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SMRs and Their Role as Nuclear Energy Gamechangers

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6–7 minutes

[Nuclear power](#) is increasingly seen as a crucial component for achieving low-carbon electricity generation and the energy transition as a result.

This is because it can provide a reliable, baseload source of energy that can complement intermittent renewables like solar and wind — significantly shifting away from the need for fossil fuels.

According to the International Energy Agency (IEA), a new era for nuclear energy beckons. This, it says, comes as projects, policies and investments in the nuclear energy space continue to increase.

Calling small modular reactors, known as SMRs, a “gamechanger for nuclear energy”, the IEA’s *The Path to a New Era for Nuclear Energy* report shares the major challenges standing in the way of current momentum and how to overcome them to usher in a new era.

The IEA’s advice includes insights on how to [finance new nuclear projects](#) while ensuring reliable and diversified supply chains for building and fuelling them.

IEA's SMR report in brief

Overall momentum is the overarching theme of the IEA's report, with it finding that nuclear power is experiencing a significant resurgence.

However, there are several critical observations about [its global potential and challenges](#) outlined above.

Despite this, nuclear power generation is set to reach a new record high in 2025, with more than 70GW of new nuclear capacity currently under construction globally.

This represents one of the highest levels of nuclear development in the past three decades, and more than 40 countries have concrete plans to expand nuclear energy within their national power systems.

At the moment, nuclear power produces just under 10% of the global electricity supply. This is set to change, the IEA says, should its expectations come true.

Although this figure seems low, it is the second-largest source of low-emissions electricity after hydropower.

To support a new era of nuclear energy and its continued growth, annual investment would need to dramatically increase, the IEA says.

In a rapid growth scenario, investments would need to double to US\$120bn by the end of the decade.

The report emphasises that this cannot rely exclusively on public financing and will require significant private sector engagement.

The benefits of SMRs

So why are SMRs so important?

SMRs are small nuclear reactors that can be used in a number of applications such as to generate electricity, heat buildings or desalinate water.

For example, as AI and data centres consume more electricity, [companies like Amazon](#) are turning to small modular reactors for clean, reliable power.

This enables Amazon to continue its commitment to investing in sources of carbon-free energy for its operations, all while bringing new sources of energy to the grid.

CSO Kara Hurst says: “Meaningful climate action requires speed and scale — and Amazon continues to explore carbon-free energy solutions.

Kara Hurst, Chief Sustainability Officer at Amazon

“We’ve signed agreements to help develop new nuclear energy projects in the US — including enabling the construction of new small modular reactors (SMRs). These advanced nuclear reactors have a smaller physical footprint and can be built more quickly, allowing them to come online sooner.”

Meanwhile, [Rolls-Royce’s SMR technology](#) offers a radically different approach to delivering nuclear power, drastically reducing the amount of construction activities and transforming the delivery environment from a large complex infrastructure programme into a factory built commoditised product.

Rolls-Royce says its technology is a solution to the global energy

security and decarbonisation challenge, claiming to be two years ahead of competitors, according to Rolls-Royce SMR's CEO Chris Cholerton.

“The Rolls-Royce SMR is a British solution to the global energy security and decarbonisation challenge,” he says.

Chris Cholerton, CEO of Rolls-Royce SMR

“We have the only SMR technology in a European regulatory approval process, putting us almost two years ahead of any of our competitors. Securing a domestic contract is vitally important to unlock the enormous global export potential of our clean energy technology.”

Other SMR benefits include:

- **Modular design and factory production** allows for standardised components and faster construction times.
- This means **construction time and cost is significantly reduced**, thanks to their smaller size and prefabricated make-up.
- **SMRs can be located in a variety of locations**, including those not suitable for large reactors. This is because of their smaller footprint and lower cooling water requirements.
- Multiple SMRs can be added to increase power generation capacity, meaning **SMRs have flexibility when it comes to scalability**.
- Many **SMR designs incorporate passive safety mechanisms**, enhancing safety in case of accidents.
- SMRs can contribute to lower carbon emissions by replacing fossil fuel-based power plants.

IEA Executive Director's view on nuclear energy

Dr Fatih Birol, Executive Director of the IEA is a firm believer in the power of nuclear energy.

“It’s clear today that the strong comeback for nuclear energy that the IEA predicted several years ago is well underway, with nuclear set to generate a record level of electricity in 2025,” he says off the back of the report’s findings.

Fatih Birol, Executive Director of the IEA

“In addition to this, more than 70GW of new nuclear capacity is under construction globally, one of the highest levels in the last 30 years, and more than 40 countries around the world have plans to expand nuclear’s role in their energy systems.

“SMRs in particular offer exciting growth potential.

“However, governments and industry must still overcome some significant hurdles on the path to a new era for nuclear energy, starting with delivering new projects on time and on budget — but also in terms of financing and supply chains.”

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