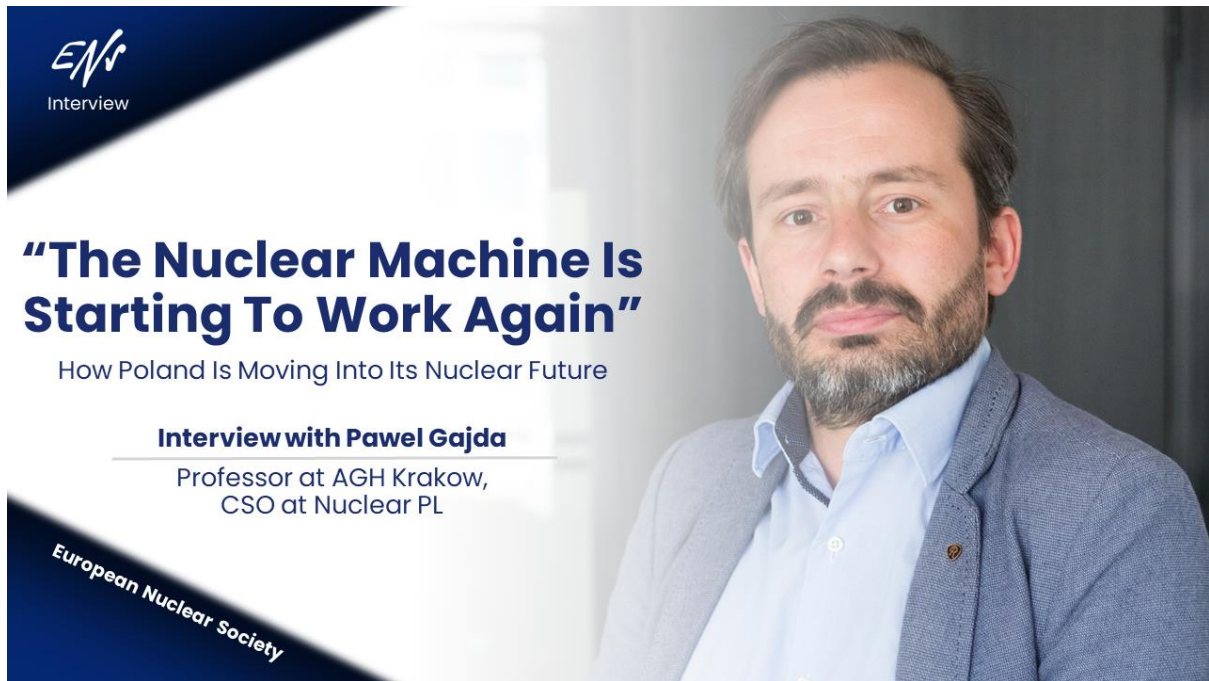


“The Nuclear Machine Is Starting To Work Again”

How Poland Is Moving Into Its Nuclear Future



Nuclear energy plays a key role in decarbonising economies and supporting energy transition. In the last years, we saw a remarkable shift in the perception of nuclear as part of the solutions to climate change, and a rising number of countries are supporting new nuclear projects. Among them Poland, confidently entering the nuclear power industry with a number of plans in works on large-scale NPPs and on SMRs. How is the country coping with the preliminary stages of such an ambitious programme?

To conclude our cycle of interviews dedicated to the EU Year of Skills – ending in May – we explore the country’s needs, strategies and capabilities together with **Pawel Gajda**, Assistant Professor at AGH University of Science and Technology in Krakow, and Chief Scientific Officer at Nuclear PL, a recently established company providing specialised consulting services in the nuclear energy industry.

- *Let's first talk about which programme Poland has. **What are its goals? What do you expect in the coming years?***

We can even say that we actually have **multiple programmes**. The official **Polish Government programme states that we shall build 2 nuclear power plants, with 3 units each**. So, we talk about deploying **6 to 9 GW in total**. For the first site, preparatory works are quite advanced, because we already have the environmental permit and a supplier, namely Westinghouse Electric Company, with its AP1000 reactors.

Among other plans, there is the one supported by **the joint venture** between the private-owned energy company ZE PAK and the state-owned group PGE (Polska Grupa Energetyczna) **with KHNP** (Korea Hydro & Nuclear Power) **for a two-unit nuclear power plant at Patnow site**, which currently houses a 1,674 MW coal-fired plant.

Then there are several companies that are **looking for SMR projects**. If we talk about signed MoUs, we could count at least six or seven of them, but I would say that only two of those projects are now undergoing official preparatory stages.

