NEUBERGER BERMAN

THE STATE OF DECARBONIZATION 2025

Assessing the progress of policy initiatives, navigating the technological, political and fiscal complexities, and identifying the opportunities for investors to explore within a decarbonizing economy



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"The climate crisis transcends borders and politics. Climate action cannot be a victim of geopolitical competition." Antonio Guterres, UN Secretary-General

The world stands at a defining moment in the race to decarbonize. Renewables are scaling rapidly, on track to surpass coal as the leading source of electricity by 2025, while clean energy investment soared to over US\$2 trillion in 2024. However, rising energy demand—driven by the explosive growth of Artificial Intelligence (AI) data centers, EV adoption and economic expansion—threatens to outpace progress. Delays in critical grid infrastructure and the need to scale transformative technologies, such as low-emission hydrogen and carbon capture, add to the challenge. At the same time, geopolitical tensions and continued reliance on fossil fuels in major economies like China and India underscore the complexity of the transition. With the 1.5°C threshold looming and natural carbon sinks weakening, the call for bold innovation and collaboration has never been more urgent.

The elections held in 2024 have contributed to a more fragmented global political landscape. Notably, in over 80% of democracies where elections were held, incumbent parties suffered losses in either seats or vote share, potentially driving governments to reassess their policy priorities. While some electorates (e.g., in the U.K.) empowered their governments to prioritize sustainability, others (e.g., in the EU) advocated for a more balanced approach. In the U.S., voters focused on addressing cost-of-living challenges.

This global hesitation to shoulder the financial burden of decarbonization reflects growing concerns in an increasingly adversarial world. Real living standards have declined for many in developed nations, with environmental policies often criticized for undermining economic competitiveness. As a result, policymakers are shifting focus away from ambitious climate agendas, reallocating resources toward defense budgets, energy security and economic self-sufficiency. The climate policies that endure will likely be those that enhance resilience to climate change, lower energy costs and improve competitiveness.

While investors have faced growing concerns about a pullback from clean energy from the U.S., recent history shows that regardless of who is in presidential office, clean energy investments have continued to grow. We believe a full repeal of the Inflation Reduction Act (IRA) remains unlikely. Despite the potential repeal of some policies and the expected prioritization of fossil fuels by the administration, long-term tailwinds for renewables still exist. Steadily declining input costs, load growth and strong corporate demand for renewable electricity are likely to bolster continued growth in the segment. The shifting regulatory environment and higher cost of capital present challenges, which may slow the pace of the U.S.'s energy transition, but appear unlikely to reverse it completely. Outside of the Trump administration has shown support in building out data center capacity and Al capabilities with a US\$500 billion AI infrastructure investment, in addition to executive orders supporting AI expansion. The surge in energy demand linked to the expansion of AI will likely lead to a needed increase in energy capacity, particularly in nuclear, which has received bipartisan support. In late 2024, the Biden administration proposed 35 gigawatts (GW) of new nuclear capacity over the next 10 years. If carried out under the Trump Administration, this additional nuclear capacity could lead to 68 million tons of reduced emissions even in a scenario of new electric vehicle (EV) sales.

Businesses remain at the forefront of this transformation. BloombergNEF's annual report shows global energy transition investment grew 10.7% in 2024 to over US\$2 trillion, driven largely by China's 20% increase. Europe saw a decline of 6.5%, with renewable energy investment particularly hard hit—down 10% in the EU. While leaders in renewables and carbon capture are making headway, progress across industries remains uneven. Some sectors, such as manufacturing and transportation, continue to grapple with structural challenges, reliance on offsets and outdated infrastructure. Sector-specific frameworks, like science-based targets, are gaining adoption, but gaps in data quality and evolving benchmarks create further obstacles. As stakeholders demand tangible results, companies must shift from ambition to action, delivering measurable emissions reductions and aligning their strategies with net-zero pathways to lead in this era of accountability and opportunity.

To help investors navigate this complex picture, we are pleased to present the second annual edition of **The State of Decarbonization**. Our work aims to help answer the questions most important to investors when it comes to managing capital in a decarbonizing economy.

The Key Questions for 2025

For asset managers and asset owners alike, it feels like there are more questions than answers on the current state of decarbonization. With this in mind, we spoke to some of the world's largest institutional asset owners and asked what was top of mind for them.



ENERGY TRANSITION DASHBOARD



Level Setting

Global temperatures continue to rise as global energy demand is going up and clean energy capex fails to keep pace

GLOBAL ENERGY DEMAND

Although the share of fossil fuels in the energy mix has been decreasing, renewable energy is still not sufficient to meet the current and future energy demand.



Global primary energy consumption by source

GLOBAL ENERGY CAPEX

Rising investments in clean energy push overall energy investment above US\$3tn for the first time.

Annual investment in clean energy by selected country and region, 2019 and 2024 - (2023, MER)



Source: IEA; OPEC - World Oil Outlook 2024; Chapter 2, Energy demand, table 2.1, NOAA National Centers for Environmental Information, January 2025.

GLOBAL TEMPERATURE RISE

Earth's warming exceeded 1.5°C on an annual basis for the first time in 2024*



Global Land and Ocean December Average Temperature Anomalies

Source: IEA; OPEC - World Oil Outlook 2024; Chapter 2, Energy demand, table 2.1, NOAA National Centers for Environmental Information, January 2025. Energy consumption is measured in terawatt-hours, in terms of direct primary energy. This means that fossil fuels include the energy lost due to inefficiencies in energy production.

*The EU's Copernicus Climate Service measured the 2024 global average temperature to be 1.6°C above the pre-industrial average, and the U.K. Met Office to be 1.53°C.

Energy Transition Dashboard

Insights and key takeaways



See Appendix pg. 51 for source data.

