

# The Future of Nuclear Energy

## WNA Vision for Next Decades

Interview with World Nuclear Association Director General  
Sama Bilbao y Leon



**World Nuclear Association (WNA)** is the international organization that represents the global nuclear industry. Its mission is to promote a wider understanding of nuclear energy among key international influencers by producing authoritative information, developing common industry positions, and contributing to the energy debate. The European Nuclear Society (ENS) and WNA have recently signed a [Memorandum of Understanding \(MoU\) to support the cooperation](#) in several areas, like research, advocacy, education and training, and knowledge management in the field of nuclear science and technology. ENS interviewed **WNA Director General Sama Bilbao y Leon** to learn more about these topics, crucial for the future of the nuclear sector.

- ***What is your vision for nuclear industry in the next 30 years? What is achievable and what has to be changed?***

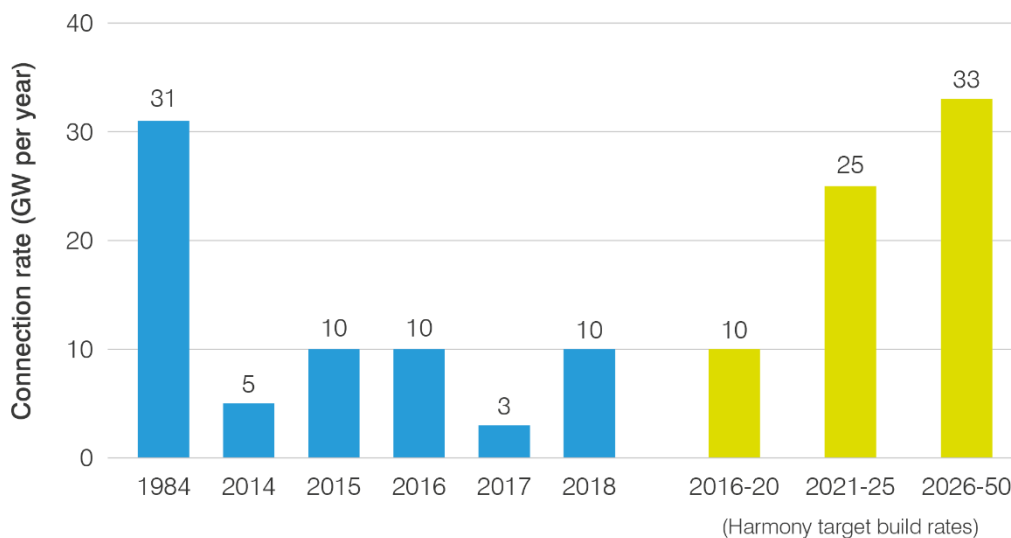
My vision for the nuclear industry is tied deeply to my hopes for the future. At this time, my first hopes are for an end to the terrible loss of life and in Ukraine and that peace is restored soon.

Across an array of challenges facing the world at the present time, the current drama unfolding in Ukraine notwithstanding, there are two that stand out. The first is to **protect our environment**, to ensure that this fragile planet on which we sail through space can continue to be a home for humanity. The second is **to provide everyone on Earth with the energy they need to live** their lives to the full.

Our association led the global nuclear industry in setting the **Harmony goal for nuclear generation** to be supplying at least 25% of the world's electricity before 2050. Now let's be clear, we are absolutely not on track to achieve that goal. But then we are also absolutely not on track as a global community to achieve net zero by the middle of this century.



### Nuclear Target Build Rates



*The Harmony goal is to build 1000 GWe of new nuclear capacity by 2050. It is an ambitious programme, but the rate at which new reactors will have to be built is no higher than what has been historically achieved (World Nuclear Association)*

While governments have set increasingly challenging emissions reduction goals, they have not taken the action required to achieve them. Every year that passes the rate of reduction required has got greater and greater. Within that context, the Harmony goal remains a practical and essential way forward.

The action taken by governments to **support and accelerate the deployment of nuclear energy technologies** will be a measure of **the seriousness of their commitment to meeting the net zero targets** to which they have committed themselves.

We in the nuclear industry also have a duty to make every effort to ensure that the huge potential that nuclear technologies have, to help make possible that better future, are delivered to the full.

If we can do all that, then in 30 years nuclear energy will be at the heart of a clean energy system that delivers a better quality of life for all.

- ***What are the main challenges that nuclear industry will have to face in the near future?***

Firstly, we must recognise the impacts of the tragic events in Ukraine. When faced with the global existential threat of climate change it is vital that the world can come together to meet that challenge as one.

The main challenges that the nuclear industry was facing ahead of recent geopolitical developments have not changed, and will still need to be addressed.

We need **effective and efficient regulation**. There needs to be greater harmonisation of regulatory approaches to allow nuclear technologies to be deployed at the scale required, while preserving the high standards to which nuclear is held today.

