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OUTLOOK 2025:

Navigating the Global Energy Landscape

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Introduction

Since the beginning of 2025, the oil market has experienced significant volatility. Following a sharp rise in January driven by escalating geopolitical tensions, prices have now entered a downward trajectory. Benchmark indices such as Brent and WTI have recorded notable declines as of early May, pressured by increased OPEC+ output and growing concerns over global demand. This bearish trend is reshaping short-term forecasts for the energy sector, amid persistent trade tensions between the United States and China and ongoing sanctions that weigh on several key producers. These dynamics exacerbate the risks of supply disruptions and underscore how dependencies and vulnerabilities can mutually reinforce one another. Mirroring the surge in protectionist measures targeting clean technologies since 2020, the persistence of high import duties undermines the competitiveness of renewable sectors and clouds the trajectories of the energy transition.

This report explores the major forces shaping the global energy landscape in 2025. It highlights key structural changes, policy shifts, and technological triggers that are reshaping energy systems and business models across the globe. The analysis highlights three main dynamics: the strategic turning points accelerating the energy transition, the impact of geopolitical tensions and trade disruptions, and the emerging risks and opportunities linked to decarbonization, digitalization, and growing energy demand.

In this context, we have identified seven megatrends that represent critical challenges for energy-sector stakeholders:

1. The energy transition and its impact on geopolitical power dynamics.
2. Oil and gas majors are redefining their strategies under profit pressure and shifting markets.
3. The global energy mix is transforming, with clean energy sources expanding and fossil fuel growth slowing.
4. Clean energy investments are rising sharply, though regional disparities persist.
5. Digitalization and technological innovation are reshaping the energy sector.
6. Electricity demand is surging, driven by the rapid growth of data centers.
7. The sector faces a growing skills gap as it adapts to emerging technologies.

Together, these insights aim to help industry stakeholders navigate complexity, anticipate change, and build more resilient, adaptive business models for the years ahead.

Executive Summary

The global energy landscape is undergoing a profound transformation. Amid ongoing geopolitical tensions, economic volatility, and climate imperatives, the sector is navigating a path toward greater resilience and sustainability. Current projections point to a cautiously optimistic trajectory, driven by recovery, innovation, and a strengthening commitment to clean energy transitions.

In 2024, global energy demand increased by 2.2%, surpassing the average of the past decade. Electricity demand rose by 4.3%, significantly outpacing global GDP growth of 3.2%, driven by record temperatures, electrification, and digitalization.

While fossil fuels still represent the backbone of energy supply, their dominance is being increasingly challenged by rapid investments in renewables. In 2024, renewables accounted for 38% of the growth in global energy supply, followed by natural gas (28%), coal (15%), oil (11%), and nuclear (8%).

Solar PV was the largest contributor to this expansion, adding about 480 TWh in 2024, and has been doubling approximately every three years since 2016. Wind power also grew but at a slower rate of 8% in 2024, its lowest annual growth in two decades, due to permitting issues in several regions.

Meanwhile, energy-related CO_2 emissions continued to rise, but at a slower rate of 0.8% in 2024, compared to previous years. Clean energy technologies helped avoid an estimated 2.6 billion tonnes of additional CO_2 emissions annually. This report outlines seven key trends that are shaping the energy sector in 2025. These insights help stakeholders — from energy companies and policymakers to investors and consumers — anticipate change and adjust their strategies in a rapidly evolving environment.

Ultimately, the transition toward a more diversified, decentralized, and decarbonized energy system is underway. However, its pace and form will depend on coordinated global action, sustained investment, and a shared strategic vision.

All figures cited in this outlook are sourced from the International Energy Agency's World Energy Outlook 2024 and 2025, unless otherwise stated. Data from other sources are referenced in footnotes throughout the document.

OVERVIEW:

Steady growth ahead for global energy production

The global energy production landscape is poised for steady growth, driven by rising electricity demand, government incentives, and significant investments across various regions.

In 2024, global energy demand grew notably (2.2%), mainly due to a 4.3% increase in electricity consumption driven by cooling needs, transport electrification, industrial activity, and data center expansion.

Building on this momentum, the primary drivers of the growth are twofold: surging electricity demand in Asia—led by rapid industrialization and urbanization in China and India—and supportive government frameworks such as China's New Energy Law, which came into force in January 2025. Together, these forces create a robust environment for expanding generation capacity, with Asian markets accounting for many new megawatts and policy incentives ensuring investor confidence in both conventional and clean-energy projects.

North America

Growth in North America is supported by cheap natural gas, while in the U.S., energy demand has declined since 2007, driven by efficiency gains (2.8% annually through 2030) and increasing electrification.

Electricity demand is rising, driven by electrification of transport and industry, as well as the expansion of data centers. Renewable energy capacity, led by solar PV and wind, is expected to more than triple by 2035, meeting all new demand and displacing fossil fuel generation.

Coal demand is set to drop by 80% by 2035, while oil and gas peak soon and then gradually decline. As a result, U.S. CO_2 emissions are projected to fall by nearly one-third by 2035. The U.S. remains the world's top producer of oil and natural gas and is expanding its role in global liquified natural gas (LNG) markets, while also scaling up clean energy technology manufacturing. However, federal incentives for renewables have largely been revoked following the 2025 policy shift.

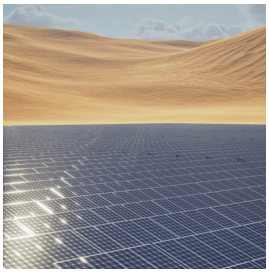
Europe

The European Union, responsible for 10% of global energy demand, is rapidly reducing emissions. CO_2 fell in 2023 due to increased renewables, with electricity from renewables set to rise from 45% today to ~80% by 2030.

Fossil fuel demand is dropping significantly: oil by 15%, gas by 10%, and coal by nearly 50% by 2030, while electric car sales and clean energy manufacturing are expanding sharply. EU dependence on Russian gas has fallen from over 40% in 2021 to under 10% today, replaced largely by LNG, supported by energy efficiency and diversification policies.

