RystadEnergy

First Edition (condensed)

House View Report

Accelerating transition amid oil and gas resilience

Rystad Energy's integrated outlook on energy market fundamentals

Energy Macro Analytics

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House View 2025: Accelerating transition amid oil and gas resilience

Global energy demand will continue rising, while the system meeting it is undergoing its most significant transformation in four decades. Over the next 15 years, electrification and renewables will take a steadily larger role in the energy mix, even as total consumption grows. Power demand is expected to increase by more than 50% by 2040, driven by transport electrification, industrial demand, data center growth, and residential infrastructure. Solar PV and wind alone are projected to supply nearly half of global power generation by then, alongside energy storage capacity, which is expected to expand more than eightfold. Electricity is becoming the cornerstone of decarbonization, reshaping transport, buildings and industry, and making the system significantly more efficient.

Still, oil and gas remain essential. Oil demand is likely to peak in the early 2030s, but the decline will be gradual, with aviation, shipping, petrochemical, and heavy industry continuing to rely on liquid fuels well into the 2040s. Gas demand will be resilient, supported by its role in balancing renewables-heavy grids and as an input for industry, though residential use will fall steadily. Coal, by contrast, enters a structural decline as renewables and natural gas plants outcompete coal-power ones. Nuclear power is set for an uptick, with generation potentially reaching 4.6 petawatt-hours (PWh) by 2040, as countries increasingly frame it as a strategic investment in energy security.

Emissions will peak, but decarbonization will be uneven. Global carbon dioxide (CO_2) emissions are expected to peak in 2026, and then gradually decline, so that by 2040 they range between the 1.9–2.0°C pathways, helped by rapid renewable deployment, efficiency gains, and electrification. The decline thereafter will be slow, reflecting significant regional disparities. China and OECD economies are decarbonizing faster, driven by policy frameworks and falling technology costs, while emerging markets face the challenge of balancing economic growth with emissions reduction. Nearly 80% of global emissions are now covered by net-zero commitments, and over 160 countries have signed the Global Methane Pledge. However, momentum is fragile: progress could be slowed by policy delays and postponements, withdrawals such as the US exit from the Paris Agreement under the Trump administration, and shifting political priorities.

Geopolitics and protectionism introduce risks but are not our base case. In the US, the rollback of the Inflation Reduction Act is slowing renewable deployment, but the impact may prove temporary. Market forces are increasingly decisive: solar PV and energy storage are already competitive without policy support in multiple markets, and learning rates continue to drive costs down.

Globally, tariffs, local-content mandates, and carbon border measures could raise costs and delay projects since much of the renewables supply chain is concentrated in China. While this is a meaningful downside risk, our base case assumes cost trends and market forces will sustain the momentum of low-carbon investment, and any disruption will be transient.

Macroeconomic fundamentals will reshape both demand and the transition. Global gross domestic product (GDP) is projected to grow around 45% between 2025 and 2040 – a significant slowdown compared to prior decades. For the past 25 years, China has been a major engine of growth and industrialization, but its contribution will diminish as its population ages and shrinks, and its productivity slows. India and Africa are expected to take on a larger role, although they will not match China's scale or speed. Meanwhile, the world continues to urbanize rapidly, with most of the growth concentrated in emerging markets, shaping infrastructure needs and boosting energy demand. On the other hand, rising protectionism and continuously falling fertility rates globally represent a significant downside risk to our economic outlook. On the upside, artificial intelligence could turn out to be a positive shock: widespread adoption may significantly boost total factor productivity and lift growth above baseline forecasts, similar to what happened in the 1990s during the digitalization era.

Rystad Energy House View. This is the first edition of the Rystad Energy House View, our assessment of how we believe the global energy system will evolve in the next 15 years. It synthesizes our outlook on demand, technology, policy, and macroeconomic drivers to outline the most likely trajectory of the energy transition and its implications for global markets.

The focus in this edition is mostly on energy demand. The next edition will shift to the supply side, analyzing investment trends, cost curves, and producing the forecasts of global energy prices.

Claudio Galimberti
Chief Economist,
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Global energy demand keeps growing and enters a structural transition

Energy demand to rise 15% by 2040

Global energy demand is projected to continue increasing in the next 15 years, primarily driven by continued population growth and economic expansion. However, the pace of growth is expected to slow significantly over time as the energy intensity of the global economy continues to decline—a clear sign of increasing efficiency and structural transformation.

