Global Conference on **Energy & AI**

Annotated Agenda

Forum on Energy & AI, 4-Dec 2024

Updated: Tuesday, December 03, 2024

International Energy Agency

Global Conference
on **Energy & AI**

Energy for AI, and AI for Energy

Artificial Intelligence (AI) is emerging as one of the most consequential technologies of our time. AI models have grown exponentially in size and capability, benefiting from the availability of massive datasets and improved computational power. The application of AI to technology innovation and invention has the potential to accelerate solutions to hard problems and unlock a new wave of material and chemistry discovery. At the same time, rapid transformation is not a given: incentives and institutions may also need to change to deliver the benefits of AI, particularly for the energy sector.

AI is also energy-intensive. A wave of recent investment in power-hungry data centres is already straining the grid in some locations – and the outlook only seems to be accelerating. Power availability is now being seriously discussed as a possible constraint to the rate of AI growth and is shaping decisions about where companies build data centres and develop this cutting-edge technology. At the same time, energy planners are faced with an unusually wide range of uncertainty. The range of possible outcomes regarding AI uptake is huge. Stakeholders also lack understanding of the data centre value chain, market and technology outlook, making the outlook for electricity demand from the sector too often a "black box".

There is an **urgent need for dialogue** between the energy industry, tech sector and policymakers, and a **structured, comprehensive assessment of the potential implications of AI in the energy sector**.

The IEA's **Global Conference on Energy & AI** provides this space for dialogue. The outcome deliverable will:

- Build **strategic understanding** among global leaders of the implications of AI for energy and energy for AI;
- Develop a shared sense of **priorities** to unlock the potential benefits of AI for the energy transition and manage the risks, including the rise of electricity demand; and
- Establish a lasting **platform** for dialogue between stakeholders.

This Conference will feed into the IEA's forthcoming **Special Report on Energy and AI**. The event will also help to support various **political fora** where the AI and energy nexus is discussed.

The Conference is structured around two days:

- **4 December**: the IEA will host a technical-level **Forum on Energy & AI**, bringing together key experts from across government, industry and academia.

- **5 December**: the IEA will host an invitation-only **High-Level Roundtable on Energy & AI** with global decisionmakers from government, the tech sector and the energy industry.

Global Conference
on **Energy & AI**

Forum on Energy & AI

The Forum on Energy & AI brings together leading subject-matter experts from government, the energy industry, the tech sector, civil society and academia. The objective is to engage in a series of expert roundtables on the implications of AI for energy systems and energy for AI. Roundtables will be structured with input presentations from selected participants and ample time for discussion. It is envisaged that participants will participate actively throughout the day, attending several roundtables, and that insights from one sector or issue area will spark reflections in another. The agenda overview is shown below. Exact timing and sequencing of sessions is subject to change.

Agenda Overview

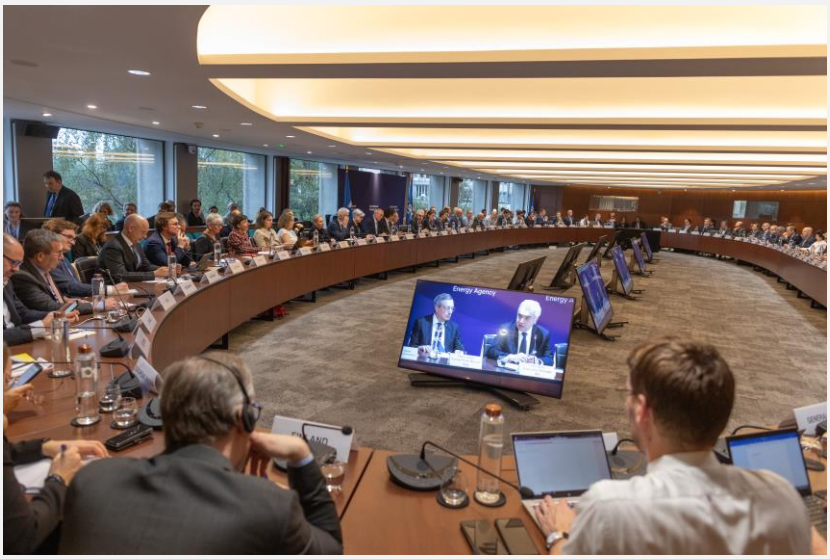
Date: 4 December 2024 **Location:** IEA Headquarters, 9 Rue de la Federation, Paris 75015