We need a level-playing field for nuclear. That means not only should nuclear energy be treated equally with other clean energy sources in legislation, but that governments, energy institutions and other expert bodies **include nuclear energy fully in their visions of the future**.

We also need access to affordable financing, so that once we have that commitment to nuclear in policy there are funds available to deliver on that commitment.

And we as an industry need to be ready to grow, to have the ambition to deliver the accelerated rate of new build required, and to expand our front and back-end fuel cycle services to support that expanded capacity.

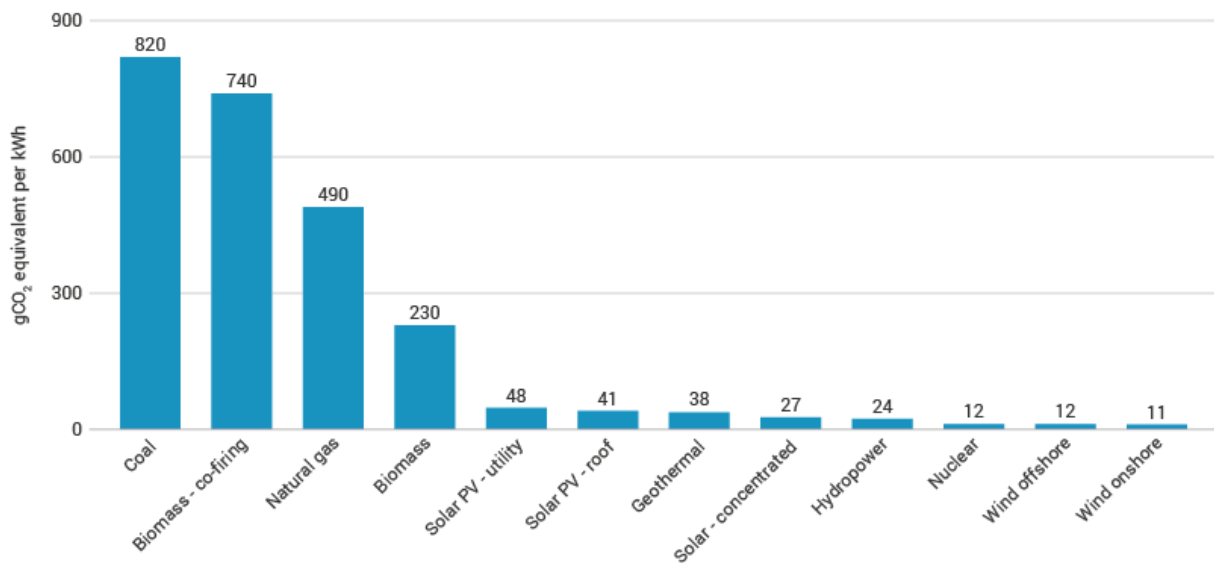
- *WNA, like ENS, supported the inclusion of nuclear energy in the EU Taxonomy Complementary Delegated Act. However, EU Commission still sees nuclear as "transitional" energy. **Is it actually like that? Could nuclear innovation ensure, not only in Europe, a more than "transitional" role to this source of energy?***

**Nuclear is far more than a transitional source.** The nuclear reactors that are under construction and coming online in the near future in Europe are likely to be operating through into the 22nd century, long after the current construction of other low carbon technologies, such as wind and solar, have been dismantled.

It is right to think of **the current generation of nuclear reactors in operation Europe as having a role in facilitating the transition to a clean energy future**. With the potential for

long term operations, many of the reactors generating today could continue to do so for much of the period towards 2050 or even beyond.

Nuclear fission does have a very important role to play in allowing nuclear to make an even greater contribution to net zero. One area of particular area of interest is small modular reactors (SMRs). The smaller size of these reactors facilitates the process of securing capital to invest in their construction. but perhaps more importantly, the greater range of applications for new SMR designs could enable nuclear technology to decarbonize more difficult areas, particularly those requiring high temperature process heat.



Average life-cycle carbon dioxide-equivalent emissions for different electricity generators  
(Source: IPCC)

- ***In your opinion, how should nuclear research and industry work closer, in order to support innovation and achieve great results?***

I passionately believe that scientists need to be given the freedom to discover and innovate. At the same time, I think the industry can help focus the goals scientists set themselves by working with research institutes to highlight the key challenges facing industry that innovation could help address.

- **What do you see as break-through technologies which might change the application of nuclear power (e.g. hydrogen, district heating, SMRs, fusion...)?**

Just as nuclear energy provides the base load to provide security of supply to electricity generation, I'm sure that large reactors will continue to be the foundation of nuclear technology's contribution to a clean energy future for a long time to come.

But without doubt there are many exciting technologies on the horizon that have the potential to massively **increase the contribution that nuclear technology can make to achieving our sustainable development and energy supply goals.**

**District heating** is already a reality, being carried out by dozens of reactors around the world. The **first SMRs are under construction**, and we have seen fantastic developments in this area over the last few years. There is such a broad range of different reactor designs encapsulated by the term 'SMR' come on cross we really should be grouping them by application.

