Towards a Nuclear Renaissance?

Westminster Energy Forum: Global Energy Trends

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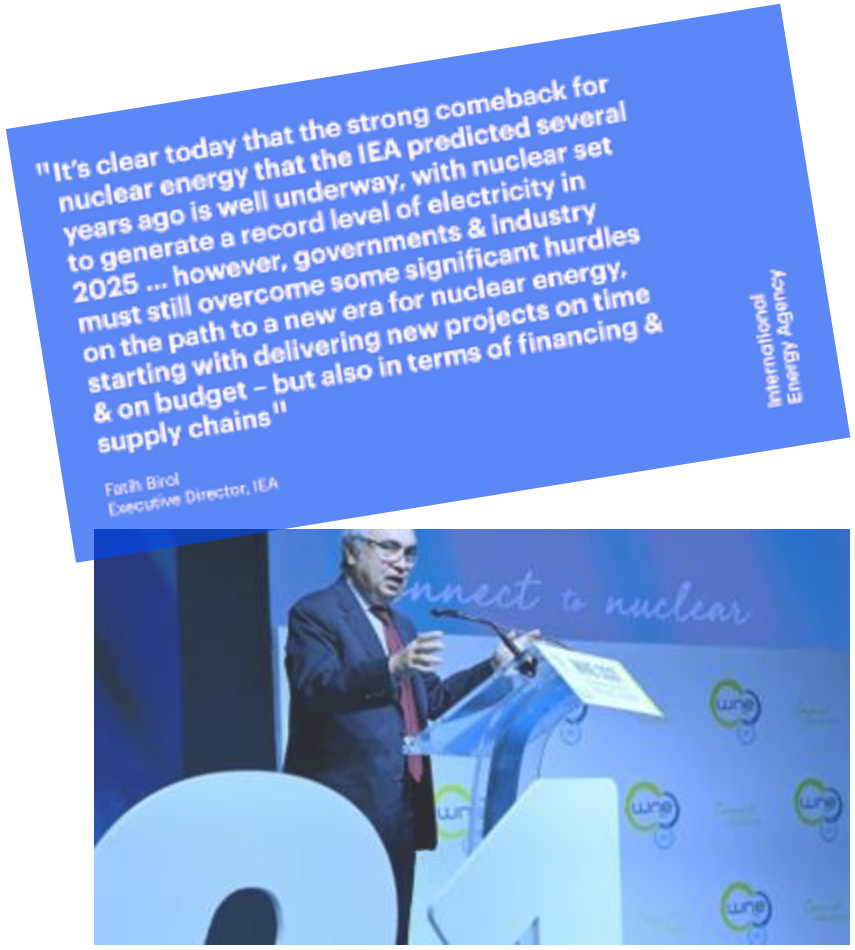
FRESHFIELDS

“Strong comeback”



After a three-decade slide from 18% to 9% of global energy production, the IAE declared in 2025 that nuclear’s strong comeback is well underway. Keir Starmer declared that the UK is at the start of a golden age of nuclear.

Why?

- **Demand**: The need for clean, secure, independent and continuous energy is growing, driven by global economic growth, climate goals, electrification of heating and transport, and increasing demand around data and AI

- **Innovation**: Advances in both GW-scale and SMR technology are supporting new use-cases, reducing cost and barriers-to-entry, and re-building public confidence in safety

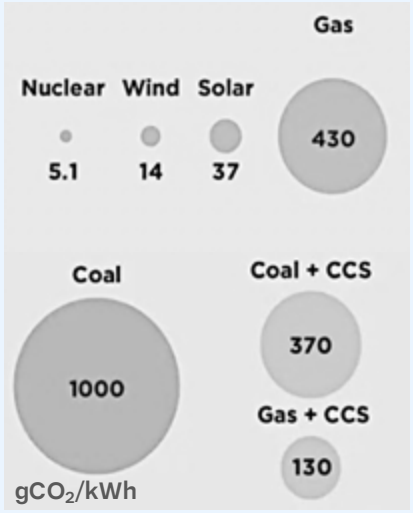
- **Policy**: Governments are seeking to mobilise new sources of finance, streamline project licensing, and collaborate internationally on regulation

An image problem? Myth versus reality

Climate change

Nuclear generation is zero-carbon.