Structural transition taking place

The global energy mix is entering a structural transition phase—fast enough to reshape the growth profile of fossil fuels, but not nearly fast enough to trigger a deep disruption by 2040.

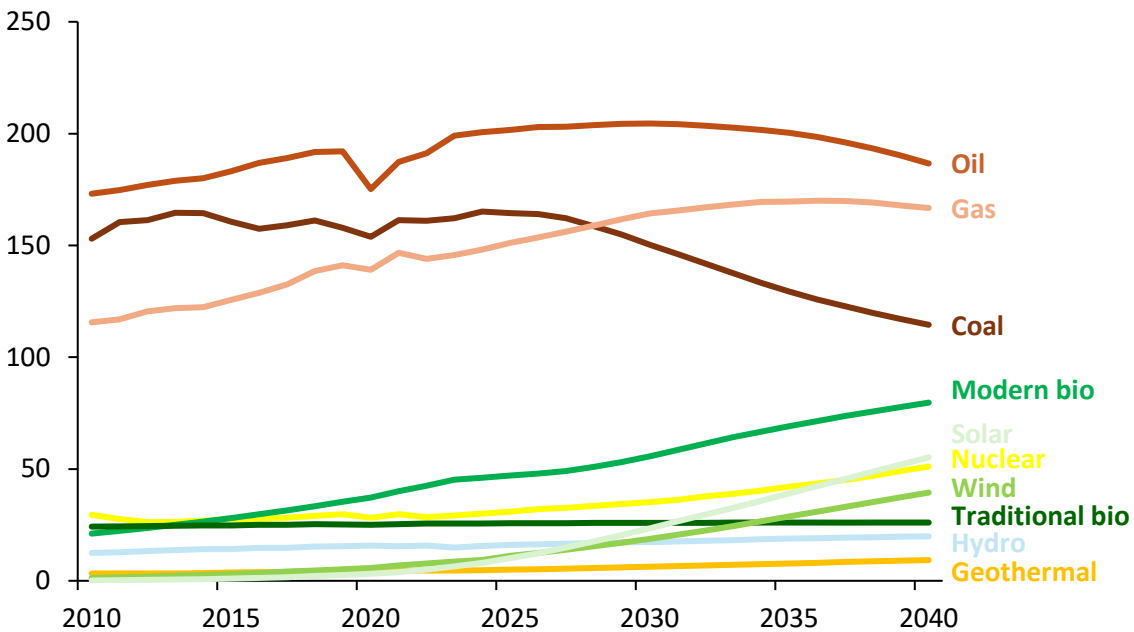
Oil and gas remain the backbone of the system, underpinned by their critical role in transport, industry and petrochemicals.

While oil and demand is set to peak in the early 2030s, and gas growth slows toward the end of that decade, neither sees a rapid collapse. Their combined dominance persists, highlighting the inertia of sectors where not all alternatives are competitive and some remain costly, technologically immature or slow to scale.

The most visible shift is the collapse of coal, tied primarily to power sector decarbonization.

Wind and solar are the fastest-growing sources in the energy mix, becoming a central driver of power generation growth globally, supported by steady cost reductions and strong policy momentum.

