

Javier DIES

COUNCILOR NUCLEAR SAFETY COUNCIL

Training and research are key in the nuclear field. To analyze these factors and their role in the Spanish regulatory body, Nuclear España interviews Javier Dies, who was appointed councilor in October 2015 and whose experience serves to support these activities in the Nuclear Safety Council.

INTEREST IN NUCLEAR ENGINEERING

Training is key to all areas of science and technology. However, Javier Dies says that since about 15 years ago, it has been observed that "because nuclear energy is a controversial issue, there are less and less European students in nuclear disciplines".

In countries such as Germany, which has decided to phase out nuclear power, he acknowledges that it is very hard to find both students and professors who are still interested in this field. "On the contrary, in those countries with operating nuclear power plants that are reportedly going to operate for up to 60 or 80 years if they meet the safety conditions and where new third-generation plants are being built, there are numerous brilliant students who are enthusiastic about these disciplines. The clearest case is Finland, where the nuclear education programs are full of students".

During his 30 years as nuclear engineering professor, Javier Dies has promoted several initiatives to boost and maintain the interest of young people in the fields of education related to nuclear technology.

One of the most well known of these initiatives is a book on reactors. "I wrote it for the sole purpose of making appealing material available to students. However, the heads of the IAEA and the ENEN network (see inset I) leaned about this book and asked me for permission to make copies". The book is now translated to English, French, Russian and Chinese and the Arabic version is about to be complet-

ed, and it has been distributed by the IAEA to 90 countries.

Professor Dies also installed a simulator of a nuclear reactor and promoted the creation of chairs supported by the Nuclear Safety Council. Specifically, the chair in Barcelona took an initiative that ended up being very well received by the students: scholarships amounting to 2,000 EUR to complete a graduation project. "All these actions have served to increase the number of graduates in recent years, which is now sufficient to satisfy the existing demand".

However, he thinks that to keep moving forward along these lines, different kinds of activities should still be considered. "It is necessary to have good professors in the universities that provide nuclear engineering education, with excellent teaching laboratories and good educational materials. Furthermore, the training should focus as far as possible on the needs of the end users".

Another area that must be promoted, according to Dies' experience, is the connection between job offers and the demand of students. "The recent graduates in these disciplines should receive information on the job offers that come up in the field. In the department we have seen that on many occasions there are interesting, specific offers, but the students with the most suitable training do not know about them and do not submit applications; as a result, the companies end up recruiting professionals with an education that has little to do with

Javier Dies has a degree in industrial engineering from the Polytechnic University of Catalonia and is professor of Nuclear Engineering at this University, where he has coordinated the nuclear engineering research group.

From 1995 to 2002, he was deputy director of the Industrial Engineering School of Barcelona. Between 2004 and 2005, he was secretary of the Nuclear Safety Argos Chair, sponsored by the Nuclear Safety Council.

He was vice president of the European Nuclear Education Network (ENEN) from 2013 until March of this year. He has taken part in and been an evaluator for various R&D projects in Spain and the European Community in the field of nuclear engineering, and his most recent area of research is nuclear safety based on Probabilistic Safety Assessments.

Dies has authored more than 240 publications on nuclear engineering and has directed 11 doctoral theses on the subject matter. He has written numerous articles in international journals and is author of the educational module "Multimedia of nuclear reactor physics", distributed to more than 90 countries and translated to six languages.

He has participated in 12 missions of the International Atomic Energy Agency (IAEA) to various countries such as Argentina, Austria, China, United States and Vietnam.

In October 2015, he was appointed Councilor of the Nuclear Safety Council.



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the nuclear field and who then have to be given long, expensive training programs".

To turn this situation around and be more effective in the hiring of professionals, Dies suggests "that the Spanish Nuclear Society have a specialized employment portal where nuclear engineers can enter their CVs and the companies can post job offers". In this respect, he thinks that the talent recruitment initiative promoted by the SNE and Nuclear Youth is of particular interest.

Along these same lines, he says there is a specialized job fair that is held in Brussels where sector companies are present and which can be attended by all the students of nuclear disciplines in Europe to have interviews with these companies. "The SNE Annu-

al Meeting would be an ideal venue for an event of this sort", says Dies.