Time	Room 1	Room 2
08:30 – 09:30	*Arrival and Registration*	
09:30 – 10:00	Opening: **AI for Energy, Energy for AI** Welcome address and context setting by **Mary Burce Warlick, Deputy Executive Director, IEA**	
10:00 – 11:00	**AI in Energy Supply and Electricity Generation** Applications of AI in electricity generation, networks, storage and oil and gas supply	**AI in Energy Use** Applications of AI in energy consumption from industry, transport and buildings
11:00 – 11:30	*Coffee Break*	
11:30 – 13:00	*(Continuation of previous session)*	*(Continuation of previous session)*
13:00 – 14:00	*Lunch*	
14:00 – 16:00	**Energy Demand from Data Centres and Meeting it Sustainably** Outlook for electricity demand from data centres, strategies and policies to supply clean electricity for data centres	**AI and Energy Innovation** Applications of AI in energy technology R&D, deployment and early commercialisation
16:00 – 16:30	*Coffee Break*	
16:30 – 18:00	*(Continuation of previous session)*	**AI in Emerging and Developing Economies** Applications of AI in meeting the energy security and transition needs of emerging and developing economies.

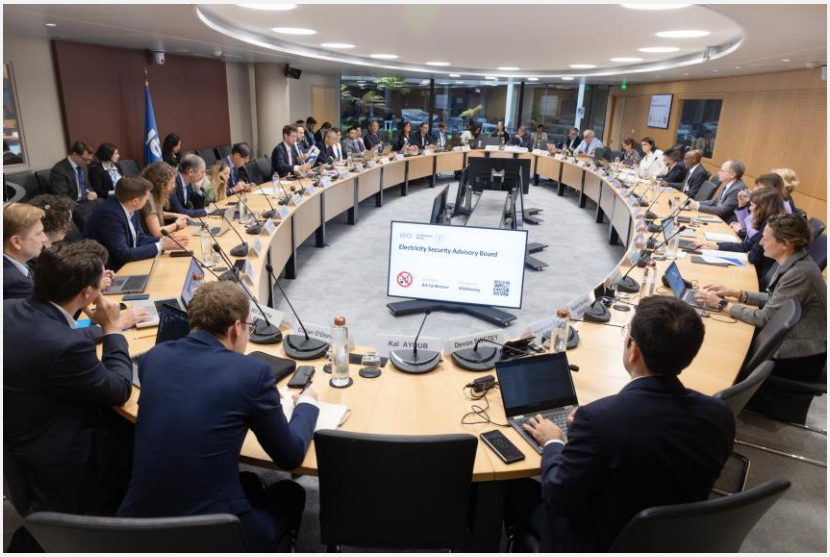
Format of discussions at the Forum

Discussions in all sessions of the Forum on Energy & AI on 4 December will be held in a roundtable format. As it is intended to be an open forum, the sessions are designed to be conversational. Participants are invited to flag their interest to speak during the sessions, following which the Chairs of the sessions will invite you to speak if time permits. Participants are requested to keep their interventions short and relevant to the session themes.

Room 1:



Room 2:



AI in Energy Supply and Electricity Generation

Time / location	Session
Room 1 10:00– 13:00	**Co-chairs:** • Lilybeth Go, Head of Data Strategy, **Siemens Energy** • Christophe McGlade, Head of ESU Unit, **IEA**
	Session Agenda
10:00 – 10:10	**Chairs' opening remarks**
10:10 – 11:00	**Opening presentation:** • Frank Wiersma, Senior Strategy Advisor, **TenneT** • Naoki Kobayashi, Senior Manager, **TEPCO Power Grid, Inc.** • Josselin Kherroubi, AI Director, **SLB** **Followed by open roundtable discussion**
11:00 – 11:30	**Coffee break**
11:30 – 12:15	**Opening presentations:** • Paulina Tapia, Director of Innovation, **Coordinador Eléctrico Nacional of Chile** • Ignacio Rodríguez Carretero, Network Planning Director, **Iberdrola** **Followed by open roundtable discussion**
12:15 – 13:00	**Opening presentations:** • Priya Donti, Assistant Professor, Electrical Engineering & Computer Science, **MIT** • Victor Martin, Manager Digital R&D, **TotalEnergies** **Followed by open roundtable discussion**

This session focuses on energy supply – primarily of oil and gas – and electricity generation, grids and storage. These sectors are characterised by complex and capital-intensive assets, extensive networks, and stringent requirements for security of supply in often challenging operating environments. They are also at the forefront of applying AI tools to improve efficiency, safety and productivity. Participants are encouraged to seek generalisable insights on the capabilities and challenges of AI across these industries.