Energy demand – House View
Exajoules



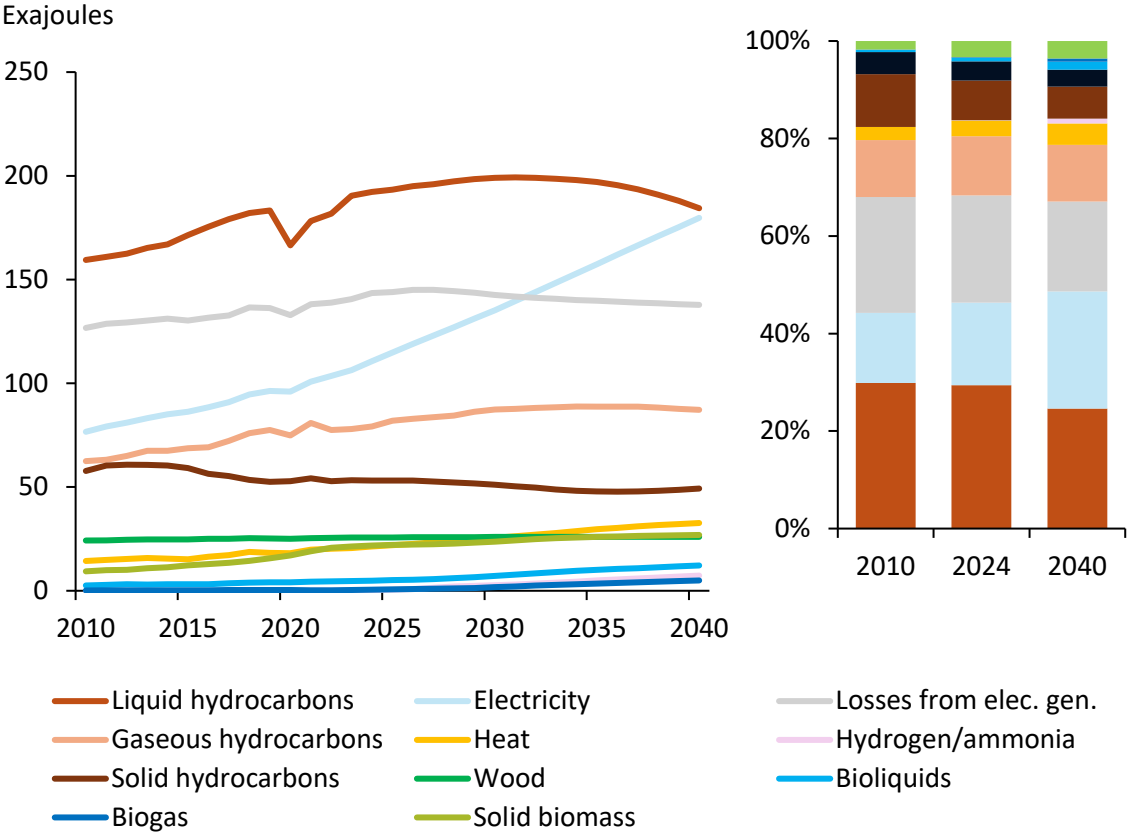
Source: Rystad Energy House View dashboard

Electrification – via market and policy – increasingly drives decarbonization

The next 15 years will see a rapid increase in the use of electricity as an energy carrier, growing from 111 exajoules (EJ) in 2024 to 180 EJ by 2040. Electricity demand is expected to grow three times faster than energy demand over the next 15 years, as countries worldwide pursue their climate targets. As economies decarbonize, electricity will be increasingly used to power transport, heating, and industrial processes, replacing direct fossil fuel use.

Energy demand by energy carriers – House View

Exajoules



Hydrocarbon (liquids, gaseous and solid) energy carriers only grow marginally between 2024 and 2040 as declines in solids are offset by increases in gaseous. Liquid hydrocarbons will remain the most important energy carrier during the forecast period but it barely grows.

In fact, its lead is likely to be challenged by electricity in the 2040s. The use of bioliquids more than doubles in the next 15 years as hard-to-electrify sectors try to decarbonize, particularly the aviation, shipping and heavy industry sectors.

Source: Rystad Energy House View dashboard

Global CO_2 emissions peak in 2026 despite energy demand growth

CO_2 emissions from fossil fuel combustion are expected to peak in 2026 at 36.6 gigatons (Gt), marking a critical milestone in the global energy transition. As the energy mix decarbonizes, the positive relationship between energy demand growth and emissions growth breaks.

However, the pace of decline after the peak is relatively modest, 1.1% per year, so that by 2040, global CO_2 emissions are anticipated to return only to 2010 levels. This underscores the scale of the challenge ahead in reducing emissions across a broader range of sectors and fuels.

Coal in power sector drives CO_2 reductions

Most of this decline will come from the power sector, particularly due to the fall in coal use. Natural gas emissions are projected to peak around 2036, while oil emissions rapidly decline in the 2030s as electrification in the transport sector accelerates.

