential.

In the case of Vandellòs I, studies of alternatives and comparative analyses between dry and underwater strategies have been carried out. Finally, the relevance of how the graphite is disposed of in Spain was highlighted, as this will condition both the plan for dismantling the graphite pile and its subsequent processing.

SESSION 46 POSTER

The poster session, sponsored by Amphos21, took place on Friday, 6 November, from 10:30 to 11:30; 14 papers from diverse fields, such as nuclear medicine, decommissioning, nuclear fuel separation processes, and knowledge management, were presented.

This year, as a novelty, the posters were presented on electronic screens, a much more ecological and comfortable way for the speakers.

Alice Cunha da Silva introduced the speakers, who briefly explained their work, after which more than 70 attendees could vote for their favorite poster. **José Miguel Gallego** and **César Alvarado**, with their work entitled 'Monitoring of Crosby 6M6 model PSVs in Westinghouse type power plant pressurisers,' were the winners of the prize for the best poster by majority vote.

In addition, once the voting was over, a draw for a €100 gift voucher was held among all those who had voted for their favorite poster. The winner of the draw was **Olga Riba**.

The session was a success, both in terms of participation and attendance, and we hope to continue with this format for future editions of the Annual Meeting.

Córdoba 2024
October 9-11
50 ANNUAL MEETING
SPANISH NUCLEAR SOCIETY

Córdoba 2024

50th ANNUAL MEETTING

We are waiting for you in Córdoba from October 9 to 11, 2024

WOMEN IN NUCLEAR

Within the framework of the 48th Annual Meeting of the Spanish Nuclear Society, WiN Spain organizes and develops two activities aimed at the society of the host city during the day before the start of the meeting itself and participates in a couple more within the technical program of the meeting. These activities fall within the objectives of the association.

MENTORING WORKSHOP WIN SPAIN - NEA (OCDE)

WiN (Women in Nuclear) Spain, a non-profit entity that brings together professionals who carry out their activity in the different areas of application of ionizing radiation, such as energy production, medicine, industrial applications, research or the restoration of works of art, has as a fundamental objective the dissemination directed at different social groups, especially the female group, as well as the promotion of the role of women in the professional field.

The OECD Nuclear Energy Agency (NEA) has developed the NEA International Mentoring Workshop as a platform to encourage young people to pursue careers in science and engineering, promoting gender equality. These international events have been held in several countries in recent years (e.g. Japan, Russia, Kenya and Spain) and bring together international and local mentors with young students, with the aim of advising them on their professional future.

Under this objective of promoting science and technology among the youngest, due to the fact that fewer and fewer STEM careers are studied, WiN Spain in collaboration with the NEA has once again organized, for the fifth consecutive year, the International Mentoring Workshop: "Promoting future leaders in science and technology", aimed at ESO students in the city of Toledo. The workshop held on the campus of the weapons factory of the University of Castilla la Mancha in Toledo, brought together 17 mentors with 50 students between 12 and 15 years old, who shared their experience and knowledge. Professionals from different companies and organizations in the sector participated as mentors: Amphos21, CNAT, CIEMAT, EEAA, ENSA, EPRI, Framatome, Foro Nuclear, GE, Iberdrola, Nfq, and from the engineering school of the University of Castilla la Mancha.

The opening of the event was attended by Ms. Elvira Romera (Counselor of the Nuclear Safety Council), Mª Arantzazu Gómez Esteban (Director of the School of Industrial and Aerospace Engineering of the Univ. Castilla la Mancha), who hosted us for this workshop, and Ms. Susana Falcon (president of WiN Spain).

It is inspiring that both the NEA and the professionals from WiN Spain work and organize events like this so that the youngest women can meet women who have contributed to the field of science since its beginnings. People in whom to find references and who give the best example that success is not a matter of gender but of dedication, motivation and effort. During the activity, a space was provided for each of the participants to have the opportunity to talk, think and reflect on their future; to meet people who have already taken the path that perhaps they would also like to take and who were able to give them information and clues to help them find the field of activity towards which they would like to direct their professional future. Without a doubt, a very rewarding activity that will be organized again in future meetings.