Asia

Asia is the fastest-growing energy market due to its high electricity demand, with China leading global production. Asia is now the central hub of global energy dynamics; investment is rising in both traditional and renewable energy sources. China alone accounted for over two-thirds of global oil demand growth and one-third of gas demand growth from 2013 to 2023. It also drove 80% of the rise in global CO_2 emissions over the last decade, while leading in clean energy with over 40% of global wind and solar PV capacity and more than half of the world's electric cars. Coal consumption is also on the rise, with China and India driving global demand growth and China alone now responsible for a record 58% of total global coal use. Asia imports over twice as much oil as Europe, making it the largest oil-importing region. In Southeast Asia, energy demand has grown by 11% since 2010, with projections showing it will contribute over 25% of global demand growth by 2035. Looking ahead, China's oil import dependence will exceed 80% by 2050, while India's gas import reliance will near 75%. Growth in India alone was more than the increase in demand in all advanced economies combined.



Middle East

Despite global shifts towards renewables, oil and gas exports dominate the market and remain a critical component of the region's energy strategy.

The Middle East is heavily reliant on fossil fuels, with oil and gas making up 98% of energy demand in 2023, slightly decreasing to around 92% by 2035. Energy demand is projected to grow by nearly 25% by 2035, and CO_2 emissions are expected to rise by over 10%. Renewable electricity, mainly solar PV, grows rapidly, though oil and gas continue to dominate power generation, accounting for about 80% by 2035.

Latin America and the Caribbean

The Latin America and the Caribbean (LAC) region primarily relieve hydroelectric power, biofuels, and fossil fuels for its energy needs.

Hydroelectric power contributes significantly to the region's low CO_2 emissions intensity, while biofuels are widely used in transportation.

Despite the importance of fossil fuels, including oil, natural gas, and coal, the region is increasingly investing in renewable energy sources such as solar PV and wind. This shift is driven by the need to enhance energy security and reduce vulnerability to extreme weather conditions. Looking ahead, LAC is expected to see substantial growth in renewable energy capacity, with a focus on electrifying transport and industry sectors, leveraging its low-emissions power systems and rich mineral resources to support sustainable economic growth.

Africa

Africa's energy sector is set for major growth to meet the demands of its expanding economy and population. Renewable energy investments are increasing, with clean energy projected to rise by 42% by 2030. Electrification progress is expected to boost access rates to nearly 70% by 2030, with renewables like solar PV, geothermal, and hydropower making up 80% of new capacity.

Coal demand is anticipated to decline by 16%, while natural gas demand will rise by 12%, driven by power and industrial needs. Oil demand is projected to grow by 13%, mainly for transport and cooking, though subsidy reforms are moderating this increase. Despite new oil prospects, overall oil production is expected to decline, while natural gas production will increase by 8.5%.

Africa's critical minerals sector remains vital, contributing significantly to exports and revenue. Leveraging bioenergy for low-emissions hydrogen production and expanding clean energy value chains are key to sustainable growth and employment opportunities.

1 The energy transition is shifting global geopolitical risks

The global energy transition is reshaping geopolitical dynamics, introducing new vulnerabilities and risks while altering traditional dependencies. This trend encompasses persistent fossil fuel risks, emerging challenges due to China's leading position in critical minerals, and varied responses from Western nations.

Fossil fuel risks persist:

Conflicts in regions like the Middle East and Ukraine continue to disrupt supply chains, affecting global energy security. Key transit routes, such as the Strait of Malacca and the Strait of Hormuz, remain crucial for oil and gas transport, and any disruption in these areas could result in major supply shortages and increased prices.

In Asia, both China and India are becoming more reliant on energy imports. China, which currently imports 75% of its oil, is projected to raise this share to 80% by 2050, while India's reliance on imported gas is expected to grow from 50% to 75% over the same period.

New vulnerabilities due to energy transition and China's leading position:

The energy transition introduces new vulnerabilities, particularly due to the high concentration of critical mineral supply chains in China. Currently, 85–95% of battery components, 80% of solar panels, and 75–90% of rare earth refining capacity are located there. This geographic concentration creates potential risks for global energy security and underscores the importance of supply diversification.

Western response:

In response to the growing risks posed by the geographic concentration of critical mineral supply chains, Western economies have begun to take strategic action. The United States' Inflation Reduction Act and the European Union's Net Zero Industry Act include major incentives to localize clean energy manufacturing. Roughly 10% of the USD 2 trillion in public clean energy investment committed globally since 2020 comes with local content requirements. Early signs of progress are visible: announced battery cell manufacturing capacity in the U.S. and Europe appears sufficient to meet domestic needs by 2030, assuming planned projects (i.e. newly announced plants by firms such as Tesla, Northvolt, and CATL, some still pending construction or permitting) move ahead as scheduled. In contrast, in other segments of the supply chain (such as refined copper, lithium, nickel, and cobalt) between 50% and 95% of future supply growth is still expected to come from dominant producers like China and Indonesia, limiting true diversification.

To that end, the US Congress has embedded various support measures enacted in legislation, notably in its 2022 Inflation Reduction Act (IRA). IRA's tax credit provisions for electric vehicles are of particular concern to the European Union (EU). To qualify for these subsidies, set and progressively increasing percentages of minerals and battery components must come from North America or a country with which the US has a free trade agreement.

The UK has committed to advancing its clean energy industrial policy by establishing strategic partnerships with Canada and Australia to strengthen critical mineral supply chains. Concurrently, it is investing in domestic rare-earth refining capacity. As part of its broader strategy to reduce dependency on imported fossil fuels and technologies, the UK is also prioritising the scale-up of green hydrogen production and the deployment of small modular nuclear reactors (SMR).