Our **Energy Transition Dashboard**, now in its second year of publication, provides a comprehensive overview of the state of climate action and the pace of decarbonization across the global economy. It tracks momentum shifts in critical areas of the energy transition, offering insights into both progress and setbacks. The 2024 findings reveal a challenging year for the energy transition, with significant backward momentum in key areas.

Key Highlights:

- The overall momentum of the energy transition took a substantial step back in 2024.
- The most significant negative shifts were observed in **global temperature increases and rising greenhouse gas (GHG) emissions**, signalling a worsening trajectory.
- Despite widespread net-zero commitments and the implementation of carbon-mitigating policies, global emissions continue to rise and are projected to peak between **2025 and 2035**.
- Current emissions remain far above the carbon budget required to stay on track for the **1.5°C global warming target** established under the Paris Agreement.
- Areas such as **renewable energy deployment**, **electric vehicle adoption**, **clean energy capital expenditures** and **technology readiness** showed positive momentum. However, this progress is slower than required and falls short of policymaker targets.
- While decarbonization has become a global consensus (with over 90% of global GDP now tied to net-zero commitments), translating these high-level goals into actionable policies at regional and local levels remains a significant hurdle.
- Despite repeated predictions of "peak coal," the world's consumption of coal—the most polluting fossil fuel—continues to grow, driven by rising energy demands in developing economies.
- While global economic losses from natural disasters in 2024 were slightly lower than in 2023, they still remain above the **21st** century average, highlighting the ongoing financial toll of climate inaction.

Conclusion:

Despite incremental progress in areas like renewables and clean energy investment, overall the Energy Transition Dashboard signals negative momentum. The ongoing rise in emissions, coupled with challenges in policy implementation and political fragmentation, underscores the need to reassess and strengthen existing frameworks. Decarbonization of the economy at the speed and scale needed to achieve net zero requires governments, businesses and society to work together to overcome barriers and deliver tangible results.

HOW WILL THE WORLD MEET THE PROJECTED INCREASE IN ENERGY DEMAND?



GLOBAL ELECTRICITY GENERATION BY SOURCE, 2014-2025

Diverse Forces Are Redefining Global Energy and Regional Dynamics

Electricity use set to outpace global GDP growth

Source: IEA, January 2025.

Global electricity demand is projected to grow nearly 4% annually through 2027, marking the beginning of a new "age of electricity." This surge is driven by rising industrial production, increasing electrification, expanding data centers, and greater use of air conditioning, with emerging economies like China, India and Southeast Asia leading the growth. China's electricity consumption has outpaced its economic growth since 2020, while India plans to increase renewable energy's share in power generation from 21% in 2024 to nearly 27% by 2027. However, in sub-Saharan Africa, limited generation capacity leaves nearly 600 million people without electricity access, though countries like Kenya and Senegal are making significant progress in expanding renewables and universal access. The global energy landscape is rapidly transforming, with renewables playing a central role. By 2025, renewable energy generation is expected to surpass coal-fired electricity, with renewables' share rising from 30% in 2023 to 35% in 2025. However, the increasing frequency of negative wholesale electricity prices in many markets highlights the urgent need for greater system flexibility. Digital solutions like the Digital Energy Grid (DEG) offer opportunities to address these challenges by enhancing coordination, reducing fragmentation and enabling efficient integration of renewables. We believe such innovations are critical for a sustainable, interconnected and resilient energy future.

Electrification's major bottleneck remains grid expansion, which requires US\$22.5 trillion in global investment by 2050 to remain on track for a net-zero scenario. Optimizing grid systems through innovative technologies, storage, flexibility and long-distance interconnectors is vital, but new grid construction remains essential. Historically, grids have been slow to adapt, and developed countries need to accelerate grid construction. Delays create the risk of missing out on significant renewable energy potential. The International Energy Agency warns that grid delays could result in losing 58 Gt CO₂ emissions savings by 2050, significantly impacting the carbon budget for a 1.5°C scenario.

BREAKDOWN OF GLOBAL ANNUAL GRID INVESTMENT REQUIRED (2024-2050) \$BN

Source: Systemiq analysis for the ETC; BNEF (2024), New Energy Outlook; Nexans.

Supercharged natural gas

Gas demand and prices are rising. Global liquefied natural gas (LNG) is a key theme benefitting from regional imbalances and volatility, expecting to grow at a compound annual growth rate (CAGR) of 4% per year, with Asia and Europe acting as primary drivers. Recent cold temperatures in Europe along with continuing supply constraints from the Russia-Ukraine conflict has kept the market tight, but this is expected to reverse post-2025. The recent removal of the LNG permitting pause in the U.S. should also continue to support exports, which are expected to grow to over 30 Bcf/d. Potential headwinds still exist as both supply and demand remain vulnerable to project delays and weather impacts. Additionally, a recent study has indicated that the fugitive methane emissions from the production and transportation of LNG could mean that LNG carbon emissions are actually 30% more than the emissions from coal. These potentially higher emissions could impact how LNG fits into a net-zero scenario.

GLOBAL LNG DEMAND BREAKDOWN BY REGION (2019-2030) METRIC TONS (MT)

Source: IEA; Jefferies, Energy Institute; Energy Science and Engineering.

Despite these questions, demand is unlikely to slow, especially as the AI boom continues to ramp up. Data center power demand currently accounts for 1 - 2% of global power demand and is expected to grow by 165% through 2030 vs. 2023 levels. Despite headlines surrounding nuclear, much of this additional demand will be met with natural gas. LNG is expected to see ~28 GW of incremental capacity additions solely to meet data center demand.

