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Charging Forward:
THE CASE FOR INVESTING IN POWER NOW

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- **Global demand for power has exploded since the mid-20th century**[1] and is set for more dramatic growth in the decades ahead.[2] Industrial development and an expanding middle class are driving demand for power infrastructure in emerging economies. AI-driven investment in data centers, EV adoption, and industrial electrification are stretching power networks in the developed world.

- **Countries, companies, and customers are demanding cleaner power.** Natural gas has been seen as a logical source of inexpensive, stable, clean***er*** power, but it is far from emissions-free and its pricing is volatile.[3] Renewable power's intermittent nature requires energy storage and resilience technology. Nuclear is emissions-free and provides stability, but waste, cost, and perception remain challenges.

- **Establishing the supply needed to meet demand requires new and better solutions.** Technological advances and policy changes both in the U.S. and other key countries and blocs support long-term growth for companies with sustainable competitive advantages in power markets.

- **Disruptions to the long-term growth trajectory for renewables remain a risk**, given geopolitical uncertainty and the imperative among developing nations to generate economic growth. The secular trend toward cost parity between renewables and fossil fuels should, however, continue to support expansion of emissions-free solutions.[4]

- **In this report, we highlight sectors that we believe are positioned to benefit** from this classic supply/demand imbalance over the long term:

  - Grid infrastructure and broad infrastructure
  - Energy generation operators (utilities)
  - Raw materials, metals, minerals
  - Storage, efficiency, resilience solutions
  - "Beaten-down" renewable energy OEMs
  - Natural gas products and services
  - Carbon capture storage

This note is a summary of our full-length report, available for download here:
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Introduction and Overview

As proponents of long-term investing, Pathstone seeks to identify and understand secular trends and disruptive forces that are likely to drive sustained and varied opportunities for investment. Along with many fund managers with whom we place capital on clients' behalf, we see long-term potential rooted in the imbalance of electricity supply with demand, which has seen a recent boost – a turbocharge, really – from the advent of generative artificial intelligence (AI).

The transition to renewable energy is well under way, but the interplay between power demand and supply also reflects near-term realities, risks and headwinds. In this report we attempt to provide a clear-eyed assessment of these demand and supply drivers in the context of the long-term global push to decarbonize the energy landscape. We also highlight segments of the electrification supply chain that we regard as holding long-term potential to benefit from these trends.

If you are a Pathstone client and would like more information about specific investment opportunities, please contact your client advisor.

Demand Drivers: Economic Development, AI, and the Push to Decarbonize in a Challenging Environment

Global demand for electrical power has increased significantly since the mid-20th century and is expected to grow even more in the coming decades. In the United States, the Energy Information Agency (EIA) reports that electricity consumption has quadrupled since the 1950s.[5] This trend is mirrored globally, with expectations for a 50-100% increase in electricity demand over the next 25 years.[6]

In emerging economies, industrial development and a growing middle class have been fueling growth in demand for electricity, while in developed countries, the adoption of electric vehicles (EVs) and the industrial shift toward renewable energy have been the key drivers.[7]

The mainstream launch of ChatGPT and other AI tools recently lit a match under demand expectations. A generative AI query such as one might make through ChatGPT uses as much as ten times the energy as a (pre-AI) Google search. Morgan Stanley estimates that global power needs for data centers will surge from 15 terawatt hours (TWh) in 2023 to 220 TWh in 2027.[8]

Efforts to decarbonize the economy globally support an increasing role for renewable energy sources in satisfying demand. There are significant forces at play that create tension and risk in this space, however:

- The all-in cost of renewables, including transmission and storage, remains higher than that of natural gas, the prevalent form of energy in use.[9]
- The initial cost of investment in low- or zero-carbon energy infrastructure can be prohibitive. Developing countries are unlikely to prioritize cleaner power systems at the expense of short-term economic growth and social mobility.
- Recent conflicts and trade tensions have heightened the focus on energy security, with countries striving to stabilize their energy infrastructure and reduce reliance on regions like Russia and the Middle East. This need for energy security often conflicts with long-term decarbonization goals, as seen in Germany's temporary return to coal-fired power amidst the natural gas crisis created by Russia's invasion of Ukraine.

Supply Dynamics: Renewables, Natural Gas, Nuclear…All of the Above?