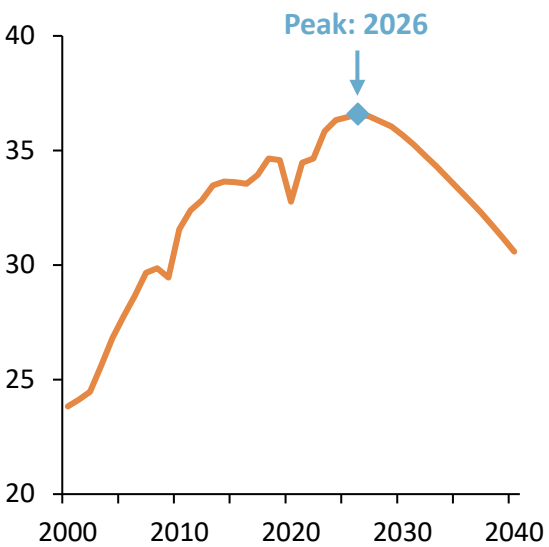
House View emission range between 1.9°C and 2.0°C scenarios towards 2040

Initially, emissions in the House View track closely with Rystad Energy's 1.9°C scenario through the end of this decade, reflecting near-term progress in reducing coal use and increasing renewable energy use. However, as we move into the 2030s, emissions in the House View decline more slowly and gradually align with the trajectory of the 2.0°C scenario by 2040.

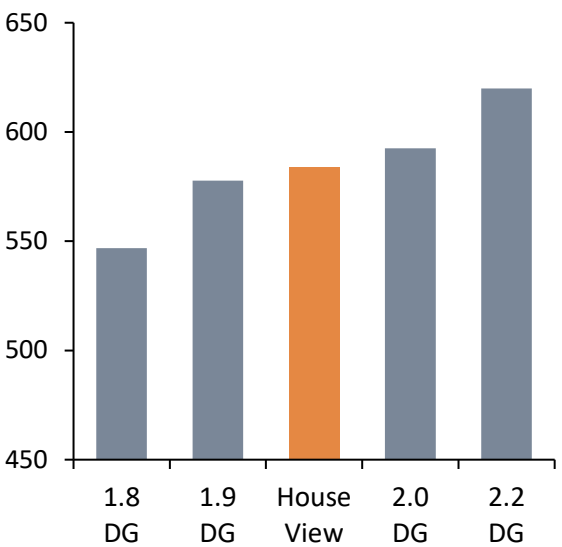
This suggests that while the current trajectory may fall short of the most ambitious goals, it is not far off a pathway consistent with limiting warming to around 2.0°C.

At the same time, it is worth highlighting that the main decarbonization efforts in these scenarios will occur after 2040, and are therefore outside the House View timeframe.

Global fossil CO_2 emissions
Gigatonnes of CO_2



Cumulative CO_2 emissions, 2024 – 2040 Rystad's House View and Degree Scenarios
Gigatonnes of CO_2



Note: includes CO_2 emissions from fossil energy combustion and fossil fugitive emissions. Does not include CCUS
Source: Rystad Energy House View dashboard; Rystad EnergyScenariosCube

Solar PV and wind winning race to meet growing power demand

Electricity generation is expected to rise by more than 50% by 2040, reaching nearly 46,000 terawatt-hours (TWh). Electrification is spreading across transport, industry and buildings, while digital infrastructure is emerging as a new growth engine.

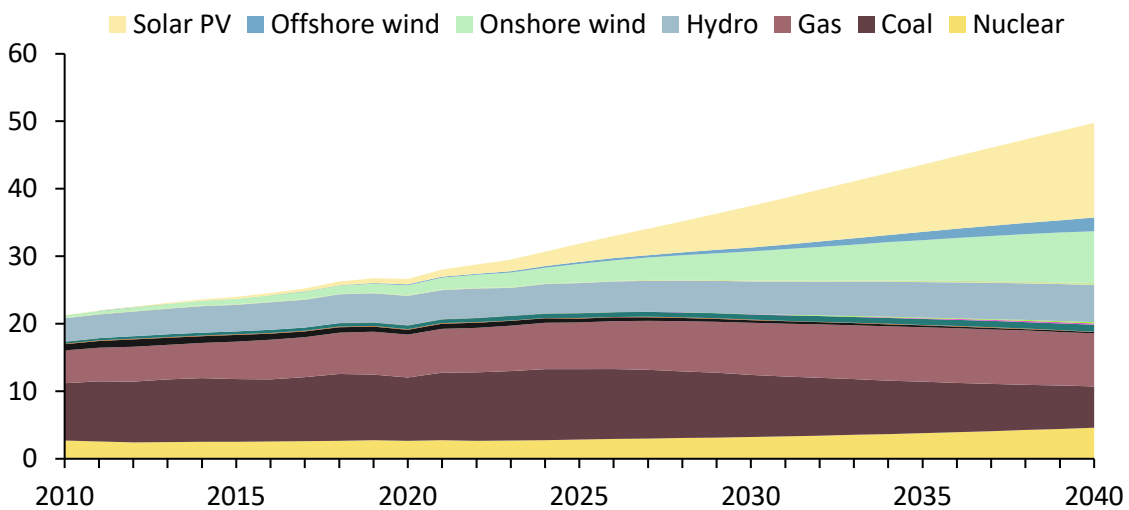
The industrial sector will remain the largest consumer of power, accounting for almost half of total demand. Decarbonization targets mean industries that today rely on fossil fuels, such as steel, cement and chemicals, will increasingly switch to electricity through technologies like electric furnaces, green hydrogen production, and large-scale heat pumps. This makes industry the single largest driver of demand growth in absolute terms over the next 15 years.