It has the lowest cradle-to-grave carbon footprint of all generation technologies



Energy security

Grid-balancing: Nuclear is one of only two baseload, dispatchable, low-carbon generation technologies

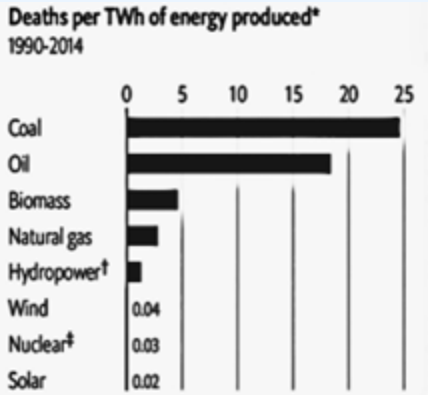
Proven: Unlike CCUS, nuclear is proven at scale (and cheaper)

Fuel security: Nuclear fuel is available from politically stable countries (Canada and Australia), dense and readily stockpiled

Safety

By volume of energy generation, nuclear has – after solar - the second-lowest fatality rate from emissions and accidents (including Chernobyl and Fukushima)

Nuclear is 94-times safer than gas and 820-times safer than coal



Waste

Spent nuclear fuel is physically stable, and capable of safe, permanent containment.

It will decay to natural radiation levels within timeframes that are geologically predictable.

The barriers to deployment of waste facilities are not technical nor economic – they are **political**.

However, the concept is now being proven in Finland, where the world's first deep geological repository is under construction.

Cost

Nuclear's LCOE (the life-cycle cost of exporting 1MWh) is competitive with other forms of low carbon generation, especially with support to reduce capital costs during construction

But LCOE hides the system costs borne by consumers:

- **Backup** costs (eg, Capacity Market)
- **Balancing** costs (eg, Balancing Mechanism)
- **Grid** (connections, extensions and reinforcements)

The system costs of nuclear are *extremely* low

Nuclear headwinds

Spreading the cost of funding the long build phase

- Nuclear has **high upfront costs and delayed returns** - it takes longer to build compared to other power energy projects. Governments typically support delivery of new nuclear power through a range of support mechanisms.
- In the UK this has involved two models:
  - **RAB option**: IRR-controlled returns with Ofgem oversight of economics through generation licence - first project to use this is Sizewell C.
  - **CFD option**: bespoke offtake pricing support overseen by DESNZ
- Other countries use a range of other support mechanisms – loan/loan guarantees through ECAs and investment tax credits etc.

Structuring investment around regulation

- Nuclear projects are subject to the **stringent and highly specialised regulation** over operations, financial resources and corporate governance.
- The needs for a highly qualified, experienced, project-specific operator effectively precludes traditional project finance
- Projects need equity, but shareholder arrangements behind development, construction and operational funding have to be adapted to operate within a myriad of regulatory constraints.
- Many countries further constrain private investors by imposing governance controls over national security risks.
- Creative solutions to balance shareholder control and risk management with and regulatory frameworks are emerging.

Buildings skills and supply chains alongside projects

- Nuclear supply chain capacity is constrained, in a **highly concentrated sectoral market**. The industry recognises a need for investment and international cooperation to avoid bottlenecks and ensure resilience.
- Key initiatives include:
  - Increasing global harmonisation of standards to allow cross-border replication, reducing costs and delays.
  - Strengthening global and local supply chains to secure delivery, localise skills and support local economies
  - Investment in skills training programmes
- Allocation of nuclear risk through supply chains also poses challenges. These are being addressed through broader nuclear liability channelling regimes, aimed at securing the insurability of key risks.

Nuclear game-changers

Small modular reactors

Source: IAEA

- More than 80 SMR designs and concepts globally. Most in various developmental stages and some are claimed as being near-term deployable.
- Due to the smaller, modular characteristics of SMRs, they can be more readily deployed and are designed to be built more quickly.

High energy use activities

Source: Financial Times

- Nuclear energy offers a stable, low-carbon solution with minimal fluctuations, unlike intermittent renewables.
- These are attractive to data centres and other AI technologies that require high volumes of reliable and consistent power. Support for nuclear development from the data sector is growing in a potentially game-changing way.

Growing political support

Source: Nuclear Energy Agency

- 31 counties have endorsed the declaration to triple global nuclear energy capacity by 2050
- Governments are focussed on encouraging investment from the private sector (eg, the UK's RAB model and engagement with the CfD model across the EU) , and supporting project deployment at pace and at scale in an internationally collaborative way.

Fusion

Source: Openstar Technologies Limited

- Fusion technology development and innovation continues to expand – the US has over 25 fusion companies developing technologies.
- Fusion Industry Association's 2025 survey reported:
  - 20 companies are engaged in PPP including cost sharing with government.
  - 35 companies target commercial pilot plant between 2030-2035