Despite some uncertainty surrounding expected data center demand due to DeepSeek's R1 model, which claims to be more energyefficient, many still expect to see elevated power demand. The energy and cost savings from more efficient AI models will likely lead to increased rates of AI adoption, particularly from enterprises. The elevated use of AI models could continue to support the projected growth in AI and data center energy needs, even in light of more efficient models.

INCREMENTAL CAPACITY ADDITIONS THROUGH 2030 TO MEET DATA CENTER DEMAND IS EXPECTED TO BE LARGELY SUPPORTED BY NATURAL GAS

Source: Morgan Stanley; IEA; Goldman Sachs; Jefferies.

Renewables - solar continues to surprise to the upside

While still short of the COP28 pledge to triple renewable energy capacity by 2030, current 2030 capacity growth is projected at 2.7x its current level. Much of this can be attributed to solar, which is set to account for 80% of growth in renewable power globally. This is thanks to declining costs, policy support and social acceptance, particularly as consumers look to reduce their electricity bills. While recent tariff increases remain a concern, the U.S. had already levied a 50%+ tariff on imported PV modules; such tariffs are likely to have a higher impact on offshore wind. A greater headwind across all renewables is the current approval time to connect renewables to the grid, which have increased 2.5x since the mid-2000s and currently average three years.

CURRENT CAPACITY GROWTH IS LIKELY TO LAG DUE TO LONGER APPROVAL TIMES FOR GRID CONNECTIONS

Source: Electricity - Renewables 2024 - Analysis - IEA.

However, the global south (Africa, Latin American, South and South East Asia), which is less impacted by these potential headwinds, is expected to experience an accelerated renewable energy transition. The global south's renewable energy capacity is expected to grow by 1.36x compared to the global north's more established renewable industry (U.S. and Europe), which is expected to grow by 1.28x through 2030. The global north and China will still add more renewable energy capacity in absolute terms, but some experts expect the global south to overtake these players as the cost of renewable technology continues to decline. Countries in this region of the world are particularly well positioned for an accelerated energy transition due to their proximity to the equator and less established fossil fuel infrastructure. Additionally, as trade tensions and tariffs between the global north and China continue to rise, developing countries will likely maintain a willingness to source cheap renewable technologies from China.

SOLAR AND WIND SHARE ELECTRICITY GENERATION (%) PROGRESS TO 2022

Source: Financial Times; IEA.

Entering a nuclear renaissance

Source: IEA; World Nuclear Association; Goldman Sachs.

Nuclear energy is experiencing renewed momentum as global electricity demand rises, signalling the potential for a new era of secure and clean power. Nuclear power generation is projected to reach a record high in 2025, driven by Japan's reactor restarts, completed maintenance in France, and the launch of new reactors in markets such as China, Europe, India and Korea. Over 70 GW of nuclear capacity are currently under construction, marking one of the highest levels in three decades. Interest in nuclear energy is at its strongest since the 1970s oil crises, with over 40 countries planning expansions.

Technological advancements, particularly in small modular reactors (SMRs), are reshaping the industry. The first SMRs are expected to begin operations by 2030, and with sufficient government policy support and effective project execution, more than 1,000 SMRs could be operational by mid-century, transforming the global nuclear landscape. So what has changed over the last 12 months? Hyperscalers in the U.S. have signed contracts for over 10 GW of potential new capacity, including SMRs, de-mothballed plants and existing nuclear power agreements. Governments are showing greater support, with Switzerland and Italy reconsidering nuclear, bipartisan backing in the U.S., proposals from Australia's opposition party, and a global COP28 agreement to triple nuclear capacity by 2050. Utilities are also recognizing accelerated power demand growth, increasing openness to large-scale reactors, provided there are safeguards against cost overruns to ensure financial viability. However, enriched uranium supply is a key challenge and likely to be more prominent in the nuclear debate in 2025.

Other Energy Sources and Technologies

In five out of the past six years, the IEA's annual year-end coal review has shown significant upward revisions. The world still has over 1 trillion tons of proved coal reserves, equivalent to 125 years of production, implying the potential for more revisions to coal and subsequently more CO₂.

Source: IEA; Energy Institute, TSE Modelling.

Hydrogen

Global hydrogen demand reached 97 Mt in 2023, and is anticipated to reach 100 Mt in 2024, although less than 1 Mt of 2023 production was in low-emissions hydrogen. Hydrogen producers are currently combatting demand uncertainty, licensing and permitting issuers, continued high costs and operational issues, which may continue to delay production and increase the risk associated with hydrogen investments.

DESPITE FURTHER DEVELOPMENTS, THE PORTION OF FID AND OPERATIONAL PROJECTS REMAINS SMALL

CHINA IS EXPECTED TO ACCOUNT FOR THE GREATEST DEMAND (PJ) FOR RENEWABLE HYDROGEN IN 2030

Source: Jeffries; IEA; FID (Final Investment Decisions).

Electric vehicles

Many automakers took a step back from their EV production goals during 2024 in spite of rising global EV penetration, including GM, Ford, Volkswagen and Stellantis, who delayed their planned EV production and launch of new EV models over concerns of consumer adoption, particularly in the U.S. market. Costs inflated by recent U.S. tariffs, along with regulatory uncertainty in the U.S. and Europe, are likely to continue to hinder EV growth, while China remains at the front of the pack.

Source: IEA; Barclays.

Carbon capture

The criticality of building a net-zero ecosystem is synchronization, with all parts of the value chain moving together, carbon capture and storage (CCS) will be crucial to this. While the momentum from planned project announcements is positive, to meet the circa 1 Gt CO_2 per year which is captured and stored in the IEA's Net Zero Emissions by 2050 (NZE) Scenario would require all existing planned projects to be completed and 10x more CCS projects to enter the pipeline.