Transport, while smaller in size, is the fastest-growing sector. The global stock of battery electric vehicles is projected to surpass one billion units by 2040, driving demand above 4,000 TWh compared with less than 600 TWh today. Asia, led by China, will dominate growth, but North America and Europe will also see strong expansion as EV adoption accelerates.

A newer source of demand growth is the rapid build-out of data centers, propelled by cloud services and artificial intelligence. Power consumption from data centers is set to triple by 2040, exceeding 1,800 TWh, with the US leading but other regions catching up fast. This raises both opportunities for clean power deployment and challenges around grid flexibility.

To meet this surge in demand, the global power mix is undergoing rapid changes. Wind and solar will dominate capacity additions, jointly supplying nearly two-thirds of total generation by 2040. Solar PV, in particular, will account for nearly half of all installed capacity globally. Battery storage will scale more than sevenfold, providing grid stability and enabling higher penetration of variable renewables. Nuclear power is experiencing a modest revival, especially in Asia and parts of Europe, while coal power generation is set for a significant decline between now and 2040.

Global gross power generation
Petawatt-hours per year



Source: Rystad EnergyDemandCube; Rystad Energy PowerCube; Rystad Energy House View dashboard

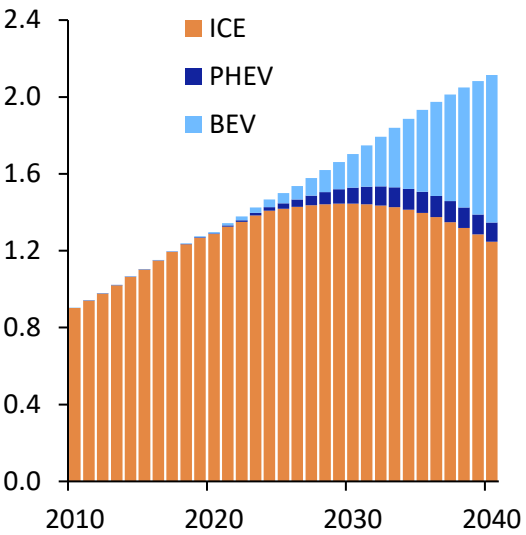
Transport sector transitions through electrification and biofuels

The transportation sector is undergoing a structural transition, with a clear divergence in decarbonization pathways. Passenger road transport is advancing rapidly through electrification, while aviation, shipping and heavy freight rely more on fuel diversification, particularly biofuels. Passenger vehicles lead the shift, with EV adoption surging – especially in China and Europe – driving a peak in vehicle oil demand this decade and a projected 18% decline by 2040.