2 Oil majors reshape strategies amid falling profits and market pressure

In 2025, oil majors are under significant economic pressure due to the sharp decline in Brent crude prices, which dropped below US$60 per barrel[1] in May, compared to nearly US$75 earlier in the year. This decreases, driven by geopolitical tensions and an oversupplied market, directly affects profitability and investment decisions across the sector.

[1]El País, *El oro negro pierde brillo*, May 13, 2025

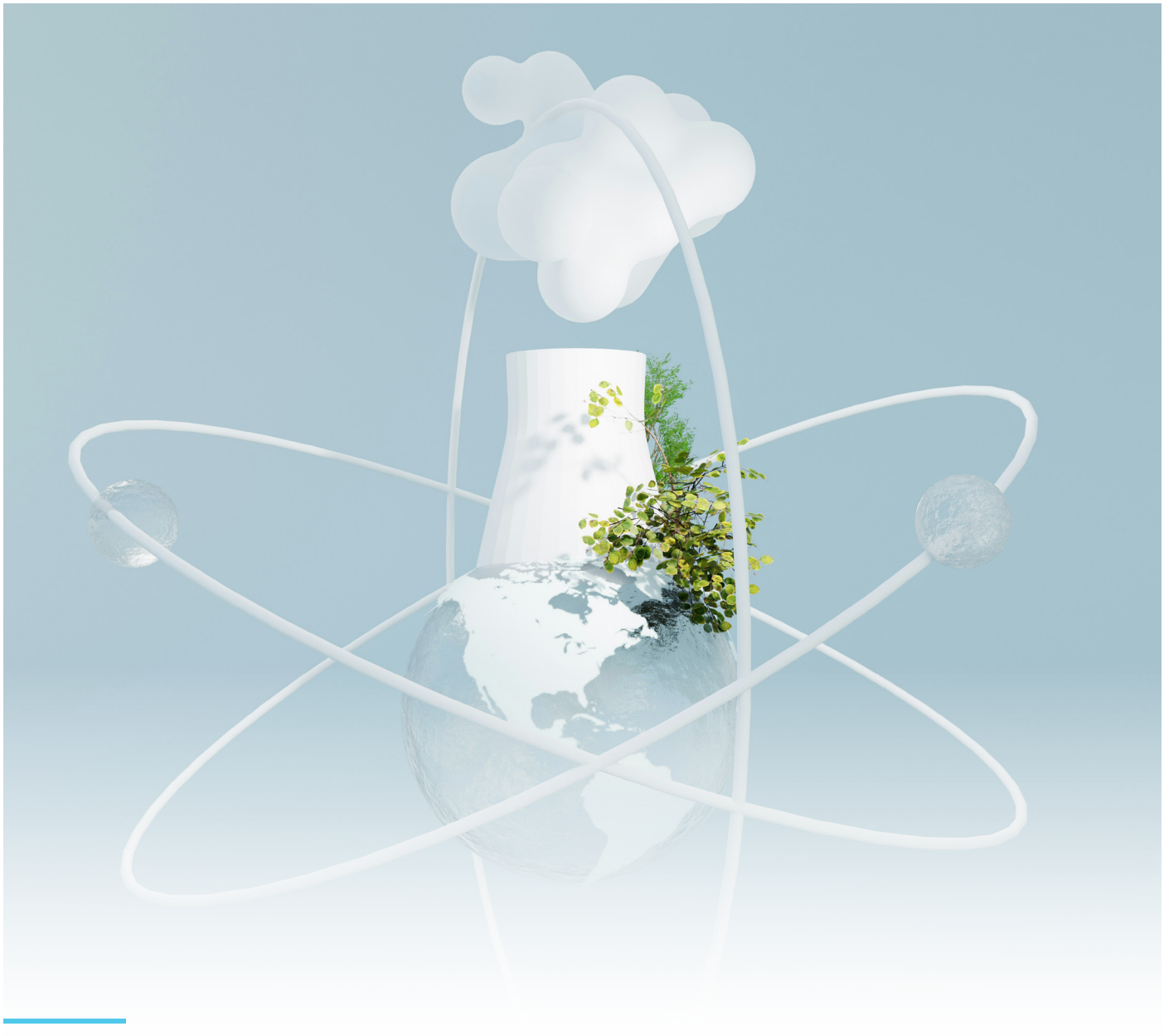
One clear example is TotalEnergies, which had already recorded a decline in net profit in 2024. The continued drop in oil prices in 2025 is reinforcing the need for strategic shifts. The company has cut its low-carbon investment plans by US$500 million[2], signaling a reassessment of its energy transition ambitions in light of tighter margins.

This issue is not isolated to TotalEnergies. Across the board, oil majors are revisiting their climate commitments. For instance, BP rolled back its target to reduce oil and gas production by 40% by 2030[3], lowering it to 25%. Similarly, Equinor has scaled back the scope and pace of its transition efforts, prioritizing shareholder returns amid market volatility.

These pressures have also impacted market valuations. BP's shares have dropped by about 27%[4] over the past 12 months, with an additional 10% decline in early 2025. The British major is now valued at around US$71 billion, less than half of Shell's market capitalization of US$189 billion. This imbalance, combined with investor frustration and strategic uncertainty, has triggered acquisition interest. Notably, Shell is reportedly exploring the merits of acquiring BP, in what would be a landmark consolidation to form a European energy powerhouse capable of competing with ExxonMobil.

While this potential merger is still in the evaluation stage and Shell is not the only potential buyer, it illustrates the mounting pressure for strategic repositioning among oil majors and the start of a new wave of industry consolidation.

[2]France 24, *Oil giants TotalEnergies, Equinor reduce low-carbon investments*, February 5, 2025
[3]France 24, *Oil giants TotalEnergies, Equinor reduce low-carbon investments*, February 5, 2025
[4]Bloomberg, *Shell is said to study Merits of BP deal as rival's stock slumps*, May 3, 2025



3 Energy mix transition

As the world pivots towards a more sustainable future, the prominence of renewables and nuclear power is steadily rising. This evolution is driven by declining technology costs, favorable regulatory frameworks, and a growing demand for low-carbon energy sources.

