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A NEW ERA IS EMERGING

Global Momentum Over the last decade, energy transition investing was shaped to a large degree by policy and climate priorities. In the next, it will be driven by market forces and a reordering of energy sector economics, with distinct winners and losers. The transition is accelerating rapidly, and momentum is building globally.

"All-of-the-Above" Electricity Addition This new era will be defined by **soaring electricity demand**, leading market players to adopt an "all-of-the-above" approach to energy addition, mixing a broad range of electricity generating technologies.

Adaptation & Resilience as an Actionable Investment Theme Investment in adaptation and resilience will take on growing importance, as adverse climate impacts have only accelerated—underscoring the need to harden infrastructure, safeguard supply chains, and build resilient systems amid a more volatile climate.

Emerging Technologies Mature Even as policy noise has captured attention, the technologies driving the energy transition have raced ahead—from nuclear to electric aviation—creating massive new investment opportunities in next-gen energy, transportation, and infrastructure.

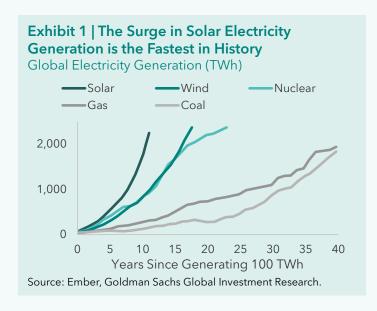
CLIMATE INVESTING UPDATE

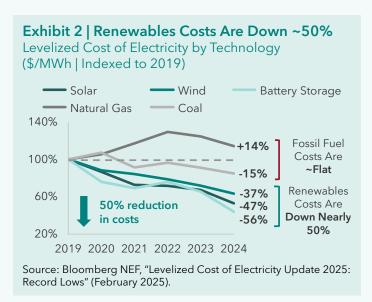
Separating Signal from Noise

Since the start of the energy and climate transition investing journey, there's rarely been such a sharp disconnect between the rapid pace of ongoing technological innovation and progress, on the one hand, and perception about the path ahead, on the other. The noise of the moment has obscured the substantial gains that have already been made and the emerging opportunities on the horizon.

Our role as long-term investors is to tune out this noise and recognize the early patterns and signals pointing to lasting market shifts. Such shifts are evident today, with energy markets currently undergoing a structural transformation, driven by the rapid adoption of solar power, which has outpaced every other source of electricity in history (See Exhibit 1), and by major advances in battery technology that allow solar power to be firmed. This acceleration in the energy transition hasn't simply been the product of supportive government policy but has been propelled forward by powerful market dynamics (See Exhibit 2).

The result has been significant early strides in the energy transition, marking the beginning of a generational investment theme that will reshape the global economy for decades to come. Looking ahead, the energy and climate transition is entering a new phase, one which will increasingly be shaped by economic fundamentals and technological progress rather than policy support. Powerful fundamental forces are already transforming industries and sectors, creating both winners and losers, and producing a new generation of actionable investment opportunities.







The Signal in the Climate & Energy Transition

The current chapter in the energy transition will be remembered for two events that arrived just months apart. The passage of the Inflation Reduction Act (IRA) in August 2022 represented a milestone in the long arc of government climate initiatives. But it was the release of ChatGPT in November 2022 that marked the real turning point and ignited powerful new market forces, from surging electricity demand to accelerating innovation and capital formation across the energy transition landscape.

Both events left their mark, but it's ChatGPT—and the competitive AI race it's unleashed—that will likely be remembered most and drive the market forward in the years ahead. The explosion of generative AI has catalyzed a deluge in electricity demand and intensified the pressure for cleaner, more abundant sources of supply.

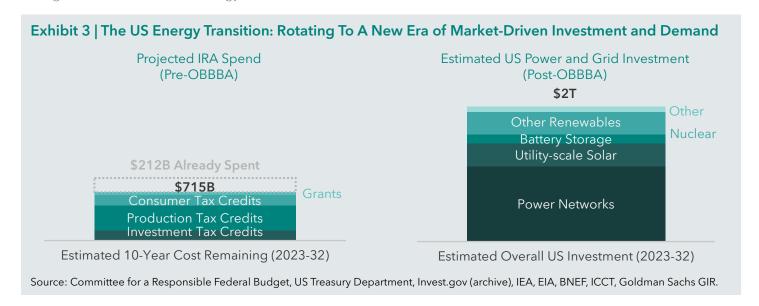
Despite a reversal of some of the provisions of the IRA, via the One Big Beautiful Bill Act (OBBBA), government support for most energy transition technologies remains well ahead of the status quo prior to its passage. When we began investing through TPG Rise Climate ("TRC") in 2021, we didn't anticipate the magnitude of policy support that would emerge in the US in the form of both tax credits and subsidies for the energy and climate transition. The IRA therefore came as somewhat of a positive upside surprise but one that we've never felt was essential for sustaining the strong momentum of clean energy innovation.

