

Equilibrium

The energy transition: 10 essential indicators for institutional investors



HIGHLIGHTS

- The transformation of the global energy system is underway, igniting an unprecedented capital movement with profound implications for investment portfolios.
- Over 80% of Nuveen's 2024 Equilibrium survey respondents indicated they consider or plan to consider the energy transition in their investment decisions.
- The shift to a cleaner global energy system will be a complex, multi-decade endeavor influenced by interrelated and fluctuating geopolitical, macroeconomic and technological factors.
- We have identified 10 key indicators to help investors evaluate how their portfolios and investment managers are positioned for the energy transition, reassess risks and uncover compelling investment opportunities.

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Building resilient portfolios amid a multi-decade energy transition

A concerted global effort is underway to decarbonize industries, particularly the energy sector, through a series of policy and regulatory interventions. This international push, building on the momentum of the Paris Agreement, aims to create a more secure and sustainable future.

Although the pace of the energy transition is highly uncertain, one thing is clear: the massive secular trend towards lower-carbon energy sources is top of mind for the world's largest investors. Over 80% of Nuveen's 2024 EQUilibrium survey respondents indicated they consider or plan to consider the energy transition in their investment decisions. More than half (55%) believe they can significantly influence the low-carbon energy transition with their capital allocations.

Institutional investors globally, whether or not they have net zero commitments, are eager to align with and prepare for this once-in-a-lifetime capital movement. It is projected to require \$275T in cumulative spending¹ on physical assets through 2050. Tracking the transition through the key indicators we have identified will provide investors with a more granular view of the evolving economy.

These indicators are inspired by our active collaboration with our parent company TIAA to develop low-carbon signposts to monitor the pace and magnitude of the energy transition over time. The projected speed of the transition heavily influences the climate scenarios many global investors integrate into their strategic models. Different climate scenarios will affect — and be affected by — critical factors such as inflation, interest rates and risk/return assumptions across asset classes.

This framework helps investors evaluate how their portfolios and investment managers are positioned for the energy transition. Investors can reassess portfolio risks and uncover compelling investment opportunities by analyzing the assumptions and reasoning around the trajectory of these indicators.



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Decoding the transition with 10 key indicators

Leveraging our ongoing work with TIAA, we have identified 10 forward-looking indicators related to capital deployment, policy shifts and technological advancements. These indicators are highly interconnected and offer valuable insights into the pace of the energy transition over the near to medium term.

Each indicator is classified as an accelerant, bottleneck or neutral based on our assessment conducted in mid-2024. This determination reflects the indicators' current impact on the pace and progress of the energy transition but acknowledges that these classifications will evolve over time as market dynamics, policies and technologies change.

10 leading indicators of the energy transition: current status



Capital deployment

- | | |
|---|---|
| 1. Clean energy capex: Global annual capital expenditure on clean energy vs. fossil fuels | ● |
| 2. EV infrastructure: Electric vehicle charging infrastructure and capital expenditure | ● |
| 3. Corporate carbon reduction: Decarbonization forecasts for top 100 corporate emitters | ● |
| 4. Emerging market cost of capital: Cost of financing for renewable energy development in emerging markets | ● |

Policy shifts

- | | |
|---|---|
| 5. Carbon pricing: Global carbon pricing, including emission coverage, price trends and market integrity | ● |
| 6. Coal phase-out: Global coal plant planned retirements | ● |
| 7. Trade policy: Major policies influencing global trade | ● |
| 8. Land management: Policies addressing land management and change in global forest cover | ● |

Technological advancements

- | | |
|---|---|
| 9. Climate tech funding: Climate technology funding from venture capital and private equity | ● |
| 10. Nuclear and CCUS: Carbon emissions avoided due to nuclear and carbon capture utilization and storage | ● |

1

Global capital expenditure: clean energy vs. fossil fuel spending



INDICATOR:
Clean energy to fossil fuel ratio
1.8:1 (2024)²

Relevancy

Capital expenditure is a crucial determinant of the pace at which low-carbon energy capacities achieve scale and high-carbon energy sources are displaced. Monitoring the flow of capital into clean energy relative to fossil fuels provides insights given the lag time between capital deployed and project completion or technology utilization.

Driving forces

Over the past decade, lower costs and improvements in renewable energy technologies have enabled attractive economics in many markets. Government support is an additional tailwind. As a result, more renewable capacity is projected to be built in the next five years than the cumulative capacity installed since clean energy technologies became commercially viable.³

The International Energy Agency's (IEA) forecasting model includes three scenarios to evaluate clean energy and fossil fuel investment trends through 2050. Each of

these scenarios, described below, is based on different assumptions about the evolution of the clean energy/fossil fuel spending ratio:

- **Net Zero Emissions by 2050 Scenario:** A pathway for the global energy sector to achieve net zero CO2 emissions by 2050.
- **Announced Pledges Scenario:** Assumes all climate commitments made by governments and industries as of August 2023 will be met in full and on time.
- **Stated Policies Scenario:** Reflects current policy settings and policies under development as of August 2023.

Investors can leverage the IEA model to construct their own climate-aware baseline scenario as part of their long-term strategic asset allocation.