CONFERENCE
"PAST, PRESENT AND FUTURE OF MARIE CURIE IN TOLEDO"

The second WiN activity, framed within the dissemination facet towards society and constantly on a topic of interest related to ionizing radiation, was the conference "Past, present and Future of Marie Curie in Toledo" given jointly by Professor Rafael Camarillo of the University of Castilla la Mancha and by Marisa Chapel, head of the radiophysics and radiation protection service of the University Hospital of Toledo. The conference took place in the auditorium of the former convent of San Pedro Mártir, now the Faculty of Legal Sciences, and was presented by the President of the SNE, Emilio Mínguez, by the Vice-Rector for Internationalisation, Raúl Martín Martín, and by Susana Falcón, President of WiN Spain.

This year's conference, which focused on the figure of Marie Curie, looked at the visit she made to Toledo in 1919. Professor Rafael Camarillo, professor of Chemical Engineering in the Faculty of Environmental Sciences and Biochemistry and a great enthusiast of Marie's life, was in charge of telling us the story that led Marie

Curie to visit this city, the lecture she gave and the reasons why she returned to Toledo a few years later. A very illustrative and well-documented lecture on this visit. For this reason, the Toledo Arms Factory has a plaque commemorating this important event. Marie Curie's research, as is well known, gave rise to medical practice. Therefore, thanks to Ms. Marisa Chapel Gómez, Coordinator of the Network of Experts and Professionals in Radiophysics and Radiological Protection (SESCAM) and Head of the Radiophysics and Radiological Protection Service, we learned first-hand about both the type of work and the state-of-the-art technological equipment available at the new Toledo University Hospital.

After the end of the conference, a fascinating question and answer session took place, which was a great pleasure.

#nucleares

The Women in Nuclear Spain (WiN) Commission exhibited in the #nucleares space, in addition to a video on the trajectory of the commission and the activities carried out during its 25 years of history, which included its conferences, mentoring workshops, visits, the visualization of its different social networks, its videos, etc., a brief survey, with magnetic cards on the blackboard set up for this purpose, on a series of statistics taken from its latest report on the presence of women in the Spanish nuclear sector. Statistics on the number of women in public/private companies, age ranges, level of position held, equality plans in the companies, etc., to make it known. They also interviewed professionals in the sector for use in social media.

WIN LECTURE

As part of the RA technical program, the WiN Commission also presented the paper "Situation of Women in the Spanish Nuclear Sector and Main Measures and Actions on gender equality" in the Training and Communication Session. In 2018, WiN conducted a Study on Women's Presence in the Spanish nuclear sector. During 2023, this study has been updated with the result of the analysis of the different equality plans of various companies, presenting the results of this report with the primary data and indicators obtained and its conclusions. The results that Spanish companies sent into the survey conducted by the NEA-OECD on this subject were also included.

NUCLEAR YOUTH

ACTIVITIES DURING THE 48th ANNUAL MEETING

As has become a tradition, Jóvenes Nucleares (JJNN), founded in 1996 and active for more than 25 years, took advantage of the 48th Annual Meeting of the SNE to carry out multiple activities, all of them aimed at young professionals, students, and the general public. As they say, JJNN will continue to promote awareness and understanding of the many applications of nuclear science and technology in the years to come, bringing together its activities and its members, the two central pillars of the organization.

STEM WORKSHOPS

Ts part of the scientific dissemination activities open to schools, the week began (Monday, two and Tuesday, 3 October) with the coordination by JJNN and the Organising Committee of the Annual Meeting of the STEM (Science, Technology, Engineering and Mathematics) Workshops. In particular, this year, the STEM workshops were coordinated by Miriam Díaz (ARN, JJNNN) and Alejandro Carrasco (Westinghouse, JJNN). Aimed at secondary school students in their last two years of ESO, the workshops were held at the Technological Campus of the Antigua Fábrica de Armas de Toledo of the Castilla La

Mancha University. On this occasion, and along two itineraries, the activity included workshops organized by ENDESA (Sustainable Chemistry), FORO NUCLEAR (Magic to spread science), EMPRESARIOS AGRUPADOS (Training for operators of CCNN ¡Controla el reactor!), IBERDROLA (Masterchef Nuclear), ENRESA (Explora Cabril), WiN (DiY Polymers) and JÓVENES NUCLEARES (DiY Holograms).