CO₂ CAPTURE CAPACITY OF COMMERCIAL CCS FACILITY PIPELINE SINCE 2010

Source: Global CCS Institute.

HOW DO WE PAY FOR THE ENERGY TRANSITION?

How do we pay for the energy transition when sentiments are shifting away from the view that we "must decarbonize the world at any cost"?

Post-2024, the world experienced a massive shift in the political landscape, becoming more fragmented in the process. This has left uncertainty in how global political powers will approach decarbonization. Here we explore:

- The pullback from high-cost environmental policies
- Green protectionism and its impact on global climate collaboration
- The widening gap between investor and national decarbonization

Shifting Policy

Populist policymakers back away from high-cost environmental policies

EVERY GOVERNING PARTY FACING ELECTION IN A DEVELOPED COUNTRY IN 2024 LOST VOTE SHARE, THE FIRST TIME THIS HAS EVER HAPPENED

Rise/fall in vote share for governing parties in national elections (% pts), by year

Source: ParlGov; FT Research; https://abcnews.go.com/538/democrats-incumbent-parties-lost-elections-world/story?id=115972068; BNEF.

In 2024, the world experienced a sweeping wave of elections across more than 70 countries, including major economies such as India, the United Kingdom, the United States and the European Union. These elections have contributed to a more fragmented global political landscape. Notably, in over 80% of democracies where elections were held, incumbent parties suffered losses in either seats or vote share, potentially driving governments to reassess their policy priorities. While some electorates (e.g., in the U.K.) empowered their governments to prioritize sustainability, others (e.g., in the EU) advocated for a more balanced approach. In the U.S., voters focused on addressing cost-of-living challenges.

This global hesitation to shoulder the financial burden of decarbonization reflects growing concerns in an increasingly adversarial world. Real living standards have declined for many in developed nations, with environmental policies often criticized for undermining economic competitiveness. As a result, policymakers are shifting focus away from ambitious climate agendas, reallocating resources toward defense, energy security and economic self-sufficiency. The climate policies that endure will likely be those that enhance resilience to climate change, lower energy costs and improve competitiveness. Europe is losing momentum in the race for low-carbon industries. BloombergNEF's annual report shows global energy transition investment grew 10.7% in 2024 to over US\$2 trillion, driven largely by China's 20% increase, while Europe saw a decline. EU green investment fell by 6.5%, and the U.K. dropped 12%, with renewable energy investment particularly hard hit—down 10% in the EU and 68% in the U.K. Weak grid infrastructure and policy uncertainty, including slow permitting systems and reduced subsidies, are major barriers. This has led to declines in industrial decarbonization investment, heat pump sales and electric vehicle demand. Europe still invests 2% of GDP in green sectors, but far behind China's 4.5%. We believe policymakers must prioritize emerging sectors like green hydrogen and carbon capture to regain competitiveness, as these areas remain open for global market leadership.

Mind the gap: the continued dislocation between national and investor net-zero targets

This shifting sentiment is likely to increase the gap between investor and national net-zero targets. Compared to a 2019 baseline, select investor targets are more than 2x greater than national targets. While many investors continue to strive for real-world decarbonization in their portfolios in line with a net-zero scenario, many national targets are not currently at the levels needed. The global stocktake at COP28 had mandated that countries submitted updated NDCs by February 10, 2025. However, only 13 countries met this deadline. NDCs present a critical opportunity to strengthen global climate pledges and avoid an overshoot of a 1.5°C temperature rise. However, the current move away from climate spending by the EU and the U.S.'s exit of the Paris Agreement presents uncertainty around other countries shoring up their climate pledges. A further divergence may make it harder for investors to find investments in line with targets that offer real-world decarbonization.

WHAT IS THE DECARBONIZATION DISLOCATION?

Slippage against 2030 national emissions intensity goals brings into question investors' ability to achieve their own real-world emissions reduction targets

Indexed (i) regional emissions intensity (per unit of US\$ GDP) pathways implied by key economies' stated NDCs and (ii) weighted average emissions intensity targets (per \$ mn invested or WACI of holdings) to 2030 vs. 2019 baseline.

\"Select Investors\" represents the weighted average annualized reduction rates of the 104 firms who have publicly set intensity-based emissions reduction targets under the Net Zero Asset Managers initiative as of April 24, 2023. Regional decarbonization indices are implied pathways based on current 2030 Nationally Determined Contribution (NDC) targets from major economies by region.

Source: UNFCCC; European Commission Joint Research Centre; Net Zero Asset Manager initiative; Goldman Sachs Global Investment Research.

Green Protectionism

Its rise and implications

The global shift toward industrial policies, such as Made in China 2025, the EU Green Deal and the U.S. IRA, alongside the implementation of border carbon taxes like the Carbon Border Adjustment Mechanism (CBAM), highlights the rise of green protectionism. This trend reflects a dual focus of advancing economic and environmental priorities. However, it also introduces trade barriers that may disrupt free trade, slow environmental progress and limit companies' ability to scale by restricting access to global markets.

Industries such as solar panels and EVs are particularly exposed to the trade challenges arising from these environmental regulations, while efforts to establish global agreements on low-carbon steel production have largely stalled, leading to fragmented regional strategies.

The U.S. and EU have adopted distinct approaches in this context; the U.S. emphasizes tariffs (e.g., a historical 50% tariff on Chinese solar PV cells) and national security measures (e.g., bans on EVs using Chinese software), while the EU leans more heavily on subsidies, but exhibits a fragmented stance on solar procurement policies.

While the EU's CBAM currently targets a limited number of sectors, its potential expansion could significantly impact global trade dynamics. Although green protectionism seeks to balance environmental sustainability with economic interests, it risks fragmenting global trade systems, impeding environmental progress and fostering regionalism at the expense of global collaboration.