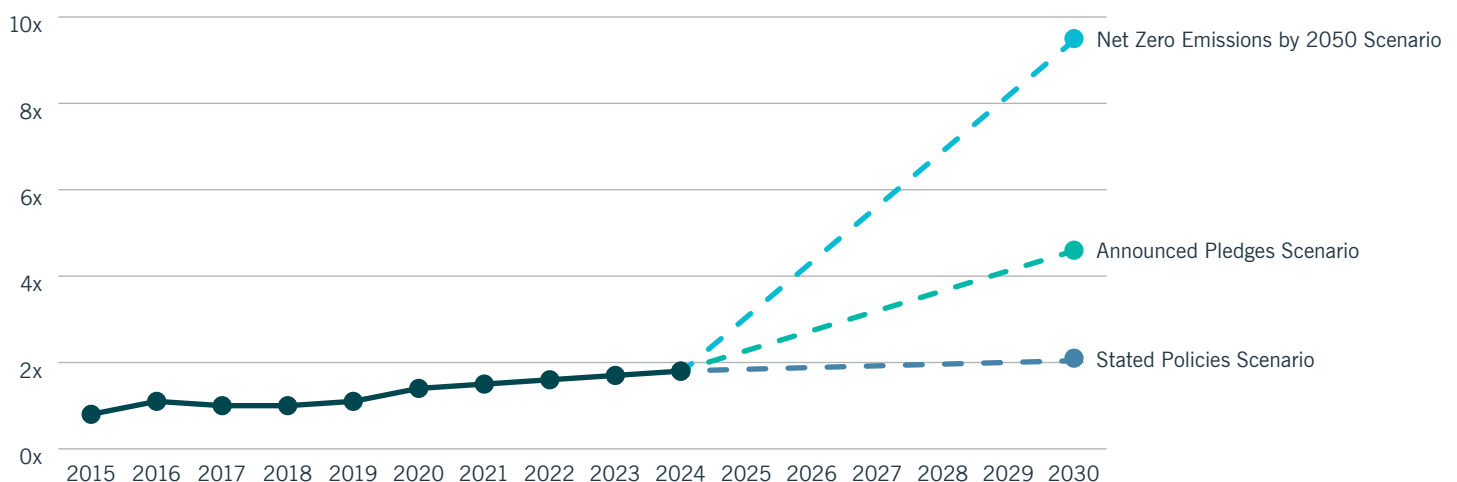
While the ratio of clean energy/fossil fuel spending is expected to rise in all three scenarios, the range of potential investment is immense. Historically, forecasts have significantly underestimated the deployment of solar and wind energy.

Investment implications

The evolution of capital deployment will have widespread ramifications and unintended consequences. Should the ratio of clean energy to fossil fuel capital expenditures fail to increase as anticipated, heightened global warming is likely to result. This may create more investment opportunities in adaptation solutions and introduce greater physical risks that investors need to monitor, particularly related to systemic inflationary pressures. Other risks include those associated with real estate, insurance, mortgages and related pooled securities.

Conversely, should the ratio of clean energy to fossil fuel capital expenditures increase faster than expected, as it has in recent years, markets may see a disruption in demand for certain commodities while geopolitical power and competitive trade dynamics may shift materially. Moreover, while an accelerated transition is initially inflationary due to the front-loaded capital spend, it may be deflationary in the medium to long term.

FIGURE 1: Global investment ratio: clean energy to fossil fuels



Source: IEA, World Energy Investment 2024

2 Electric vehicle charging infrastructure



INDICATOR:
3.9m public connectors in 2023 globally⁴

Relevancy

Electric vehicle (EV) charging infrastructure is a forward-looking indicator for oil demand reduction. Its expansion, both public and home, will enable higher levels of EV demand across various vehicle types. Given that transport accounts for approximately 50% of overall oil demand globally, reaching a possible tipping point where oil demand materially declines will have massive implications for the fossil fuel complex and geopolitics.⁵

Driving forces

The economics of building more EV charging infrastructure is slowing expansion. Upfront costs of constructing and connecting direct-current fast charger stations are high considering the limited level of demand particularly outside of urban areas. Government subsidies and technology innovations will help, but the bar is high. If all new car sales were hybrid, battery or fuel cell EVs, global public electric charging stations would need to increase from 4 million to 31 million.⁶

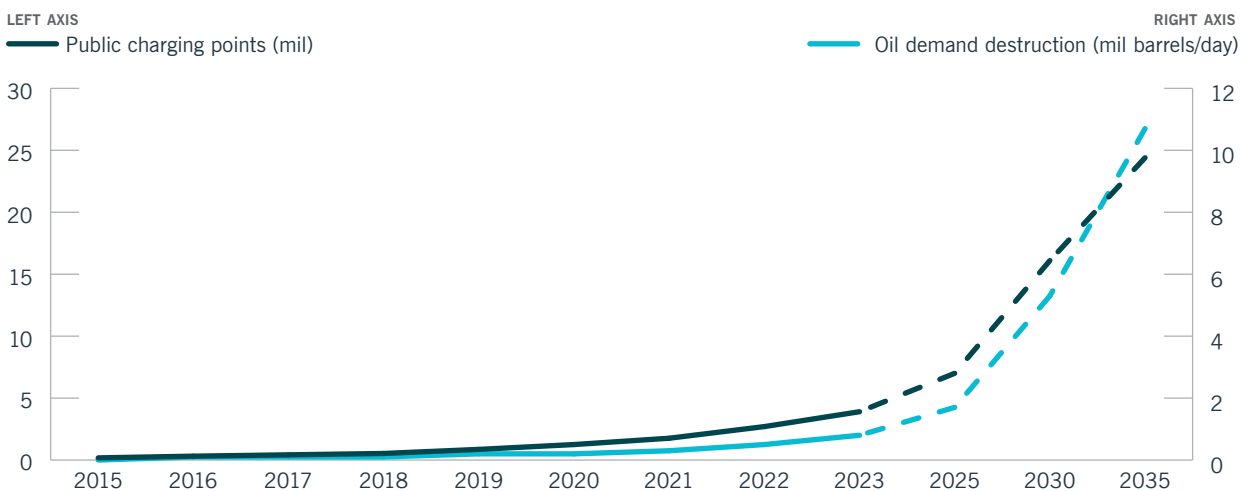
Investment implications

Currently, the lack of EV charging infrastructure is a headwind for many automakers, particularly in the U.S., where some may have bet too much too fast on EV demand. But as charging infrastructure expands, it should significantly change the landscape underpinning consumer demand. Expanding EV infrastructure may also have meaningful downstream effects for critical mineral and battery producers. The utilities sector is also likely to experience increased electricity demand.