According to official figures, a total of 375 students and teachers from schools and colleges in the province of Toledo took part in these workshops.

SCIENCE IS THE CANE

In the evening of the same day, Jóvenes Nucleares organized "La Ciencia es la caña" at the Círculo de Arte in Toledo, an activity consisting of short talks in a more relaxed atmosphere on both nuclear energy and science in general.

#nuclear

In addition, and as part of the collaboration of Jóvenes Nucleares in the #nucleares space of the SNE Annual Meeting, the Jóvenes Nucleares wanted to put colleagues in the sector to the test, through more playful activities to continue promoting and encouraging the dissemination of knowledge about nuclear energy and the numerous applications of ionizing radiation, as well as to point out the role that this industry plays in the well-being of society. These activities were coordinated by Cristina Domingo (IDOM, JJNN).

NUCLEAR TECHNOLOGY WORKSHOP

Finally, on Friday, 6 October, the innovative Young Session took place, a space designed to promote interaction between young people from the nuclear sector and companies interested in attracting new talent. This innovative format, sponsored by IDOM Consulting, Engineering, Architecture S.A.U., seeks to facilitate the transition of students and young professionals into the nuclear labor market. Pau Aragón (CIEMAT, JJNN), vice-president of JJNN, helped to organize this session as part of the CTRA, together with Luis Felipe Durán (IDOM, CTRA), the vice-president of the Technical Committee of the Annual Meeting (CTRA). The session was structured in two parts: a first one where students briefly shared their work, including technical presentations with oral presentations, and a second one dedicated to networking with the representatives of the companies attending the session. For more details about this activity and the Nuclear Technology Workshop, see the articles in this magazine dedicated entirely to these sessions.

BASIC COURSE FOR NUCLEAR YOUTH

During the congress, Pau Aragón (CIEMAT, JJNN), vice-president of JJNN, as part of the CTRA, coordinated and moderated the monograph on Spanish participation in the new designs of modular nuclear reactors. In the monographic session, the participation of various Spanish companies in the development of the nuclear reactors of the future was announced, with the experience of three high-level speakers: Óscar Larrosa, Director of the Nuclear Technical Area at IDOM, Mateo Ramos, Head of the Directorate of Digital Operation and Asset Management at Tecnatom, and Valentín Fernández, Project Director at Empresarios Agrupados – GHESA.

The Technological Campus of the Old Weapons Factory of Toledo of the Castilla La Mancha University was also the venue chosen for the celebration of the Basic Course for Young Nuclear Professionals, an activity taught by young professionals from the nuclear sector in which the basic concepts of nuclear technology were taught. This activity was coordinated by Araceli Dominguez (UPM, JJNN).

The JJNN would like to thank "the work of our many collaborators; JJNN would be nothing without the work of the many volunteers who help in our activities. In addition, the support of Rosa González Gandal and Patricia Cuadrado, presidents of CORA and CTRA, respectively, has been fundamental in this annual meeting. Thank you for always being willing to answer our calls at ungodly hours; working with you has been a pleasure. We would also like to make a special mention to Luis Felipe Durán, vice-president of CTRA, a young acquaintance of ours, and a fundamental support for these activities to have gone ahead, thank you Luisfe".

COMMUNICATION

The 48th Annual Meeting of the Spanish Nuclear Society (SNE), held in Toledo, brought together more than 700 experts from the nuclear sector. National and international professionals shared their knowledge through 300 technical presentations, which were complemented by plenary and monographic sessions that analyzed the role of the nuclear industry in Spain and Europe, where many countries are committed to this energy, given the emerging energy paradigm.