At the same time, fossil fuels remain dominant in the global energy mix, but their growth is slowing in the electricity sector, where they face increasing competition from cleaner alternatives. This shift is particularly evident in regions such as Europe and the United States, and reflects broader structural, policy, and market changes.

The following insights explore two key dynamics influencing this transformation: the rise of renewables and nuclear energy, and the slowing growth of fossil fuels in electricity production, highlighting the drivers, regional variations, and projected trajectories through 2030.

A. Rise of renewables and nuclear

Renewables and nuclear energy are on the rise globally. In 2023, modern renewables accounted for 12% of total energy supply, supported by a 20% increase in global investments reaching nearly USD 750 billion. Five new nuclear reactors also began operations in Belarus, China, Korea, the Slovak Republic, and the United States, showing that nuclear remains a key low-emissions source. In the first nine months of 2024, an additional 4.5 GW of nuclear capacity was connected to the grid in China, India, the UAE, and the US, and construction started on seven more reactors, mainly in China, Egypt, and Russia.

Among the European countries, UK in particular has emerged as a global leader in offshore wind, having added over 4 GW of new capacity in 2024[5]. It also re-affirmed its long-term commitment to nuclear with continued investment in the Sizewell C project[6] and early-stage SMR development. Solar deployment and heat pump adoption are rising steadily, supported by the Warm Homes initiative announced in mid-2025[7].

[5]Renewable UK, *Official stats show renewables generated over half UK's electricity for the first time in 2024*, March 27, 2025
[6]Financial Times, *Sizewell C nuclear project to get go-ahead during Anglo-French summit*, June 3, 2025
[7]The Guardian, *Labour's £13.2bn warm homes plan will not face cuts in spending review*, June 5, 2025

Key drivers:

Policy support is a key driver behind the global shift toward renewables and nuclear, with strong momentum in Europe and Asia, while recent federal rollbacks in the United States have slowed progress in clean energy investment and deployment.

Policy support continues to accelerate the shift towards renewable and nuclear power in Europe and Asia. In Europe, countries like Germany have set ambitious targets, aiming to source 80% of their electricity from renewables by 2030 and 100% by 2035. The UK has also shown similar commitments in this space through its Net-Zero 2050[8] and ZEV Mandate[9].

In Asia, China continues to lead in renewable energy adoption, having installed nearly 350 GW of new capacity in 2023, more than half of the global total. The country is expected to exceed its 2030 wind and solar target of 1,200 GW ahead of schedule. India is planning significant additions with 500 GW of non-fossil fuel capacity by 2030, while ASEAN countries aim to add 225 GW. However, many Asian economies remain reliant on fossil fuels, and current renewable targets may not be sufficient to meet climate goals. The IEA suggests that government intervention and policy changes are essential to boost renewable energy adoption and phase out fossil fuels.

In contrast, since March 2025, the United States has experienced a reduction in federal policy support, which in turn has contributed to a noticeable slowdown in clean energy investment and manufacturing—especially in emerging technologies that are highly sensitive to policy and regulatory shifts.

Renewables growth:

The global renewable energy landscape is experiencing significant growth, with renewables accounting for the largest share of the increase in global energy supply in 2024 (38%). This expansion is primarily driven by the power sector, where electricity demand surged by 4.3% in 2024, well above the 3.2% growth in global GDP, due to factors such as record temperatures, electrification, and digitalisation.

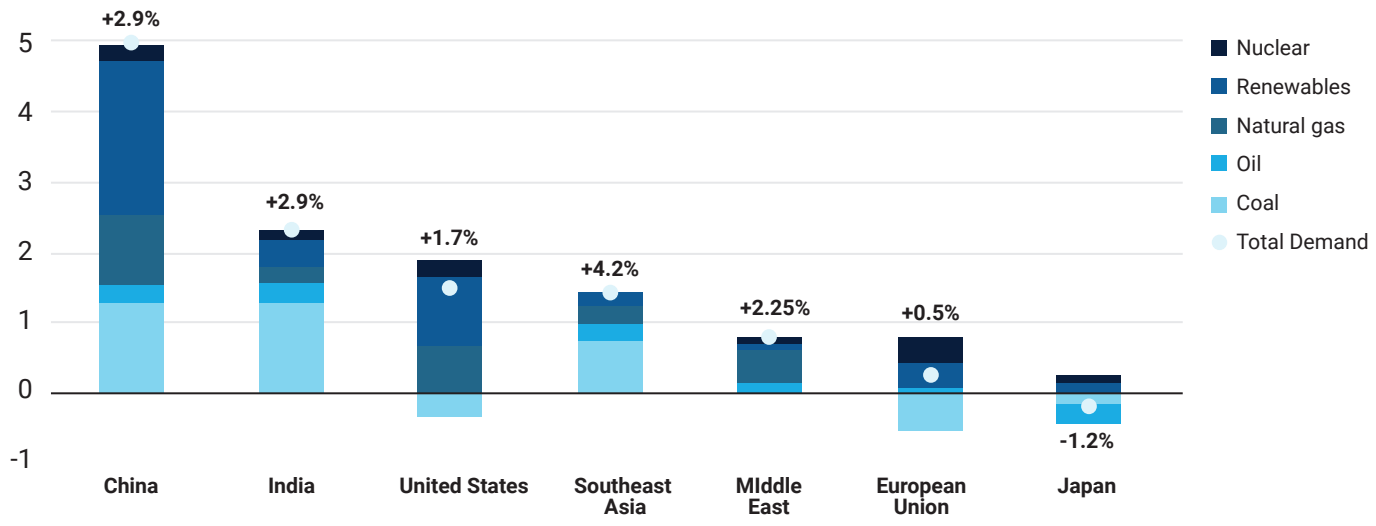
In terms of electricity generation, renewables collectively accounted for one-third of global electricity production in 2024, led by hydropower (14%), wind (8%), solar PV (7%), and bioenergy and waste (3%). Nuclear power contributed 9% to global electricity generation.

