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William D. Magwood, IV is the Nuclear Energy Agency (NEA) Director-General since 2014. Prior, he served as Commissioner appointed by the U.S. President and confirmed by the Senate to the U.S. Nuclear Regulatory Commission. From 2005 to 2010 he provided independent strategic and policy advice on energy, environmental and technology policy issues. From 1998 to 2005 Mr. Magwood was Director of Nuclear Energy at the U.S. Department of Energy, where he launched several important initiatives including Generation IV International Forum (GIF). He began his career working as a scientist for Westinghouse and Edison Electric Institute. Mr. Magwood holds Bachelor's degrees in Physics and English from Carnegie Mellon University and a Master of Fine Arts from University of Pittsburgh.



The NEA's vision for the future of Nuclear Energy

Geopolitical instability and surging electricity demand from electrification, AI and industrial growth have repositioned nuclear energy as a strategic asset to handle these structural challenges. Realising this shift depends on extending existing reactor fleets, rebuilding fuel and industrial supply chains, developing a skilled workforce and closing the gap between technological innovation and regulatory deployment speed. Whether this period marks a durable expansion or another missed cycle will hinge on whether countries

commit to sustained, programmatic reactor construction rather than isolated projects.

How have geopolitics, AI and electrification contributed to the nuclear revival? Is this trend widespread across OECD countries?

For the nuclear sector, recent years have marked a significant turning point. While countries face different circumstances, geopolitical developments have clearly brought energy security back to the forefront of policy discussions. For

many countries, particularly those dependent on imported fossil fuels, nuclear energy is increasingly viewed as a way to strengthen resilience, reduce exposure to external shocks and provide a stable source of domestically generated electricity.

At the same time, the expansion of data centres, artificial intelligence and digital infrastructure is creating new demand in many OECD countries, while electrification across transport, industry and buildings is adding further pressure on power systems. Beyond the OECD, rising living standards and economic development are also driving substantial growth in electricity demand.

The convergence of these trends is leading more countries to view nuclear energy as a strategic asset capable of delivering reliable, clean electricity while supporting energy security, economic competitiveness and long-term resilience.

Is the current nuclear revival a structural shift or another temporary cycle?

I see this as a structural shift rather than a temporary cycle. In the early 2000s, electricity demand was essentially flat in many OECD countries, energy security concerns were less prominent in many countries and environmental objectives were not yet driving investment decisions. Today, governments and industry

are looking for sources of reliable, clean electricity that can support long-term economic growth and resilience. When all of these objectives are considered together, the range of options becomes much narrower, which creates a much stronger and more durable foundation for nuclear energy than we have seen in previous periods.

Which of these structural forces do you believe will matter most over the next twenty years, and why?

While artificial intelligence and data centres are attracting considerable attention, I believe electrification and re-industrialisation will most likely be the most significant drivers of electricity demand over the next two decades. Transport, industry and buildings still rely heavily on fossil fuels, and their transition to electricity will require a substantial expansion of power generation. Road transport alone accounts for 45% of global oil demand, and electrifying it at scale will dramatically increase electricity demand. The same is true for energy-intensive industries. Data centres will certainly play an important role, but the scale of economy-wide electrification means it is likely to have the greatest long-term impact on electricity systems and investment needs.

How important is the existing nuclear fleet to meeting climate and energy security goals?

In many cases lifetime extensions, refurbishments, uprates and plant

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restarts are the fastest and most cost-effective means of increasing the supply of reliable, clean electricity because the infrastructure, workforce and regulatory frameworks are already in place.

As highlighted in the recent NEA report *Nuclear Energy Outlook: Global Installed Capacity to 2050 and Beyond*,ⁱ long-term operation of the existing nuclear fleet also remains a key factor in meeting global nuclear capacity targets. Many reactors in OECD countries will reach the end of their initial operating licenses before 2040 but there is no technical reason most of these plants can't continue generating energy for many years after this period. Extending operations to 60 years and, increasingly, 80 years could preserve reliable low-carbon capacity, support energy security and avoid the need to replace large volumes of firm generation at short notice. Many governments have recognised this reality and are taking steps to preserve and maximise the value of their existing nuclear assets.

Are expectations for small modular reactors (SMRs) realistic?

Small modular reactors (SMRs) offer opportunities to expand

the role of nuclear energy in markets, industrial applications and geographies where large-scale conventional reactors may not be the best fit. The latest NEAⁱⁱ analysis shows that large-scale reactors are expected to remain the dominant source of new nuclear capacity through at least 2040, while many SMR developers focus on demonstrating and commercialising their first projects. Beyond that, the success of SMRs will depend on the industry's ability to move beyond traditional construction models and take advantage of serial production, advanced manufacturing and modular assembly techniques. If that can be achieved, SMRs could become an important complement to large-scale nuclear power in the decades ahead.

Could global supply chains meet demand if nuclear deployment accelerated worldwide?

Delivering higher deployment scenarios will depend on overcoming challenges related to supply-chain and workforce capacity. In many OECD countries, limited new build over the past 25 years has weakened industrial capabilities and project-delivery experience.

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- i. OECD NUCLEAR ENERGY AGENCY. (2026). *Nuclear Energy Outlook: Global Installed Capacity to 2050 and Beyond*. August 2026. NEA. https://www.oecd-neo.org/jcms/pl_119893/nuclear-energy-outlook-global-installed-capacity-to-2050-and-beyond
 - ii. OECD NUCLEAR ENERGY AGENCY. (2026). *Nuclear Energy Outlook: Global Installed Capacity to 2050 and Beyond*. August 2026. NEA. https://www.oecd-neo.org/jcms/pl_119893/nuclear-energy-outlook-global-installed-capacity-to-2050-and-beyond

Meeting this challenge will require close co-operation among countries, stronger industrial partnerships and a shift from project-by-project approaches to programme-based deployment. Developing the skilled workforce needed to design, build, operate and regulate nuclear facilities will also be a longer-term effort. This includes not only engineers and scientists, but specialised trades such as welders, construction professionals and technicians.