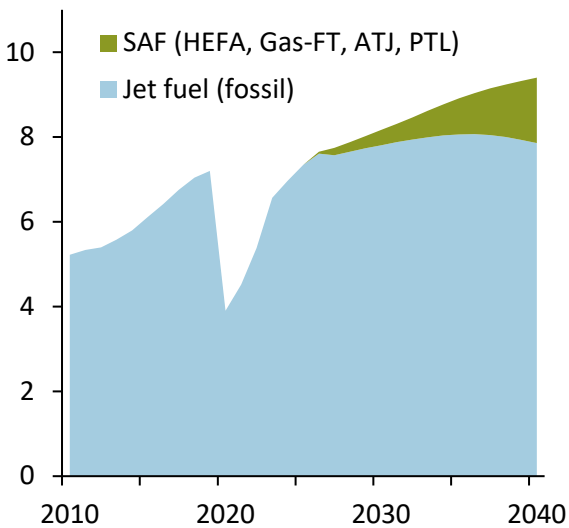
Commercial road transport decarbonizes more slowly. Fuel demand grows until the mid-2030s, plateaus, and then gradually declines as electrification expands in light and medium-duty trucks. However, long-haul freight remains technically difficult to decarbonize, preserving demand for diesel, LNG and alternative fuels. Maritime liquids demand follows a structural decline, falling 19% by 2040, as the sector gradually shifts away from fuel oil and accelerates adoption of LNG, biofuels, and e-fuels under tightening IMO regulations.

In the aviation sector, liquids demand increases 35% by 2040, driven by strong air travel growth in Asia, Africa and the Middle East. Critically, this growth is increasingly underpinned by sustainable aviation fuels (SAF), which are expected to represent 16% of the fuel mix by 2040. Despite SAF adoption and efficiency gains, technological constraints prevent full decarbonization. The global commercial fleet expands by 46%, mostly in emerging markets, cementing aviation's long-term reliance on liquid fuels well beyond 2040, even as its carbon intensity improves.

Global passenger vehicle cars
Billion vehicles



Global liquids demand in aviation
Million barrels per day



ICE: internal combustion engine; PHEV: plug-in hybrid electric vehicle; BEV: battery electric vehicle; HEFA: hydroprocessed esters and fatty acids; ATJ: alcohol-to-jet; PTL: power-to-liquids
Source: Rystad Energy OilMacroCube; Rystad Energy House View dashboard

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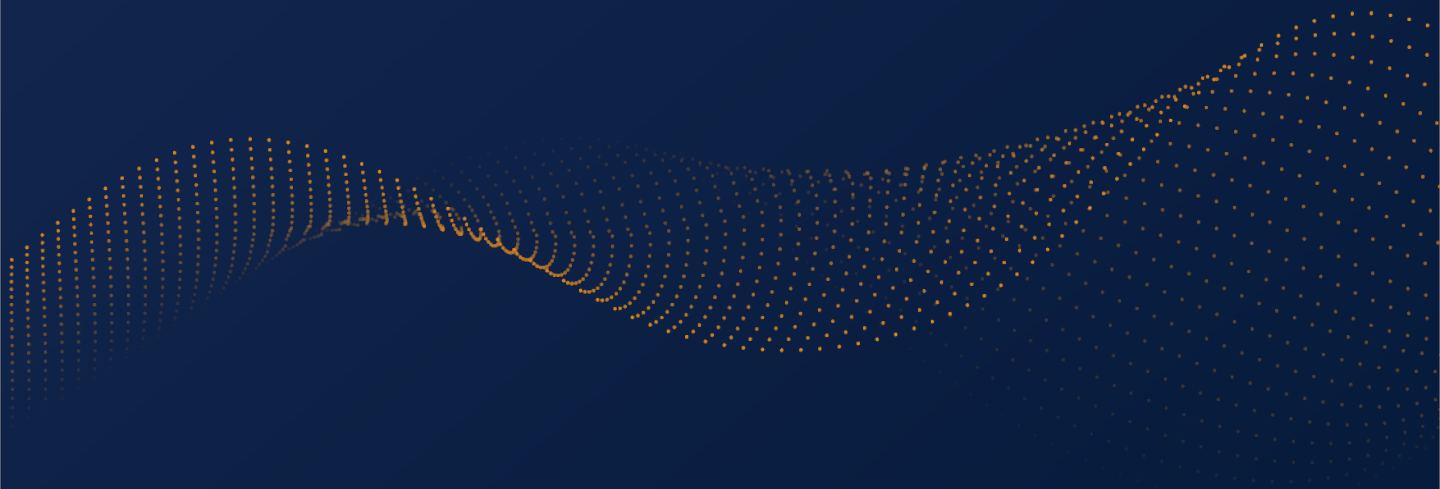
Navigating the future of energy



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