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# *Navigating* the U.S. Energy Transition

Energy Resilience and the Role of Long-Term Investment Strategy

**Authors:**

**Ilona Vovk, CFP®**

Vice President, Investment Strategy

**Melanie Fornes**

Climate Change Investment Specialist, Sustainable Investing

**GLENMEDE**

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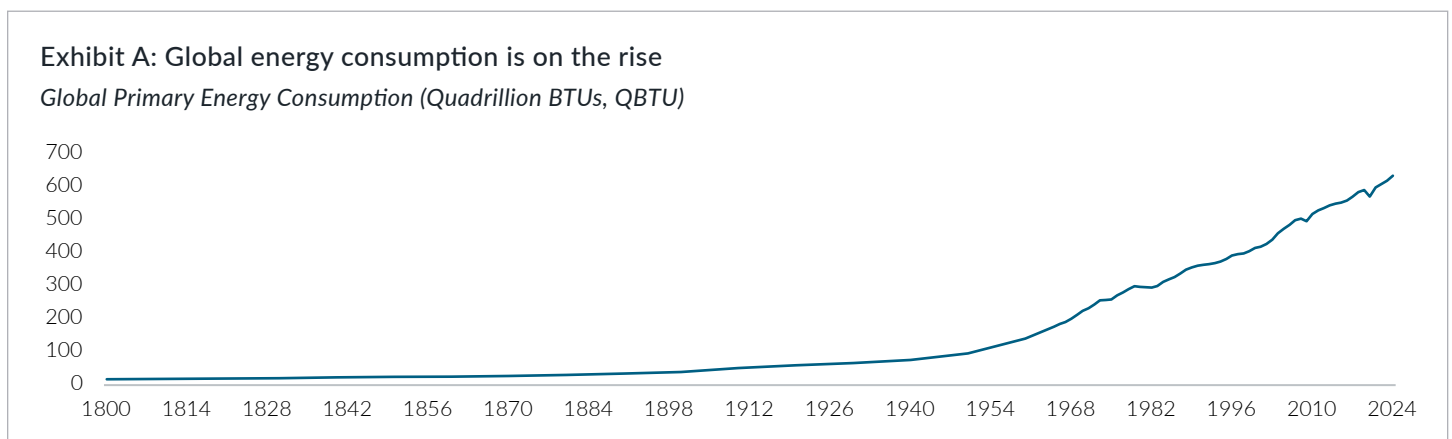
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## Executive Summary

- Energy demand is rising, driven by artificial intelligence (AI), electrification, and industrial reshoring, which are raising supply-demand imbalance and price risk.
- Past energy demand shifts were triggered by rising consumption, while today's transition is structural and will require new investment across traditional and emerging sources.
- The future of the U.S. energy system will likely hinge on how innovation, policy, and capital deployment interact.
- The energy transition will impact companies differently across the energy supply chain, requiring investors to apply sector-specific, forward-looking metrics and analysis to assess risks and opportunities.

## Introduction: A Sharp Rise in Energy Demand

Global energy demand has nearly doubled over the past 40 years to reach 600 quadrillion British Thermal Units (BTUs) annually, enough to power every U.S. home for more than a century (Exhibit A). This sharp rise is primarily led by China, the U.S., India, Russia, and other major economies, which together account for over 50% of global energy consumption.



Source: Glenmede, Our World in Data

Data as of 12/31/2024

Data shown represent global primary energy consumption trends over time, measured in quadrillion British thermal units (QBTU).

The U.S. in particular stands out for its energy intensity, representing less than 5% of the world's population but nearly 16% of global consumption. The core challenge is whether the U.S. energy system, which is shaped by an aging infrastructure, prolonged permitting processes, and fragmented oversight, can evolve quickly enough to deliver reliable, affordable power where and when it is needed. If not addressed, the difference between demand and supply could lead to energy shortfalls, regional reliability risks, and sustained pressure on prices.

This paper explores the structural forces reshaping energy demand, assesses how well today's infrastructure and regulatory environment are positioned to meet rising demand, and outlines plausible scenarios for how the U.S. energy system may evolve. It also offers insight for identifying companies well-positioned to benefit from this structural shift and support true energy resiliency.

## Energy Through Time: A Historical Context

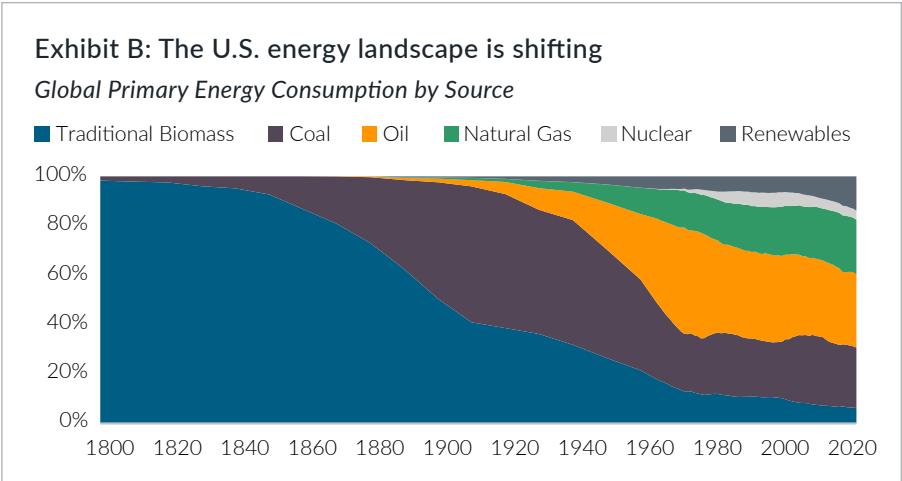
The U.S. energy landscape has undergone multiple evolutions, each tied to broader global economic and technological shifts.