Should build out and adoption be accelerated, sustained lower oil prices resulting from decreased demand could have a broad-based deflationary impact, influencing market capitalization and growth prospects for companies within the fossil fuel value chain. This deflationary force may also influence macro factors such as overall inflation and interest rates.

If all new car sales were hybrid, battery or fuel cell EVs, global public electric charging stations would need to increase by almost **700%**

FIGURE 2: Public EV charging points and oil demand destruction in Stated Policy Scenario



Source: BNEF (Bloomberg New Energy Finance), IEA, Global EV Outlook 2024

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3 Corporate carbon reduction



BOTTLENECK

INDICATOR:

-0.04% projected annual decline of GHG emissions forecast from 2023 – 2030⁸

Relevancy

Capital expenditures to reduce greenhouse gas (GHG) emissions from the largest corporate emitters represent a significant source of potential climate finance and emissions reduction. Such expenditures may also enhance the business model resiliency of these corporations. While low-carbon supply and demand factors are the primary drivers of decarbonization throughout the economy, monitoring corporate strategy and capital expenditure changes can illuminate the shifting near-term economic landscape.

Driving forces

A Carbon Disclosure Project (CDP) report observed that a small number of corporations drove the majority of GHG emissions since

1988.⁷ Due to influences from a variety of stakeholders, including investors, customers, regulators and employees, many companies have set voluntary carbon reduction targets. These include long-term goals to achieve net zero emissions in operations and supply chains by 2050. But whether they achieve or maintain these targets is uncertain.

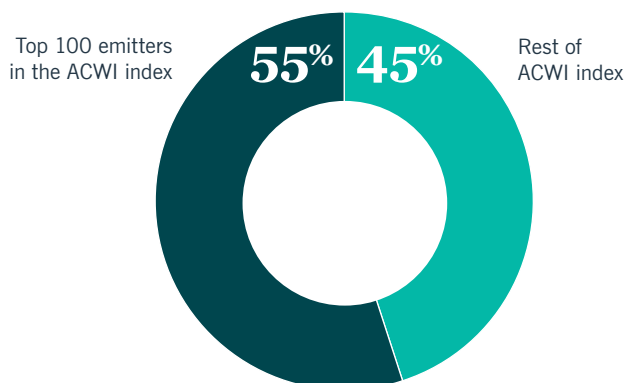
In 2022, corporations contributed approximately \$192 billion of the \$1.2 trillion in climate finance tracked by the Climate Policy Initiative. Decarbonizing efforts are also being made in sectors where reducing carbon emissions is more difficult, such as mining and cement manufacturing. The potential for innovation is strong in these areas. However, corporate demand commitments and offtake agreements are critical for helping new technologies scale.

Investment implications

Companies that are proactively reducing their carbon footprint and investing in clean energy may be better positioned for the long term. However, capital expenditure to meet targets can weigh on free cash flow generation, which may explain why some companies that have scaled back their climate ambitions have been temporarily rewarded with public equity price increases.

Investors will need to monitor corporate commitments and actual progress towards net zero targets, as failure to meet these targets could result in regulatory or market pressures. More broadly, the lack of corporate GHG reduction could limit the speed of the transition.

FIGURE 3: Absolute emissions (Scope 1 – 3) from companies in the MSCI ACWI Index



Annual carbon reduction rate 2023 – 2030 for top 100 corporate emitters:

-0.04% MSCI forecasts based on credibility of company targets

-10.61% Required to align with Net Zero scenario carbon budget

Source: MSCI ESG Research as of July 2024.

4

Cost of capital in emerging markets



INDICATOR:

~ 9% – 14% cost of capital in emerging markets in 2022 (based on solar PV and storage projects)⁹

Relevancy

Emerging markets have substantial economic growth potential compared to developed countries, which in turn drives increased energy demand. Ensuring this growth is met with clean energy rather than fossil fuels is critical to decoupling economic growth from carbon emissions. Approximately 88% of electricity demand between 2019 and 2040 is expected to come from emerging markets,¹⁰ making their energy choices pivotal in impacting global carbon emissions.

Driving forces

Clean energy projects in emerging markets often face high upfront capital costs, necessitating significant investments in infrastructure and technology. Access to affordable financing is limited in these regions, and the average cost of financing renewables across emerging market countries ranges from 9% – 14%.⁸ This creates a climate investment trap, where countries most vulnerable to climate change struggle to attract sufficient investment for climate mitigation and adaptation projects. High financing costs, economic instability and perceived investment risks exacerbate this challenge.

Overall, we see the high cost of capital as a bottleneck. However, financial support from entities like the Green Climate Fund, the Africa Renewable Energy Initiative and other blended finance mechanisms are stepping in to mitigate risks, enhance investment appeal, catalyze innovation and build local capacity.

Investment implications

Higher financing costs increase the total costs of clean energy deployment and will likely delay the transition from fossil fuels to renewables. This delay has implications for the medium- and long-term demand for coal, natural gas and liquified natural gas.

