

Demand-side flexibility becomes more important as countries adopt more ambitious climate targets (IEA)

The power system transformation that is taking place to support net zero trajectories is putting pressure on both supply and demand, creating the need for more flexibility, which can be increasingly obtained through demand-side resources, including demand response systems.

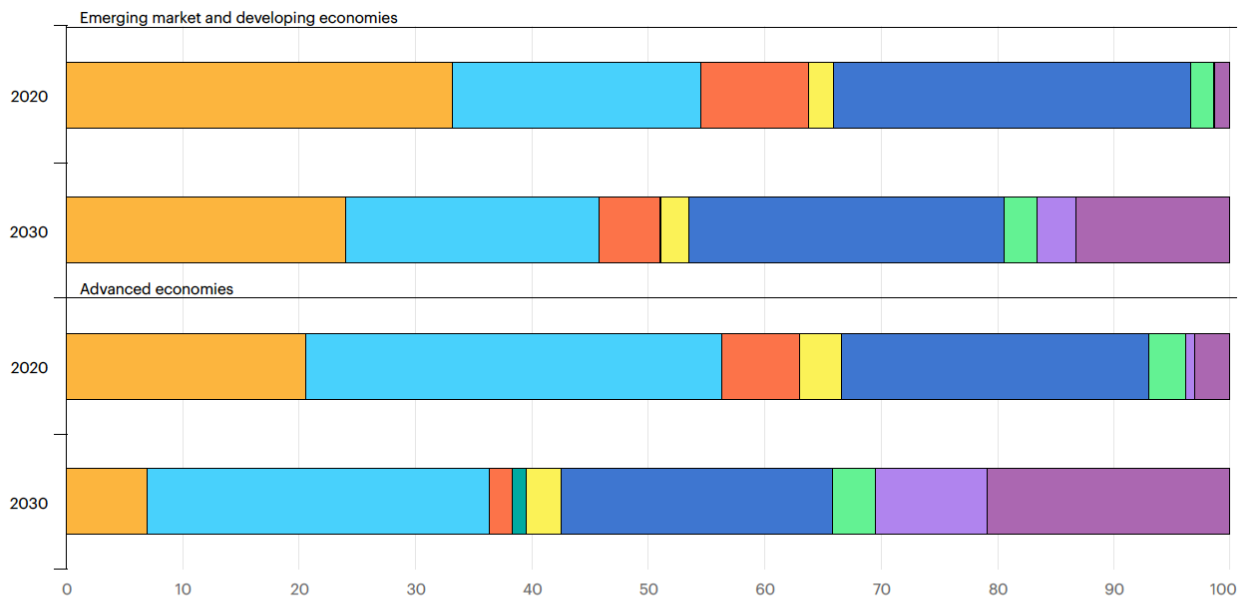
On the supply side, the share of renewables in total output in the Net Zero Emissions by 2050 Scenario expands from 29% in 2020 to over 60% in 2030, driving the need for additional system flexibility. At the same time, flexibility provided by thermal power plants is set to decrease in many markets, with decommissioning of conventional power plants already in progress in countries such as Germany, [France](#), Chile and the United States.

Massive changes are also expected on the demand side. As electrification of all end uses grows rapidly in the Net Zero Emissions by 2050 Scenario, the share of electricity in final energy demand expands from 20% to 26% by 2030. Rapid electrification, especially of transport and heating, alters the shape of demand curves. Several jurisdictions, including [Canada](#), the [European Union](#), [Japan](#) and [Singapore](#), recently announced strategies and targets for EVs and charging infrastructure. This could be an important demand-side flexibility resource if drivers are offered for attractive smart charging propositions, but it could also negatively affect the power system without adequate management. [For example](#), private and uncoordinated charging might raise evening peak loads, resulting in network congestion and the need for further grid investments.

To maintain security, electricity system flexibility (defined as hour-to-hour ramping ability) more than doubles to 2030 in the Net Zero Emissions by 2050 Scenario. [Battery storage](#) and demand-side response are poised to become major sources of flexibility in advanced economies as well as in emerging market and developing economies, together meeting almost a quarter of flexibility needs globally by 2030, on their way to providing around half of flexibility by 2050. The role of demand response grows most rapidly in advanced economies.

At all levels of the power system, digitalisation will be key to scale up demand-side flexibility and leverage small-scale flexibility resources, with more advanced real-time energy demand visualisation and analytics and smart controls being among the main technological enablers. However, growing dependence on ICT systems across the power network means that strategies are needed to mitigate the risks associated with failures of these communication channels, which should ensure supply security and power system resilience.

At the same time, digitally enabled power system transformation could stimulate the development of more innovative business models and new revenue streams.



IEA. All Rights Reserved

▣ Coal
 ▣ Natural gas
 ▣ Oil
 ▣ Hydrogen-based
 ▣ Nuclear
 ▣ Hydro
 ▣ Other renewables
 ▣ Batteries
 ▣ Demand response