In the section on communication, the Commission has worked to promote the dissemination of the program and the content of the sessions. In addition, the Annual Meeting has been used as a framework to encourage the strategic messages of the Spanish Nuclear Society: the commitment to the continued operation of the Spanish nuclear power plants.

For this reason, the committee members worked intensively during the first part of the year to define the communication plan for this edition and outline the main actions to be carried out before, during, and after the event.

Due to the intense activity caused by the current situation, an update of essential points of the arguments and critical messages to be conveyed at such a necessary time for the nuclear sector as we are currently experiencing was once again carried out.

It is worth highlighting the work carried out by the working team. This team is made up of communica-

tion professionals from the nuclear sector and external professionals in communication, social networks, and audiovisuals, who have worked together to highlight, now more than ever, the fundamental role of nuclear energy in our future.

The impact on the media has been notable, especially in the region and the specialized press. The tone of the publications has been positive. The media's interest has allowed the Company to deliver the most critical strategic messages established. Among them is that nuclear power plants in Spain are an essential asset that should be considered, regardless of political considerations. It was also emphasized that nuclear energy is green and sustainable, has high technological know-how, and has an industry that adds value to the GDP, with international projection and quality jobs. The possibility of continuing with the operation of the Spanish nuclear fleet and the value of the Annual Meeting for the city where it is held were stressed.

As part of the strategy, local authorities have been given adequate space, allowing for more excellent coverage of the Annual Meeting and for the main messages to be conveyed more widely and forcefully. We counted on the Mayor of Toledo, Carlos Velázquez, and the Deputy Mayor, Loreto Molina.

Work has also been intense in digital communication. Thanks to the activity on social networks during the 48th Annual Meeting of the SNE, the society's virtual community has been strengthened as all profiles have gained followers.

The Toledo edition has reaffirmed the full functionality of the communication team. These days, working together has contributed significantly to our collective growth, providing us with valuable experience. This strengthening positions us optimally to face future editions with confidence and efficiency. We will meet in Cordoba to continue building our path to success together!

BEST PRESENTATIONS

The central focus of the technical program of the Annual Meeting of the Spanish Nuclear Society is undoubtedly the nearly 300 papers that professionals and experts from the sector present during the meeting on relevant projects, outstanding scientific events, or recent advances in thematic areas related to the nuclear world.

At the closing session of the 48th Annual Meeting of the SNE, held from 4 to 6 October in Toledo, the Technical Committee of the Annual Meeting announced the best papers in each thematic area, the Poster session, and the Young session. You can consult the winning papers below:

QUALITY AND HUMAN FACTORS AREA

04-02 **ORGANIZACIÓN Y DIMENSIONAMIENTO PARA LA OPERACIÓN DE UN REACTOR AP1000TM**
Jesús Iglesias Morán (TECNATOM)

FUEL AREA

10-04 **PROGRESS IN MODELLING ADVANCED TECHNOLOGY FUELS: THE CIEMAT FOOTPRINT**
Pau Aragón Grabiel (CIEMAT)

DISMANTLING AND MANAGEMENT WASTE AREA

31-04 **EFECTO DE LA RELACIÓN LÍQUIDO/SÓLIDO EN LA INMOVILIZACIÓN DE LODOS EN CEMENTOS DE ESCORIA ACTIVADOS ALCALINAMENTE**
M. Jimena de Hita (Instituto de Ciencias de la Construcción Eduardo Torroja (CSIC))

38-02 **REDUCCIÓN DE VOLUMEN DE RESINAS DE INTERCAMBIO CATIÓNICO GASTADAS MEDIANTE TRATAMIENTO TÉRMICO**
Esther Irene Marugán Martín (CIEMAT)

COMMUNICATION AND TRAINING AREA

26-02 **REIMAGINING NUCLEAR ENERGY**
Olga Marcos Cortés (EAG (EA-GHESA))

