Energy Innovation Forum 2025

In support of Canada’s G7 2025 Presidency

International Energy Agency

Summary and key insights of the Energy Innovation Forum

The State of Energy Innovation 2025

- Energy innovation is now motivated by a broader range of factors, with **energy security & competitiveness** taking more prominence alongside decarbonisation and affordability.

- Key factors: policy certainty; availability of funding; maximising use of digitalisation and AI; energy, data and minerals will underpin success in the new economy.

- New technologies can **create new national sectors and change trade balances**, but it takes time. Government energy R&D spending is rising. However, it remains well below the 0.1% of GDP seen in the 1980s. Consistent support for innovators across the innovation stages is undermined by a fall in private venture capital since 2023.

- Enabling actions: robust market signals, standards for new technologies, consistent support from low- to high-TRL projects, regulatory innovation (e.g. sandboxes).

- The **analytical and convening capacities of the IEA** can be fully utilised to make evidence available for decision-makers, via its reports and future Forums.

Races to first for energy innovation

- First-of-a-kind project developers are finding creative ways of overcoming financing and technological challenges. Major industrial plants for pre-commercial tech are **in construction**.
- **Key lessons**: “policy really matters”; offtake agreements are key; learning curves are a result of building and operating; improvements and cost reductions unlock funding and customers.

Energy innovation for economic development and security needs

- **Local context** is critically important for energy innovation. Projects and priorities need to be tailored accordingly, and can even lead to new solutions to global challenges.
- **Priority areas**: access to international markets and capital; development of appropriate local finance and facilities; inclusion of broader social benefits and skills development; planning for macro trends, such as urbanisation and cooling.
- **IEA can further support international cooperation in this area**, via its institutional networks and in partnership with countries in the context of their specific opportunities and challenges. Technological diversity and knowledge exchange are important in this regard.

AI can boost energy technology innovation

- AI tools are already widely used for R&D, delivering striking results in several energy areas
- To accelerate the pace of innovation, AI-led research needs to focus on: access to **better datasets**, **standardisation** (such as regulation and security), **integration** (such as models), ensuring a **sustainable supply chain** and, crucially, **modernising the grid**.

Carbon dioxide removal needs support to get to the next level

- CDR is now a nascent industrial sector, with proven technologies raising funds from strategic investors for major projects. Revenue is starting to flow from carbon credits. **Multiple approaches** to CDR now exist, each with co-benefits and applicability to different geographies
- Today's leading countries (several are in the G7) can stand to benefit from economic & social opportunities of CDR investment, but others are catching up. Government support for a package of **procurement**, **standards**/ **demand creation, testing** and **verification** is important

Technologies under development can improve battery mineral resilience

- The main categories of technology – battery chemistry, recycling, reuse, mineral extraction in new places – have strong interdependencies. Direct lithium extraction, solid state batteries & recycling are becoming technically mature, thanks to **security of demand** (e.g. offtake agreements) and **policy incentives**
- Governments can help mitigate risks through **advanced planning**, investment in education, skills and R&D and **international public-private partnerships** along the value chain

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