Amid these challenges, carbon pricing has emerged as a key tool for achieving net-zero emissions by 2050. By internalizing the environmental costs of greenhouse gas emissions, carbon pricing creates financial incentives for businesses and investors to reduce their carbon footprints. Looking ahead, the global harmonization and evolution of carbon-pricing mechanisms will be critical in establishing a uniform global carbon price. Such convergence would help mitigate competitive imbalances and carbon leakage while accelerating the global transition to a sustainable, low-carbon economy.

REAL CARBON INDEX - REPRESENTS THE CARBON PRICE ACROSS ALL EMISSIONS FROM ALL JURISDICTIONS

Source: Real Carbon Index – the Real Carbon Price Indices represent the carbon price across all emissions from all jurisdictions. This includes emissions that are covered by a carbon price and those that are not—the latter being included as a zero price. These indices enable a carbon price and price history to be determined which reflects the global value of carbon.

Tariffs & Transition

The Implications of a trade war

On April 2, 2025, the Trump administration announced a blanket tariff of at least 10% on all countries, with many countries also facing higher reciprocal tariffs. On April 9, the administration then announced a 90-day pause on all reciprocal tariffs to allow time for negotiations with the exception of China. Many countries had already responded with China, the EU and Canada announcing countermeasures to combat these tariffs, while others extended olive branches in attempt to reduce reciprocal tariffs imposed. The 10% blanket tariffs remain in place during the 90-day pause and the ultimate fate of reciprocal tariffs remains uncertain, but we believe it is likely that these tariffs will hinder trade. The extent of this impact on the global economy will continue to develop with market volatility an inevitable outcome. Outside of market impacts, it is likely that these tariffs will also create additional barriers for trade necessary for the energy transition.

POTENTIAL U.S. TARIFF IMPACT ON KEY GREEN CAPEX VERTICALS

The U.S. and many other countries rely on global supply chains, particularly tracing those back to China and Southeast Asia, to procure components necessary for the climate transition. With these tariffs, China will likely redirect and increase its clean tech imports to low- and middle-income countries as they move away from trade with the U.S.

Offshore wind is one of the areas at greatest risk due to its cost and lower policy support compared to other products. While tariffs are in part meant to drive manufacturing back to the U.S., the inflated cost of inputs may impact the economic feasibility of this. India has the potential to emerge as the U.S.'s new primary trade partner for clean tech, dependent on the results of negotiations with countries like Vietnam, Thailand and Cambodia. But the likely scenario is that no one will emerge the victor in this trade war. Prolonged bouts of volatility is likely to dissuade progress in domestic manufacturing and the hurdles introduced into the global supply chain will slow the energy transition at a time when it needs to accelerate in order to achieve decarbonization commitments.

THE U.S.'S CLEAN ENERGY TRANSITION HISTORICALLY RELIES ON IMPORTS FROM A VARIETY OF COUNTRIES THAT ARE SUBJECT TO UNCERTAIN TAX POLICIES.

WHAT COULD HAPPEN TO THE STATE OF DECARBONIZATION UNDER TRUMP 2.0?

What could happen to the state of decarbonization under Trump 2.0?

In the first 100 days of the new U.S. administration, there was a pullback from a number of Biden-era climate policies. The full scope of these pullbacks in addition to state and company responses remains to be seen. Here we explore:

- Potential repeal or cuts from the Inflation Reduction Act (IRA) and other energy policies
- The pursuit of American energy dominance
- The impact of deregulation on environmental policy in the U.S.

Implementation of Campaign Promises Through Executive Orders

On Day 1 of his administration, Trump signed a flurry of executive orders after declaring a national energy emergency. These orders provide an initial insight into how the administration may follow through on campaign promises. Some of the most notable climate and energy executive orders included:

LNG and Fossil Fuel Permits	Paris Agreement Exit	Offshore and Onshore Wind		
Signed an executive order to remove the pause placed by the Biden Administration on the processing of export permitting for LNG among other orders to help fast-track fossil fuel extractions. These orders are in line with the administration's "drill, baby, drill" approach to energy and indicates likely prioritization of fossil fuels under energy strategy.	As promised, Trump has initiated the withdrawal of the U.S. from the Paris Agreement, which will take approximately one year to complete. Trump has cited the agreement as putting the U.S. at a competitive disadvantage to geopolitical rivals like China.	An executive order has suspended new federal offshore wind leasing pending an economic and environmental review. Onshore wind is also subject to a freeze on federal permits, which will impact federal projects in addition to state and private projects needing federal permits.		
EV Targets	IRA Disbursements	Creation of National Energy Dominance Council		

It is likely that many of these executive orders will face state and judiciary challenges that may reduce or halt their impacts. However, the new administration has set a clear tone for their approach toward environmental policy.

The Fate of the Inflation Reduction Act (IRA): Still Up for Debate

The IRA, which introduced US\$1.2 trillion in decarbonization incentives, has been one of the most hotly debated climate policies in recent months. President Trump has vowed to gut the legislation, often referring to it as "the green new scam." However, a repeal of the IRA would ultimately be up to Congress. While it is unlikely that the IRA will survive in its original form; the primary question is whether Republicans will be using a "scalpel or sledgehammer" to roll back the landmark legislation. At the time of this report, the House and Senate were still in the negotiation phase of the reconciliation process.