ENGINEERING, DESIGN AND INNOVATION AREA

27-01 **TRANSITORIOS DE TEMPERATURA EN RECINTOS DE CENTRALES NUCLEARES EN CASO DE INDISPONIBILIDADES EN SISTEMAS DE VENTILACIÓN**
Jorge López Tanco (EAG (EA-GHESA))

27-07 **ESTIMACIÓN DEL MÍNIMO DNBR PARA LA VERIFICACIÓN DE LAS FORMAS AXIALES MEDIANTE TÉCNICAS DE MACHINE LEARNING**
Isabel Esteban Pascual (ENUSA Industrias Avanzadas, S.A, S.M.E.)

35-03 **EMPLEO DE LA NUBE DE PUNTOS PARA MODIFICACIONES DE DISEÑO EN CENTRALES NUCLEARES**
Vanesa Muñoz Portela (EAG (EA-GHESA))

NUCLEAR MEDICINE AND RADIOLOGICAL PROTECTION AREA

25-03 **ESTUDIO DE LA DISTRIBUCIÓN DE DOSIS EN TRATAMIENTOS CON LU-177 MEDIANTE SIMULACIÓN MONTECARLO**
Sandra Oliver Gil (Universidad Politécnica de Valencia (UPV))

OPERATION AND MAINTENANCE AREA

24-03 **SENSÓRICA PARA MONITORIZACIÓN EN DISTRIBUCIÓN ELÉCTRICA**
Carlos Molina Gabriel y Galán (SCHNEIDER ELECTRIC)

ADVANCED REACTORS AND NUCLEAR FUSION AREA

28-05 **CSS-N PROJECT SPECIFIC SOFTWARE PERFORMANCE PROCESS**
Ana María Hernández Almería (EAG (EA-GHESA))

NUCLEAR SAFETY AND LICENSING AREA

05-04 **GESTIÓN DE SECUENCIAS DE SBLOCA CON FALLO DEL HPIS EN REACTORES VVER-1000/V-320**
Elena Redondo Valero (Universidad Politécnica de Madrid (UPM))

43-04 **PROYECTO PULSAR: CAPACIDADES Y LIMITACIONES DE LOS SISTEMAS DE APOYO EN LA PREPARACIÓN Y RESPUESTA A LAS EMERGENCIAS NUCLEARES. EXPERIENCIA NACIONAL EN EL MARCO DEL PROYECTO DE INVESTIGACIÓN COORDINADO DE LA OIEA CRPJ15002**
Rafael Juan Caro Benito (TECNATOM)

THERMOHYDRAULICS AND NEUTRONICS: SIMULATION AND EXPERIMENTATION AREA

06-02 **PANELES VIRTUALES DE SALA DE CONTROL Y PANELES LOCALES MEDIANTE GLASSTOP Y KIOSKOS PARA FORMACIÓN**
Guillermo Vidal Lahera (TECNATOM)

22-01 **VALIDATION OF CONTAINMENTFOAM-9 USING THAI EXPERIMENTS ON HYDROGEN RECOMBINATION**
Luis Serra López (Universidad Politécnica de Madrid (UPM))

POSTER SESSION

46-13 **MONITORIZACIÓN DE LAS PSVS MODELO CROSBY 6M6 EN LOS PRESIONADORES DE CENTRALES TIPO WESTINGHOUSE**
José Miguel Gallego Montero (EAG (EA-GHESA))

YOUNG SESSION

14-01 **ANALYSIS OF THE LIQUID TRANSFER IN THE VERTICAL 3D CONNECTORS OF A MULTI-ZONE MODEL USING THE GOTHIC CODE**
Carlota Gabicagogeascoa Cuesta (Universidad Politécnica de Madrid (UPM))

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COMMERCIAL EXHIBITION

Iberdrola

IBERDROLA GENERACIÓN NUCLEAR, IN THE 48th ANNUAL MEETING OF THE SNE

Our greatest asset: Our nuclear professionals

Iberdrola Generación Nuclear has participated in the 48th Annual Meeting of the Spanish Nuclear Society (SNE) held in Toledo, where once again it had a large presence of professionals led by its director, Francisco López, and by the director of Cofrentes, Tomás Lozano, who in turn has also served for the first year as vice-president of the SNE.