At this point, it is really difficult to say how many of these plans will actually be carried out, because, obviously, it is impossible to pursue eight parallel nuclear programmes. A mix between the large-scale reactors and one, maybe two, SMR based programmes would be more realistic.

Even in these early phases, **there is a largely shared optimism about nuclear energy and projects**. We can see a **rising interest in nuclear from the industry**, and especially from those energy-intensive or hard-to-abate sectors that really look at nuclear as an alternative source of energy supply, but also **from investors** and **from all those companies that could have a role in the future nuclear supply chain**.

What is important at this stage is to **keep plans and efforts as close to reality as possible**. The remaining uncertainties are not about the actual advances in the programmes, but rather about their sizes, in terms of total installed power and consequent needs.

- *What is the current **situation in Poland regarding the nuclear workforce?***

Talking about human resources in nuclear, Poland is not a totally newcomer country, because **we have a long nuclear tradition in the research sector**, and **we also had a nuclear power programme in the past**, but it was cancelled in 1990. So, there is already some know-how and competencies that are related to those operations and plans. Moreover, **some Polish companies have also participated in nuclear construction projects in other European countries**, as well as in onsite maintenance.

However, I would say that **we are experiencing very similar issues to the prominent nuclear countries**, in particular problems linked to the **generation gap**. We had a lot of specialists who retired during the last 10-15 years, and several others are about to retire. The gap has also increased due to the cancellation of the aforementioned Żarnowiec nuclear project in the early '90s, and the consequent, massive decline of students' interest in nuclear science and engineering. **This trend is quite common with those of other European countries**, which stopped building new nuclear power plants in the last decades. When nuclear started being reconsidered in Poland about 15 years ago, a younger generation of students pursued studies in the nuclear field, but it was still a rather small group.

What we need to do now is **to expand our human resources quite rapidly in this area** and we are actively looking at how to do it.

- ***What are the main strategies and their targets to achieve this goal?***

Our first target is universities. Only two universities, the **AGH University of Krakow** and the **Warsaw University of Technology** managed to **assure the continuity of education and research in nuclear energy throughout the years**. Other academia had research groups in the past, but as I said, most of their members retired. However, these **institutions are looking at how to get back on track**. Of course, **many universities have other excellent research groups and specialisations that are needed for nuclear power programmes**, e.g. mechanical, thermal or electrical engineering. It is positive to have this talent pool, but now the question is - *how should we "nuclearise" this potential?*

The nuclear revival is encouraging universities to restart courses and programmes, but the **lack of sufficient staff and specialists** and the **uncertainties on the actual demand for nuclear engineers** are the two main obstacles. That is why the "nuclearisation", **the reskilling of all those other related fields that have a role in a nuclear programme is so important**. This is what we already started doing with **several postgraduate programmes**, which today mostly involve people who are already working in industry or companies especially interested in having a role in the nuclear supply chain.

Postgraduate opportunities, of course, are not the only way. We are currently looking at offering non-nuclear students the possibility to enrol to **additional elective courses in nuclear**, to be already "nuclearised" when they graduate. As previously said, we do not only need nuclear engineering for every position in the programmes. A nuclear project requires so many different skills, capacities, and expertise in so many fields that **reskilling people and students is the best approach to quite rapidly, effectively expand the workforce** for the nuclear industry we are creating right now.

- *In our previous interviews, we saw that a comprehensive system, which effectively deals with new nuclear projects and innovation, must actively include research, training and education. **What are their roles and the challenges they could face?***

As it is important to find **a good balance between reskilled people and nuclear engineers**, the same is true **between industry and research needs**. Indeed, due to the need for qualified people and the competition between different industry stakeholders to attract them, universities and researchers are losing their appeal. **We can't risk "cannibalising" all our research and education areas** for the sake of developing the industry, because then there will be no one able to train the next generations or to develop new solutions for the industry itself. With that, we are linking back to the lack of specialists mentioned before, but we are looking at how to avoid it.

Research has a key role. Educating people for the industry is one thing, but **if you want to go beyond the know-how**, explore the *know-why*, and train future teachers able to educate the next generations - **all this has to be done through research**. We are then looking to establish **a research programme complementary to the nuclear programme**, so as to serve cross-cutting purposes.

One of them is **to support the cooperation with the industry, using research to develop solutions and technologies**. This collaboration would be mutually beneficial, to acquire competencies on both sides, for the industrial sector and for the participating research institutes and universities. In this way, we are looking for having **a single, but comprehensive programme devoted to that and covering as many topics of the national plan as possible**. So far, we have been doing research on nuclear power, but we had mainly separated projects, scattered here and there and covering only parts of the topics' diversity which characterises a nuclear programme.

