

Renewables remain most cost-effective and efficient method to meet surging power demand

This whitepaper explores why we believe the clean power sector is poised to continue its growth trajectory. A number of fundamental forces—including surging electricity demand, economic competitiveness, swift scalability, and enduring bipartisan support—create compelling investment opportunities within the energy transition, regardless of political cycle.

US power demand is entering an era of unprecedented growth

Power demand growth, or load growth, in the US remained relatively flat during the first 20 years of the 21st century, increasing less than 9% between 2000 and 2020 (under half a percent annually). This nominal growth was primarily the result of globalization trends, the offshoring of US

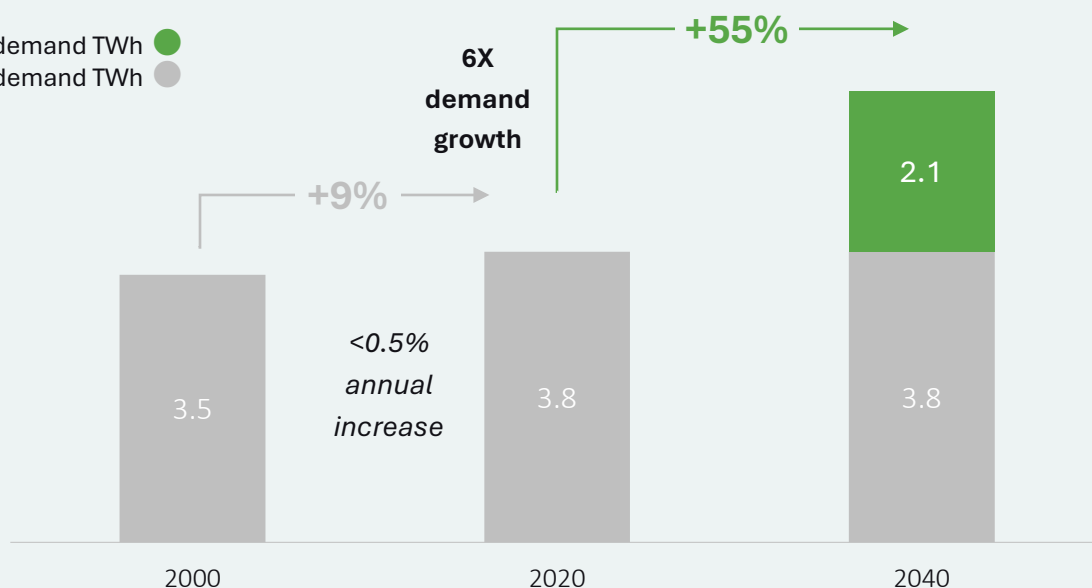
manufacturing, and greater efficiencies in electricity consumption.¹

Today, US power demand growth is in the midst of a dramatic surge, expected to increase 55% by 2040—a more than 6x increase relative to the last 20 years, as seen in *Display 1*.²

Display 1: Six-fold increase in US power demand growth by 2040

Terawatt-hours (TWh)

Additional demand TWh ●
Historical demand TWh ●



Sources: U.S. Energy Information Administration; IHS May 2024 Outlook.



This dramatic acceleration in the country’s electricity consumption is being driven by multiple converging factors.