As in previous editions, Iberdrola staff have actively participated in the Annual Meeting, chairing and coordinating some technical sessions, or as speakers on topics of interest to the sector.

Prior to the start of the Meeting, Iberdrola has collaborated with the Nuclear Youth Association by giving workshops aimed at students from educational centers in the province of Toledo, to disseminate aspects related to nuclear energy in general and, specifically, with the operation of the Cofrentes Nuclear Power Plant.

Throughout the Congress, Iberdrola Generación Nuclear has once again highlighted the value of its professionals and the leadership it exercises in the nuclear sector, achieving excellent operating results in its plants.

Iberdrola Generación Nuclear maintains a permanent commitment to nuclear technology to ensure a safe, reliable electricity supply that is absolutely respectful of the environment and is firmly committed socially and economically to the environments where its facilities are located.

The motto **“Our greatest asset: Our nuclear professionals”** that presided over the Iberdrola stand at this Congress is a clear reference to the talent and knowledge of its professionals, who are the company's greatest asset.

In this edition of the SNE Annual Meeting, EAG (Empresarios Agrupados – GHESA) showed off the synergies between its business areas and its talent, with representatives from its different brands and units. We actively participate in the technical sessions with nothing less than a record number of awards obtained to date by our company for best presentation, as well as in the poster session:

- 2 awards for best presentation in "Engineering, Design and Innovation": *Jorge López Tanco and Vanesa Muñoz Portela*
- Award for best presentation in "Advanced Reactors and Nuclear fusion": *Ana María Hernández Almería*
- Award for best presentation in "Communication and Training": *Olga Marcos Cortés*
- Poster: *José Miguel Gallego and César Alvarado*

Likewise, Luis Cerrada and Ana María Hernández collaborated in the "STEM" workshops, with the aim of bringing science closer to young people; and we participated in the "mentoring" workshop given by Women in Nuclear (WiN) led by Pilar López.

We also demonstrated to be a leading company in the "Nuclear Technology" workshops, thanks to the help of Manuel Sainz, David de Castro and Alejandro López, publicizing the latest innovations in nuclear technology through the projects in which EAG works.

To close this annual meeting, we participated in the monographic session: "The Spanish nuclear industry in the nuclear bet." During this session, Valentín Fernández represented EAG and spoke about "Reactors of the Future" as a specialist in the TMSR-500 molten salt reactor.

ENDESA, IN THE 48th ANNUAL MEETING OF THE SNE IN TOLEDO

ENDESA, a benchmark in the Iberian electricity market and the first nuclear operator in Spain, was represented at the 48th edition of the Annual Meeting of the Spanish Nuclear Society by a large group of professionals from the company's General Nuclear Directorate headed by its Nuclear General Director, Gonzalo Carbó.

The ENDESA team, in addition to participating in the Organizing Committee, chaired and coordinated various technical sessions in the areas of Decommissioning, Engineering, Nuclear Safety and Waste Management.

In addition, ENDESA was also present at the Congress trade exhibition through a stand in which it reiterated its commitment to nuclear energy as an essential generation source for the energy transition, due to its reliable, safe and sustainable energy characteristics.

ENDESA will be the host company of the next edition of the Annual Meeting to be held between October 7 and 11, 2024 in the city of Córdoba and where the 50th Anniversary of the SNE will be celebrated.

ENUSA IS ONCE AGAIN PRESENT IN THE ANNUAL MEETING OF THE SNE

A large delegation from Enusa, led by its president, Mariano Moreno, attended in Toledo the 48th Annual Meeting organized by the Spanish Nuclear Society (SNE), the most prominent meeting point in our country for experts, professionals, researchers, teachers and authorities related to energy and nuclear technology.