We are also trying **to revitalise some research activities in all fields related to nuclear engineering**, because for nuclear programmes you need, for example, materials science or cybersecurity research. It is then important to redirect towards nuclear applications some of the works that specialists in these sectors are doing.

Regarding education, not only the above-mentioned universities are fundamental, but **working at the high school level is also important**, despite it still being quite an unanswered area. **Technical high schools usually educate** and train mechanics, electricians, welders, and **all that range of professionals that are fundamental in every construction project**. It is then important to "nuclearise" these education paths as well, to develop and add some more skills strictly related to nuclear.

We started looking at how to approach this topic and which institutions must be involved, because **a large cooperation**, also with assigned Ministries, **is required**. We are then working on a roadmap and to pointing out the better direction.

The **Polish Ministry of Climate and Environment is particularly involved in these reskilling processes**, dedicating specific attention **to training courses for companies**, especially for those new-to-nuclear, which want to participate in the construction phase. The Ministry

already listed companies which can apply, as well as it's preparing a catalogue of those with nuclear skills, so as **to facilitate the cross-sectoral cooperation**. They are still at the very early stages, and as for education, also the industry feels the uncertainty around the needs of the workforce. How many people do they need? Hard to say, before some contracts are finalised. But contracts will follow skills and capabilities ... so, it looks like a vicious cycle, but companies today are showing their willingness to take this opportunity, to start this process because of the chance represented by nuclear.

- ***What do you think is a determining parameter in choosing a nuclear career today?***

What is most important is to **make working in nuclear appealing**. And to do so, **we need to have something to offer to people**, young professionals and students to be willing to join the sector. We need to offer a future, an industry that in 30, 40 years will still be there. That could be a decisive advantage for the sector.

We saw in the past the mismatch between the real interest that students had in nuclear, and the uncertainty given by pending plans. The same was happening for the industry. There were no clear perspectives and no stable career paths, so they both opted for alternatives. In the last two years, **we saw that the trend is changing again, the interest in nuclear is back again, and today it is real**.

As previously said, the generation gap could have an impact in the coming years, especially in academia, but **we are actively identifying all the needs, as well as the competencies we have**. So, **promptly filling the gaps and enhancing international cooperation at every level** – universities, industry, and research – **is vital to succeed**.

I would compare all this system, the human resources and their development, to a machinery with multiple components. We have some of them, some of them are missing, and others need to be refurbished. There is still a lot of "maintenance" to do, but the machine is starting to work again. The global situation is developing, and it has remarkably improved in the last three years.

- *Several surveys show that, beyond good job conditions, youth is looking for jobs which also have an impact on society, a social added value. **Do you think the role of nuclear energy in mitigating climate change could be an additional factor?***

Definitely yes. Looking at how the debate around climate change – and nuclear energy – evolved in the last five years, from COP24 in Katowice to the last one in Dubai, it seems quite clear that **energy transition plays an important role**, and **nuclear has finally become more and more visible**.

Youth has been fundamental in this process, and today we see the **massive participation of young people, professionals and students, at every educational level**. It's important to join the discussion and engage with them. And to plant the seeds of interest in those topics. In the past, we already organised here in Poland some activities aiming to popularise science, in topics of energy transition, nuclear and climate change, like more than 1,500 lessons at primary and high schools.

Overall, **it's great to see Polish youth generally very positive towards nuclear energy**. They really see it as part of the solutions to climate change and as an essential source for the country's future energy mix.

This factor, together with **good career opportunities**, a **stable work environment**, and job offers that meet youth's needs in terms of **work-life balance and flexibility**, contributes to attracting and retaining talents to the sector.

- *Concluding our interview, I think your personal path is in some way linked to what we discussed so far. Belonging to the generation which saw the cancellation of the Żarnowiec project, **what made you choose a career in nuclear then?***

I've always had a clear interest in science, specifically in two of the most fascinating things that science made possible: space exploration ... and splitting atoms! So, while dreaming of being an astronaut, I've always been attracted by all advanced technologies. This interest in technology made me choose power engineering at the university, but at the same time it was a sensible option.

Then I remember when we had to choose our specialisation for the master's degree there was the "nuclear energy option", and my colleagues told me: "Who would go for nuclear if not you?!". Well, they got the point. What's one of the most advanced technologies if not nuclear? So, to conclude my university path, I went back to my first interests. Or at least first realistic ones if we disregard becoming an astronaut since, as a popular mem claims "Poland cannot into space".

But that's one part of the story. The other part are all the good professors at any education level that made me so passionate about science and technology. I think that **the human factor in education has an important role, sometimes underestimated, and it can impact the students' choices from primary school to university**.