But among the forces that will shape the next decade of the energy transition, none may rival the demand surge triggered in part by AI, which we believe will transform energy and electricity markets more profoundly than policy ever could.

The scale of the surge is staggering—and almost unimaginable just a few years ago—with electricity demand growth expected to rise twelve-fold over 2025-35 relative to the prior decade, fueled by Al's explosive power needs and global competition to lead the next technological era.

An estimated \$2T in spending on power supply and the grid will be required in the US alone to meet this surge in demand, according to Goldman Sachs Global Investment Research. That's more than twice the amount of tax credits and grants from the IRA, much of which will continue to flow to the private sector even after the cuts made by the OBBBA (See Exhibit 3).

With greater clarity on where US policy is settling, and the extraordinary investment needs required for energy addition to meet surging electricity demand coming more sharply into focus, the signal for the next decade in the energy transition is now well defined—expanding opportunity, deepening complexity, and an increasingly global stage for investment.





An Accelerating Global Energy Transition Flywheel

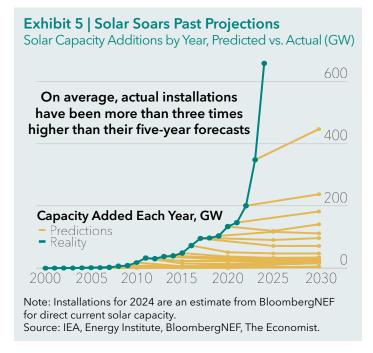
The contours of the longer-term outlook for energy transition policy and investment have now become clearer, but what has been most remarkable—and perhaps least anticipated—is the tangible evidence of accelerating adoption that's already visible today.

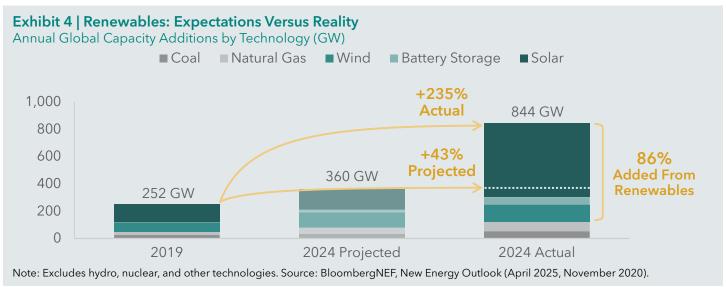
In recent years, the pace of deployment and technological progress has consistently outstripped even the most optimistic forecasts—creating a positive and self-reinforcing energy transition flywheel. And while the world still hasn't adopted renewables fast enough to meet long-term climate goals, progress has been substantially above what most expected even a few years ago.

A Surge in Deployment:

When it comes to deployment, in just the past few years, the adoption of renewables and other transition technologies has far outpaced expectations. In 2019, it was projected that new global energy capacity additions would grow by around 40% over the next 5 years. In actuality, we ended up with 235% growth in new energy capacity, and more than 85% of energy additions globally came from renewables (See Exhibit 4).

As policy debates raged in the US, new renewable energy investment globally reached a record \$386B in 1H 2025, with the US only accounting for around 15%. Recognizing the powerful momentum of the energy transition outside the US, TPG Rise Climate has deployed over \$2B of equity globally this year while taking a disciplined approach to new US investments until policy clarity improved.









Across renewables technologies, the deployment of solar power has outpaced expectations by more than 3x on average over the past decade and a half (See Exhibit 5). Looking ahead, solar is expected to be the world's single biggest source of electrical power by the mid-2030s and largest source of energy by the mid-2040s, according to *The Economist*.