That said, opportunities exist for investors to support clean energy projects in these regions through blended finance mechanisms and partnerships with international financial institutions. By reducing the cost of capital and enhancing investor confidence, these initiatives can help accelerate the energy transition in emerging markets.

Average cost of capital for solar and storage projects



Source: IEA Cost of Capital Observatory 2024

88% of electricity demand is expected to come from emerging markets, making their energy choices pivotal for curbing global carbon emissions

5

Global carbon pricing



BOTTLENECK

INDICATOR:

Global weighted average carbon price
~\$23/ton CO₂ equivalent (CO₂e)
covering ~11.6 gigatons CO₂e¹¹

Relevancy

Carbon trading and pricing schemes play a pivotal role in climate financing and incentivizing decarbonization. Effective carbon pricing can mobilize substantial funds for the energy transition, and higher carbon prices combined with broader industry coverage could significantly bolster the capital required for these efforts.

Driving forces

Carbon pricing is largely implemented regionally through emissions trading systems and carbon taxes, often targeting specific industries. There is a growing trend to expand industry coverage and limit allowances over time. In 2023, global carbon pricing generated over \$104 billion in revenue, yet it covered only 24% of global GHG emissions.¹¹

International trade tariffs based on carbon content could incentivize countries to implement their own carbon pricing schemes.

This would enable domestic companies to pay taxes locally rather than to foreign governments, retaining revenue domestically and encouraging broader adoption of carbon pricing.

Compliance carbon markets, also known as regulatory markets, are supplemented by voluntary markets, where companies and individuals buy and sell carbon credits to offset their emissions. Both markets have their challenges, which is why we currently see carbon pricing as a bottleneck to the transition.

Compliance markets are only available in a limited number of jurisdictions and prices for carbon on these markets are low. Price levels generally do not reflect the estimated social cost of carbon or a price that would support the economics of many carbon-abating technologies. Voluntary markets provide an option for institutions, such as corporations, or consumers to offset emissions. While there are promising new efforts to bolster the credibility of voluntary markets, such as the Integrity

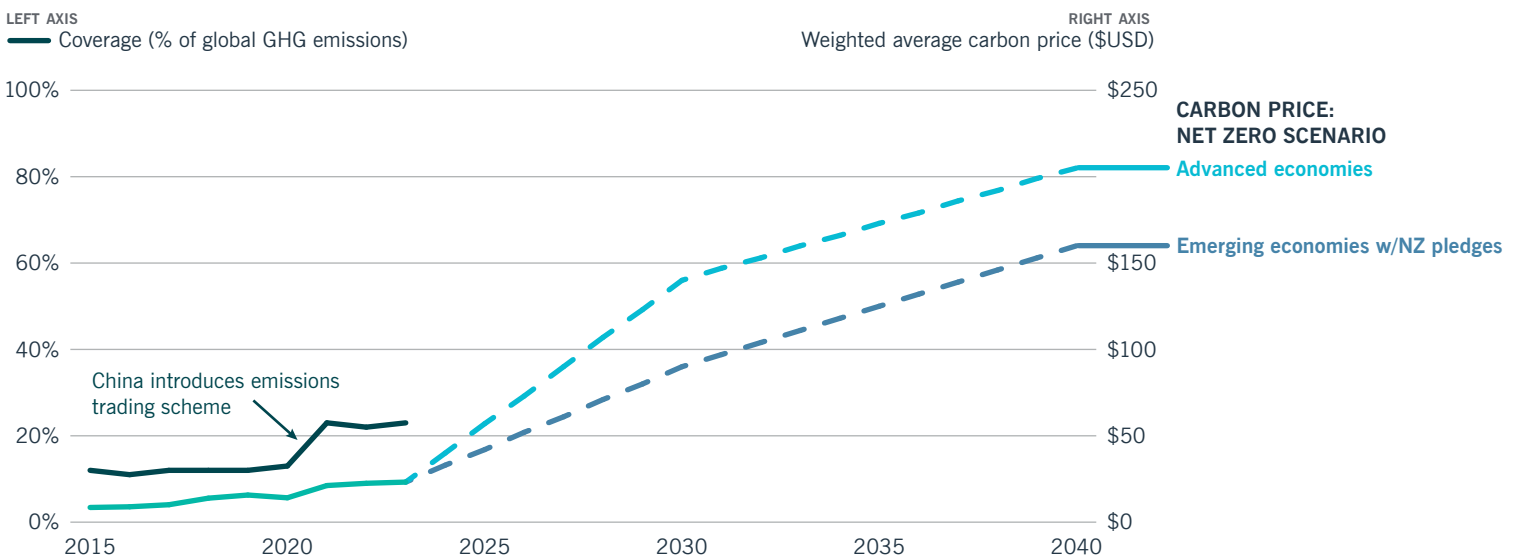
Council for the Voluntary Carbon Market, these markets are still challenged by a lack of common standards, market liquidity and volume.

Investment implications

Investors should anticipate potential increases in carbon taxes and broader economic coverage to elevate the cost of carbon-intensive activities, incentivizing investments in clean technologies. From a macroeconomic perspective, higher carbon prices may drive inflationary pressures as companies pass on incremental costs to consumers.

Should voluntary markets advance and integrate with compliance markets — and at higher levels of carbon pricing — nature-positive investments could emerge as financial beneficiaries. Not only can these investments help improve ecosystems, biodiversity and food security, but they also produce carbon credits for investors.