This session will explore the common themes, such as:

- **Resource evaluation, planning and infrastructure development**, which has the potential to be improved, simplified and de-risked through the application of AI. This includes analysing very large datasets from, for example, satellite, geological and infrastructure geospatial sources, to identify new energy resources, perform risk assessments and conduct cost-benefit analyses to optimise developments.

- **Applications of AI in asset and system operations,** in which AI forecasts and plans production, maximises asset utilisation and improves scheduling and preventative maintenance. By analysing historical production, consumption and weather data, AI can better forecast supply and demand, including patterns in variable renewables.

- **Policy and regulatory enablers**, as well **as infrastructural, institutional or skill-related barriers**, which also benefit from AI applications. Training AI models requires substantial high-quality data and robust standards to secure critical infrastructure, including a "human-in-the-loop" approach. Broader AI adoption will depend on strong **data governance** for secure and accurate data that ensures privacy and transparency for consumers. While AI may increase cybersecurity risks, it also offers new tools for regulators and operators to defend against attacks.

The session will be held in a roundtable format, with a select number of input interventions and then open discussion.

Key questions:

1. What are the key advantages and enablers for integrating large geospatial datasets into AI models to optimise resource identification and infrastructure development? What are other applications such as emissions monitoring?

2. How can asset and system operation benefit from the application of AI? Will improvements in asset operation and efficiency be incremental or more transformative?

3. Can AI assist with planning and building infrastructure and siting new assets?

4. How can we ensure transparency and accountability in AI decision-making processes?

5. What barriers need to be overcome and what is the role of policy and regulation?

AI in Energy Use

Time / location	Session
Room 2 10:00 – 13:00	**Co-Chairs:** • David Sandalow, Chair, **ICEF Innovation Roadmap Project** • Araceli Fernandez Pales, Head of TIU Unit, **IEA**
	Session Agenda
10:00 – 10:10	**Chairs' opening remarks**
10:10 – 11:00	**Opening presentations:** • Mattia Romani, Partner, **Systemiq** and Senior Visiting Fellow, **LSE Grantham Research Institute** • Mark van Stiphout, Deputy Head of Unit for Competitiveness, Digitalisation, Research and Innovation, **European Commission, DG Energy** **Followed by open roundtable discussion**
11:00 – 11:30	**Coffee break**
11:30 – 12:15	**Opening presentations:** • Claude Le Pape, VP Technology Portfolio and Partnerships - Data and Artificial Intelligence Domain Leader, **Schneider Electric** • Sophie Yule-Bennett, Director of Policy and Governance, **Energy Unlocked** **Followed by open roundtable discussion**
12:15 – 13:00	**Opening presentations:** • Owen Dignam, Senior Industry Advisor, **Microsoft** • Carlos Alba, Chief Digital Officer - ArcelorMittal Global Research, **ArcelorMittal** **Followed by open roundtable discussion**

Rapid advances in AI and machine learning are already resulting in a growing range of new and enhanced applications across energy use sectors, which cover industry, transport and buildings. The impact of AI will emerge in combination with ongoing digitalisation efforts in these sectors, facilitated by the growing availability of ever-richer datasets. Applications have the potential to bring energy efficiency gains, promote the integration of new technologies and facilitate the coupling of different sectors. Applications range from uses to improve and optimise industrial processes, energy management systems and transport fleets.

- AI is enabling smarter energy management in **buildings**, helping optimize heating, cooling and lighting systems. AI can also help enhance design and construction processes.

- In the **transport** sector, AI can assess factors like traffic, weather and fuel usage to optimise routes and fleet management, with multiple efficiency benefits across land, sea and air transportation.

- AI applications can similarly bring supply chain benefits for **industry**, while enabling optimisation and automation of industrial and manufacturing processes.

Several **cross-sectoral themes** will thread through the discussion. AI is helping enable more advanced predictive maintenance, with benefits in many sectors, while also empowering design advances, bringing efficiency and emissions gains across fields ranging from automotive and aviation to buildings. The role of AI in smart grids will enable expansion of demand-side response, including in growing areas such as EV charging.

The session will be held in a roundtable format, with brief opening remarks followed by open discussion.

Key questions:

1. What role can AI play in facilitating smarter distribution grids, enhancing the integration of systems and creating energy consumption benefits in buildings, transport and other sectors?

2. How can AI be used to optimise energy use in sustainable industrial and manufacturing processes?

3. What role might AI play in optimising transport fleets and supply chains, through improved demand forecasting, load management and route optimisation?

4. Can AI deliver energy efficiency benefits across sectors through improved design and facilitating predictive maintenance?