In the early 1800s, wood met the bulk of America's energy needs, but by the late 1800s coal had taken the lead, powering railroads and factories through the first wave of industrialization. Oil began to climb in the early 20th century, driven by the popularity of internal combustion engines, while natural gas followed as pipeline infrastructure expanded to support residential and commercial use. These shifts occurred in part because the fuel being replaced was no longer sufficient—wood supplies grew scarce, and coal could not keep pace with the scale and efficiency demanded by modern engines and industries.

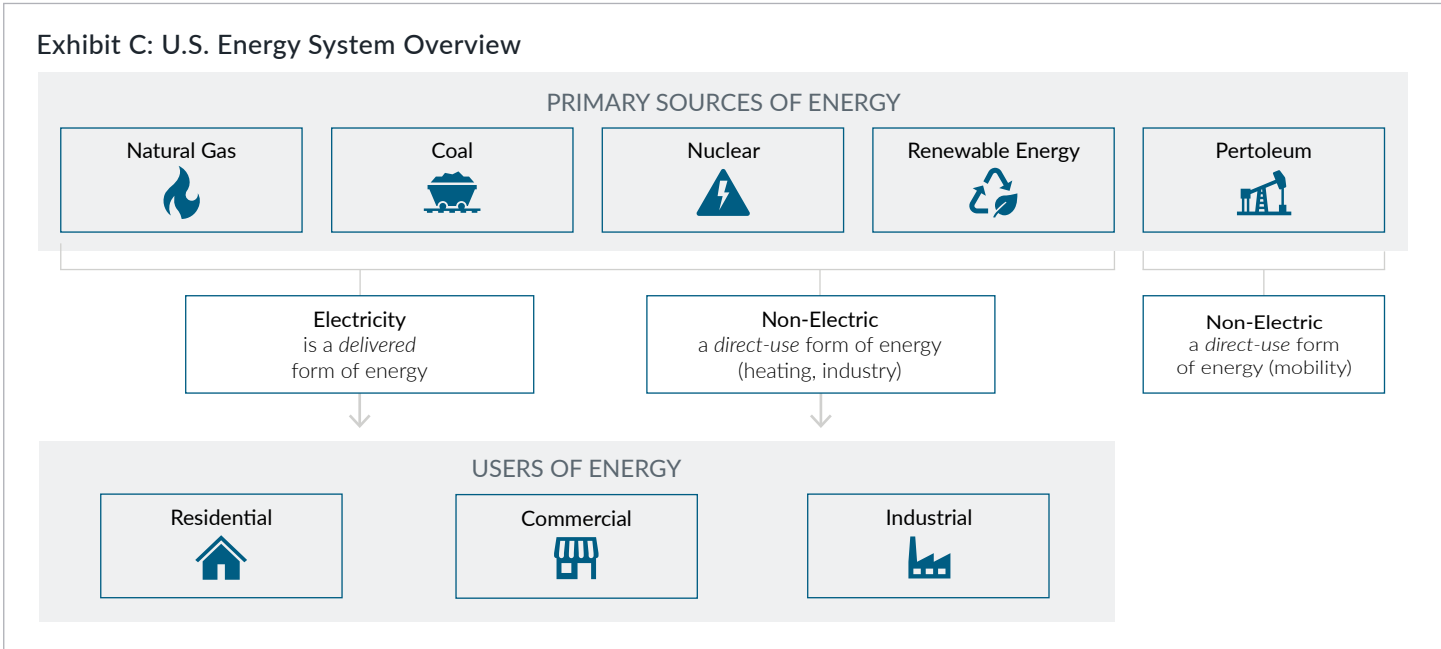
The mid-20th century marked the rise of nuclear power, introduced with great promise but ultimately constrained by regulatory hurdles, safety concerns, and cost overruns. By the end of the 1970s, oil shocks exposed the vulnerabilities of fossil fuel dependence and helped incentivize early interest in alternative sources. Fracking in the 2000s re-established U.S. dominance in oil and gas production, shifting the country from a net importer to a net exporter in less than a decade (Exhibit B).

Solar and wind technologies have gained momentum over the last two decades, supported by federal incentives and significant cost breakthroughs, such as reductions in panel manufacturing and improvements in turbine efficiency. Yet despite hundreds of millions of dollars invested, renewable energy accounts for just 9% of total U.S. primary energy consumption and 21% in electricity generation in 2023, according to the Energy Information Administration (EIA).

Energy and electricity are sometimes used interchangeably, but distinguishing between the two is helpful in understanding the broader transition in the energy space. Generally speaking, primary energy sources such as petroleum, natural gas, coal, nuclear, and renewables can be consumed in different ways: some directly as fuels for transportation, heating, or industrial processes, and others converted into electricity for delivery to households, businesses, and industry. While electricity is central to many conversations about the future of energy, it represents one channel among several through which primary energy is ultimately consumed (Exhibit C).



Source: Glenmede, Our World in Data  
Data shown represent the historical mix of global primary energy consumption over time, broken down by source and expressed as a percentage of total energy use. Traditional biomass refers to wood, crop residues, and other organic matter used in low-efficiency forms, primarily in developing regions.



Source: Glenmede  
The illustration depicts a general overview of the primary sources of energy and how they are used to provide electricity, direct fuel use, and transportation energy. Categories are simplified for presentation purposes and do not reflect exact proportions of global energy consumption. The visuals shown are for illustrative purposes only.