[8]UK Government, *Net Zero Strategy: Build Back Greener*, October 19, 2021
[9]UK Government, *Pathway for zero emission vehicle transition by 2035 becomes law*, January 3, 2024

Asia, particularly China, continues to lead in renewable energy production. In 2024, China produced 2.46 trillion kWh of renewable energy, contributing significantly to Asia's total of 3.62 trillion kWh. This growth is fueled by declining costs of solar and wind energy and increasing corporate and public demand for sustainable energy.

Despite the rise in renewable energy, the global energy mix remains heavily reliant on fossil fuels. In 2024, emissions from coal rose by 2%, natural gas emissions increased by 3.7%, and oil emissions rose by 0.3%, reflecting the continued reliance on fossil fuels to meet expanding industrial activity and improve energy access.

Change in energy demand, selected regions, 2023-2024



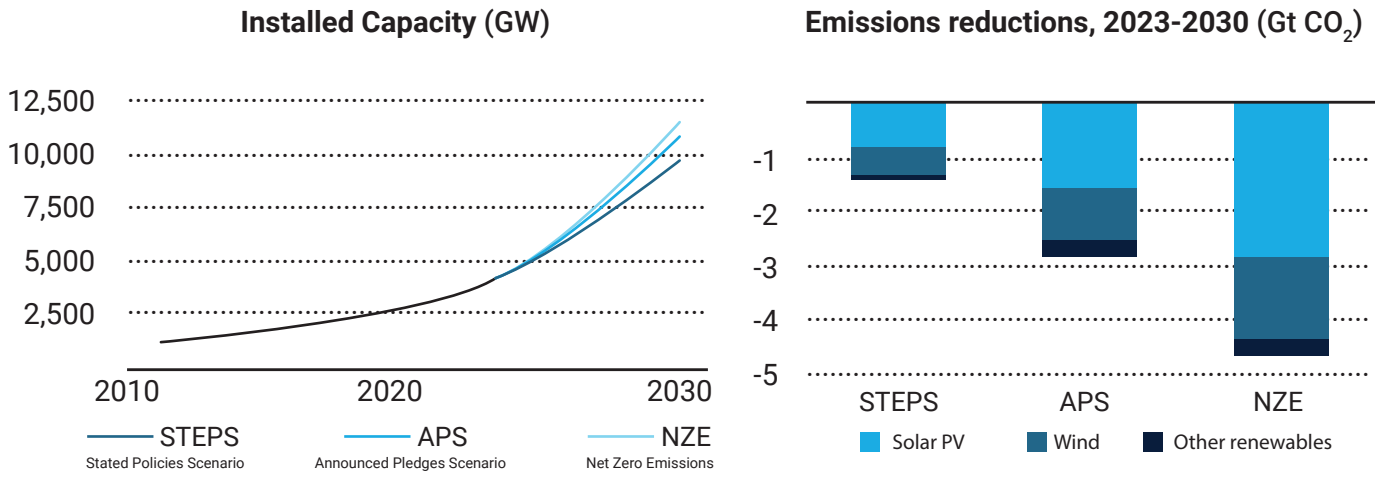
Source: Energy Institute (2025)

The chart above illustrates projected changes in energy demand across key regions from 2023 to 2024, highlighting both total demand growth and the contribution of different energy sources. Notably, fossil fuels remain a significant driver of this growth, even in regions with rising renewable adoption.

This data underscores that while the share of renewables in electricity generation is increasing, the absolute consumption of fossil fuels continues to grow due to rising global energy demand. Therefore, renewables are currently supplementing the growth in energy demand rather than replacing existing fossil fuel consumption.

Over the past few decades, the global energy source mix has remained largely unchanged, as can be seen on the graph below.

Global installed capacity of renewables, 2010-2030, and emissions reductions by scenario, 2023-2030



Installed capacity of renewables increases between 2.5- and 3-times by 2030 in each scenario, leading to significant emissions savings

Notes: GW = gigawatt; Gt CO_2 = gigatonnes of carbon dioxide. Other renewables include hydropower, bioenergy and renewable waste, geothermal, concentrating solar power and marine power.

Source: Energy Institute (2024)

This graph shows that global renewable energy capacity is set to increase significantly by 2030, between 2.5 and 3 times compared to today, under all three scenarios (STEPS, APS, and NZE). This rapid growth, especially in solar PV and wind power, is expected to lead to major reductions in CO_2 emissions, with the most ambitious scenario (NZE) achieving the greatest cuts, approaching five gigatonnes of CO_2 avoided between 2023 and 2030.

However, U.S. federal clean energy investments are expected to decline in 2025.

Since the start of the year, over $8 billion[10] worth of clean energy projects (including solar, wind, hydrogen, and battery initiatives) have been cancelled or scaled back. These cuts have already resulted in the loss of approximately 20,000 jobs, with an additional 40,000 at risk[11].

In March 2025, the Trump administration paused federal funding for renewable energy initiatives—previously supported under the Inflation Reduction Act and the Bipartisan Infrastructure Law—for 90 days. The proposed 2026 federal budget seeks to eliminate more than $15 billion in clean energy and carbon capture funding, along with $6 billion for EV charging infrastructure. These rollbacks have sparked lawsuits from 17 states and Washington, D.C., highlighting growing political and economic tension around the country's clean energy future.

Nuclear comeback:

Nuclear power continues to play a significant role in the global electricity landscape. As of 2024, it accounts for 9.5% of global electricity generation, with a higher share of nearly 20% in advanced economies.

The International Energy Agency projects that nuclear generation will experience an average annual growth of close to 3% through 2026. This growth is supported by the completion of maintenance in France, the restart of reactors in Japan, and the commissioning of new reactors in countries such as China, India, Korea, and various European nations.

In 2024, over 7 GW of new nuclear capacity came online, marking a 33% increase compared to 2023. This addition represents the fifth-highest level of new capacity in the past three decades.