Renewable energy prices have declined significantly over the past 25 years as a result of subsidies, industry maturation, and increased manufacturing capacity. National policies and incentives, such as the U.S. Inflation Reduction Act (IRA) and similar initiatives in Europe and Asia, have been crucial in driving clean energy investments, as have commitments from major tech companies. Google, for example, has pledged to source emissions-free electricity for its data centers, aiming for net-zero emissions by 2030.[10] However, challenges remain in delivering reliable energy using renewables alone given the challenges of storing and distributing the electricity.

Natural gas plays a transitional role in decarbonization efforts due to its lower carbon intensity compared to coal. Electricity from natural gas fired thermal generation plants is less carbon intensive than the incumbent electric fuel source, coal. Natural gas is also a dispatchable energy source. It can quickly fill supply gaps when intermittent sources like solar or wind are down. However, natural gas is not emissions-free, and it carries environmental risks. Also, natural gas prices have been volatile, influenced by factors like extreme weather and geopolitical events.

Nuclear power could also play a more significant role in future energy systems, especially with the development of small modular reactors (SMRs) and potential advancements in nuclear fusion. However, the majority of new emissions-free power generation capacity is expected to come from solar and wind.

Overall, an "all-of-the-above" approach, incorporating renewables, nuclear, backup batteries, and more sustainable hydrocarbons, is likely to shape the future power system.

Sectors Likely to Benefit

The transition to a cleaner energy system necessitates significant investment in renewable power, with BloombergNEF estimating that over 1,400 gigawatts of renewable power need to be installed annually through 2050. Despite record investments in 2023, the gap between current funding and the required investment remains substantial.[11]

Regardless of short-term disruptions from economic and geopolitical events, changes in government policy together with customer demand will continue to fuel long-term growth in key parts of the power generation and distribution supply chain, particularly those that play a role in the transition to clean energy. We highlight the market segments positioned to benefit in Figure 1.

Conclusion

Power demand growth is creating challenges for a smooth transition to the renewables-based power system required by science-based targets to prevent the worst impacts from climate change. The growth of renewables delivered to the grids worldwide over the past few years is promising, but there is a gap in what is being delivered versus what is required for a timely transition to renewables. Technological barriers are falling, policy/fiscal incentives are rolling out, and continued investor demand for these solutions are all trends coalescing right now to support investors in the short, medium, and long term.

To this end, opportunities for investors may coincide with the greatest needs: electrical infrastructure equipment and service providers, electricity generators like utilities, renewable energy manufacturers, technologies that fill the gaps of renewable energy in terms of storage, efficiency, and resilience; and the companies and technologies that will solve the challenges traditional fossil fuel companies face, especially carbon capture and storage.

Figure 1: Power and Related Sectors Likely to Benefit from Energy Transition

Grid infrastructure and broad infrastructure	▪ High voltage transmission lines, transformers, electrical components, other electronics hardware and software. ▪ Roads, trucks, boats, trains, other broad supporting infrastructure. ▪ Construction and engineering services.
Energy generation operators – electric utilities and independent power producers	▪ Utilities that can afford the capex necessary to connect existing power generation assets to new sources of demand, and/or to build new renewable power generation capacity.
Raw materials, metals, minerals	▪ Companies that can navigate the mining, processing, shipping, logistics, and fabrication of raw materials into useful base components.
Beaten down renewable energy OEMs (original equipment manufacturers)	▪ OEMs are descending into "value" territory despite projected longer-term growth as the energy transition unfolds. ▪ The rollout of tax credits and ongoing implementation of the Inflation Reduction Act could bolster sales. ▪ Beaten-down renewable OEMs could have the most to gain from a decline in interest rates.
Storage, efficiency, and resilience solutions	▪ In addition to lithium batteries, storage technologies just emerging from the R&D phase and working towards commercialization. ▪ Energy efficiency solutions such as electrification (e.g., vehicles and some residential building applications; energy management systems. ▪ Smart grid technology, virtual power plants, and other software and hardware products to enable renewable energy systems to reliably integrate with the end use of the power.
Natural gas products and services	▪ Utilities with generation turbines, natural gas services companies, decentralized/distributed generation backup power systems, and other avenues that acknowledge the continued role of natural gas in the power system.
Carbon capture storage	▪ Carbon capture storage – either at the point of use, or in wider atmosphere – is the process of using technology or natural solutions (e.g., living or geologic processes that 'eat' carbon dioxide) to remove carbon emitted from using fossil fuels and other sources of carbon emissions (e.g., agriculture).

Source: Pathstone, using information from multiple sources cited throughout this report.

Sources

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Disclosures