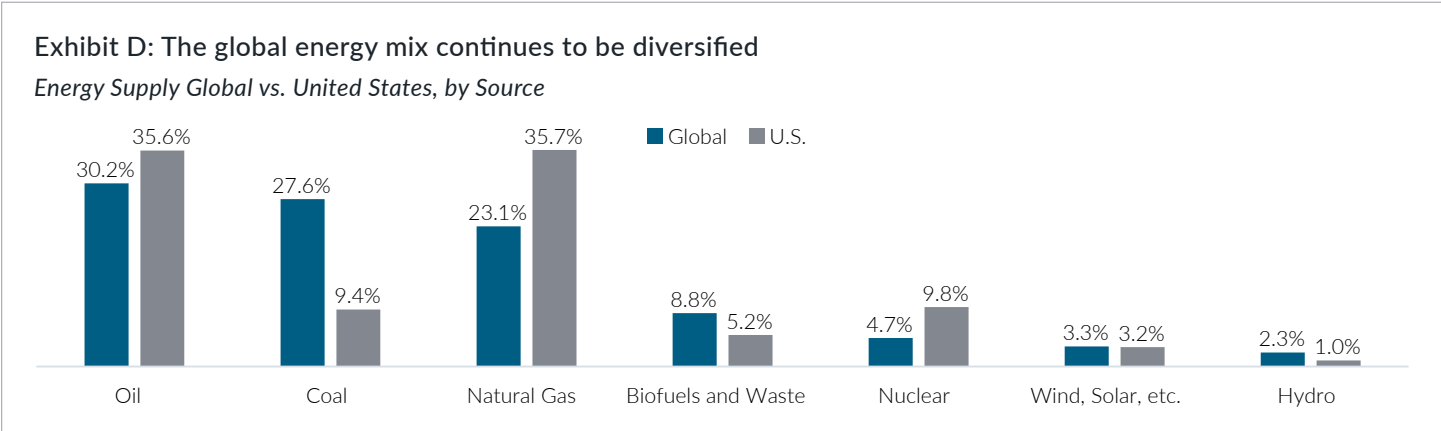
Over time, innovation has transformed the energy system into one that is more diverse and interdependent than ever. As demand intensifies and electrification increases, understanding the underlying supply-demand dynamics is critical to determining whether the system can scale quickly enough to meet the moment.

# Supply Versus Demand Dynamics: A New Tension Pattern

For much of the last century, supply growth, which was fueled by technological advances and expanding infrastructure, managed to keep pace with rising demand. But as new patterns of usage emerge and the global energy system becomes more complex, maintaining that balance is becoming increasingly difficult.

## Current U.S. Energy Supply

The global energy mix is more diversified than ever, reflecting both technological progress and geopolitical changes. Oil still accounts for roughly 30% of global primary energy consumption, followed by coal and natural gas. Renewable sources, such as solar, wind, and hyrdo, are growing rapidly but still represent a relatively smaller share both in the U.S. and globally (Exhibit D).



Source: Glenmede, International Energy Agency (IEA) Data as of 12/31/2022  
Data shown represent the composition of total energy supply within the U.S. compared to the global average. Figures are based on International Energy Agency (IEA) Total Energy Supply estimates, with the most recent year of data available at the time of publication. Actual future energy mix may differ materially from historical values or estimates.

Trade dynamics play a significant role in both the global and national energy mix. The U.S. has emerged as a leading exporter of crude oil and liquefied natural gas (LNG), supplying key markets in Europe and Asia. This transformation has shifted energy diplomacy, loosening the grip of traditional suppliers from Russia and the Middle East while increasing U.S. leverage. Along with this level of globalization and exporting leverage come new concerns over energy security for traditional fossil fuels and new alternative energy sources. For example, alternative energy technologies scale, turning supply chains for critical materials (such as lithium, cobalt, graphite, and other rare earth elements) into geopolitical tension points. Countries are racing to secure access and control to these critical materials, often leading to export restrictions, tariffs, or trade disputes. In addition, production could lag demand given that new mines take years to develop, even as recycling and technological innovation work to mitigate potential bottlenecks. Energy security now depends not only on physical reserves but also on the resilience and flexibility of supporting supply chain systems, from mining to distribution to delivery.

## Demand Trends in the U.S.

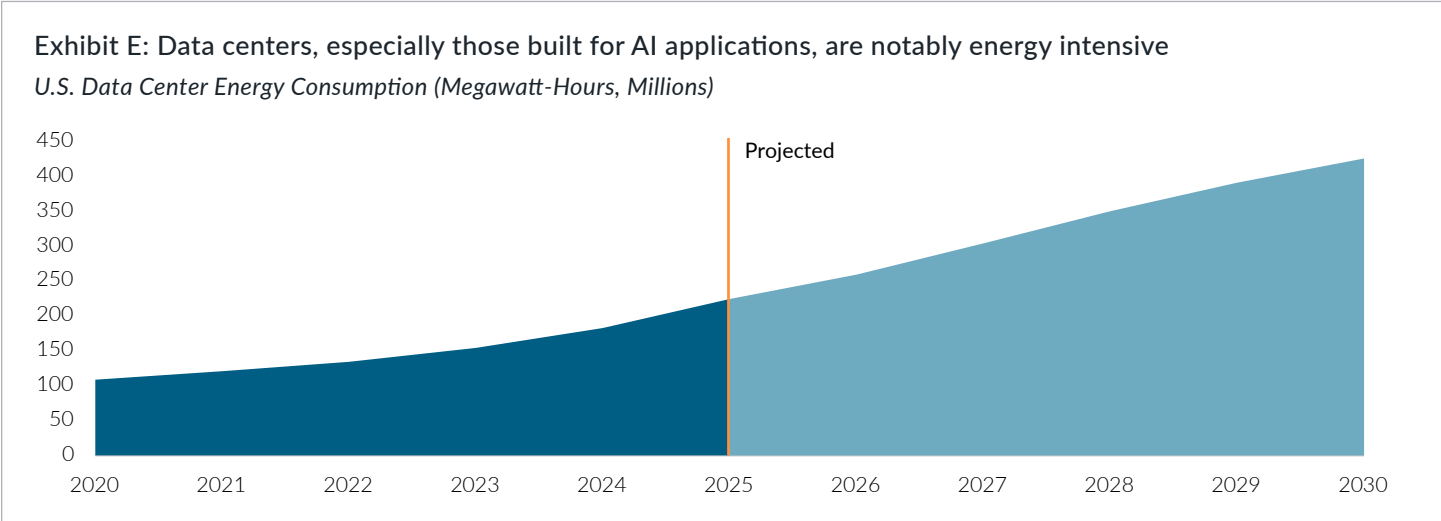
U.S. energy demand, once characterized by steady and predictable growth, is now accelerating due to structural changes. Electricity sits at the center of structural shifts in how energy is produced, delivered, and consumed. Three primary factors are expected to shape electricity demand over the next 10 to 15 years: the rise of data centers due to the expansion of AI, increasing domestic manufacturing and reshoring, and broad electrification across the U.S. economy.