Despite calls for repeal from President Trump, the Republican party is facing some division on how to address the IRA. This is due to the fact that approximately 48% of the clean energy projects announced under the IRA have been in states with a Republican trifecta. The job creation linked to these projects led 21 House Republicans to speak out in defense of the IRA. The Republicans who signed an open letter to Speaker of the House Mike Johnson are primarily concerned with the preservation of tax credits benefitting the companies operating in their districts. These credits include **45Q (carbon sequestration)**, **45X (advanced manufacturing)** and **45Y/45E (tech- neutral energy production)**, among others.

Components of the IRA that are likely to be first on the chopping block include the **Department of Energy Loan program, EV** (30D) Tax Credits and EPA Emissions Standards. Outside of a full repeal, Republicans may also implement shortened timeframes or reduced scopes of tax credits to attempt to capture savings. Even with a repeal of certain tax credits, safe harbor laws would allow companies to continue to benefit from these credits where the work has already been completed to meet the standards.

Even with these repeals, long-term tailwinds for renewables still exist. Steadily declining input costs, load growth and strong corporate demand for renewable electricity are likely to bolster continued growth in the segment. The shifting regulatory environment and higher cost of capital still present challenges, which may slow the pace of the U.S.'s energy transition, but appear unlikely to reverse it completely.

EVEN IN AN INSTANCE OF A FULL IRA REPEAL (CURRENTLY CONSIDERED A LOW POSSIBILITY), SOLAR AND WIND INSTALLATIONS STILL EXPECTED TO GROW DUE TO TAX CREDIT SAFE HARBORS

Source: JPMorgan.

Deregulation's Impact on Decarbonization

Deregulation remains a major theme for the Trump administration in both his first and now second term. Deregulation in this second term is likely to focus on energy, governance and technology, likely targeting Environmental Protection Agency (EPA) rules on electric vehicle standards and other EPA rules. In early March, Lee Zeldin, the new head of the EPA, announced potential rollbacks to more than a dozen core EPA rules and policies. This includes a reconsidering of the 2009 Endangerment Finding, which acts as the basis for the agency's emissions regulations under the Clean Air Act.

The Department of Government Efficiency (DOGE), an advisory group that operates outside of traditional government agency structures, has been created through executive order with aims to reduce government spending by as much as US\$2 trillion. Elon Musk has been selected as the head of DOGE, although many questions remain around the department's actual powers. In recent history, presidents' executive orders and deregulatory action have been increasingly met with legal challenges from the states, which could pause or reverse some of the actions as litigation proceeds.

	Deregulation: -232 bn	Regulation: 297 bn
Environmental Protection Agency		-209,474
	Labor	-11,962
	Transportation	-5,863
	Interior	-3,835
	Justice	-1,031
	Federal Energy Regulatory Commisssion	211
	Consumer Financial Protection Bureau	252
	Food and Drug Administration	276
	Federal Communications and Commission	1,323
	Housing and Urban Development	1,762
	Federal Reserve	1,995
	Veterans Affairs	3,227
	Agriculture	8,936
	Treasury	10,127
	Energy	21,153
	Homeland Security	31,509
	Securities and Exchange Comission	35,852
	Health and Human Services	45,753
	Defense	134,673

TOTAL REGULATORY COST UNDER TRUMP 1.0 BY AGENCY IN \$ MILLIONS (2017-2020)

HOW DO EFFORTS TO SAFEGUARD EUROPE'S COMPETITIVENESS AND PRODUCTIVITY WEIGH ON THE EUROPEAN ENERGY TRANSITION?

What is the balance between EU competitiveness and the energy transition?

The EU still has momentum for climate and energy policy, acting as a best-in-class region, but has the added task of balancing these efforts with increasing the EU's competitiveness. Here we explore:

- The increasing focus on competitiveness and regulatory simplification
- How the Draghi report is likely to inform the EU's approach to decarbonization
- The recent updates issued by the EU related to the Clean Industrial Deal

EU Policymakers Juggle Sustainability with Competitiveness, Energy Security and Defense

The recent European Parliament elections saw the center-right European People's Party (EPP) gain influence, signalling a shift toward business-centric policies focused on competitiveness and regulatory simplification. Despite this, Ursula von der Leyen's leadership is expected to maintain momentum on the Green Deal, with added emphasis on industrial competitiveness, as highlighted by the Mario Draghi report.

Geopolitical instability and rising defense spending (€700-800 billion from 2022 to 2028) pose challenges to funding decarbonization efforts. While sustainability policies are unlikely to be rolled back, flexibility in their implementation may increase, as seen with delays to the Deforestation Regulation. Compromises on controversial measures, such as the 2035 internal combustion engine ban, are possible. The Commission also aims to streamline sustainability reporting to reduce burdens on companies, but lacks sufficient alignment between EU standards (CSRD) and global frameworks (ISSB, SASB).

The EU is likely to prioritize domestic capacity for strategic technologies (e.g., batteries, wind turbines) while leveraging external technologies (e.g., China's solar panels) to lower energy costs and achieve net-zero goals. Further details are anticipated in the upcoming Clean Industrial Deal.

IN EU ELECTIONS, THE EUROPEAN PEOPLE'S PARTY RETAINED THE LARGEST NUMBER OF SEATS, BUT FAR-RIGHT PARTIES MADE THE BIGGEST GAINS

(of 720 seats in total)

Group	Seats	Change	Seats %
European People's Party	188	+12 🔺	26.1%
Socialists and Democrats	136	-3 🔻	18.9%
Patriots for Europe	84	+35 🔺	11.7%
Conservatives and Reformists	78	+9 🔺	10.8%
Renew	77	-25 🔻	10.7%
• Greens	53	-18 🔻	7.4%
● Left	46	+9 🔺	6.4%
Europe of Sovereign Nations	25	0	3.5%
Nonaligned	33	-29 🔻	4.6%

Source: "Poll of Polls — European Election results, polls and election news", POLITICO.