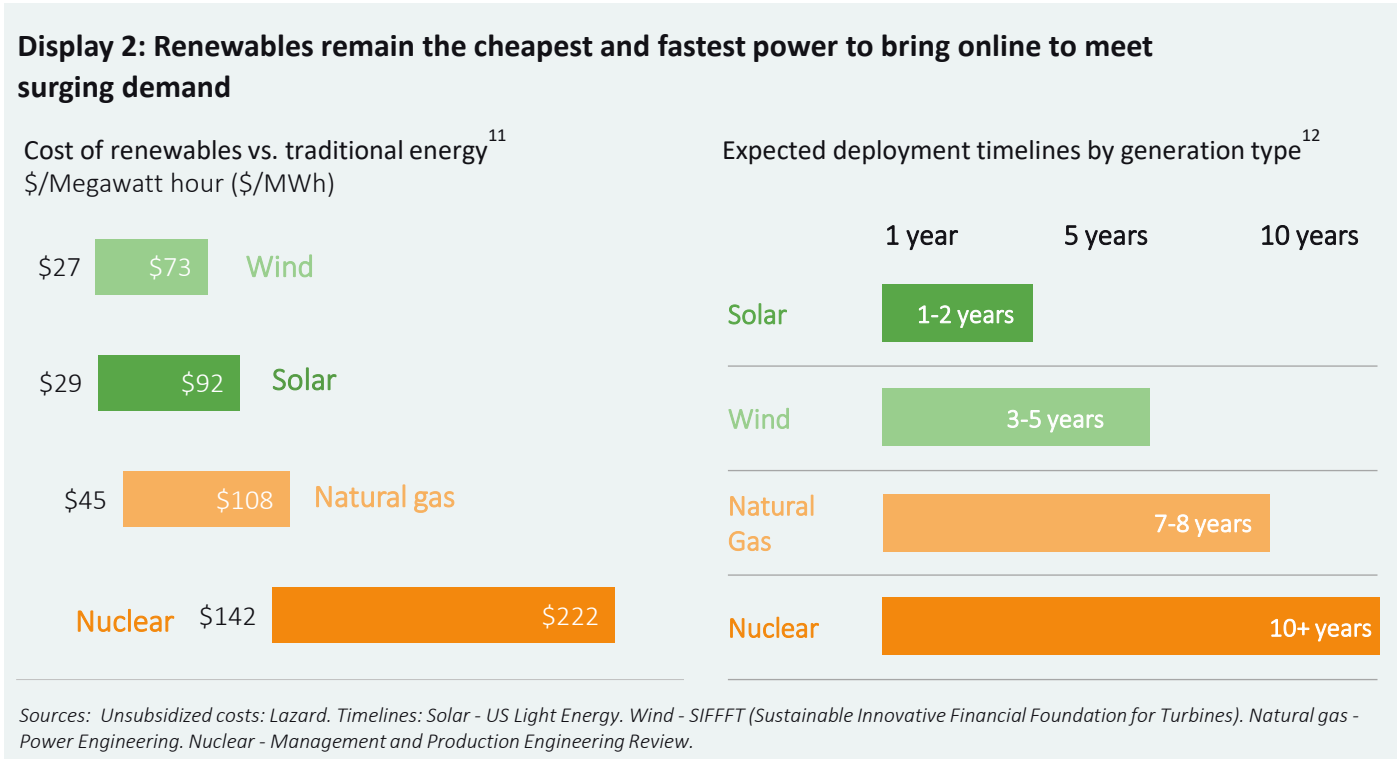
- **AI and data centers:** The exponential growth in artificial intelligence computing requires massive new power infrastructure, with each new hyperscale data center requiring over 100 MW of capacity.³ The US is expected to be the fastest-growing market for data centers, with demand increasing over 3x by 2030.⁴
- **Cryptocurrency operations:** Despite volatility in the market, crypto mining operations continue to consume significant electricity resources, with the US now hosting over 40% of global Bitcoin mining capacity.⁵
- **Reshoring and advanced manufacturing:** The CHIPS and Science Act,⁶ Inflation Reduction Act (“IRA”), and other initiatives are bringing

- production back to the US, across a wide range of industries, including technology, automotive, consumer goods, pharmaceuticals, semiconductors, solar, and battery storage. Each new manufacturing facility requires significant amounts of reliable new power generation capacity.⁷ Even the potential repeal of those laws would not completely halt this trend, given that even before their passage, US industries had begun reshoring manufacturing to increase supply chain resilience and insulate against geopolitical risk.⁸
- **Electrification:** The ongoing transition of heating systems and transportation to electric power is creating an additional layer of demand. By 2030, EV adoption is expected to grow from 15% of new vehicle sales today to over 40%,⁹ while the US market for electric heat pumps is expected to increase 72%.¹⁰

Renewables remain the cheapest—and fastest—new power to bring online

Renewable energy is the most scalable solution to meet this surging demand. As illustrated in *Display 2*, solar and wind continue to be the cheapest power to produce—on an unsubsidized basis—

delivering electricity at significantly lower costs than fossil fuels and nuclear. (With subsidies factored in, the cost-effectiveness compared to traditional forms of energy is even more pronounced.)