Once again, Enusa professionals traveled to the event headquarters to share their knowledge and experience with the rest of the attendees, either through their participation as speakers in the various technical and plenary sessions, or by collaborating in the development of these through the different possibilities of participation and management.

Also, as usual, Enusa was part of the commercial exhibition with its own corporate stand that was inaugurated by the company's president, Mariano Moreno, together with Emilio Mínguez, president of the SNE. Both were accompanied by representatives of the Enusa management and the Organizing Commission of the Annual Meeting.

The stand was the ideal setting to receive the congressmen, exchange impressions and strengthen relationships with various organizations in the sector.

Enusa's participation in the different sessions

The people at Enusa always take a very active part in the development of the technical sessions that are organized and this year could not be different. On this occasion, twelve specialists from the company participated as speakers, demonstrating once again their professionalism, talent, commitment and involvement in the various areas of knowledge. These values were distinguished in a special way with the recognition of the Best Presentation to Isabel Esteban Pascual. Her exhibition **"Estimation of the minimum DNBR for the verification of axial shapes using machine learning techniques"**, which was co-authored by Rubén Matías Martínez, won this distinction in the knowledge area **"Engineering, design and innovation"**.

In addition, the head of Supplies and Business Development of the Uranium Supply Directorate, Lourdes Guzmán Gómez-Sellés, participated in the **plenary session "The Spanish nuclear bet"**. In it, she highlighted the relevance of nuclear fuel and the need for diversification for the entire chain to work.

The event was once again an excellent opportunity for all agents involved in the nuclear sector to debate and share experiences, projects and knowledge with the common objective of building the future of a sector that, without a doubt, is in the hands of great professionals. that keep their respective organizations at the forefront.

GDES has participated, once again, in the 48th Annual Meeting of the Spanish Nuclear Society in which more than 700 professionals from the nuclear sector at a national and international level participated. Three days in which from GDES, in addition to having the stand with the latest innovations, we have presented works, presentations and high-profile technical projects in engineering, R&D&I, quality and nuclear medicine.

The presentations were the following: "Mobile drilling units for action in emergency situations" by the Innovation department; "Safety II in the nuclear sector: analysis of results after the first year of implementation", from the Department of Quality, Safety and CSR (QHSE/RSE), and "Technical support in the national implementation of the Inveat Plan in the field of nuclear medicine", Radiological Protection (UTPR). At our stand, the services and milestones in engineering and innovation have been shown and, in addition, our geographical and sectoral diversification has been represented.

From GDES we were also present in the space dedicated to the commercial exhibition to present one of our technological advances: the VIGIA system, a software system developed by the innovation department for the control and monitoring in FME (Foreign Material Exclusion) zones using technology. wireless.

Naturgy

Naturgy has been the host company of the 48th Annual Meeting of the Spanish Nuclear Society in Toledo, presiding over its Organizing Committee.

At this Annual Meeting, Naturgy has participated very actively in the technical program, participating as host in the opening session. In addition, he has presented several technical presentations, chaired and coordinated several tables, highlighting his presence in the session titled “The strategic value of nuclear energy for Spain.”

As in previous years, Naturgy has shown its commitment to safe and efficient energy generation. The motto selected for the 48th Annual Meeting was “The energy that unites us 1843-2023”, coinciding with the 180th anniversary of the company and the 5 years of the brand.

Naturgy has reaffirmed itself with its business model, focused on the creation of value and committed to the sustainable development of society. A model that guarantees the supply of competitive, safe energy with maximum respect for the environment.

RINGO VALVULAS

Once again, Ringo Válvulas has participated in the Annual Meeting of the Spanish Nuclear Society, held in the historic city of Toledo.

Following tradition, Ringo actively joined the exhibition with a stand, providing a favorable space to interact with its clients within the Spanish nuclear sector. This event has given you the valuable opportunity to obtain up-to-date information on market progress, with the firm objective of remaining a leading supplier of nuclear valves that meets the highest engineering and quality standards.

Ringo's commitment at this annual meeting has not only focused on showing its products and solutions for the industry, but also on establishing and strengthening relationships with its clients, understanding their needs and contributing to the continuous advancement of the nuclear industry in Spain.