RESEARCH

The University is one of the points of reference in research. In the Spanish universities, the combination of teaching and research activities is very enriching. Furthermore, "focusing them both on the needs of the end users leads to better results", says Dies.

The crisis has not caused the nuclear sector to decline but in the universities it has had an influence on this field, especially because the vacancies left by retiring professors are not being filled. "The professor replacement rate was very low for many years, and now it is only 50 percent.

Therefore, measures must be taken to ensure that the teaching staff in nuclear engineering is maintained in Spain in spite of retirements".

In Dies' opinion, on the road to excellence in the universities, the measures that must be taken include attracting numerous and brilliant students to the disciplines related to nuclear engineering and radiological protection. "The next step is ensure that some of them choose to stay on as professors for their professional career and then that the necessary number of posts are maintained for these professors".

In addition, "a nuclear engineering research policy must be defined that is stable over time and not subject to the shifting political climate", says Dies.

THE ACTIVITIES OF THE REGULATORY BODY

The CSN Plenary is a collegial, multidisciplinary body "and multidisciplinary teams are always enriching", says the councilor. As part of the Plenary activities, Javier Dies has been entrusted with representing Spain for the next five years on the Committee of Safety Standards of the IAEA (International Atomic Energy Agency), which is in charge of approving all the safety guidelines developed by the Vienna-based Agency.

He also coordinates the Integrated Regulatory Review Service (IRRS) of the CSN which is promoted by the IAEA and takes place every ten years. Some 22 international experts participate in these missions, which visit the CSN and some of the regulated facilities for two weeks. The next mission is planned for October 2018. "It is without a doubt a great opportunity to improve the institution", says the councilor.

On the other hand, Javier Dies attaches special importance to the CSN's relations with international organizations. "The Council participates in numerous international groups and institutions such as WENRA, INRA, ENSREG, CSS-IAEA and the Ibero-American Forum of Radiation and Nuclear Safety Regulatory Agencies, among others".

In this respect, he says that international relations are a positive, enriching activity "but that one has to know

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how to strike a balance between participating in international activities and seeing to the needs of the regulatory processes in Spain so that they are as agile as possible, thus guaranteeing their quality", he concludes.

THE NUCLEAR SECTOR

After the accident that occurred in the Fukushima nuclear power plant as a result of the tsunami that struck Japan, the plants have implemented various measures to improve safety.

To better understand the implementation of these improvements, Javier Dies has begun a series of visits to the Spanish nuclear power plants. The first ones have been to Almaraz and Trillo.

"During this visit I was able to verify that a very significant portion of the measures stemming from Fukushima have been implemented and I be-

lieve that, if we performed a probabilistic safety analysis now – for instance at the Almaraz nuclear power plant – and we calculated the core damage frequency, the fuel damage frequency in the spent fuel pool and the expected frequency of a significant early release, we would see that these three parameters have decreased significantly compared to their value during the first year of plant operation. Therefore, that is a very objective way of saying that the nuclear power plant is safer now than at the beginning of operation. And this reasoning can be applied to all the Spanish nuclear power plants", says Dies.



ENEN. A Training Network

The main purpose of ENEN, the European Nuclear Education Network (ENEN), is to help secure the necessary human resources for maintaining and developing nuclear technology in Europe in fields such as energy production and medical applications.

The network is formed by 64 institutions from 18 countries that are involved in nuclear education and training, and it also has collaboration agreements with international bodies such as the IAEA, the European Nuclear Society and the European Commission and research entities in South Africa, Russia, Japan, Ukraine and Canada.

Javier Dies is very familiar with ENEN, as he was its vice-chairman and was about to take over as chairman when he was appointed CSN councilor. He summarizes its objectives in four points:

- Promote and broaden collaboration in nuclear education and training between students, researchers and professors
- Assure the quality of education and training in the nuclear field
- Make it more appealing for students, researchers and professors to enroll in the nuclear field
- Promote continuing education and profession-

al development at the postgraduate level.

In the councilor's opinion, two activities are essentially needed to achieve these objectives. The first is to support the universities and promote an exchange of students, professors, educational materials and information. "In addition, bridges must be established between universities and end users, e.g. the industry, regulatory bodies and research centers".