Not only are wind and solar the most cost-effective power generation, they can also be deployed significantly faster to meet urgent capacity needs—a critical advantage in the current high-demand environment. Renewables remain easier to site,

quicker to build, and safer to operate than gas, coal, or nuclear energy facilities, significantly decreasing the ramp up time to add more production to the grid.¹³

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Early executive orders created uncertainty—but with limited material impact on clean energy

The first few weeks of President Trump's second term were marked by a number of executive orders (“EOs”) creating uncertainty and turbulence across financial markets.

The “Unleashing American Energy” EO, in particular, encouraged energy exploration activities for the fossil fuel industry, as well as for non-fuel rare earth minerals, such as lithium.¹⁴ The same EO temporarily paused energy projects requiring federal permitting and approvals, particularly those involving the US Army Corps of Engineers and the Department of the Interior, reflecting the new administration’s broader policy shift toward prioritizing fossil fuel development over clean power initiatives. (As of this writing, the Corps had already lifted its pause on evaluations).¹⁵

As a result, offshore wind—a sector to which Greenbacker’s strategies have no exposure—now

seems to face significant headwinds, as those projects are typically located in federal waters and are therefore reliant on governmental approval to develop. Solar and onshore wind have been less affected but have still experienced some spillover uncertainty due to the pause on permitting.

However, this spillover may only impact a fraction of US renewables, as only 4% of the country’s land-based utility-scale renewable energy generation operations, are located on federal lands.¹⁶

Additionally, there’s a critical point that should not get lost in the shuffle: EOs do not constitute legislation in and of themselves. On the other hand, both the Infrastructure Investment and Jobs Act of 2021 (“IIJA”) and the IRA are legislation, and changes to those respective bills’ funding outlays would need to be enacted through new legislation passed by Congress.



Bipartisan support for clean energy across political cycles

The clean energy industry has historically enjoyed bipartisan backing, both in Congress and at the state level, further strengthening the case for renewables' long-term resilience across political and market cycles. Even during periods when the broader Republican party did not strongly favor renewable power, tax incentives for clean energy have received support from both sides of the aisle.

The first investment tax credits for renewable energy were passed by Congress as part of the Energy Tax Act of 1978,¹⁷ while the first wind energy production tax credit legislation was sponsored in 1992 by long-time Senator Chuck Grassley (R-Iowa).¹⁸ Both the Investment Tax Credit ("ITC") and Production Tax Credit ("PTC") have since been extended several times with bipartisan backing. In fact, in 2016, Senator Grassley went as far as to say that if President Trump wanted to do away with wind power it would be "over my dead body."¹⁹

There are also many recent examples of support for clean energy across party lines.

When the solar ITC credits were scheduled to phase out, a bill passed during the first Trump administration extended them through 2022.²⁰ (To paraphrase from our previous white paper on

Renewable Energy's Resilience Beyond the 2024 Election: This demonstrates how clean energy incentives receive federal support even under a conservative administration—and, specifically, a Trump presidency.)

Additionally, the Energy Act of 2020, a major bipartisan energy package, authorized billions of dollars for research and development in clean energy technologies.²¹ In 2021, the IIJA garnered significant bipartisan support, passing the Senate with a 69-30 vote that included 19 Republicans.²²

More recently, in August 2024, 18 Republicans in the House of Representatives wrote a letter to Speaker Mike Johnson expressing their support for the clean energy tax credits codified into law by the IRA.²³ In January 2025, an additional 8 Republican members of Congress also voiced their support²⁴ for renewable energy tax credits—more than enough to influence any House vote, given the narrow majority. Additionally, in April 2025, four Republican senators also publicly opposed terminating the tax credits, warning their repeal could undercut investments "that are vital to domestic manufacturing, energy innovation, and affordability for American families."²⁵

"Even during periods when the broader Republican party did not strongly favor renewable power, tax incentives for clean energy have received support from both sides of the aisle."