During 2023, Ringo has continued to supply relevant valves to Spanish Nuclear Power Plants and, internationally, it is worth highlighting the manufacturing of the prototype of the steam discharge control valve to the condenser for the Akuyyu nuclear power plant in Turkey, the supply of around 150 valves and spare parts for the modernization project of the Atucha nuclear power plant in Argentina in collaboration with Tecnatom, as well as some supplies of nuclear class I valves with N stamp (balloon bellows and check) for the market from North America, where we are also currently manufacturing feedwater isolation gate valves (MIFV) for a plant in the USA.

Our participation in the 48th Annual Meeting of the SNE held in Toledo has been a reflection of our leadership and commitment to innovation. In this edition, we share a stand with Westinghouse; Our joint presence at the event symbolizes a new era of synergies and opportunities in the field of nuclear energy.

In this edition we present 21 presentations, highlighting areas such as the operation of advanced reactors, training through simulation and preparation for nuclear emergencies. Three of them have obtained recognition for best presentations in their respective sessions. Specifically, the awards have been obtained by Jesús Iglesias Morán, Guillermo Vidal Lahera and Rafael Juan Caro Benito, underlining the quality and relevance of our work. These awards demonstrate Tecnatom's ability to lead and provide innovative solutions to the sector, keeping us at the forefront of the nuclear industry.

Additionally, Manuel Fernández Ordoñez moderated one of the plenary sessions, focused on the new European Energy Paradigm. In the social framework, Tecnatom has been the sponsor of the cultural event that opened the doors of the Toledo Cathedral to us.

Westinghouse had the opportunity to participate as a sponsor in the most important nuclear energy event in Spain held in Toledo (October 2-6, 2023).

On this occasion we had the presence of Jacques Besnainou, executive vice president of global markets and commercial director, as a speaker on “The European nuclear bet”, and also with other participants who presented 17 presentations focused on dismantling and waste management, advanced reactors and nuclear fusion, nuclear safety and operations licenses, engineering, design and innovation, and digital solutions for maintenance optimization.

Patricia Cuadrado, one of the leaders of the innovation team at Westinghouse and principal project manager, completed her 6th year as president of the SNE technical committee.

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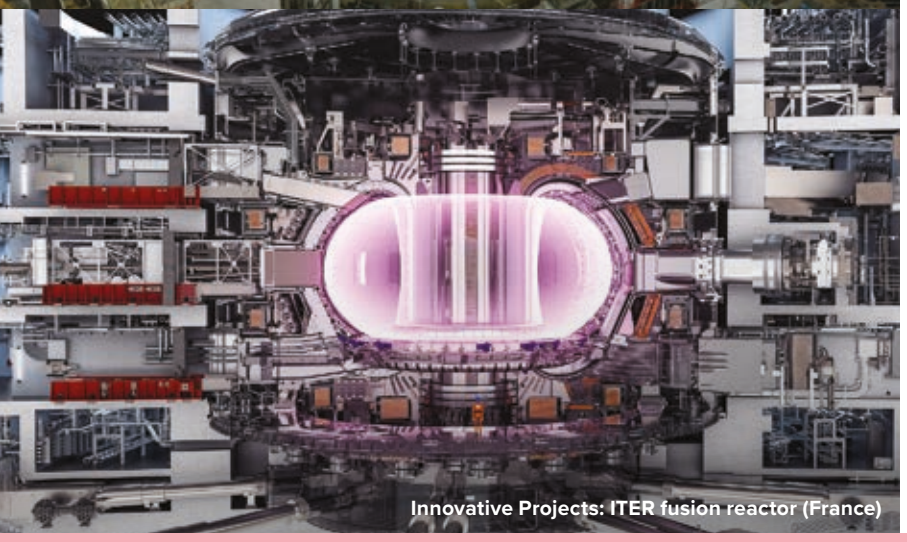

Innovative Projects: ITER fusion reactor (France)

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