Electric Vehicle Adoption:

Another major upside surprise in the arc of the global climate and energy transition has been the rapid pace of adoption and increased affordability of electric vehicles (EVs). As of the end of 2024, the global electric car fleet had reached almost 58 million vehicles, representing a more than three-fold increase relative to 2021. In aggregate, EVs displaced over 1 million barrels per day of oil consumption last year.

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Exhibit 7 | Europe Now Generates More
Electricity from Renewables than Fossil Fuels
European Electricity Generation by Technology (TWh)

2.3K

Fossil
Fuels

1.7K

Renewables

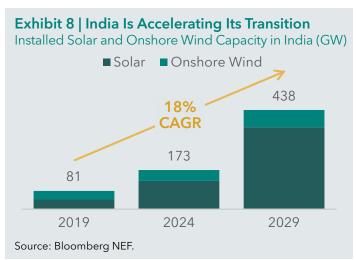
Fossil
Fuels

2019 2024
Note: Renewables includes Solar, Wind, Hydro, Bioenergy, and other renewables. Source: Ember.

The growth of the passenger EV market in China, in particular, has vastly exceeded expectations. EV sales in China last year were more than 10x compared to 2019, and China today accounts for almost two-thirds of global electric car sales (See Exhibit 6). Chinese OEM BYD is now the world's largest EV manufacturer, catapulted into first place on the back of its highly affordable Seagull and Dolphin Surf models.

Global Momentum:

Bigger picture, the scale of the global energy transition is far larger than many investors' UScentric lens often suggests, with transformative momentum building across geographies that are often barely acknowledged. It's a bit like the fact that, in the US, football means helmets and touchdowns; everywhere else, football is a sport with more than ten times the audience.





Globally, government support for green energy has quadrupled since 2020, and less than one-fifth of that increase came from the US. The EU is on track to reach its 2030 greenhouse gas emissions reductions targets, and Europe now generates more electricity from renewables than fossil fuels (See Exhibit 7). The majority of new energy additions in India by 2029 will come from renewables (See Exhibit 8). China's astonishing pace of new renewables deployment means its net emissions peak may be a thing of the past, while, in the Middle East, renewables will represent 30% of the energy mix by 2030, according to the energy consultancy Rystad.

Significant Cost Declines:

The most significant upside surprise of all has been the rapid decline in the cost of renewables, and commercial solar in particular, which has contributed to truly exponential growth in deployment. The acceleration of solar adoption hasn't simply been a product of supportive policy or government intervention. Instead, it's been driven above all by powerful market forces, as relentless competition, innovation, and scale have driven down the cost of solar panels faster than any other investment good in modern history (See Exhibit 9).

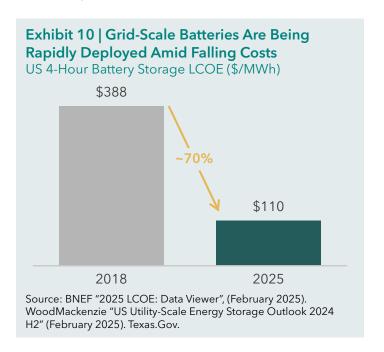
Exhibit 9 | Unprecedented Speed of Price Declines for Solar PVs Investment Price Index (Index=1985) Solar PV Communication Equipment Computers & Peripheral Equipment 1.00 0.80 0.60 0.40 0.20 98% cost decline 0.02 in 4 decades 1985 1995 2005 2015 2025 Source: Ember, Pinto et al. (2013), Bureau of Economic Analysis, Haver Analytics, Goldman Sachs Global Investment Research.

This unexpected decline in solar costs is likely to only continue. Solar technology benefits from a significant positive learning curve, with the price of panels declining by about 20% with each doubling in new installed capacity globally. Additionally, the marginal fuel cost of solar panels, once installed, is zero, and the highly modular nature of solar power can also enable a more decentralized and secure grid.

At the same time as solar prices have plummeted, battery storage costs have come down by 70% (See Exhibit 10), making it possible for renewables to deliver inexpensive and reliable power around the clock. The growing ability to firm solar power through storage and grid integration is increasingly enabling it to replace traditional sources of baseload generation.

On balance, while there is plenty of noise to navigate in the current moment, the path of the climate and energy transition in just the past few years has exceeded expectations, as technological progress has accelerated, global momentum has picked up, and costs have rapidly come down.