Many people see **hydrogen as an important energy carrier of the future** and there are several ways in which nuclear technology can be used to produce it. I think the potential of integrating electricity supply with hydrogen production to help eliminate the need for fossil fuels to provide peaking services is very exciting.

As **for fusion, the potential is huge.** However, the contrast between the first fission reactors and the first fusion reactors is stark. We went from the first experiments in a squash court in Chicago to commercial scale reactors in less than 20 years. Although the speed of development is accelerating, and there are quite a few exciting fusion concepts moving forward fast, commercial fusion reactors are unlikely to be widely deployed ahead of 2050. Therefore, we must be ready to achieve net zero using all proven technologies, while at the same time investing in fusion so that we can continue to make technological progress and provide the world with more options to supply more energy and help with global development further into the future.

- *Education & Training are more important than ever in a fast-changing world. "A stronger collaboration between industry and academia is needed for dual education", ENS Past President Prof. Emilio Minguez said at the last ENS NESTet Conference. **How could the collaboration between academia and industry be improved to meet next generations' expectations and to increase the attractiveness of the sector?***

One of the ways that industry can **increase the attractiveness of the sector is to show that it respects and shares the values of the next generation.** In this sense, I think we are making significant progress not only in aligning values but also in **communicating with younger audiences.** I have seen in recent times quite a few younger professionals flocking towards the

nuclear sector because of their strong interest in making a difference in the world with their work and their career.



*Sama Bilbao y Leon moderating the panel "Understanding the next generation of talent" at the last NESTet Conference, Brussels, 15<sup>th</sup> November 2021*

Like many industries linked to the physical sciences and engineering, women have been underrepresented in the nuclear industry. There are **programmes in place now, goals and targets to increase the number of women working in the industry**. But, while those targets are a way by which we can measure progress in addressing this issue, at a fundamental level we need to look at our industry and at academia and ask why it is necessary to have those targets, what is it that is preventing the industry from attracting the very best candidates from across all society.

- *ENS and WNA have recently signed a MoU to support the cooperation in several areas, including advocacy. Despite trends are positively changing in several countries, the perception of nuclear energy must be still improved. **Which role can our Societies play in supporting nuclear science and technology, explaining them to a wider audience and raising public awareness of nuclear?***

I think one of **the most important aspects of nuclear societies**, which marks them out from nuclear associations, **is that they are largely comprised of individuals as members**, many

thousands of members. One of **the most effective ways in which they can help improve the public perception of nuclear energy is through their own interactions** with friends, family and others they are meeting in their day to day lives. I think that we nuclear professionals are often shy to talk about our jobs and the many and very significant contributions we and nuclear science and technology make every day. We need to change that!

I also think it is important that, when discussing nuclear science and technology, we **emphasise the benefits that they bring to people**. While I'm sure many of us are fascinated by nuclear science and technology, to best convince the general public we need to move beyond our abstract fascination and demonstrate the positive ways in which nuclear science and technology brings benefits to their lives will make those developments more tangible and meaningful. Because at the end of the day, **the story of nuclear is a human story...** the story of the men and women that power the nuclear sector and the story of the millions of people around the world whose life is better because of nuclear science and technology.

- *COP 26 has recorded positive impressions for nuclear sector, thanks to successful events, panels, stands and meetings, organised by nuclear international institutions, associations and movements and actively participated. **Are there any plans on the horizon for COP27?***

COP26 did have a lot of very positive aspects for nuclear energy. I particularly admired the **energy enthusiasm of the young generation network** who put so much effort into representing nuclear energy and conversing with the delegates who came to visit them. I was also very pleased with the level of **cooperation shown between the different nuclear**



*Sama Bilbao y Leon at COP26 in Glasgow.*

**organisations** as well as the invitations we did receive to speak at country pavilions and at other events.

However, I do think we need to make more progress in taking our positive messages into broader arenas. In the main we spoke about nuclear energy at events about nuclear energy. We need to make more progress towards **being present at broader discussions of energy policy in general** and **entering into dialogue with energy and development organisations** outside of our normal sphere.

I also think that over the coming year there will be **greater emphasis on implementation and deployment**, showing that the international community cannot only reach agreement on what they should be doing but start actually putting those commitments into practise. So, for nuclear energy and the nuclear industry this means to take that step beyond getting acknowledgment of the contribution that nuclear energy should be making to a clean energy future, and seeing practical steps being taken to gain the maximum contribution from our existing nuclear fleet and accelerated deployment of new nuclear capacity.

For COP27 itself, I look forward to working with friends and colleagues in the nuclear sector and doing more to reach out beyond our own circle, as well as work with others in the broader energy and finance sectors.

I hope events will have transpired so that the nations of the world can once again come together, agree a common path and show what can be achieved when humanity works as one.