FIGURE 4 : Global carbon pricing and coverage



Source: World Bank, Statista, IEA Net Zero Roadmap

6

Global coal plant planned retirements



INDICATOR:

307 gigawatts of coal capacity planned for retirement between 2023 – 2040¹²

Relevancy

As countries committed to the Paris Agreement work toward reducing greenhouse gas emissions, the phase-out of coal plants becomes a focal point. Each country has created a climate action plan that outlines specific strategies for curbing emissions. These plans are expected to result in stricter regulations eventually.

Moreover, the availability of reliable and plentiful substitute power generation, such as clean energy through utility-scale solar and battery assets or natural gas, is necessary to support the phase-out of coal plants.

Driving forces

The pace and trajectory of these retirements, tracked by sources such as the Global Energy

Monitor, are heavily influenced by national regulations and economic conditions.

In 2023, 23 gigawatts of coal capacity was retired.¹³ But global coal power capacity continues to rise, primarily driven by China, India, Japan, Indonesia and Russia. The U.S.'s commitment to retire coal capacity is progressing too slowly to meet Paris Agreement goals.

Increasing energy demands, currently driven by AI and the reshoring of manufacturing, place additional pressure on coal phase-out plans. If energy demand remains flat or declines due to improved energy efficiency or changing consumer behavior, the transition away from coal should face less resistance. Conversely, rising demand may complicate or delay coal phase-out efforts.

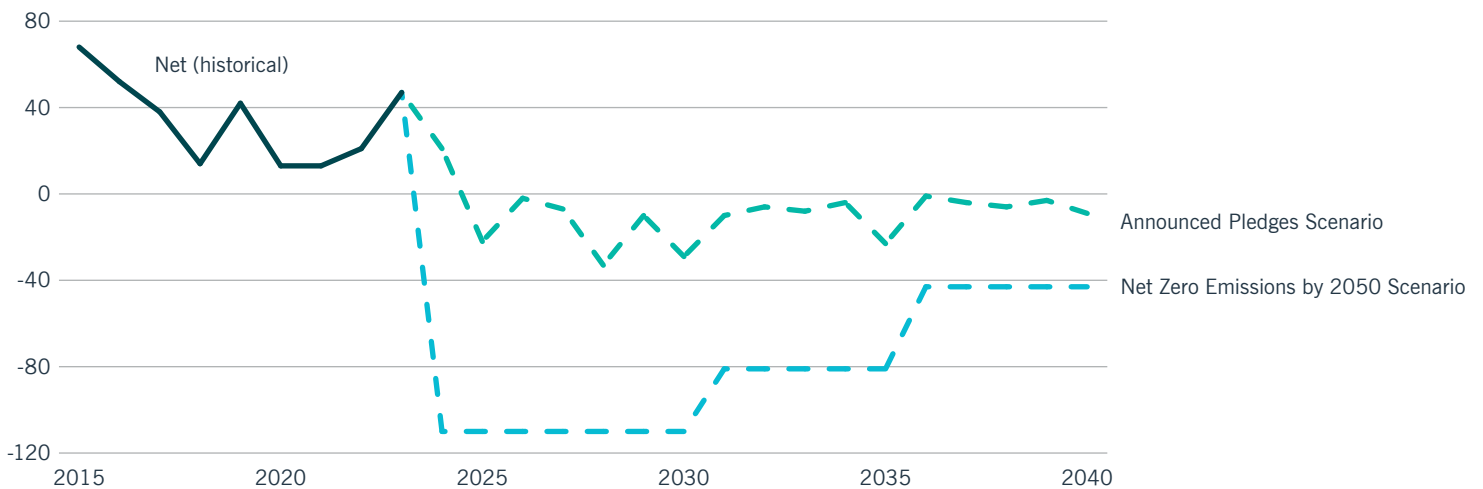
Investment implications

Monitoring the planned retirements of coal plants provides investors with a forward-looking view of the scale of growth opportunities for low-carbon power generation. These retirement plans should significantly impact utilities and their supply chains, especially in regions with high coal dependency.

As regulatory environments tighten and international cooperation increases through initiatives like the Paris Agreement and the Just Energy Transition Partnership, companies involved in coal power generation may face growing financial and operational pressures.

FIGURE 5: Coal-fired power generation capacity (net gigawatts)

Net GW (additions - retirements)



Source: Global Energy Monitor, IEA Net Zero Roadmap



Major policies influencing global trade



INDICATOR:

Two major climate policies influencing global trade: U.S. Inflation Reduction Act and European Green Deal

Relevancy

Countries aiming to compete in global markets now face stronger incentives to decarbonize. Energy security is growing in importance and likely to be a long-term dynamic, as countries dependent on fossil-based energies are vulnerable to influence from supplier nations.

Additionally, the rise of economic nationalism has seen countries channeling resources toward subsidies and tax credits for clean energy projects. Meanwhile, some businesses are lowering the carbon intensity of their exports, aiming to gain a share of the clean energy technology value chain and strengthen energy security.

Driving forces

The allocation of government funding through industrial policies is expected to stimulate substantial private financing, creating opportunities for profitable investments. Major

industrial policies, such as the EU's European Green Deal and the U.S.'s Inflation Reduction Act (IRA), are driving significant investments in clean energy and advanced manufacturing. Both the IRA and the Green Deal include climate and energy provisions totaling over \$1 trillion each, focusing on EV production, clean electricity/energy and advanced manufacturing of solar, wind and battery plants.

Carbon border adjustments (CBAs) and tariffs based on carbon intensity are creating a ripple effect, making it a geopolitical priority for countries to hasten the pace of the transition and secure a position in the global clean energy value chain. CBAs incentivize exporters to adopt cleaner production methods to avoid additional costs.