China has emerged as a significant player in nuclear energy development. By the end of 2024, 63 nuclear reactors (totaling 71 GW) were under construction worldwide, with half of them located in China. This expansion aligns with China's goals to reduce carbon emissions and achieve net-zero targets by 2060.

Conversely, some countries are moving away from nuclear energy. For instance, Germany has been phasing out its nuclear power plants, reflecting policy decisions influenced by various factors, including public opinion and energy strategy.

[10]Gridmonitor, *Nearly $8 billion in U.S. clean energy investment announcements cancelled in 2025*, April 18, 2025
[11]Clean Investment Monitor, *US clean energy supply chains 2025*, April 24, 2025

In Europe, nuclear energy remains a significant component of the electricity mix. However, the share of nuclear power in Europe's electricity production has been declining, falling below 25%, with projections indicating it may drop under 15% in the next decade.

Overall, while nuclear energy faces challenges such as policy variability and competition from other energy sources, it continues to be a vital part of the global strategy to reduce carbon emissions and ensure energy security.

B. Slower growth and shifting shares for fossil fuels

The global energy landscape is evolving, with the share of electricity generated from fossil fuels beginning to shift under the influence of economic, regulatory, and geopolitical factors. While fossil fuels continue to dominate electricity generation globally (representing 65% in 2024) their growth is slowing, with a projected compound annual growth rate (CAGR) of 1.8% between 2024 and 2029. China remains the largest producer of fossil-based electricity, generating 5.66 trillion kWh in 2024.

The sector is undergoing structural changes driven by:

Implementation of carbon pricing mechanisms

Stricter environmental regulations

Declining costs for renewable energy technologies

Evolving investor preferences

Increased market volatility caused by geopolitical developments

These shifts are altering the composition of the global electricity mix. Although fossil fuels remain a major source of energy, particularly in China and the United States, their dominance is increasingly being challenged by low-carbon technologies. This is driving accelerated investment in renewable power and storage solutions, although no global decline in fossil fuel use beyond the electricity sector has been clearly observed yet.

In terms of broader energy consumption, oil's share of total energy demand fell below 30% in 2024, a historic low since its peak at 46% fifty years ago. This drop reflects structural changes in the transport sector, including the rise of electric vehicles, natural gas-fueled freight, and expansion of high-speed rail, especially in China.

Market volatility and price adjustments in the USA

In early April 2025, the United States announced broad import tariffs (10%), excluding Canada and Mexico (25%), triggering retaliatory responses from these countries and China. The announcement coincided with OPEC+ unexpectedly increasing oil production, originally scheduled for later in the year. These developments caused Brent crude oil prices to drop by 14% in five days, reaching $66 per barrel on April 7, 2025. Continued fluctuations are expected as markets absorb the effects of these trade and supply disruptions.

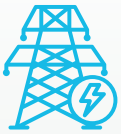
4 Surge in clean energy investments amid regional disparities

The global drive towards net-zero emissions has catalyzed unprecedented investments in clean energy technologies. In 2024, total energy investment worldwide was poised to exceed USD 3 trillion, with approximately USD 2 trillion directed towards clean technologies, including renewables, electric vehicles, nuclear power, grids, storage, low-emissions fuels, efficiency improvements, and heat pumps.

Global investment highlights (2024):

Solar power: Exceeds USD 500 billion, remaining the single largest source of power generation investment

Nuclear power: New capacity additions rose by 33% compared to 2023; nuclear construction starts increased by 50%, driven primarily by China and Russia



Grid infrastructure: Investment set to reach USD 400 billion, driven by upgrades and expansion efforts in Europe, Latin America, and parts of Asia

Battery storage: Investment on track to hit USD 54 billion, as falling costs improve deployment economics

Impact on industries:

Expansion of carbon markets

Surge in green finance investments

Rising compliance costs for fossil fuel-dependent sectors

Policy divergence and the U.S. pullback:

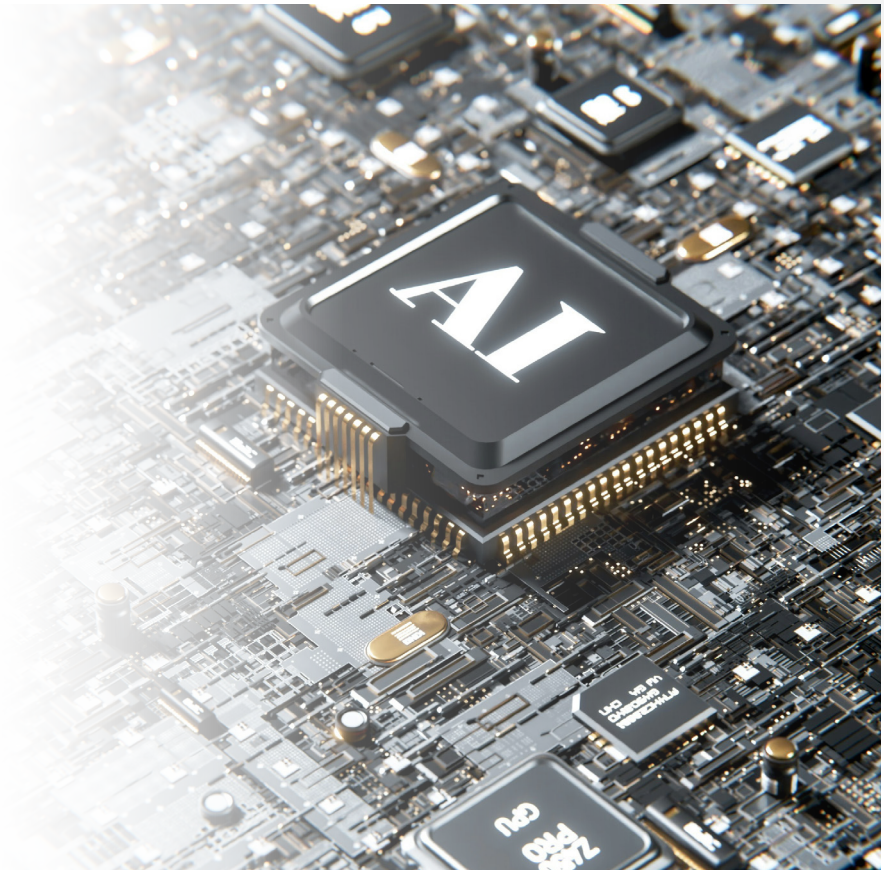
While China and the European Union continue to scale up public and private financing in clean energy, the United States has seen a sharp reversal in federal climate and energy policy. Following the U.S. withdrawal from the Paris Agreement in March 2025 under the Trump administration, multiple federal programs supporting carbon capture (CCUS), decarbonization, and green finance have been cancelled or suspended. This includes the withdrawal of hundreds of millions of dollars previously earmarked for clean technology deployment and infrastructure. At the same time, regions such as Africa, Latin America, and Southeast Asia continue to lag in clean energy investment, underscoring the urgent need for targeted policies and financial mechanisms to support energy transitions in these parts of the world.