Along these lines, ENEN has developed numerous projects financed by the European Commission, including the recently launched project Advanced Networking for Nuclear Education and Training and Transfer of Expertise (ANNETTE). This project has a budget of around 2.5 million EUR and is being implemented by ENEN with its members. Another important initiative is the European Science Master in Nuclear Engineering.

Spain is very active in ENEN, in which the polytechnic universities of Madrid, Valencia and Catalonia participate, as well as the UNED, TECNATOM and CIEMAT.



LONG-TERM OPERATION

To analyze the viability of extending the operating life of the Spanish nuclear power plants beyond the originally planned period of 40 years, the best thing, in councilor Dies' opinion, is to know what the situation is elsewhere in the world.

In accordance with the data provided by the World Nuclear Association (www.world-nuclear.org/info/reactors.html), the current situation is as follows:

- 440 nuclear power plants in operation
- 65 nuclear power plants under construction
- 173 nuclear power plants purchased or planned
- 337 nuclear power plants proposed

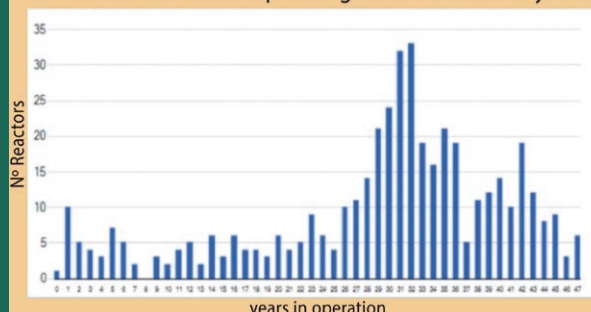
Another variable to be considered is the long-term operation of the nuclear fleet. In the United States, there are already 83 nuclear power plants that have obtained an operating license up to 60 years and 11 more plants that are in the process of being assessed by the regulatory body – the Nuclear Regulatory Commission (NRC).

Furthermore, countries such as Switzerland, Sweden, Russia, Holland, Japan, Finland, Canada and Belgium also have nuclear power plants with operating licenses approved for beyond 40 years.

To these data Javier Dies adds data obtained from the Regulatory Information Conference that was organized by the NRC and took place in March 2016 in Washington. There was a technical session in this meeting devoted to license renewal in which a representative of the U.S. regulatory body, a representative of the nuclear

How many years have the world's nuclear reactors been operation?

There are 442 nuclear reactors in the world
88 reactors have been operating for more than 40 years



industry and a representative of government (Department of Energy – DOE) explained their positions regarding regulation of the operation of nuclear power plants when they reach 60 years of operation in order to reach 80 years. This session can be summarized as follows:

1. By 2017, the NRC will have completed the standards that will regulate the license renewal process for 60 to 80 year periods.
2. By 2019, a U.S. nuclear power plant will submit the documentation to obtain an extension of the operating license from 60 to 80 years.
3. The NRC commits to issuing a decision on that first application by 2021-2022.

CURRENT NEWS

The two most important issues on which the sector is focused right now are: renewed operation of the Santa Maria de Garoña NPP and the ATC project.

With regard to Garoña, Javier Dies says that on February 3, 2016, the CSN plenary session approved five points in relation to the plant's operating

license. "We are waiting for Nuclenor to complete the required works, which mostly involve the containment isolation, safety-related equipment protection against the collapse of the turbine building roof after a fire and modification of the electrical system independence", says Dies. In parallel, the CSN technicians continue to

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Visit to Trillo Npp.

work on the remaining aspects of the licensing process.

As for the ATC, the councilor says that the CSN plenary session in 2006 issued a favorable report on the generic design of the ATC and last year it granted, with conditions, the site license. Nevertheless, the CSN technicians are still working on this matter.

However, he stresses that "the ATC is a State-controlled project and the process for its execution was approved in the Congress of Deputies, almost unanimously except for IU. The CSN is in charge of overseeing nuclear safety in Spain, and the ATC would represent a significant safety improvement if compared to the confinement of the spent fuel inside the Spanish nuclear power plants, and it would be an improvement to the safety of all Spanish citizens and to environmental protection".