Clean energy drives more investment and jobs in red states and districts

The reason clean energy appeals to both sides of the aisle is because these projects catalyze investment and create good-paying jobs for Americans. In fact, clean energy investment dollars and job creation overwhelmingly benefit red states and Republican-led congressional districts.

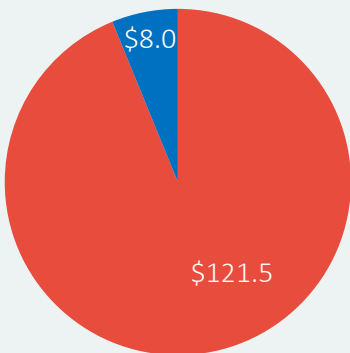
Between the passage of the IRA in August 2022 and January 2025, it is conservatively estimated that the IRA has driven approximately \$130 billion in clean

energy investment,²⁶ the vast majority of which has flowed into states that voted for Donald Trump in 2024. As *Display 3* shows below, this represents over \$121 billion of new capital entering red states, compared with \$8 billion into blue states. This trend continues at the congressional district level, where more than \$106 billion has been invested in Republican-led districts, while less than \$20 billion has gone to Democrat-led districts.²⁷

Display 3: A significant majority of clean energy investments driven by the IRA have gone to red states and Republican-led districts

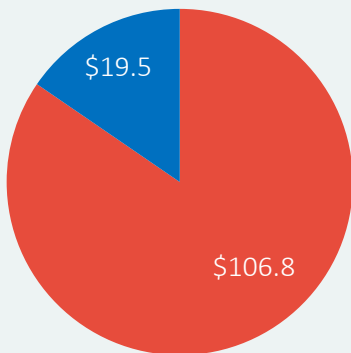
Estimated Clean Energy Investments by State
(in \$ billions)

Blue states ●
Red states ●



Estimated Clean Energy Investments by District
(in \$ billions)

Democratic-led districts ●
Republican-led districts ●



Source for state- and district-level data: E2, February 2025. Red states are defined as states that voted for Donald Trump in the 2024 election, and blue states are those that voted for Kamala Harris in the 2024 election. Total state-level investment differs slightly from total district-level investment due to certain project announcements not including specific locations within a state; investments related to these projects could not be attributed to specific congressional districts.

According to the Clean Jobs America 2024 Report, approximately 3.5 million Americans work in clean energy jobs. Texas alone accounts for over 268,000

clean energy jobs, while other red states like Ohio, Florida, and North Carolina each host over 100,000 clean energy jobs.²⁸