### Data Centers and the AI Renaissance

In the U.S., data centers, which power all data storage, processing, and distribution needs, used approximately 200 million megawatt-hours of electricity in 2024, roughly what it takes to power Thailand for a year<sup>1</sup> (Exhibit E). Data centers built for

<sup>1</sup> O'Donnell, J. and C. Crowhart. May 20, 2025. "Climate Change and Energy." MIT Technology Review. <https://www.technologyreview.com/2025/05/20/1116327/ai-energy-usage-climate-footprint-big-tech/>.

AI applications are especially energy intensive. According to projections from the Lawrence Berkeley National Laboratory, by 2028 more than half of the electricity going to data centers will be used for AI. If realized, this means AI could consume as much electricity as 22% of U.S. households,<sup>2</sup> or roughly 5% to 8% of total U.S. electricity demand by the end of the decade. While smaller in total share, AI is among the most rapidly scaling contributors to near-term load growth.



Source: Glenmede, International Energy Agency (IEA), MIT Technology Review  
Data shown represent U.S. data center electricity consumption over time. Consumption is expressed in millions of megawatt-hours.  
Projected are based on third-party estimates of data center energy consumptions. Actual results may differ materially from projections.

### Domestic Manufacturing and Reshoring

Industrial reshoring is also adding to new energy demand as companies seek to reduce supply chain risk and capitalize on incentives such as those in the Inflation Reduction Act and CHIPS and Science Act. New facilities being built for semiconductors, battery production, and electric vehicles (EVs) are both capital- and energy-intensive.<sup>3</sup>

According to regional utility forecasts from providers such as Duke Energy and TVA, this wave of industrial activity could represent 5% to 10% of total electricity demand growth through the mid-2030s. In certain areas, surging industrial loads have already begun to outpace available capacity, creating bottlenecks in power delivery and sparking new investment in energy infrastructure, such as dedicated small nuclear reactors (SNRs) at industrial sites.

If sustained, this trend may reshape the industrial load profile of the U.S. grid and require new approaches to power delivery and reliability planning.

### Electrification

U.S. electricity is not only replacing traditional fossil fuel combustion but is also projected to grow between 35% and 50% by 2040 from new demand patterns<sup>4</sup> (Exhibit F). One driver of this demand pattern is the increase in connected devices in daily life, from the adoption of heat pumps and electric water heaters to induction stoves and home EV chargers. According to studies from Princeton’s Net-Zero America project and the EIA, electrification of buildings and transportation could account for 30% to 40% of this future demand growth, especially when factoring in underlying population and economic expansion in high-growth regions. However, these new loads are not evenly distributed; for example, rising EV charging and extreme weather spells can create sharp demand spikes, straining distribution systems, increasing outage risk, and causing costly damage to the grid. The shift affects both the volume and timing of electricity consumed.

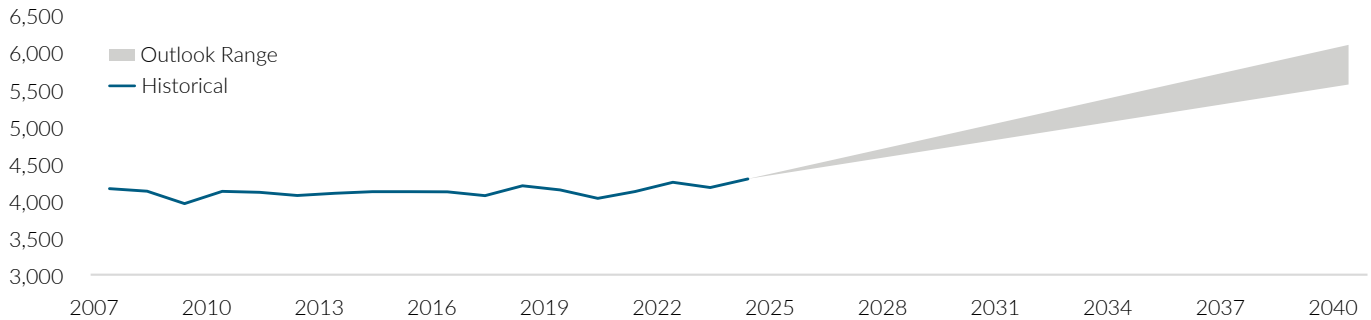
<sup>2</sup> Shehabi, A., A. Newkirk, S. Smith, et al. “2024 United States Data Center Energy Use Report.” <https://escholarship.org/uc/item/32d6m0d1>. Accessed October 7, 2025.

<sup>3</sup> “Reindustrialization, Decarbonization, and Prospects for Demand Growth.” GPRI. <https://www.epri.com/research/products/000000003002027930>. Accessed October 7, 2025.

<sup>4</sup> “US National Power Demand Study.” American Clean Power. <https://cleanpower.org/resources/us-national-power-demand-study/>. Accessed October 7, 2025.