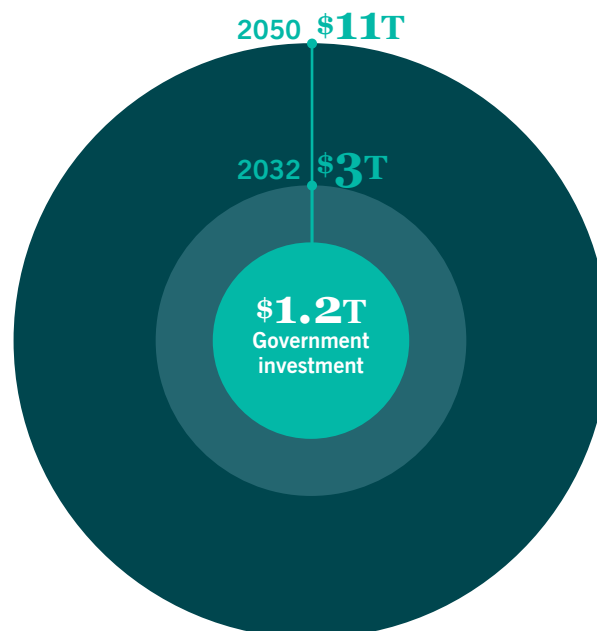
While significant policies are in place in the EU and the U.S., most countries globally have not implemented major climate bills comparable in scale. Most cannot afford to, creating a bottleneck in the global effort to decarbonize.

Investment implications

For investors, the most significant aspect of major industrial policies like the IRA and the European Green Deal is the positive change in economic incentives that drive more private capital investment. Goldman Sachs estimates, for example, that the \$1.2T U.S. government investment in the IRA will mobilize approximately \$3T in total investment by 2032 and \$11T by 2050.¹⁴ This creates substantial opportunities for investors in projects that benefit from government support.

Investors should also consider the potential impacts of carbon border adjustments and tariffs on global trade dynamics and sovereign debt. Larger government interventions may also drive the adoption of cleaner technologies and influence the competitiveness of different industries depending on their regional profiles.

FIGURE 6: Cumulative clean energy investment mobilized by the U.S. Inflation Reduction Act



Source: Goldman Sachs Research

8

Change in global forest cover



INDICATOR:

Annual forest area net change, -4.7m hectares (2010 – 2020 average)¹⁵

Relevancy

Forests, along with oceans and soil, act as carbon sinks, which are natural reservoirs that absorb and store more CO2 from the atmosphere than they release, helping to mitigate the effects of climate change.

Despite efforts to curb deforestation, it continues at high rates in many regions, releasing significant amounts of stored carbon back into the atmosphere.

Driving forces

Comprehensive policies aimed at reforestation are lacking, limiting large-scale efforts to restore forested areas and enhance carbon sequestration capabilities. Carbon-friendly

agricultural practices, such as agroforestry, conservation tillage and cover cropping, have not seen widespread adoption, despite their potential to significantly enhance carbon sequestration in soils and vegetation.

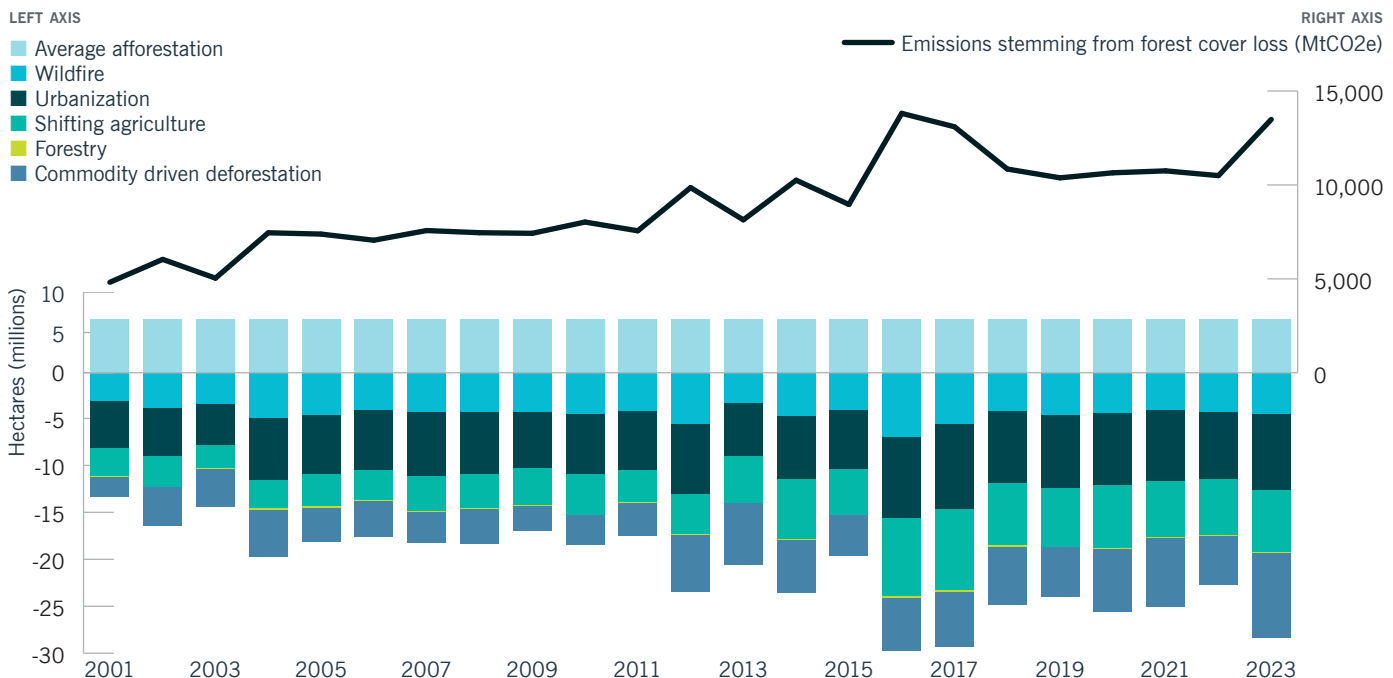
Though we currently view the lack of widespread and effective policies to protect and restore carbon sinks as a significant bottleneck, policies that aim to protect these sinks are starting to emerge. In recent years, Brazil has shown a renewed commitment through various policy measures to preserve the Amazon and mitigate climate change. Additionally, the EU has introduced the European Deforestation Regulation, aimed at curbing global deforestation linked to products sold within its market, which will come into full effect in December 2024.