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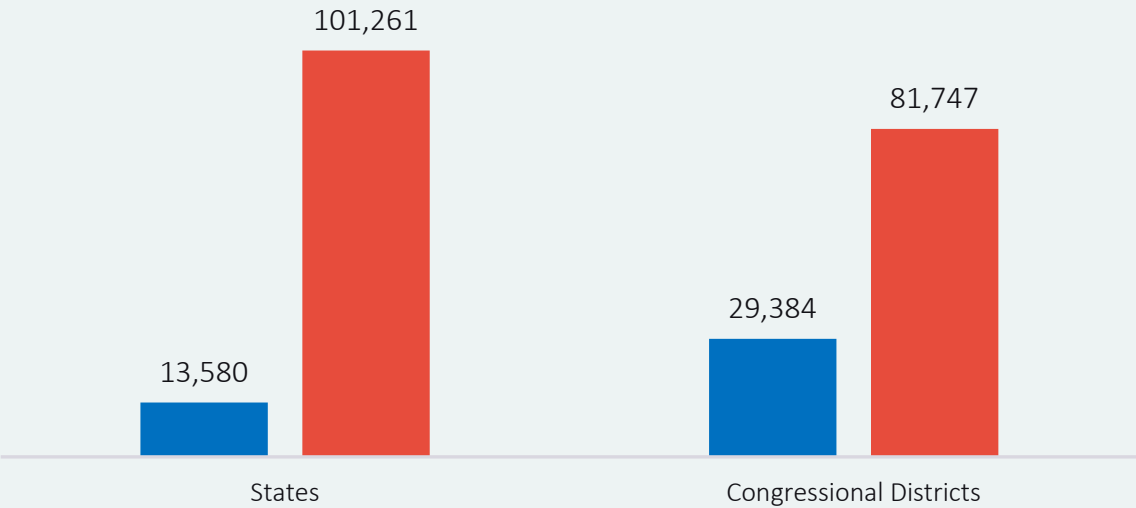


As of January 2025, it is estimated that approximately 115,000 new US clean energy jobs—the overwhelming majority of which are permanent, long-term jobs—have been or are expected to be created by IRA-related projects.

As *Display 4* illustrates, nearly 90% of those jobs will be in red states. At the district level, the vast majority of these new jobs are located in red districts (82,000), compared with blue districts (29,000).

Display 4: The IRA is creating substantially more clean energy jobs in red areas

Estimated green jobs created by IRA across states and congressional districts, August 2022-January 2025



Source for state- and district-level data: E2, February 2025. Red states are defined as states that voted for Donald Trump in the 2024 election, and blue states are those that voted for Kamala Harris in the 2024 election. Total state-level investment differs slightly from total district-level investment due to certain project announcements not including specific locations within a state; investments related to these projects could not be attributed to specific congressional districts.

In addition to federal support, there has also been long-standing support at the state level for clean energy. In fact, 29 states and Washington, DC have Renewable Portfolio Standards (“RPS”),²⁹ mandating that a certain percentage of electricity production come from clean energy sources. Notably, Republican governors in states like Iowa, Texas, and Utah have championed renewable energy development as economic engines for their states.

Clean energy can bridge ideological divides because it aligns with pro-business and progressive priorities alike: economic development (a Republican focus), climate action (a Democratic priority), and energy independence (a shared goal). Whether it’s wind farms in the Midwest, solar arrays in the Southeast, or hydropower in the Northwest, clean power demonstrates tangible benefits that lawmakers can tout to constituents.



The IRA's core tax credits are likely to remain

If Congress considers removing individual provisions created by IRA, the more politically contentious technologies, such as the consumer EV tax credit and credits for offshore wind, would be the most likely to be scaled back or eliminated.

However, while industry experts think it unlikely that the core tax credits associated with solar, wind, and energy storage projects—the ITC and PTC—will be eliminated;³⁰ there is potential for the timeline on these tax credits to be compressed. Currently, as a result of the IRA, the ITC and PTC are set to expire in 2032; it's possible this timeframe could be shortened to fund the new administration's initiatives elsewhere.

A shorter expiry for these tax credits has actually been the norm since they were first enacted into law during the 1990s and 2000s. Historically, each time the tax credits have approached their expiration date, they were extended with bipartisan support—including during the previous Trump administration. Between 2017 and 2020, these credits were extended several times with bipartisan votes.³¹

In the unlikely event that the ITC or PTC are eliminated entirely, the result would likely be a corresponding increase in electricity price—and a significant one at that.³² Such an increase in prices would almost certainly be received negatively by the public, creating a separate political problem regardless of the administration. In any case, the elimination of tax credits would not be expected to have an impact on existing clean energy projects, as the US has no historical precedent for rolling back legislation and requiring backpay for taxes previously offset.