## Exhibit F: U.S. electricity is projected to grow due to new demand patterns

### U.S. On-Grid Electricity Demand (Megawatt-Hours, Billions)



Source: Glenmede, U.S. Energy Information Administration (EIA), S&P Global

Data as of 12/31/2024

Data shown represent U.S. on-grid electricity demand in billions of megawatt-hours. The blue line reflects historical demand, while the shaded region illustrates an outlook range of potential future outcomes through 2040. Outlook range figures are based on industry and third-party estimates of electricity consumption trends. Actual results may differ materially from projections.

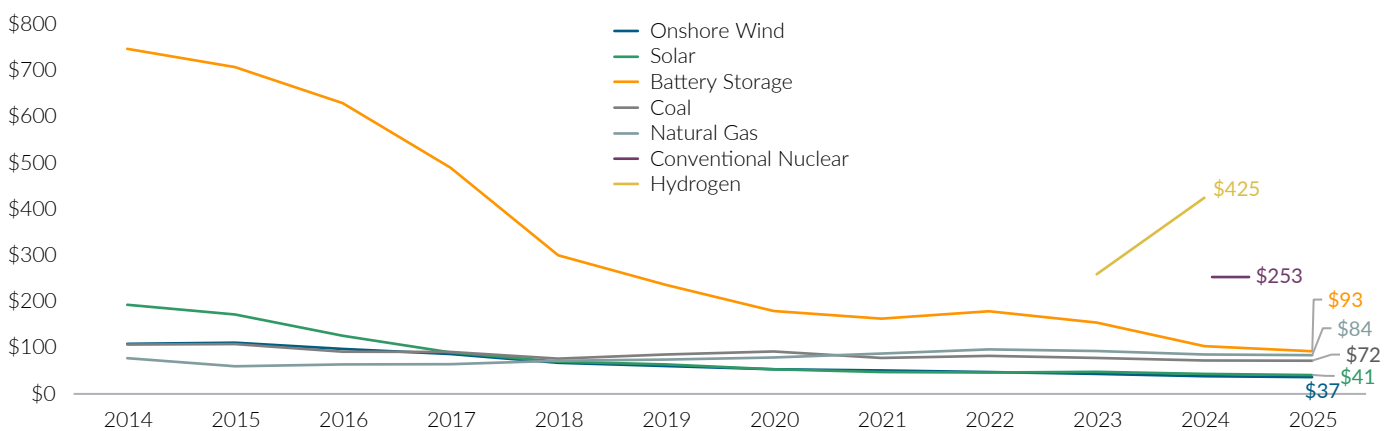
Growing energy demand poses a dual challenge: adding enough capacity to meet new demand while modernizing the grid to deliver energy where and when it is needed. This requires a coordinated response, and its success or failure will shape the reliability, cost, and efficiency of the future U.S. energy system.

What is becoming clear is that the margin for error is shrinking. Utilities, grid operators, and regulators now face the dual challenge of adding capacity and modernizing the energy grid.

## Additional Cost Drivers of Energy

Coal and natural gas historically have anchored energy costs (Exhibit G). These fossil fuel-based energy sources have had well-established generation and delivery systems, creating a mature and relatively stable price environment. However, energy markets still experience price volatility, and these energy sources continue to be at risk of sharp price fluctuations due to geopolitics, supply disruptions, and extreme weather events. As demand accelerates and the push to decarbonize intensifies, the cost dynamics of traditional energy sources may prove less stable. The question now is whether emerging technologies can absorb the strain and scale fast enough to meet future needs.

### Exhibit G: Global Levelized Costs of Energy by Source (\$ per Megawatt-Hour)



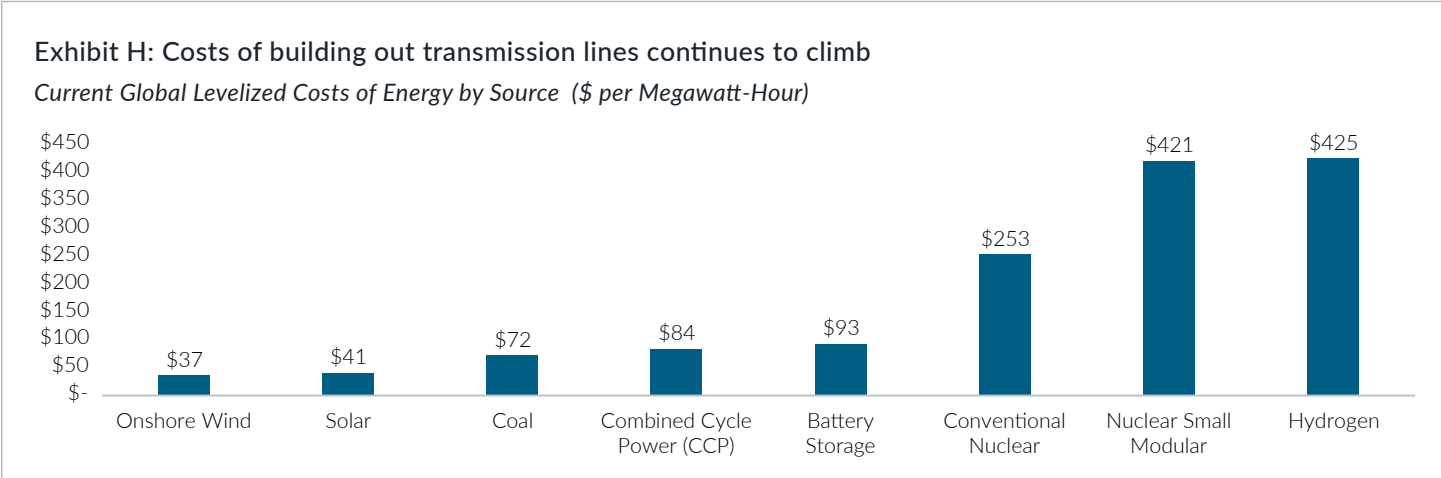
Source: Glenmede, Bloomberg New Energy Finance (BNEF)

Data as of 12/31/2024

Data shown represent global levelized costs of energy by power source over time, with 2025 values shown as estimates. Costs are expressed in U.S. dollars per megawatt-hour, adjusted to real 2024 terms. Figures reflect industry estimates of technology costs over time and are intended to illustrate relative trends across power sources. Actual results may differ materially from projections. Data sourced from Bloomberg New Energy Finance (BNEF). The BNEF service/information is derived from selected public sources.