Investment implications

Investors should be aware of their exposure to companies highly dependent on exploiting natural resources for value creation. These companies may face more stringent environmental regulations, which increases operational costs. Environmental degradation can lead to resource scarcity, increasing costs and reducing margins for companies reliant on natural resources.

As policies to protect carbon sinks potentially become more widespread, there will be opportunities for investments in sustainable land use practices and technologies that enhance carbon sequestration.

FIGURE 7: Global CO2e emissions stemming from forest cover loss



Source: Global Forest Watch

9 Climate technology funding



INDICATOR:
\$32B in private
technology
funding in 2023¹⁶

Relevancy

Innovation and technology diffusion are pivotal for reducing CO2 emissions and enhancing the financial incentives for decarbonization. Technological advancements, particularly in energy production and consumption, lead to significant efficiency improvements, lowering the cost per unit of energy and making economics for lower-carbon activity attractive. The diffusion of technology is especially crucial for enabling emerging market countries to bypass the carbon-intensive development paths of industrialized nations.

Driving forces

Private equity and venture capital funding are essential in developing nascent technologies such as energy storage and green hydrogen. Climate tech has seen substantial share growth

in the venture capital and private equity space, now accounting for over 10% of global investments in these areas, compared to less than 2% in 2014.¹⁶

The clean tech ecosystem now boasts over 100 companies valued at over \$1 billion.¹⁷ As these companies advance and their technologies mature, they become more appealing to a broader range of investors.

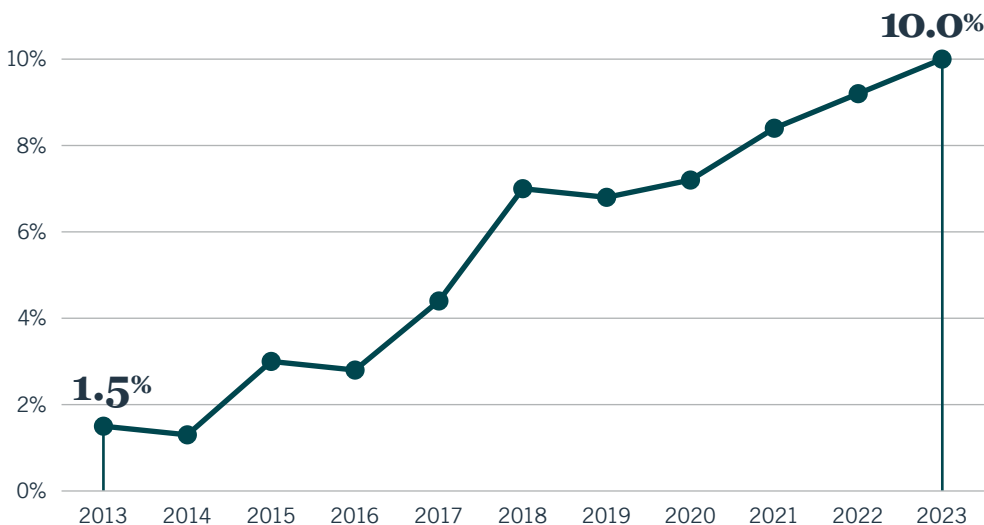
In hard-to-abate sectors like cement, mining, steel and chemicals, new technologies will be vital for meeting global decarbonization goals. Carbon capture, utilization and storage (CCUS) technologies, for instance, have the potential to mitigate emissions associated with mining and cement production. Technology is particularly important in these sectors as they are typically upstream within value chains. And with little excess margin in these sectors, the need for efficiency gains is even higher.

Investment implications

The influx of private equity and venture capital funding into climate tech should help with the overall promise and breadth of low-carbon innovations. Capital is needed to scale the most promising solutions for larger deployment and penetration, presenting substantial opportunities for investors, particularly within private markets.

FIGURE 8: Climate technology as a percent of all VC and PE investment

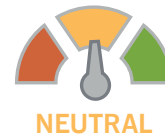
% investment in climate technology



Source: Pitchbook, PwC Analysis

10

Progress on nuclear and carbon capture utilization and storage



INDICATOR:

~50m tCO₂e avoided from CCUS in 2024, ~416 GW of nuclear generation capacity in 2023¹⁸

Relevancy

Nuclear power and carbon capture utilization and storage (CCUS) could be indispensable technologies to address the challenges of baseload power and reducing CO₂ emissions. Both have gained traction and made significant progress recently, yet they remain underdeveloped with respect to 2050 net zero targets.

Driving forces

For nuclear power, emerging technologies like small modular reactors (SMRs) and fusion may have the potential to revolutionize the energy sector. SMRs, in particular, are

nearing commercialization due to their proven safety, efficiency and flexibility. But these new technologies face significant challenges, including cost overruns, execution risks and supply chain issues.