The EU Has the Way, but Does it Have the (Political) Will?

Mario Draghi, former president of the European Central Bank, published a comprehensive 400-page report in 2024 outlining strategies to enhance the EU's competitiveness and productivity. Over the past 30 years, the productivity gap between Europe and the U.S. has significantly widened, growing from around 5% in 1995 to approximately 25% as of 2022, according to European Central Bank data.

One key driver of this gap is the diverging cost of electricity for large industrial customers. U.S. companies save about 60% on electricity compared to their European counterparts, as European firms spend more than double. This cost disparity is attributed to cheaper gas, the absence of carbon taxes, and lower levies in the U.S. Investment trends have also played a role. Prior to the Global Financial Crisis (GFC), Europe and the U.S. invested similar amounts annually. However, since the GFC, Europe's annual investments have fallen by nearly \in 1 trillion. Draghi's report recommends increasing EU investments by approximately \in 800 billion per year, equally divided between public and private spending, to reinvigorate Europe's economy. Of this amount, \in 300-450 billion would focus on supporting electrification and decarbonization efforts, aligning with broader goals of economic revitalization and sustainability.

OF THE €800 BN P.A. INCREASE IN INVESTMENTS THE DRAGHI PLAN CALLS FOR, €300 – 450 BN WOULD BE DEVOTED TO ELECTRIFYING THE ECONOMY

OVER 1995-2022, THE PRODUCTIVITY GAP BETWEEN THE EU AND U.S. HAS WIDENED SIGNIFICANTLY Labor productivity data, 1995 – 2022 (\$ per hour, %)

IN 2023, U.S. INDUSTRIAL ENERGY BILLS WERE c.60% CHEAPER THAN IN THE EU (I.E. EU BILLS ARE MORE THAN TWICE THOSE IN THE U.S.)

Evolution of industrial energy bills in the U.S. and the EU $(\notin/MWh, 2020 - 23)$

Source: EU Central Bank.

The EU Competitiveness Compass: Regain Competitiveness and Secure Sustainable Prosperity

From the recommendations of the Draghi report, the EU has created the competitiveness compass to act as a roadmap to increase competitiveness while remaining on track in their energy transition. The components of this compass include:

Source: Competitiveness Compass.

On February 26, 2025 the EU published their initial guidance on regulatory simplification, i.e. the Omnibus Package and the Clean Industrial Deal. The Clean Industrial Deal, meant to replace the Green Deal, focused on decarbonization of traditional energy-intensive industries and the emergence of new clean energy technologies. On the other side, the simplification is expected to drastically reduce the regulatory burden for European companies and lead to cost savings. However, while these cost savings should help companies maintain competitiveness, it will likely be at the expense of improved climate-related data. The proposed legislation is still pending approval, but provides initial insight into the EU's new balancing act between competitiveness and sustainability.

HOW SHOULD INVESTORS MANAGE "CHINA RISK" WHILE ALSO TRYING TO ACCELERATE REAL-WORLD EMISSION REDUCTIONS AT LOW MARGINAL COST?

How should investors manage "China risk" while also trying to accelerate real-world emission reductions at low marginal cost?

The world cannot decarbonize without the efforts of China. As the U.S. takes a step back from the global climate stage, China in conjunction with the EU is expected to fill the gap. Here we explore:

- China's importance to the energy transition
- The improving policy and disclosure landscape in China

China Is Key to the World's Emission Reduction Ambitions

China, the world's largest emitter, has considerable potential to decarbonize its economy, with emissions likely to peak before its 2030 target. By 2030, the country aims to reduce CO_2 emissions per unit of GDP by 65% from 2005 levels and increase the share of non-fossil fuel sources to 25% of its primary energy consumption. According to a Centre for Research on Energy and Clean Air (CREA) survey, over 70% of experts believe China will achieve peak emissions before 2030, with 44% of experts expecting this to happen by 2025, up from just 15% in 2022.

This decline in emissions has been driven by China's rapid deployment of clean energy at a scale consistent with 1.5°C scenario, alongside a transition to a less capital-intensive growth model and slower-than-expected economic growth. Despite its progress, many investors continue to overlook China due to limited direct exposure to Chinese assets—a risky stance given its significant influence on sectors like European autos and the global solar market. However, caution is still warranted. While emissions may peak early, China's trajectory remains misaligned with a below-2°C pathway. Furthermore, the ongoing construction of domestic coal-fired power plants—partly spurred by hydropower shortages during recent summers and a push for energy security—underscores coal's continued importance in China's energy strategy.

Source: Global Carbon Project; Chinese Electric Council Electricity Industry Annual Report 2024.

Despite continued reliance on coal, China is projected to contribute over 50% of the global increase in renewable capacity by 2030, having achieved its 2030 target of installing 1.2TW of wind and solar capacity six years ahead of schedule, propelled by its national climate goal and declining technology costs. China saw installed solar power capacity reach 890GW by the end of 2024, up 45% year-on-year. Company data implies pricing over US\$1,000/kW for Western turbines (at negative margins) vs. US\$500/kW for Chinese turbines (at c.3% margins). Labor rates explain 30% of the cost difference, as it takes c.2,700 man-hours to make a 100m blade, at c.\$50/hour in the West versus c.US\$7/hour in China. It then costs just c.US\$20k to ship a blade from China to Europe in a US\$200k/day vessel, i.e., less than 4% of the cost of manufacturing the blade.