At a glance, solar and wind appear cheaper than ever. Often-cited cost comparisons refer to levelized cost of electricity (LCOE), a metric that averages the cost of producing electricity over a project’s lifetime. The LCOE for utility-scale solar has fallen over 80% since 2010, with wind following a similar trajectory. These declines stem from technological advances, manufacturing scale, and policy incentives.

But those headline figures only capture the price of producing power, not delivery, which can be costly for renewables. Solar panels, for example, do not generate power at night, and wind turbines slow when the wind diminishes. Often, the cleanest power is generated far from where people live. So, while electricity may remain relatively inexpensive at the generation level, the costs of building out the transmission lines, storage capacity, and backup systems needed to ensure reliability remain. That part of the system, including grid upgrades, energy storage, and flexible power plants, is now one of the biggest drivers of future energy costs (Exhibit H).



Source: Glenmede, Bloomberg New Energy Finance (BNEF)  
Data shown represent 2025 estimates of current global levelized costs of energy (LCOE) by power source, expressed in U.S. dollars per megawatt-hour. Costs are presented in real 2024 terms and are intended to illustrate relative trends across power sources rather than precise future outcomes. Actual costs may differ materially from these estimates. Data sourced from Bloomberg New Energy Finance (BNEF). The BNEF service/information is derived from selected public sources.

There are also underlying cost pressures. Key materials for clean energy (e.g., lithium for batteries, copper for transmission lines) are becoming more expensive amid surging global demand. Labor shortages in construction and engineering are extending project timelines and increasing costs. Even well-intentioned policies, including prescriptive state-level mandates, can create undue pressures if not carefully structured.

Despite rapid growth in clean power capacity, most systems continue to rely heavily on natural gas to maintain reliability. The shift toward intermittent sources like solar and wind changes not only how power is generated but also when it becomes available—forcing utilities and grid operators to reengineer how electricity is stored, dispatched, and balanced. That reality adds cost and complexity and underscores that the energy transition is about more than just building renewables; it is also about redesigning the system to support them. As of late 2024, the U.S. currently expects 63 gigawatts (GW, or 63,000 megawatts) of new utility-scale electric-generating capacity to be added to the U.S. power grid in 2025.<sup>5</sup> But to fully support a future grid with more renewables, estimates suggest storage needs of 225 to 930 GW,<sup>6</sup> or 3 to 14 times more than what is currently planned. Importantly, these numbers reflect both power capacity (GW) and duration (hours), which determine actual energy (MWh) that can be delivered when sun or wind is not available.

Looking ahead, the central question is not simply how low electricity generation costs can go, but whether the systems surrounding electricity transmission, storage, and infrastructure can be built quickly and affordably enough to meet rising demand when and where it occurs.

### Technological Innovation as the Game Changer

Technological innovation has been central to driving progress in our energy system. Advances in wind turbine and solar panel technologies, for instance, have driven their scale and commercialization, allowing new forms of energy production.

<sup>5</sup> “Today in Energy.” February 24, 2025. U.S. Energy Information Administration. <https://www.eia.gov/todayinenergy/detail.php?id=64586>.  
<sup>6</sup> U.S. National Power Demand Study.

Today’s breakthrough technologies have similar potential to reshape today’s energy landscape. They extend beyond how energy is produced to encompassing how it is stored, transmitted, and managed. This next wave of innovation is critical to building the infrastructure and flexibility required for a more resilient, diversified energy system.

Following are some of today’s innovative energy technologies categorized by market readiness: nascent, emerging commercialization, and market ready. Nascent technologies, such as small nuclear reactors (SNRs), are largely still in the pilot stage and not economically viable, with few real-world deployments. Emerging commercialization, on the other hand, encompasses technologies that have commercial viability in some applications but still face the need to scale. Market-ready technologies are those that are already deployed at scale and are continually improving.

| Exhibit I: Market readiness of today’s innovative energy technologies |                            |                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Technology                                                            | Market Readiness           | Description                                                                                                                                                                                                                                                                                                          |
| Energy Storage                                                        | Market Ready               | Lithium-ion and other emerging batteries are critical to managing the intermittent nature of solar and wind. Their continued cost declines and efficiency gains could enable renewables to provide reliable, 24/7 power, reducing fossil fuel reliance.                                                              |
| Grid Modernization                                                    | Market Ready               | Inclusive of smart grid software, advanced sensors, and AI-driven demand response technologies. These tools can revolutionize electricity management, optimizing load balancing and distribution in real time.                                                                                                       |
| SNRs                                                                  | Nascent                    | Modular nuclear reactor units with the potential to offer scalable, in-range baseload power, particularly for industrial applications.                                                                                                                                                                               |
| Green Hydrogen                                                        | Emerging Commercialization | Potentially versatile solution for producing hydrogen energy for hard-to-decarbonize sectors such as long-haul transportation or heavy industry.                                                                                                                                                                     |
| Carbon, Capture, Utilization, and Storage (CCUS)                      | Emerging Commercialization | A set of technologies designed to capture carbon dioxide emissions from industrial sources or directly from the atmosphere, for various purposes (utilization) or storage to prevent it from entering the atmosphere. Usually paired with fossil-fuel based generation systems like natural gas for decarbonization. |

Together, these technologies are poised not only to expand clean energy capacity but also to redesign the energy system's landscape. Whether or not these technological innovations are successful depends on varying regulatory frameworks and incentives.