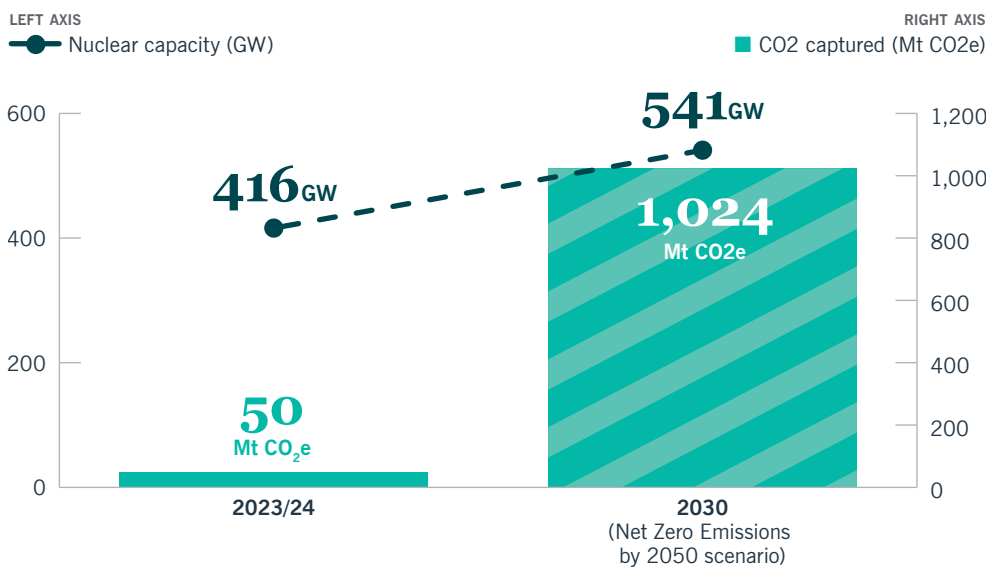
Key factors driving the growth of CCUS capacity include capital deployment, subsidies, industry coordination and customer willingness to pay for low-carbon products. Despite challenges in capture efficiency and storage reliability, there is optimism about CCUS's potential to reduce the carbon intensity of hard-to-abate sectors and its pivotal role in emerging markets with high coal and gas capacity.

Investment implications


Investors need to consider the provision of carbon-free baseload power and the potential longevity of fossil-based activities with capture, storage and utilization, which have implications for the asset value of legacy infrastructure.

Transitioning from high-risk, proof-of-concept projects and early-stage investments to more stable, growth-oriented opportunities in nuclear and CCUS technologies will likely create unique investment opportunities.

FIGURE 9: Growth needed on nuclear energy and CCUS



Source: IEA. Nuclear data as of March 2024, CCUS data as of April 2024



Investing in the energy transition

Rebuilding the world's energy system is a monumental task. This unprecedented capital movement is set to have far-reaching consequences for investment portfolios. Extracting value and mitigating risk may require investors to step into unfamiliar territory to achieve a resilient, climate-aware strategic asset allocation.

At Nuveen, we know that the transition to a low carbon economy will create tremendous opportunities and risks for our clients globally, including TIAA, which is our parent company and largest client. Our work to decarbonize TIAA's \$300 billion+ portfolio enables us to help manage transition risks and embrace investment opportunities, and we are bringing these capabilities to our third-party clients.

Learn more about our investment capabilities that are directly supporting the energy transition, including:

- *Energy Infrastructure Credit*, which provides private debt solutions to assist companies transitioning to a low carbon economy, while also ensuring energy security.
- *Nuveen Green Capital* that specializes in Commercial Property Assessed Clean Energy (C-PACE) lending to help accelerate deployment of energy efficiency and renewables in commercial real estate.
- *Global clean energy infrastructure*, one of Europe's largest fund managers focusing exclusively on clean energy infrastructure.

About Nuveen

Nuveen, the investment manager of TIAA, offers a comprehensive range of outcome-focused investment solutions designed to secure the long-term financial goals of institutional and individual investors. Nuveen has \$1.2 trillion in assets under management as of 31 March 2024 and operations in 27 countries. Its investment specialists offer deep expertise across a comprehensive range of traditional and alternative investments through a wide array of vehicles and customized strategies.

For more information, please visit [nuveen.com](https://www.nuveen.com).

Endnotes

- 1 McKinsey, The Net-Zero Transition
- 2 IEA, World Energy Investment 2024
- 3 IEA, Renewables 2023
- 4 IEA, Global EV Outlook 2024
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- 18 IEA

For more information, please visit nuveen.com.

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ESG integration is the consideration of financially material ESG factors in support of portfolio management for actively managed strategies. Financial materiality of ESG factors varies by asset class and investment strategy. Applicability of ESG factors may differ across investment strategies. ESG factors are among many factors considered in evaluating an investment decision, and unless otherwise stated in the relevant offering memorandum or prospectus, do not alter the investment guidelines, strategy or objectives.

Responsible investing incorporates Environmental Social Governance (ESG) factors that may affect exposure to issuers, sectors, industries, limiting the type and number of investment opportunities available, which could result in excluding investments that perform well.

Economic and market forecasts are subject to uncertainty and may change based on varying market conditions, political and economic developments. As an asset class, real assets are less developed, more illiquid, and less transparent compared to traditional asset classes. Investments will be subject to risks generally associated with the ownership of real estate-related assets and foreign investing, including changes in economic conditions, currency values, environmental risks, the cost of and ability to obtain insurance, and risks related to leasing of properties.

Nuveen, LLC provides investment services through its investment specialists. This information does not constitute investment research, as defined under MiFID.

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