5. How sure can we be sure of the real scale of AI's impact on energy consumption, as well as accounting for rebound risks?

Energy Demand from Data Centres and Meeting it Sustainably

Time / location	Session
Room 2 14:00 – 18:00	**Co-Chairs:** • Mariah Kennedy, Director Energy Policy, **Microsoft** • Dennis Hesseling, Head of Gas, Coal and Power Markets, **IEA** • Pablo Hevia-Koch, Head of Head of Renewable Integration and Secure Electricity Unit, **IEA**
	Session Agenda
14:00 – 14:10	**Chairs' opening remarks**
14:10 – 15:15	**Opening presentations:** • Arman Shehabi, Staff Scientist in Energy/Environmental Policy, **Lawrence Berkeley National Laboratory** • Audrey Lee, Senior Director of Energy Partnerships, **Microsoft** • Sasha Luccioni, AI & Climate Lead, **Hugging Face** • Josh Parker, Sr. Director, Legal - Corporate Sustainability, **Nvidia** **Followed by open roundtable discussion**
15:15 – 16:00	**Opening presentations:** • Jim Simonelli, CTO Data Center, **Schneider Electric** • David Noronha, Head of Future Networks & Strategic Offshore Planning, **EirGrid** **Followed by open roundtable discussion**
16:00 – 16:30	**Coffee break**
16:30 – 18:00	**Opening presentations:** • Kenichi Takeya, Manager, **Kansai Electric Power Company** • Sergio Hernández de Deza, Vice President Global Corporate Customers PPA and Decarbonization, **Iberdrola** • Maud Texier, Global director of clean energy and Decarbonization Development, **Google** **Followed by open roundtable discussion**

The digitalisation of the global economy has had significant impacts on the energy sector. The rapid growth of dedicated infrastructures, such as data centres and transmission networks, has raised concerns about their energy consumption. The recent emergence of new drivers, such as AI, brings further complexity to this landscape, underscoring the need to better understand the evolving energy demand of data centres.

The tech sector today is one of the largest procurers of renewable electricity and has recently started exploring the potential of nuclear power to meet rising demand from data centres. Electricity system planners and operators require a better understanding of the demand outlook for data centres and their operational characteristics, in order to to integrate them into the grid, including incentivising more flexible location or operations. Meanwhile, policymakers and regulators are looking at efforts to accelerate the supply of low-emissions sources of electricity by reforming permitting and incentivising new generation capacities.

Key questions:

1. What is the outlook for data centre installations over the next decade, and what is the role of AI in driving this growth? What could limit the growth of AI adoption?

2. What is the outlook for electricity demand from data centres and AI, and what needs to be done to ensure a better understanding of this outlook among actors in the energy sector?

3. What is the potential for efficiency improvements in data centres and what are the limits?

4. What can be done to make data centres more grid friendly, including maximising energy efficiency, incentivising grid friendly connections and assessing the potential for flexible operations?

5. What needs to be done to supply the data centre sector with clean electricity, including accelerating permitting, developing and supporting appropriate market structures and procurement strategies, and favouring new technologies?

AI for Energy Technology Innovation

Time / location	Session
Room 2 14:00 – 16:00	**Co-Chairs:** • Varun Sivaram, Senior Fellow for Energy and Climate, **Council on Foreign Relations** • Antonia Gawel, Global Director, Sustainability & Partnerships, **Google**
	Session Agenda
14:00 – 14:10	**Chairs' opening remarks**
14:10 – 16:00	**Opening presentations:** • Tejs Vegge, Professor, Director, Head of Section, **Technical University of Denmark** • Chirranjeevi Balaji Gopal, CTO and Cofounder, **Mitra Chem** • Sara Moradi, Deputy Head of Fusion Science & Co WPT, **EUROfusion** • Hitesh Jain, Director Business, Policy and Planning, **Natural Resources Canada CanmetMATERIALS, Canada** • Taehun Kim, Director, Office of Strategic Planning & R&D, **Ministry of Trade, Industry and Energy, Korea** **Followed by open roundtable discussion**

Clean energy innovation has been accelerating in recent years, yet new generations of technologies will be needed to fully address climate and energy security challenges in the near- and longer-terms.

There is much discussion of the use of AI to change the nature of scientific discovery and accelerate each of the key steps of energy technology innovation: R&D, demonstration and early deployment. The first commercial impacts of AI-assisted innovation are beginning to emerge in areas such as pharmaceuticals, and labs around the world are also exploring the possibilities for energy. Efforts are focusing on designing complex systems, such as those for **nuclear fusion**, or for identifying high-performing materials, such as those for **battery cathodes**, **electrolytes**, **membranes** and **CO_2 capture frameworks**. In addition, there is considerable scope for energy technologies to benefit from developments in adjacent areas, including improved **self-driving labs**, **robotics**, **digital twins**, **biotech** and **control software**.

