

ENERGY TRANSITIONS IN G20 COUNTRIES

EXECUTIVE SUMMARY*

Diverse Energy Transitions in G20 Countries

G20 countries lead energy transitions globally as their governments foster sustainable economic development and a cleaner energy future. Energy transitions are driven by multiple goals, including modernising and diversifying the economy; improving energy security by reducing import dependency and securing energy access; improving air quality; and mitigating climate change. Because the national resources of G20 economies differ, and because GDP growth, per capita energy use and emissions vary from country to country, the energy sources and technologies on which G20 energy system transitions are based are highly diverse. The pathways chosen by individual G20 countries to transform their respective energy sectors are also reflected in the Paris Agreement's Nationally Determined Contributions (NDCs) and the 2030 United Nations (UN) Agenda for Sustainable Development and its sustainable development goals (SDGs), including those on energy.

Sustainable and Fair Energy Transitions

Today, G20 countries' energy consumption is predominantly fossil fuel-generated. Coal remains the single largest fuel in the G20 electricity mix. Despite notable increases in renewables capacity for electricity and decline in energy intensity in recent years, the overall share of oil, gas, coal and nuclear in the fast growing G20 energy supply has not varied substantially in the past 30 years. However, individual G20 countries are expecting to see a rapid decline in coal use, where energy demand stagnates and the power sector moves towards cleaner sources.

To put the world on a sustainable pathway in line with the UN Sustainable Development Agenda for 2030, current and intended actions of the world's governments are not yet sufficient to fully achieve all three goals: better air quality, improved energy access and reduced emissions – without major additional investment. The IEA Sustainable Development Scenario of the IEA World Energy Outlook 2017 shows that a sustainable energy future in G20 countries requires a global economy twice as efficient as today's, with three times as much renewable electricity (around 50% by 2030 and 60% by 2040) and double the share of renewables in final energy consumption by 2030. Current investments in a broader portfolio of clean power technologies remain below levels required to place the world on a sustainable development pathway in line with the UN's SDGs while maintaining supply security.

To achieve consensus for a fair and sustainable energy transition, greater attention should be paid to supporting innovation in cleaner energy technologies; supporting and

retraining affected workers in new technologies and for new jobs needed and managing associated impacts such as possible fluctuations in energy costs for end users.

Developing More Flexible Energy Systems

Energy systems across G20 countries must adapt to changing energy demand patterns, rising shares of variable renewables, new opportunities presented by EVs, and greater digitalization of the energy sector. Safeguarding power system stability and mobilising flexibility are therefore becoming critical challenges as shares of variable renewables grow and as nuclear plants age and fossil fuel plants are retired in many G20 countries. Amid these challenges, energy security remains a priority in energy system transformation and flexibility a core requirement.

The Role of Natural Gas for The Energy Transitions

Natural gas has a significant potential in the coming decades, as it can enable the power system flexibility needed for the large-scale integration of lower-emitting fuels across the energy systems – not only in power generation but in industry, heating and cooking, and transportation. The role of gas-fired power generation is expected to rise notably in countries that have decided to phase-out coal and regional collaboration and market integration becomes crucial to ensure security of supply.

Increasing Transparency of Energy Markets and Systems

Transparency is fundamental to build consensus on energy transitions among concerned stakeholders and society at large. Transparent pricing is of primary importance for consumers to understand the costs of energy and for markets and energy systems to achieve cost-effective outcomes. G20 countries have consistently demonstrated their commitment to reducing inefficient fossil fuel subsidies, making the pricing of energy more efficient and transparent. Reforms of inefficient fossil fuel subsidies can be maintained over time when they are supported by policies and efficiency measures that cushion the impact of subsidy reforms on vulnerable consumers and increase public awareness and encourage investment.

Opportunities for G20 Collaboration on Energy Transitions

Argentina's G20 presidency year falls on the 10th anniversary of the Group's first Leaders' Summit in Washington in 2008. For the first time, G20 leaders will meet in Latin America, a region that may be strongly influential in building consensus on energy transitions, given its considerable oil and gas resources and a highly dynamic renewables investment landscape, turning the region into a growth region for renewable investment, thanks to its policy performance.

