

Capgemini's World Energy Markets Observatory annual report 2024: The Paris Agreement's goals are no longer achievable, but net zero is still in sight with accelerated efforts

- *Despite impressive strides in 2023 and positive projections for 2024, the pace of renewable development isn't fast enough*
- *The critical role of nuclear energy to addressing increased clean energy demands is now recognized, but construction of new large power plants takes time and industrialization of Small Modular Reactors (SMRs) is proving complex*
- *Addressing the complexity of energy transition challenges will require new market mechanisms encouraging further innovation, choosing appropriate measures, and accelerated public and private investment in low carbon technologies and the power grid*

Paris, October 10, 2024 – [Capgemini](#) has published the 26th edition of its annual [World Energy Markets Observatory](#) (WEMO), created in partnership with [Hogan Lovells](#), [Vaasa ETT](#) and [Enerdata](#). The report takes stock of the current state of the energy transition. Despite progress being made, greenhouse gas (GHG) emissions are continuing to increase, reaching a new record high of 37.4 billion tonnes (Gt) in 2023¹, confirming that the path to reach Paris Agreement's objectives is not on track. The report provides insights on what the key focus areas would need to be, moving forward, to address the complex energy transition challenges, including a change in the measurement of clean energy progress, as well as accelerated investment in the power grid and clean technologies.

James Forrest, Global Energy Transition & Utilities Industry Leader at Capgemini says: "*Despite an historical spike in renewable penetration, the pace of development isn't fast enough to close the gap. There is still much to do in the next decade to get closer to net zero by 2050 and achieve a successful energy transition: whether it be in the field of low carbon technologies, R&D efforts, nuclear or grid flexibility and storage. In addition, beyond the necessary adoption of new market mechanisms, a shift away from measuring energy based on primary consumption is needed. This measurement was relevant during past energy crises, but it is now time to adopt a more holistic approach. Moving to a final energy demand measurement would better assess clean energy progress and ensure more accurate projections.*"

Key observations from the 2024 report include:

- **There is a need to hasten the deployment of renewable energy globally, and to accelerate in developing countries**, to deliver the 2030 and 2050 decarbonization goals. The total amount of final energy provided by renewable energy is likely to be limited to about 40% of global needs. In 2023, total renewable energy capacity increased by 14% year on year with a larger capacity expansion of solar (32%) than wind (13%). But, whilst 2024 is promising to hit another record, as this was the case for the 22nd previous years, this growth is far below what is needed to achieve net zero carbon in 2050. Moreover, while the renewable penetration rate increases, they are impacting

¹ Source: IEA- [CO2 Emissions in 2023](#)



grid stability and association with stationary batteries will become compulsory. According to the report, storable renewable energies development, such as biomass or geothermal energy, should be accelerated.

- **Hydrogen is now a strategic lever in the decarbonization path.** The number of projects reaching final investment decision has quadrupled over the last two years. However, a refocus of applications has been observed due to the increasing costs of low-carbon hydrogen production, competition between uses, and regulations. Only certain uses in '**Hard to Abate**' industries, such as heavy industry and maritime mobility, have strong potential.
- **Global nuclear capacity needs to triple to ensure stable, low-carbon power.** COP28 has recognized the critical role of nuclear energy for reducing the effects of climate change. While there is some promising progress in nuclear renaissance, including Small Modular Reactors (SMRs), development of new nuclear power plants is still difficult. In 2023, 440 nuclear reactors (390 GW) provided 9% of the world's electricity, 25% of the world's low-carbon electricity. SMRs are in the planning or early construction stages with many years before they are deployed at scale as their industrialization can prove to be complex. According to the report, more focus needs to be placed on extending the life of existing nuclear plants.
- **The power grid plays a fundamental role to accelerate clean energy transitions.** Grid investment is starting to pick up and is expected to reach USD 400 billion in 2024², with Europe, the United States, China and parts of Latin America leading the way. According to the report, better forecasting electricity consumption and finer optimization scenarios thanks to technologies such as AI will help to improve grid balancing.
- Whilst **AI has the potential to significantly accelerate decarbonization, a lack of skills and a focus on short-term proof of concepts is hampering adoption to date.** However, AI coupled with GenAI in agentic LLM (Large Language Model) workflows³ has a clear role to play as a catalyst to improve grids efficiency, e-fuel discovery; new battery or wind turbine design; synthetic biology; and augmented insights from many data sources for better informed decision making.
- **Protectionist approaches to increasing energy sovereignty may have undesirable implications.** Ongoing geopolitical uncertainties are affecting energy markets and systems. To ensure security of supply, the use of embargoes, tariffs and subsidies in almost all jurisdictions is distorting energy markets and threatens efficient allocation of capital. According to the report, embargoes are proving ineffective, and decreasing the transparency and traceability of energy supplies, which is essential to tracking decarbonization efforts. Denying access to the cheapest sources of energy equipment and energy supplies drives up prices for consumers and reduces funding available for the energy transition.
- According to the report, '**Primary Energy Demand**' is an outdated concept for energy transition. There is a need to move from primary to final energy consumption measurement (in kWh) to ensure accurate projections, and clean energy progress. Measuring energy based on primary consumption ignores that: for the same end-energy services, new electric services are generally more efficient; a lot of fossil fuels are wasted in the generation of electricity; energy is also wasted on finding and processing fossil fuels.

² Source IEA: [Electricity Grids and Secure Energy Transitions](#)

³ GenAI in agentic LLM (Large Language Model): iterative and collaborative model that transforms the interaction with LLMs into a series of manageable, refinable steps.



The World Energy Markets Observatory (WEMO) is Capgemini's annual thought leadership and research report created in partnership with Hogan Lovells, Vaasa ETT and Enerdata, that tracks the transformation of global energy markets, including Europe, North America, Australia, Southeast Asia, India, and China. Now in its 26th edition, the report has been prepared by a global team of over 100 experts, and includes 15 articles, all backed with rigorous analysis. The report begins with a global outlook, then covers the topics pivotal to the energy transition including geopolitical impacts, demand side energy transition, batteries, renewables, SMRs, Hydrogen, Industrial Heat, GenAI and the Inflation Reduction Act (IRA).

For more information and to get access to the report, click [here](#)

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