Many of Greenbacker's operating assets have already secured their tax credits, and for yet-to-be-constructed clean energy projects—both at the firm and across the industry—safe-harbor provisions help preserve these credits, even amid potential changes to the ITC or PTC.³³ These provisions help provide developers and investors with a degree of stability, even in the event that tax credits were to be phased out over time.

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Additional macro headwinds contribute to a capital-constrained environment—and a compelling buyer’s market

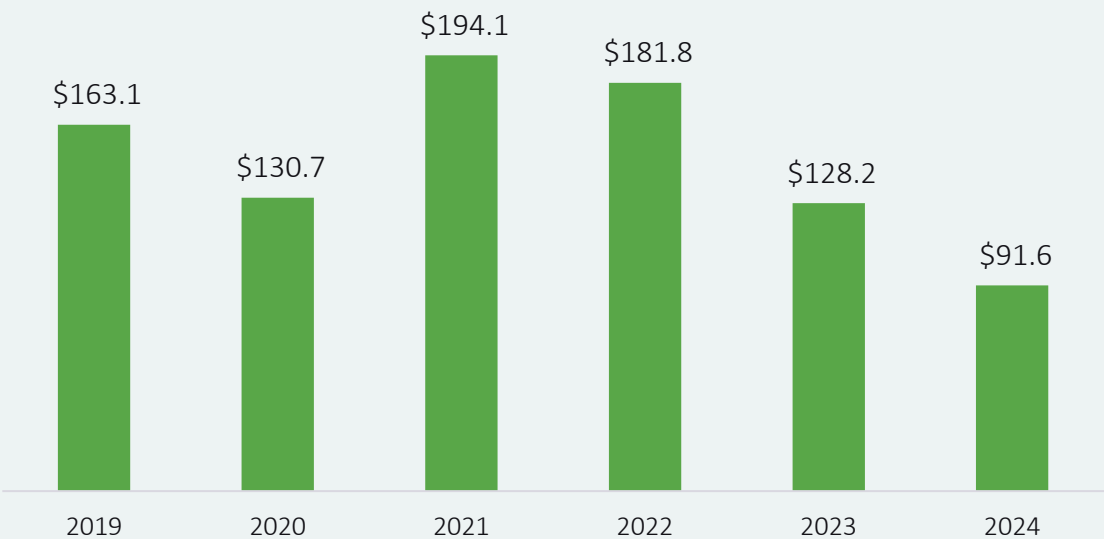
Nonetheless, uncertainty around the new administration’s clean energy policy has combined with other macro headwinds to put pressure on not just the energy transition investment space, but broader public markets as well. Following a post-inauguration rally, major indexes were down with publicly traded clean energy stocks experiencing significant swings, as markets reacted to turbulence in the new administration’s evolving economic policies.³⁴

Additionally, high interest rates and stubborn inflationary pressures have created challenges for raising capital in the energy transition space, contributing to the lowest year for infrastructure fundraising in the past decade.³⁵ As seen in *Display 5*, capital formation in the clean energy sector lagged significantly in the last two years. During 2024, private infrastructure funds raised \$92 billion, which represented a 29%, or \$37 billion, year-over-year decrease compared with the \$128 billion raised in 2023 (and a \$90 billion decrease from 2022).

In our view, this combination of political uncertainty and capital constraint has created an environment in which providers of clean energy capital have a significant advantage in today’s market, while renewable asset sellers are facing downward pressure on valuations. However, we believe the current valuations in the sector do not align with the unprecedented fundamentals driving the energy transition, resulting in a compelling inflection point for renewable infrastructure investment.

We believe that market pressures and pricing dislocations have created an attractive buying environment, offering sophisticated investors rare countercyclical acquisition opportunities with strong long-term return potential. While this dynamic may create near-term pricing challenges, we believe the structural demand drivers of the clean energy transition present a strong case for long-term value creation.

Display 5: Macro headwinds have driven recent decreases in annual infrastructure fundraising
Private infrastructure capital raised (\$B)



Source: Infrastructure Investor, January 2025



Despite headwinds, clean energy’s multi-decade opportunity remains intact

Greenbacker maintains a bullish outlook on the energy transition investment space. This view is further supported by a number of additional compelling details.