While global clean energy investment continues to accelerate, shifts in political leadership and policy direction, especially in major economies such as the United States, create significant uncertainty. This highlights the critical need for stable and consistent long-term policy frameworks to maintain momentum in the global push for decarbonization.

5 Digitalization and technological innovation are reshaping the energy sector

The rapid advancement of digitalization and technological innovation is fundamentally reshaping the energy sector, revolutionizing the ways in which we manage, distribute, and utilize energy resources to create more efficient, sustainable, and secure systems.

Artificial Intelligence & Smart Tech:



Artificial Intelligence and smart technologies play a pivotal role in this transformation. For instance, AI is revolutionizing network management by making energy grids more efficient, predicting maintenance needs, and reducing the risk of unexpected failures. In fact, AI-driven optimization has been shown to improve energy output by 8.5%[12], while predictive maintenance algorithms have reduced unplanned outages by 35% compared to traditional methods. The ability to analyze vast amounts of data is uncovering new opportunities for energy savings, transforming energy management with predictive analytics and real-time optimization.

Key applications:

Key applications include smart grids, which help balance electricity supply and demand more efficiently. Artificial intelligence is also playing a growing role in the energy sector. It is used in areas such as biofuel discovery, electric vehicle (EV) charging optimization, and clean energy research. Companies like Shell are already applying these technologies. These advancements lead to better forecasting, improved reliability, and enhanced sustainability in energy distribution.

Impact:

The impact of these advancements is profound. While enhanced productivity and reduced operational costs are important early outcomes, their true value lies in how they enable a broader transformation. These technologies play a critical role in advancing sustainable energy models, helping to build systems that are not only more efficient but also more environmentally responsible.

Moreover, the integration of smart technologies improves the security and reliability of energy systems, addressing some of the critical challenges in the sector.

[12]International Journal of Science and Research Archive, *AI-driven predictive maintenance and optimization of renewable energy systems for enhanced operational efficiency and longevity*, October 2024

6 Surging electricity demand from data centers

The exponential growth of digital services is fundamentally altering the energy landscape, with data centers emerging as significant consumers of electricity.

The exponential growth of digital services is fundamentally altering the energy landscape, with data centers emerging as significant consumers of electricity. As cloud computing, streaming services, gaming, and large-scale AI models continue to expand, electricity consumption by data centers, already estimated at 240–340 TWh (about 1–1.3% of global power use) in 2022, is once again growing rapidly after a plateau from 2010–2020. Investment in AI startups, some USD 225 billion over the past five years, and capital spending of around USD 150 billion by major tech firms in 2023 underscore the scale of this surge. These trends necessitate innovative solutions and sustainable practices to manage rising demand and maintain grid reliability.

Key drivers:

The rapid growth of cloud computing, streaming services, gaming, and large-scale AI models is driving a significant surge in electricity demand from data centers. Currently, data centers consume about 6-8% of global electricity. This demand is projected to nearly double by 2030, potentially rising to 11-15%. This increase is fueled by the exponential growth in digital services and the need for extensive data processing and storage capabilities.

Several key factors are currently shaping the evolution of global data center infrastructure and energy demand:

Surging demand in Asia: Rapid industrialization and digital adoption in China and India account for many new data-center megawatts, driving a regional spike in electricity needs.

AI and new services: Although AI today represents a modest share of data-center load, breakthroughs like NVIDIA's Blackwell GPUs—which cut energy per compute by roughly 75 %—are spurring both efficiency gains and rebound effects as usage expands.

Supply-chain bottlenecks: Over 90 % of advanced AI chips are produced by a single vendor (TSMC), whose 3–5-year lead times for new fabs constrain how quickly capacity can scale.

Policy and investment frameworks: Industrial-localization policies support domestic chip and data-center buildouts, even as trade restrictions on key components and local permitting rules introduce uncertainty.

Projected increase:

To manage this rising demand, energy-efficient cooling systems and AI-driven optimization techniques for power usage are increasingly being implemented in data centers. This helps reduce energy consumption and improve operational efficiency. Additionally, there is a notable shift towards renewable energy sources to minimize the carbon footprint of data centers. In 2023, the top ten corporate buyers of clean electricity through power purchase agreements included major data center operators such as Amazon, Meta, Alphabet, and Microsoft, illustrating the sector's strong commitment to decarbonization.

This transition is supported by growing regulatory pressure on greener energy solutions and increased transparency in energy use.

Driven by technological advancements, regional demand growth, and policy shifts, the surging electricity demand from data centers is reshaping the energy landscape. This trend underscores the critical need for sustainable practices, robust supply-chain strategies, and innovative regulatory frameworks to ensure a balanced and efficient energy future.

7 The energy sector is working to bridging the skills gap and integrate new technologies

Navigating the rapid evolution of the energy industry presents significant challenges, particularly in bridging the skills gap and integrating new technologies. There is a high demand for skilled workers in renewables, nuclear power, and digital grid management. This trend highlights workforce challenges, rising job demand, and the industry's efforts to address them.