## Regulatory Landscape: Catalyst or Constraint?

Regulation critically shapes the energy transition’s pace and success—it can accelerate innovation and infrastructure deployment or impede progress through fragmentation and delays.

At the federal level, the regulatory framework is governed by multiple agencies with overlapping but distinct mandates. Coordination between each federal agency should be measured and proactive, rather than disorganized and reactive.

- Department of Energy (DOE), which drives technology deployment, loan guarantees, and grid modernization through programs such as the Loan Programs Office (LPO)
- Federal Energy Regulatory Commission (FERC), which oversees wholesale market design, interstate transmission planning, and reliability coordination across balancing authorities
- Environmental Protection Agency (EPA), which sets emissions standards under the Clean Air Act that directly impact investment decisions for fossil assets and clean alternatives.

While federal agencies provide top-level guidance, state public utility commissions and environmental agencies retain power over siting of power plants and other assets, rate design, and resource planning. These levers can be used to either create a strong aligning force alongside federal regulation and guidance, or a disjointed patchwork of policies:

- Some states mandate renewable portfolio standards or alternative energy targets; others have no targets or fragmented infrastructure.
- Interconnection standards, metering policies, and energy efficiency rules vary widely, creating complexity for distributed energy developers.
- Permitting for transmission lines can be delayed for years due to state-level siting laws or opposition from landowners and municipalities.

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Complexity can further deepen at the local level, where zoning and permitting processes can further slow down deployment, even in supportive municipalities.

Policy design directly influences investments and capital flows. Incentives such as the IRA's Investment Tax Credit (ITC) and Production Tax Credit (PTC) for specific alternative energy technologies reduce financial risk and catalyze private investment. Such policies are particularly powerful because of their multi-year duration and clear eligibility, giving developers, utilities, and investors the clear visibility needed for capital planning and long-term investment horizons. Conversely, regulatory uncertainty—frequent reinterpretations of eligibility, slow tax guidance, inconsistent compliance, or total regulatory overhauls—can stall projects.

Ultimately, regulatory alignment across federal, state, and local levels is a prerequisite for efficient capital allocation and successful execution of the energy transition. For investors, understanding where alignments exist or clash is an important factor in identifying viable opportunities in an increasingly complex market.

## Mapping the Energy Landscape Ahead

The future of the U.S. energy system will likely hinge on how well innovation, policy, and capital deployment work together. Each alone is not enough to build stable and favorable investment conditions, but together they will determine not only investment opportunities but also whether the country can meet the structural shift in energy demand. Below are three plausible paths.

### Scenario 1: Technology Delivers + Policy Supports = A Stable, Scalable Energy System

In this best-case scenario, LCOE and delivery costs of alternative energy continue to fall steadily, facilitating these technologies to scale beyond project-level deployments. This includes ubiquitous grid optimization technologies, as well as utility-level battery deployment to complement solar and wind, and specialty applications of green hydrogen, CCUS, and SNRs in hard-to-decarbonize industries. Infrastructure would also improve in parallel, with new transmission lines enabling more reliable regional power flows.

Government agencies would have to collaborate effectively to deliver stable policy incentives supporting the diversification of energy sources. For example, the DOE could continue to accelerate funding innovation via the LPO and ARPE-E, supporting the commercialization of grid-scale battery storage, hydrogen and CCUs technologies, and SNRs.

The alignment of technological advancements with supportive and consistent policies would result in a smooth transition scenario. Power supply keeps pace with demand, costs stabilize, and regions avoid peak-hour shortages.

### Scenario 2: Demand Rises Too Quickly + Technology Can't Keep Up = Increased Costs

Here, electricity demand from data centers, industrial reshoring, and increased electrification outpaces infrastructure growth. Technology exists but cannot scale fast enough due to bottlenecks:

- Coordination between regional and federal bodies falters. Permitting delays, state siting boards, or local zoning keep new transmission lines and renewables offline.
- Aging fossil infrastructure remains in use past its design life, increasing maintenance costs, emissions exposure, and additional operational risks.

In this environment, costs are likely to rise, power prices become vulnerable to volatility, and natural gas becomes the fallback energy source. Reliability concerns grow during extreme weather, potentially exposing consumers to higher bills, increased curtailments, and frequent grid stress events during heatwaves and cold snaps. The system functions but with friction, shifting from planning to crisis management.

### Scenario 3: Technology Is There, but Policy Gets in the Way

In this scenario, the U.S. has the technological tools to build a diversified energy grid, such as utility-scale renewables and battery storage, green hydrogen, and advanced nuclear applications. However, regulatory environments lag due to fragmented policies across federal and state regulators. Federal support may exist, but state politics could delay project approvals or block implementation entirely. In this future state:

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- Federal incentives, such as the IRA's ITCs or PTCs for alternative clean energy technologies, exist but suffer from delays, threatened rollbacks, or unclear eligibility rules, slowing project bankability.
  - State regulators impose conflicting interconnection standards or refuse cost-sharing agreements for multi-state transmission lines.
  - Grid operators lack consistent mandates to incorporate distributed energy resources, leaving promising technologies underutilized.

This mismatch between technical capacity and regulatory execution creates market paralysis: Capital waits on the sidelines, projects remain in limbo, and innovation loses momentum. Despite the technological tools being available, policy fragmentation and inertia prevent meaningful progress.

## Navigating Through a Future of Uncertainty

How technological innovation, policy support, and market dynamics align will determine the future of the U.S. energy transition. It is likely that the U.S. is on a path where the technology to create a stronger more diversified energy grid exists, yet bottlenecks and policy fragmentation create barriers to full deployment and execution. Avoiding the likely costly or unstable outcomes of this kind of scenario requires a proactive and coordinated strategy that includes:

- Streamlining permitting and approvals across federal, state, and local levels through statutory deadlines, digitized and efficient applications, and interagency coordination.
- Enhancing federal-state regulatory coordination, especially among the FERC, DOE, EPA, and state utility commissions on transmission, resource planning, and pollution compliance.
- Providing clear, stable market incentives with multi-year policy horizons to reduce investor uncertainty.
- Continuing or accelerating grants and investments in alternative energy technologies, such as grid modernization, battery storage, SNRs, and green hydrogen.