1. Economics trump politics

The fundamental economics of clean energy have long since reached the inflection point where they no longer depend on policy support to be competitive.³⁶ While tax credits can enhance returns and accelerate deployment, the underlying business case for clean energy investment stands on its own merits. Moreover, this economic advantage only strengthens as technology improvements continue to drive down costs and increase efficiency.

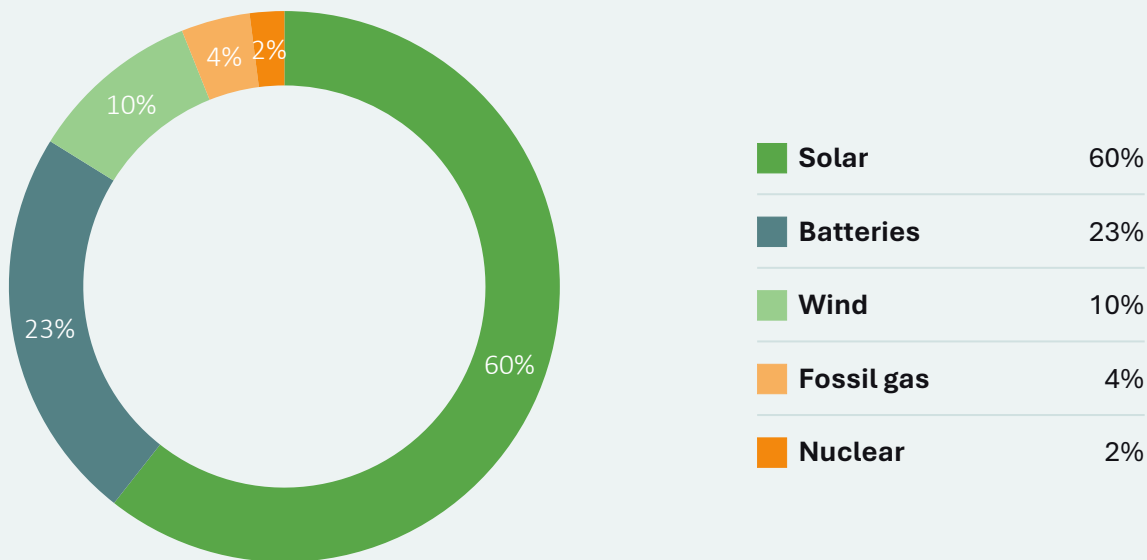
2. Surging electricity demand creates unprecedented need

Utilities, grid operators, and corporations are scrambling to secure reliable, cost-effective

generation capacity that can be deployed quickly.³⁷ This surge in demand comes as aging coal and nuclear plants are retiring, creating a "perfect storm" of supply constraint that must be addressed regardless of political preference, particularly as the North American Electric Reliability Corporation warns that two-thirds of the US faces elevated risks of electricity shortfalls in the coming years without additional new generation.³⁸ Renewables continue to offer the fastest path to bringing much-needed new capacity online. As *Display 6* illustrates, clean energy accounts for well over 90% of the new US power capacity that came online in 2024 (an annual trend that is expected to continue through 2025).³⁹

Display 6: Renewables and storage accounted for 93% of new US power generation in 2024

Share of new capacity



Source: Cleanview analysis of U.S. Energy Information Administration data. Data is for projects larger than 1 MW of capacity completed from January to November 2024 as well as those expected to come online in December. Geothermal, hydropower, and other smaller power sources add up to less than 1% of total capacity additions and are excluded.



3. Private sector leadership has surpassed policy dependence

Corporate America has embraced clean power as a strategic business decision, based on long-term economics, sustainability goals, and a need for resiliency that transcend political cycles. This corporate demand continues to accelerate as companies face pressure from customers, employees, and investors to demonstrate environmental leadership. Over 400 major US companies have made commitments to 100% clean energy in their operations, representing approximately 25% of all US electricity consumption.⁴⁰ Amazon, Meta, and Google alone have contracted for nearly 50 GW of renewable energy capacity,⁴¹ creating significant demand that exists regardless of federal policy.