Recent progress has laid the foundation for the next stage of the journey as the global economy continues to transition towards a more stable energy and climate equilibrium.





Today's Crosscurrents and the Path Ahead

In early 2025, investment in clean energy and climate infrastructure in the US slowed due to policy uncertainty while lawmakers debated and then passed the One Big Beautiful Bill Act (OBBBA) in July. The legislation threatened to unwind several key aspects of the Inflation Reduction Act (IRA) and created increased uncertainty around the future of tax credits, incentives, and regulatory frameworks for many energy transition technologies, leaving investors and companies in a holding pattern.

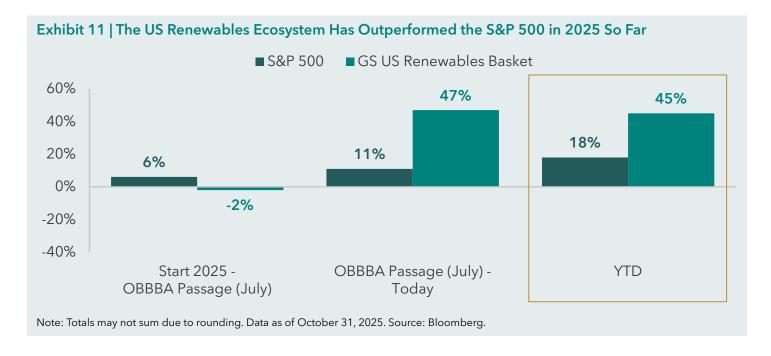
That picture has now changed. With greater policy clarity, including less severe tax credit changes than anticipated, capital and activity have returned to the sector. At the same time, the explosion in computing capacity needs driven by generative Al has triggered a boom in electricity demand, placing significant new pressure on the US grid, and creating a powerful incentive for rapidly scaling new clean energy generation, storage, and transmission.

These recent crosscurrents are evident in the stock performance of US public companies exposed to the energy transition theme, which continued to underperform the S&P 500 even after the market staged a sharp recovery in late April following easing tariff and trade concerns.

However, following the passage of the OBBBA, which provided greater clarity on the future trajectory of US government policy support for the energy transition and created both winners and losers across the US energy transition complex, these companies have staged a remarkable rally. The markets are showing signs of separating the signal from the noise and are now reacting to the underlying forces of surging electricity demand and a steady decline in renewables prices.

In fact, a basket of renewables companies compiled by Goldman Sachs has shown surprising strength in the wake of the passage of the OBBBA—a notable result amid all of the headline noise about the sector's future given a shifting policy outlook—and reflecting, in our view, the relative importance of the recent surge in electricity demand for renewable power and clean energy addition.

When we look back on the period from 2023 to 2030, the defining feature of US energy and climate transition policy won't be the Inflation Reduction Act (IRA) on its own, nor the One Big Beautiful Bill Act (OBBBA) that followed. It will be the combined effect of the two. The IRA raised the ceiling on what's politically feasible in terms of government support for





the energy transition, and the OBBBA has established the floor on what can retain support on a broad bipartisan basis. What's left is a narrower but more durable policy foundation for the next phase of the energy transition.

The OBBBA didn't reverse course so much as recalibrate it. When viewed relative to the policy landscape before the passage of the IRA, the combined effect of these two bills still represents an elevated baseline of federal support for clean energy technologies and the energy transition. The scope may have narrowed, but the floor is now higher than what existed before (See Exhibit 12).

The OBBBA made clear choices about which segments of the energy transition ecosystem will continue to receive near-term federal support and which will not. Electric vehicles, building electrification, and residential solar models reliant on consumer borrowing were deprioritized. Meanwhile, the core technologies underpinning large-scale

decarbonization, including utility-scale solar, gridconnected batteries, and domestic clean energy manufacturing, emerged with relatively more policy support compared to the pre-IRA baseline.

Utility-scale solar and wind tax credits remain available for projects that begin by 2027, while the battery tax credit remained largely unchanged. The majority of projects delivered through 2030 will continue to benefit from the grandfathering of IRA tax credits. Industrial policy has become a clear priority, with new incentives explicitly designed to prioritize domestic production and reshape clean energy supply chains.

In the end, the IRA raised expectations about the scope of federal support for clean energy and climate transition investment. The OBBBA has narrowed the aperture. But together, they reset the baseline of US federal policy support—admittedly somewhat less expansive than peak expectations but also more focused and durable than what came before.