We can expect the use of AI to become pervasive in all parts of energy technology innovation, but it remains difficult to judge where the greatest impact will be felt and the magnitude of its effect. This session will explore this issue along three dimensions:

- Ways in which AI assists researchers to run faster by speeding up time-consuming steps such as materials identification, simulation or testing.

- Opportunities for AI to help innovators leap over barriers that were previously too high to scale, for example by allowing several new fusion reactor designs to be tested at once.

- Possibilities for AI to create a new pathway by proposing an unexpected and qualitatively different solution set, such as an entirely new type of battery, not just a better cathode.

Key questions:

1. Is AI likely to secure the continuation of past technology learning rates into the future, or does it represent a fundamental discontinuity from past trends?
2. Which steps in the process of technology discovery should we expect AI to speed up, and how will that shrink the total time to market?
3. Based on evidence to date, can we quantify how much better the AI-assisted results are than those that labs develop in the same timeframe without AI?
4. How can AI help new early-stage hardware products to be tested and commercialised quicker?
5. What do governments need to know about AI for clean energy innovation and how can they foster the greatest impact, including through international cooperation?

AI in Emerging and Developing Economies

Time / location	Session
Room 2 16:30 – 18:00	**Co-Chairs:** • Anicia Peters, Chief Executive Officer, **National Commission of Research, Science and Technology, Namibia** • Cecilia Tam, Head of Energy Investment Unit, **IEA**
	Session Agenda
16:30 – 16:40	**Chairs' opening remarks**
16:40 – 18:00	**Opening presentations:** • Álvaro Soto, Head, **Chilean National Centre for AI (CENIA)** • Georges Vivien Houngbonon, Economic Advisor to the Africa VP, **International Finance Corporation** • Page Crahan, General Manager, Tapestry, **X, The Moonshot Factory** • Abhijit Abhyankar, Professor, **IIT Delhi** • Márcio Venicio Pilar Alcântara, Innovation and Market Engagement Coordinator, **Brazilian Electricity Regulatory Agency** **Followed by open roundtable discussion**

Emerging and developing economies, which account for 60% of the global population (excluding China), accounts for only 40% of global IT production and a modest 15% of clean energy investments. This disparity underscores the **unique challenges these economies face in energy access, security and transitions, and in digital transformation**. Many of these economies struggle with limited energy access, unreliable power, underfunded energy distribution networks and gaps in digital infrastructure and socio-economic data, which hinder growth and widen the global digital divide—for instance, internet access is as low as 27% in low-income countries, compared to 93% in high-income nations.

AI has the potential to help emerging and developing economies optimise energy distribution, predict and prevent equipment failures, expand affordable and reliable energy access and enhance renewable integration. However, significant barriers remain, including **lack of skills and capacity, underdeveloped regulatory frameworks and markets and data governance issues**, all of which complicate AI adoption but also present opportunities to leapfrog conventional infrastructure.

The **planned expansion of data centre infrastructure in emerging and developing economies**, while crucial for growth, places pressure on already strained energy systems. Without careful management, rising demand could lead to higher costs and reduced reliability, disproportionately impacting rural and underserved regions. Despite these obstacles, many of these economies have shown resilience by embracing innovative digital tools. This session will bring together various stakeholders to explore how AI can address energy needs while fostering inclusive, sustainable growth. Through case studies, discussions on regulatory and

infrastructure impacts and strategies for scaling AI, the session will showcase how these economies can leapfrog conventional development and achieve transformative progress.

Key questions:

1. What is the strategic role of AI in addressing the unique energy access, transition and security needs of emerging and developing economies?

2. How can emerging and developing economies capitalise on the dual role of data centres as catalysts for digital growth and drivers of energy demand?

3. Given the competing demands for clean energy investments in emerging and developing economies, how can we strike a balance between financing the expansion of energy-intensive data centres and addressing the need to enhance the broader energy grid, particularly in underserved and rural areas? How can countries ensure that essential resources are not diverted away from achieving universal energy access and grid resilience?

4. What are the key challenges preventing the adoption of AI in emerging and developing economies, particularly with regard to the energy sector?

5. How can AI help emerging and developing economies leapfrog traditional energy development models, and provide pathways for AI-driven energy solutions which are accessible, inclusive, and sustainable?