## An Investor's Lens to the Energy Transition

Recent policy changes have swept across the energy ecosystem, further supporting a likely scenario of policy bottlenecks and fragmentation. Investors can continue to navigate this developing landscape by reconsidering how they evaluate companies' ability to adapt and align with evolving market signals.

Understanding where a company sits in the diverse energy landscape can influence its unique exposures to investment risks and opportunities. Companies contributing to the energy transition can broadly be viewed as either direct drivers or indirect contributors relative to how energy is produced, delivered, and used.

Direct drivers include companies in the Energy, Utilities, Industrials, Materials, and Real Estate sectors, which are essential to building and delivering the current system and its transition. For example, while energy companies develop and integrate alternative energy technologies, industrial companies build and deploy the underlying infrastructure. Materials companies play a critical upstream role, providing critical minerals such as lithium and cobalt needed for batteries, wind turbines, and solar technologies. Real estate companies operating downstream control, build, and manage the environment, which consumes a significant share of our total energy.

On the other hand, indirect contributors include companies that are benefiting from or enabling the broader electrification and digital transformation. Technology companies fall into this category since they are the largest purchasers of new energy infrastructure in the U.S. and enable digitization. Financial institutions are also indirect contributors by underwriting large-scale infrastructure and allocating capital toward alternative energy projects. Together, this framework of direct drivers and indirect contributors underscores that the transition spans both core and adjacent sectors, each with unique opportunities and risks.

Translating this framework into action requires sector-specific metrics to guide investment analysis and decision-making (Exhibit J). Tracking the percentage of a company's revenue derived from fossil fuel-based energy versus alternative energy can provide a clear view of its current positioning, while analyzing capital expenditures on alternative energy relative to industry peers offers forward-looking insight into a company's strategic path. A robust approach might combine these thematic metrics with multi-factor analysis to screen for strong fundamentals, attractive valuations, and improving earnings forecasts. For example, a real estate firm investing in high-performance green buildings might be favored not

just for its thematic relevance but also for demonstrating how these investments result in stronger cash flows and cost-effective project delivery compared to peers.

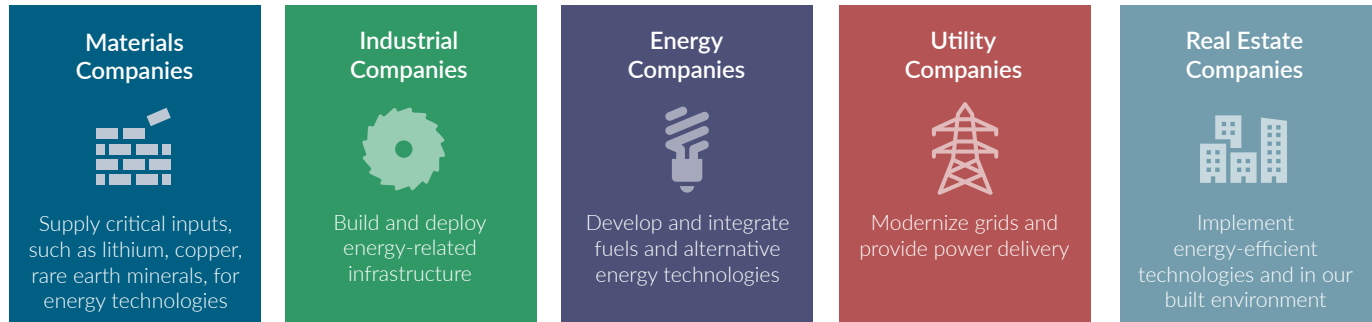
### Exhibit J: Sector-specific metrics provide a clear view of a company's positioning

### Direct Drivers and Indirect Contributors

Investors' ability to discern the level of involvement in the energy transition and contribution toward energy resilience means tailoring metrics based on a company's sector and business activities

## DIRECT DRIVERS

*Companies developing, producing, or facilitating the delivery of energy technologies*



## INDIRECT CONTRIBUTORS

*Companies benefiting from or enabling the broader electrification and digital transformation*



Source: Glenmede

Building on this framework can help identify emerging investment opportunities. In the U.S., natural gas and nuclear technologies continue to benefit from a supportive bipartisan policy backdrop. Battery technologies remain an investable solution to intermittency challenges and the need to manage load and demand peaks. Companies leveraging technologies to drive efficiency and manage load offer additional value creation in an increasingly electrified economy. Regionally, select solar and wind investments may still remain compelling, depending on policy environments and cost dynamics. These examples illustrate how this investment framework can be applied in practice: By distinguishing companies' roles within the energy ecosystem and applying sector-specific metrics, investors can identify structural, long-term opportunities tied to energy resilience while maintaining focus on fundamentals and valuation.

## The Challenges for Investors

The U.S. energy system is undergoing a structural transformation, driven by rising demand, new technological innovations, and evolving policies. While the U.S. may have the technological tools to build a better, more resilient energy grid, mismatched regulation and a lack of infrastructure readiness hinder progress.

Investors currently face a disjointed policy backdrop, where this mismatch between technical capacity and regulatory and infrastructure execution creates disruption in investment. The challenge for investors is to evaluate how companies adapt to evolving market signals and identify differentiated risks and opportunities. Taking a robust and agile approach to investment analysis, framed by sector-specific metrics and forward-looking fundamentals, will be key.

Ultimately, the energy transition presents a structural shift ripe for long-term investment opportunities. The path forward—however smooth or disjointed—will require investors to remain agile in their analysis and focused on the long-term value these companies create.

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