	The Side Shows				The Main Event			
					*	4	S+ Domestic	
	Electric Vehicles	Building Electrification	Carbon Capture	Nuclear	Solar and Wind Tax Credits	Battery Tax Credit	Supply Chain &	Panel & Battery Manufacturing ³
Pre-IRA	\$7.5K / No Exp.	\$500 Credit	\$50 per ton / 2026	\$18 per MWh / No Exp.	26% / 2022	None	None	None
IRA	\$7.5K / 2032	\$1,200 Credit	\$85 per ton / 2032	\$15-30 per MWh / 2032	30% / 2033	30% / 2033	10-20% / 2033	Variable by Tech / 2029
Post-OBBB	None	None	\$85 per ton / 2032	\$15-30 per MWh / 2032	30% / 2027 ¹	30% / 2033	10-20% / Exp. by Tech	Variable by Tech / 2029
Today vs. Pre-IRA	•	•	1	1	1	1	1	1
% of Total IRA	19% of IRA	3% of IRA	2% of IRA	6% of IRA		52% of IRA		6% of IRA

^{1.} Excludes safe harbor. 2. Includes ITC adders for domestic manufacturing and creating jobs in the community. 3. 45X credit. Source: TPG, Congress.gov, Committee for a Responsible Federal Budget ("CRFB"), U.S. Department of Treasury, Invest.gov (archived).



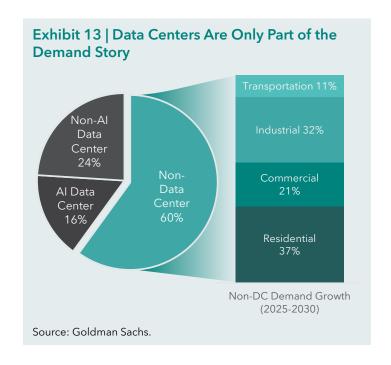
Demand Tsunami:

As AI models grow more powerful, so too has the world's appetite for electricity. Data centers are becoming the furnaces of the digital age, and reliable energy is the fuel that keeps the fire burning. But data centers are only part of the growing demand story, and electricity needs are expected to climb across the entire economy (See Exhibit 13).

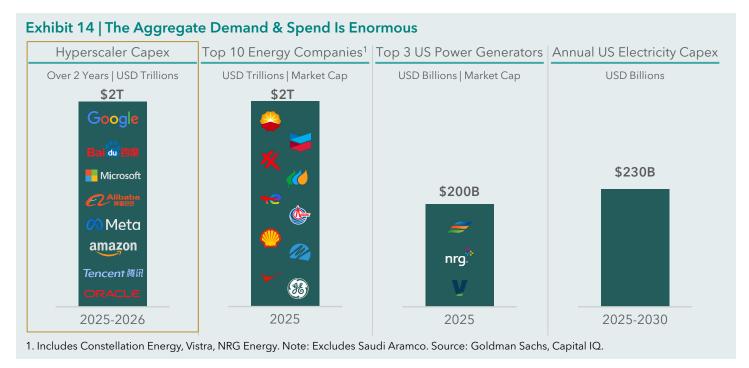
The growing need for power is driving a generational increase in energy addition. In the US, the hyperscalers are spending record amounts on data centers to support the growth of Al–a significant portion of which is going towards purchasing fast, reliable, and scalable energy.

The expected capex from just a handful of cloud players over the next two years alone is expected to dwarf the market cap of the 10 largest energy players globally, the top 3 US power generators, and US electricity capex through 2030 (See Exhibit 14).

With intense competition to build and train foundational AI models, shaving years off project timelines has become incredibly valuable for many of the leading large language model developers, and they can often achieve this most easily by scaling renewables capacity.



"The growing need for power is driving a generational increase in energy addition.