It is important to be realistic about rebuilding these capabilities. Many countries will face challenges in ensuring they have the industrial and human capacity needed to support new nuclear build, and the sooner they begin addressing these issues, the better.

Are new financing structures beginning to emerge that could accelerate deployment?

We are seeing promising signs of innovation in nuclear finance that can help accelerate the deployment of new nuclear capacity. Sizewell C in the United Kingdom is being funded using the regulated asset base model, which lowers the cost of capital and reduces the burden on government balance sheets. Increasing funding from the private sector and positive signals from development banks also indicate a shift away from the traditional government support model. Overall, these developments will provide

tangible benefits to risk-sharing and economic competitiveness, and fewer projects will lean on the traditional infrastructure project finance model going forward.

If you had to identify one decision that would secure nuclear energy's future, what would it be?

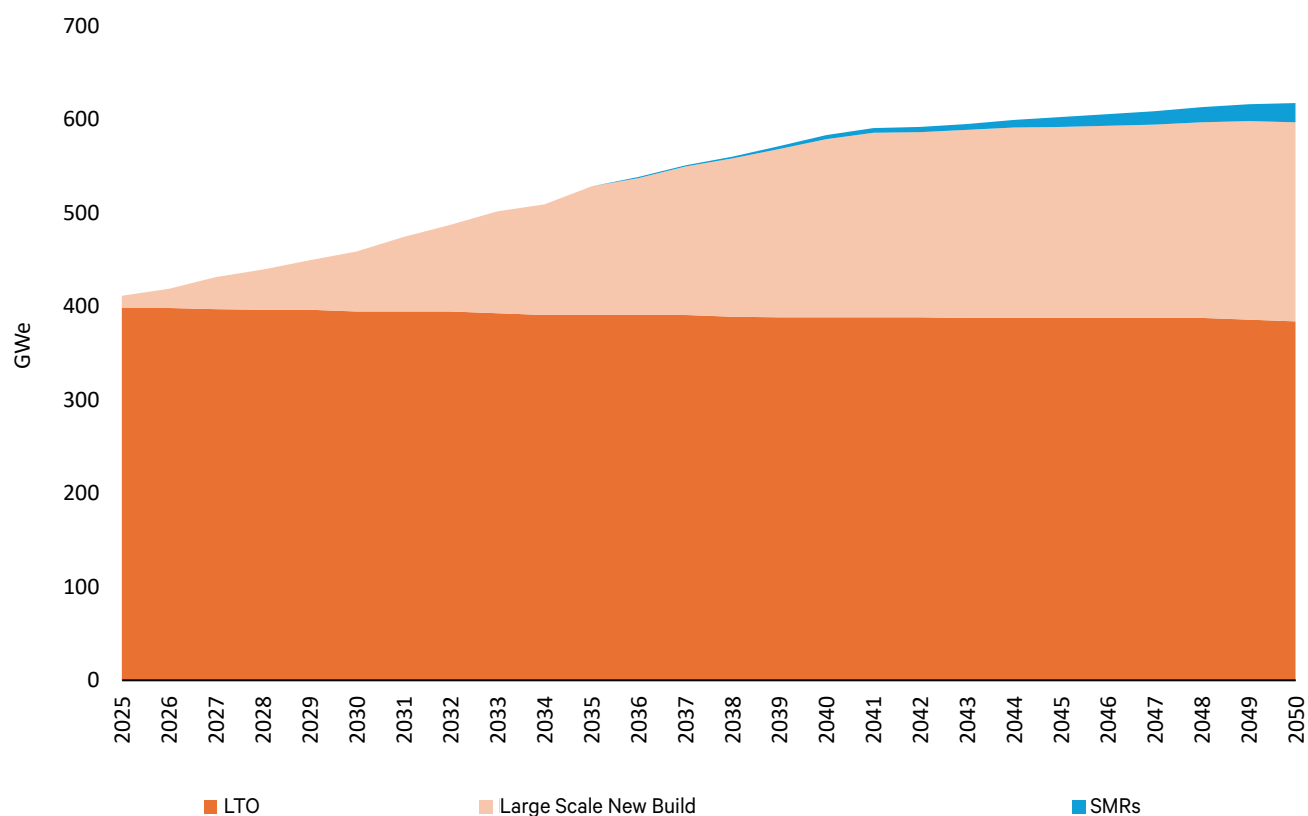
I do not believe in providing forecasts. History always surprises us, and the energy sector has a way of humbling those who make confident predictions. But from today's perspective, historians may look back on this period and ask whether countries moved beyond ambition and built the capabilities needed to deliver.

Above all, that means committing to sustained, programmatic construction rather than treating each project as a one-off endeavour. History shows that when countries build reactors in series, costs decline, timelines improve and expertise accumulates. That was the experience of the United States in the 1970s, Europe in the 1980s, Japan in the 1990s, and more recently China and Korea.

Success will also depend on whether countries invest in the workforce, strengthen supply chains and create the industrial capacity required for long-term deployment. If governments and industry address those challenges, I believe historians will see this period as the beginning of a durable nuclear expansion. **FI**

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Figure 1 - Global current trends scenario, 2026 / GWe



Note: The chart shows projected global nuclear capacity expected to be operational in each year, including existing capacity under long-term operation (LTO) and new capacity from large-scale reactors and small modular reactors (SMRs). GWe denotes gigawatts of electrical capacity.

Source: NEA.