This global momentum provides a strong foundation for future collective G20 energy transition efforts. Transitioning towards cleaner, more flexible and transparent energy systems can be an ideal opportunity for G20 collaboration, allowing each country to share its real-world experiences with energy transition challenges. The following

guidelines are suggested to help collaborative efforts take these real-world challenges into consideration and to embrace the spirit of collaboration.

This section presents key G20 energy sector trends as well as current global energy investment trends (with the focus on G20 countries); it then places these trends in the context of ongoing energy transitions to 2040.

- With the objective of building consensus for fair and sustainable development, G20 economies can build momentum to **engage in closer collaboration and exchange experiences on best practices in their energy transitions** with regard to energy planning, resilience and energy security, regional co-operation and market integration, the role of fossil fuels in the transition, energy efficiency indicators and renewable energy, energy market design and power system flexibility.
- To **foster investment from private and public sectors** across a broad mix of energy sources and technologies, G20 countries should support **stable and robust regulatory frameworks and transparent energy pricing structures** to facilitate private sector investment.
- To stimulate **innovative financing**, including through green bonds, the G20 collectively should aim to leverage support from Multilateral Development Banks (MDBs) and multilateral climate financing institutions to facilitate investment in key regions, including through the G20 Finance track.
- Accelerated innovation in the deployment of energy efficiency, renewable energy and a broad mix of cleaner energy technologies are necessary to foster energy transitions compatible with the objectives of the UN SDG goals. Building on the success of wind and solar PV, the G20 can bring down **technology costs by investing in the research and development of a broader range of critical clean energy technologies** and by **strengthening investment and efforts beyond the power sector**. The G20 can benefit from expanded collaboration through a variety of cooperative venues, such as CEM, MI, and TCPs, the Biofuture Platform, the International Solar Alliance, and others.
- To ensure cost-effective and secure energy transitions, G20 members aim to **accelerate the rate of energy intensity improvement**, collectively aiming to double the annual rate by 2030 by expanding sectoral coverage through minimum performance standards and related labelling programmes across industry, transport, buildings and appliances.
- To maximise benefits for air quality, energy access and climate change mitigation, G20 countries could aim to **triple the share of modern renewable electricity and double the share of renewable energy in total energy consumption by 2030** with accelerated deployment of renewables in **transport, heating and cooling, and industry**, which supports the greater electrification.

- Amid rising shares of variable renewable energy (VRE) and power system transformation through greater digitalization and more decentralised energy in the medium term, the G20 should **foster collaboration on power system flexibility to put forward a G20 roadmap**, assessing contributions from flexible power grids and power plants, regional integration and interconnectivity, and energy storage and demand response, as well as greater electrification and digitalization.
- G20 countries should underline **regional collaboration as a guiding principle of energy transitions** to ensure the secure and cost-effective transformation of energy systems, based on flexible, regionally integrated and transparent energy markets and systems. **Regional network planning, including interconnectors, and market harmonisation rules** can provide an institutional framework for both government and industry collaboration. Regional market integration and power and gas market interconnections are integral to cost-effective energy transitions.
- As many countries have identified **natural gas as a flexible and cleaner fossil fuel** for energy system transitions, the G20 should emphasise continued investment in gas supply infrastructure and greater regional integration, as well as flexible and diverse LNG contract terms to strengthen gas trade, supply security and resilience to market volatility.
- To track the energy transition across sectors and the economy as a whole, the G20 should take stronger action to **close energy data gaps**, especially on energy end-use data, public/private spending on energy R&D and digitalization of the energy sector. Digitalization is already transforming energy systems, breaking down boundaries between energy sectors, enabling integration across technologies and improving overall flexibility.
- As **technology innovation** is vital to enable and accelerate cost-effective energy transitions, the G20 recognises the need to boost global clean energy technology transfer and RD&D efforts as they bring economic and societal benefits, such as reducing GHG emissions and local pollution that are not yet sufficiently valued by markets. The G20 should commit to increased engagement in other multilateral efforts, including through a variety of cooperative venues. The G20 as a whole should build an **energy innovation agenda** as part of the collaboration on energy transitions.