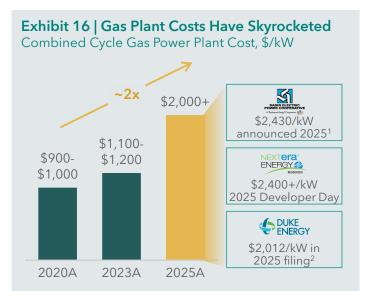


US Market Forces:

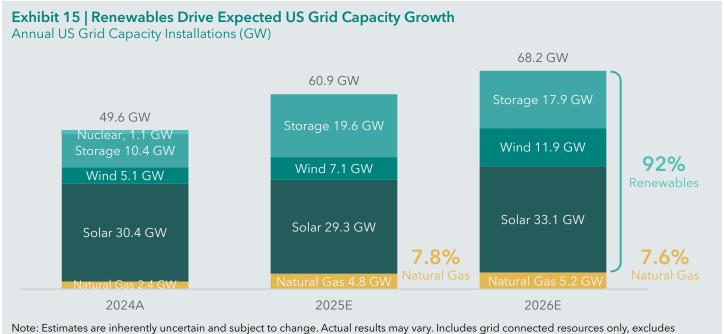
A generational shift in US electricity demand is set to reshape the future of the grid and test the limits of our current power system. An "all-of-the-above" supply strategy will be required to meet our new power needs, with renewables playing a central role alongside firm generation and rapid new infrastructure deployment.

Renewables are projected to account for over 90% of US grid capacity additions through the end of 2025, driven by cost competitiveness and fast deployment timelines. Solar and wind continue to dominate interconnection queues, with utility-scale projects leading the charge (See Exhibit 15).

The alternative of constructing new natural gas plants is more of a medium-term solution given the far longer lead times required to get new capacity online, with current wait times of up to four years or more. Recent estimates from some of the largest utilities in the US suggest that the cost of building a new gas



Note: 1. Basin Electric Power Cooperative's Bison Generation Station (1,470MW, 2x1) with COD in 2030; assumed 90% of announced project cost of \$4B as capital cost. 2. Duke Energy's Cayuga CCGT project (1,476MW, 2 units of 1x1 using GE 7HA.03) with COD in 2030 and 2031. Source: Respective Utility filings and IRP, McCoy, McKinsey.



Note: Estimates are inherently uncertain and subject to change. Actual results may vary. Includes grid connected resources only, excludes distributed generation.

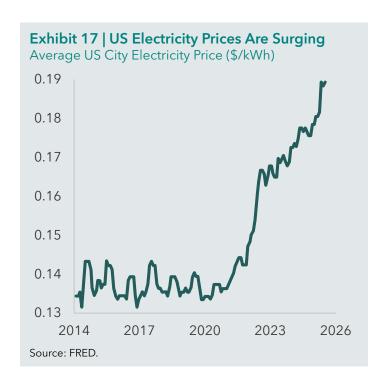
Source: EIA, "Inventory of Operating and Planned Generators" (February 2025).



power plant has more than doubled since 2020, with tariffs and supply chain disruptions significantly raising the price for new gas builds and constraining the role of gas as a possible near-term supplement for renewables as a cost competitive source of reliable power (See Exhibit 16).

Upgrading the grid to meet surging electricity demand will require massive amounts of capital and real creativity, unlocking a wave of new energy transition investment opportunities. Transmission buildout, grid hardening, and flexibility solutions are no longer options. They're going to be required to enable the significant load growth expected in the years ahead.

At the same time, electricity inflation, which has already seen US prices rise by more than 30 percent over the past four years or twice as fast as the overall rate of inflation, will persist until electricity supply and the grid catch up (See Exhibit 17). Without significant new supply and grid upgrades, worsening electricity inflation risks becoming a political lightning rod and could hamper the ability of the US to lead the global Al race.

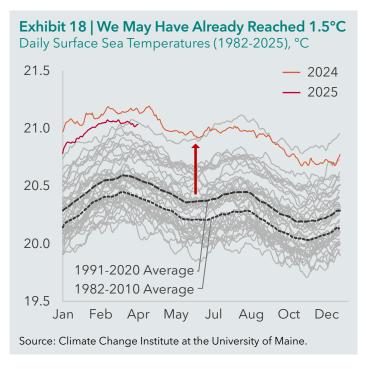


Adaption and Resilience:

Despite rapid advances in climate technology and renewables deployment, the pace of adverse changes in the climate haven't slowed. If anything, extreme temperatures and weather patterns have become more common in spite of the notable strides made to decarbonize the global energy system.

Over the past two years, the world has experienced record-high temperatures (See Exhibit 18), suggesting the 1.5°C goalpost established as an aspirational target for any future increase in global average temperatures by the Paris Accord only ten years ago may have already been breached.