4. State-level support provides a strong foundation

Although federal policy plays an important role in driving the energy transition, state-level regulatory frameworks often have greater impact on renewable development. RPS and other state-level commitments provide long-term certainty for project development across political cycles—and regardless of federal policy shifts—particularly given that most RPS were adopted over two decades ago and many states continue to revise them higher.⁴²

5. Energy security and manufacturing renaissance align with renewables

The current emphasis on domestic energy production and manufacturing aligns well with renewable energy's distributed, homegrown nature.

Solar panels, wind turbines, and batteries are increasingly manufactured in the US,⁴³ creating jobs and supply chain security. This manufacturing renaissance has created significant constituencies in swing states that benefit economically from renewable power growth. The clean energy sector now employs more Americans than the fossil fuel industry,⁴⁴ creating a political reality that transcends partisan divides.

6. The renewables industry has successfully navigated tariffs for years

The clean energy industry has a long history of navigating tariffs, starting with the Obama administration's anti-dumping and countervailing duties on Chinese solar manufacturers imposed in 2012.⁴⁵ Since then, industry participants have grown increasingly adept at managing tariffs, retooling logistics, rerouting supply chains to avoid tariff-impacted countries, and sourcing materials from a growing number of domestic manufacturers.⁴⁶ Suppliers, builders, and owner-operators of clean energy projects have also historically taken steps to collaboratively manage exposure to tariff risk by embedding protective and risk-sharing provisions in procurement and development contracts.

Although tariff policy remains a source of significant market uncertainty, it is notable that despite nearly two decades of evolving tariffs, renewable energy deployment has increased considerably,⁴⁷ underscoring the industry's resilience and adaptability.



Compelling investment opportunities in energy transition sectors

Greenbacker believes that energy transition investments will continue to offer attractive risk-adjusted returns through this period of policy uncertainty and beyond.⁴⁸ While certain sectors may face headwinds (e.g., offshore wind), we see compelling opportunities within others.

- **Utility-Scale Solar:** These large solar assets continue to offer the most attractive combination of cost-effectiveness, deployment speed, and scalability. We expect utility-scale solar development to accelerate in the Mid Atlantic, Great Lakes, West, and Southwest regions, where land is available and electricity demand is surging.
- **Distributed Generation:** Commercial and community solar projects benefit from avoided transmission costs and retail rate structures, creating resilience against policy changes. States with strong net-metering policies—allowing

consumers to receive a credit for the excess clean energy their systems generate—continue to offer particularly attractive markets.

- **Battery Storage:** The record growth in battery deployment is set to continue as costs fall and grid operators increasingly value the flexibility and reliability services batteries provide.⁴⁹ Additionally, the ancillary services markets for energy storage are maturing, creating multiple revenue streams.
- **Grid Infrastructure:** Perhaps the greatest need lies in transmission and distribution infrastructure, where congested interconnection queues highlight the need for massive reform—and investment—in the grid itself. Opportunities to take advantage of this need, however, have been few and far between to date.

The fundamental drivers of clean energy growth remain strong

While policy uncertainty can create near-term volatility, the fundamental drivers of clean energy growth remain stronger than ever. Greenbacker maintains that patient capital deployed during periods of uncertainty will be rewarded as the inevitable transition to a more resilient and sustainable electricity system continues—driven by economics, demand growth, and bipartisan

recognition of the jobs and investment that clean energy brings to communities across America.

For investors who can see beyond the political noise to the underlying economic and technological realities, the energy transition represents a compelling multi-decade investment opportunity.

Greenbacker Renewable Energy Company (“Greenbacker”) is an independent power producer and energy transition-focused investment manager. Its Greenbacker Capital Management business segment serves as the investment manager to multiple energy-transition focused strategies.

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