Key drivers:

The demand for skilled workers in the energy sector stems from the adoption of new technologies and the rapid evolution of the industry. There is a pressing need for expertise in renewables, nuclear power, and digital grid management. The International Energy Agency (IEA) reports that the global energy sector added nearly 2.5 million jobs in 2023, bringing total employment to over 67 million workers. This growth stresses the critical need for a skilled workforce to support the transition to cleaner energy sources and advanced technologies.

Rising Job Demand (between 2019 & 2024):

Regulatory & energy storage specialists: Job posting increased to 99% for regulatory roles and 136% for distributed energy engineers.

Nuclear workforce: Job postings increased to 56%.

Data centers specialists: Job postings increased to 344%.

This surge in job demand highlights the industry's need for specialized skills to manage and optimize energy systems effectively.

Industry response:

To address these workforce challenges, the energy sector is investing in academic partnerships and specialized training programs. Companies are implementing aggressive hiring strategies to build a sustainable workforce capable of supporting the industry's growth and technological advancements.

In the UK, programs like the Green Jobs Taskforce[13] and STEM re-skilling grants[14] are part of national strategies to address the shortage of skilled energy workers.

The IEA emphasizes the importance of collaborative efforts between governments, energy firms, labor representatives, and educational institutions to manage labor transition risks and ensure a people-centered transition to cleaner energy sources.

[13]UK Government, *Green Jobs Taskforce report*, July 14, 2021
[14]UK Government, *Net Zero Strategy: Build Back Greener*, October 19, 2021

Conclusion

The energy landscape in 2025 presents a paradox of opportunity and uncertainty. As clean energy investment accelerates and digital innovation reshapes the industry, vulnerabilities, ranging from supply chain dependencies to global instability, remain acute. Navigating this environment requires strategic foresight, operational agility, and sustained commitment to transformation. The decade ahead will test the sector's ability to evolve at speed and scale. Energy players that act now, by investing, diversifying, and building resilience, will be best positioned not only to adapt, but to lead.

The question is no longer whether the energy sector will transform, but at what speed and scale this transformation will unfold.

To translate this urgency into action, energy leaders must prioritize concrete measures that will shape their competitiveness and impact in this rapidly evolving landscape.

KEY TAKEAWAYS:

What energy players should do now

Accelerate investments in clean energy

Global energy investments were projected to exceed $3 trillion in 2024, with more than $2 trillion directed toward clean energy technologies. Companies should scale up commitments in renewables, energy storage, grid modernization, and efficiency solutions to meet policy objectives and soaring electricity demand (especially from emerging markets and digital sectors like data centers).

Strengthen supply chain resilience

The high concentration of critical mineral processing—especially lithium, cobalt, and rare earths—in a few countries such as China poses systemic risks. Companies must diversify sourcing strategies and secure more robust, localized supply chains to mitigate exposure to geopolitical disruptions and trade volatility.

Modernize and digitize electricity infrastructure

Expanding and upgrading transmission and distribution networks is vital to integrate the accelerating deployment of variable renewable energy. Incorporating digital grid management and AI-driven optimization will enhance operational efficiency, reduce outgages, and support the shift toward smarter, more flexible systems. This is essential to handle record electricity demand increases and a growing share of renewables, which accounted for 38% of global energy supply growth in 2024.

Integrate geopolitical risk and workforce strategy into long-term planning

Global conflicts and trade rivalries continue to disrupt supply chains and increase market volatility. Energy leaders must embed geopolitical foresight into corporate strategy and invest in building a resilient, skilled workforce. This includes supporting education pipelines, specialized training in renewables and nuclear, and aggressive talent acquisition initiatives. The resurgence of nuclear construction—up 50% in 2024 and led by Chinese and Russian designs—also calls for long-term talent development strategies in specialized sectors.

Need support navigating these transformations?

The Energy & Utilities Business Community at Nextcontinent brings together expert consultants from across our international network to help companies face complexity with clarity. We support clients in their energy transition and the evolution of their business models. From strategy development to operational project support, we empower industry players to transform energy transition into a successful opportunity. To learn more about our capabilities and explore how we can support your strategic evolution, visit nextcontinent.net.

Who We Are

We are a major international network of consulting firms that we like to call *Citizens*.

12 **citizens:** diverse, independent consulting firms

30 **countries:** in Europe, Americas, Asia, Oceania and Africa

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3,000 **consultants:** professionals in the global Nextcontinent network

Vision

Who do we want to be in 5-10 years?

We will be competing successfully in the top tier of the management consultancy market as a big, broad, strong international network of independent consulting firms, having aggregated all our strengths.

We will be known for maximizing results for clients through local and global expertise.

- Recognized as an attractive, alternative model to traditional global consultancies — differentiated by being more pragmatic, outcomes-focused, people-centred, tailored in approach, and attuned to local client cultures
- Seamlessly collaborating to innovate and deliver the results that matter most to our clients — unlocking value through synergy of worldwide expertise and local market knowledge
- Stronger together — each Citizen's independence strengthened through our global reach, blending world-class teamwork with agile, flexible, personalized service to local clients

Thank you

COORDINATED BY:

Mariano Amendolaro
Director at Paradigma
mamendolaro@paradigma.com

Olivier Pagès
Partner – Energy, Infrastructure & Industry
at Eurogroup Consulting France
olivier.pages@eurogroupconsulting.com

WRITTEN BY:

Anaëlle Pin
International Network Coordinator
apin@paradigma.com

And contributed to by the Energy and Utilities Business community.

Contact

Nextcontinent
François Pouzeratte
President
francois.pouzeratte@nextcontinent.net

Nextcontinent
Anaëlle Pin
International Network Coordinator
apin@paradigma.com

www.nextcontinent.net

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Outlook 2025:
Navigating the Global Energy Landscape

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