In this new era of the energy and climate transition, opportunities to invest in adaptation and resilience will take on growing importance, as adverse climate impacts continue to accelerate. Since 2000, there's been a 500% increase in \$1B-plus climate disasters, with \$320B in damages from natural disasters in 2024 alone. Droughts now impose more than \$300B in annual economic costs, straining water system, agriculture, and energy infrastructure. As these risks





become systemic, investment is shifting toward hardening assets, decentralizing infrastructure, and building climate resilience into every layer of the economy.

The reality of more frequent and severe weather events is creating increased demand for a new generation of infrastructure, including stronger grids, expanded transmission networks, and more durable built environments. Equally, the data and software required to monitor, model, and mitigate extreme climatic events are becoming essential tools for governments, insurers, and corporates alike. These shifts are opening a powerful new investment frontier—building the physical and digital backbone of a world that will have to rapidly adapt to a changing climate.

Technology and Innovation:

Alongside the large-scale deployment of mature technologies, we're also seeing a wave of new innovation at the frontier of the climate and energy transition. Emerging areas like small modular reactors for nuclear power, electric aviation, and autonomous EVs are pushing the boundaries of what's possible across energy, mobility, and infrastructure (See Exhibit 19).

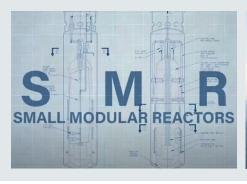
These technologies are still early-stage but advancing rapidly, backed by growing public and private capital. As they continue to mature, we expect they will open up an entirely new class of long-term investment opportunities with the potential to reshape entire industries and sectors of the economy.

Exhibit 19 | Nuclear, Aviation, & Next-Chapter EVs Are Emerging Opportunities of the Energy & Climate Transition













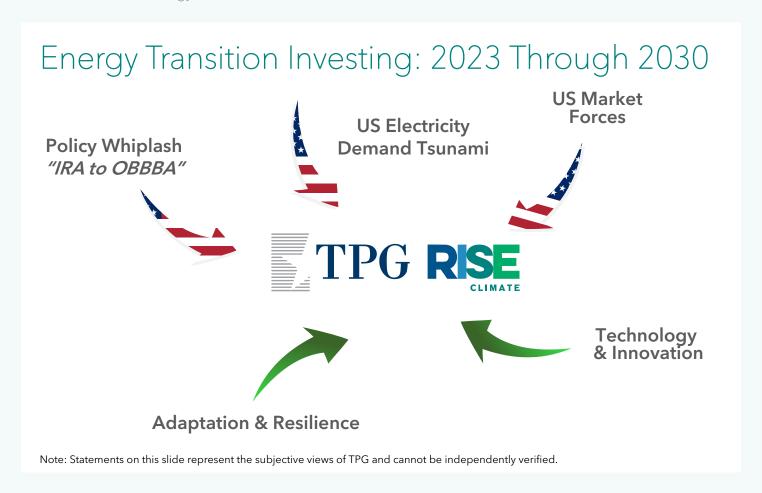
Conclusion:

As the next chapter of the climate and energy transition comes into view, we are encouraged by global momentum in the areas where we invest despite the noise of the moment. Renewables are scaling at record speed, driven by their fundamental and growing cost advantage over fossil fuels. All has supercharged global power demand and sparked a new energy arms race.

The arc of the climate and energy transition, and the investment opportunities it's unlocked, has exceeded our early expectations. At the same time, the market's evolution is paving the way for the next wave of innovation and transition solutions. This includes large—and in many cases unexpected—opportunities arising from tightening electricity supply, rapid technological progress, and favorable shifts in the relative costs of firmed solar and other renewables relative to fossil fuels.

It spans significant investment opportunities surrounding the Al-driven energy buildout, the revival of nuclear power, electric aviation, fast charging, and adaptation and resilience. Meeting the energy needs and capturing the technological opportunities of this new era in the energy and climate transition will demand a significant amount of capital in the years and decades to come.

Capitalizing on these generational investment themes requires extensive domain expertise, a globally scaled platform, and an execution-ready ecosystem. The scope and complexity of this transition are expanding rapidly, demanding new solutions, new partnership, and new forms of capital. As a leading private market climate and energy transition investor, we are excited for what's ahead.





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