Another substantial part of China's decarbonization journey includes rapid penetration of EVs. China continues to lead global electrification trends, with EVs (battery electric vehicle (BEV) and plug-in hybrid electric vehicles (PHEVs)) accounting for over 40% of total new car sales in 2024. This share is expected to approach 50% by 2025, far ahead of other markets. Critical headwinds are still present, including rising trade barriers globally, unsold inventory abroad, establishing new overseas plants (e.g., BYD), and market-specific challenges like Russia's saturation and slowing electric vehicle (EV) adoption. China faces three potential blocs in global markets: a "banned bloc" led by the U.S., citing security concerns; a "restricted bloc" (e.g., EU, ASEAN) with trade barriers like tariffs; and an "open bloc" (e.g., Australia, U.K.) with limited domestic auto manufacturing. While export ceilings challenge China's growth strategy, domestic demand stimulation and industry consolidation may offset pressures. Furthermore, Chinese automakers' cost advantages and EV leadership could ensure they remain formidable competitors globally, posing threats to incumbents like Toyota, Ford and Volkswagen.

China's Decarbonization Underpinned by a Robust Climate Policy Framework

China's climate policy framework is evolving rapidly: disclosures, taxonomies, carbon market and industrial policies are all working to drive the energy transition. This includes work done in tandem with other jurisdictions such as the Multi-Jurisdictional Common Ground Taxonomy, which was done in collaboration with the EU and Singapore to help aid cross-border sustainable capital flows. In 2024 alone, a number of policies have been enacted to help bolster the energy transition.

Local Government	s Sha Sha Ba	Shanghai Stock Exchange Shenzhen Stock Exchange Beijing Stock Exchange		CPC Central Committee State Council	Ministry of Ecology and Environment	
Shanghai: transition finance taxonomy covering six industries	Guid Develo	elines for the Sus opment Reports c listed companie	tainable of Chinese es	Opinions on Accelerating the Comprehensive Green Transition	Work Plan for Including the Cement, Steel, and Electrolytic Aluminum Industries in the]
Hebei Province: the taxonomy on transition finance for the steel industry	on .			of Economic and Social Development ⁴	National Emissions Trading Market	
1/24	3/24	4/24	6/24	8/24	9/24	12/24
•	• • • • • • • • • • • • • • • • • • • •		•	•	•	>
	The People's Bank of China		Ministry of Ecology and Environment	State Council		Ministry of Finance
Opinions on Strengthening Financial Support for Green and Low-Carbon Development ¹		Implementation Plan for Establishing a Carbon Footprint Management System ²	Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emissions, aiming to implement dual control ³ during 2026-2030	Corpc Disc layir u susta	vrate Sustainability losure Standards, ig the ground for nified national inability disclosure standard	

¹ Focusing on carbon trading, green lending, capital market, green insurance and market participants for sustainable finance.

² The plan calls for accelerating the implementation of carbon emissions accounting system, with a focus on key industries such as power, steel, metals, building materials and petrochemicals.

³ Dual Control System for Carbon Emissions: primarily focusing on intensity control and supplemented by total volume control.

⁴ Setting the national goals and top-level policies for transition.

ARE THERE ANY OTHER DECARBONIZATION PROGRAMS IN OTHER PARTS OF THE WORLD?

Are there any other decarbonization programs in other parts of the world?

While the U.S., China and Europe have historically been the major players for decarbonization policy, a number of other countries have begun implementing their own programs as part of the global climate effort. Here we explore:

- Decarbonization spending across the globe
- A deep dive into Japan's Green Transformation
- Canada and Australia's 2025 elections and their potential impacts on climate policy

Other Decarbonization Programs Around the World

More countries have begun investing in the energy transition to meet rising energy needs

2023 ENERGY TRANSITION CAPITAL EXPENDITURE - US\$1.8TN TOTAL

Source: Jefferies; IEA, Government of Brazil; Australian Office of Financial Management.

Across the globe, countries have been contributing to the energy transition amidst a number of geopolitical and economic factors. Some recently announced initiatives include Japan's Green Transformation (GX) Policy (~US\$100 billion/year over 10 years), Brazil's National Energy Transition Policy (~US\$115 billion) and Australia's Climate Change Act (an additional US\$4.6 billion in climate spending). All of these initiatives represent an effort by these countries to meet rising energy demands while remaining on track for their climate ambitions.

While a number of policies and programs are expected to be impacted by the results of the country elections held in 2024, the election outcomes for Canada and Australia signal positive implications for climate action.

The 2025 Canadian federal election re-elected Mark Carney's Liberal Party. The outcome ensures the preservation of key policies like industrial carbon pricing, zero-emission vehicle mandates and electricity decarbonization, preventing potential rollbacks proposed by the opposition Conservatives. The Liberals will continue investments in clean energy infrastructure, electric vehicles, energy-efficient technologies and critical minerals for EV batteries, supporting Canada's clean energy transition.

Furthermore, the 2025 Australian federal election also delivered several positive climate implications. The Labor Party's increased majority suggests potential for more progressive climate policies, ensuring the continuity of existing programs such as sectoral decarbonization plans and the Treasury's Sustainable Finance Strategy, which might have been diluted under a Coalition government. The election outcome allows Australia to resume its processes for setting the 2035 Nationally Determined Contribution (NDC), providing a key milestone for climate-related goals. Additionally, Australia's strengthened bid to host COP31 alongside Pacific partners could encourage the federal government to adopt bolder climate policies. At the state level, Queensland and Western Australia are updating their climate targets and sectoral strategies, contributing to broader national climate progress.

Country Spotlight Japan's US\$1 trillion Green Transformation (GX) Policy

While not the largest emitter in the world, Japan currently accounts for 2.9% of global emissions. While the U.S. IRA has garnered much attention, Japan's GX policy, which was passed in 2023, has remained relatively overlooked. This policy, meant to catalyze Japan's energy transition, incorporates a number of measures, including JP¥20 trillion of transition sovereign bonds, transition roadmaps for high-emitting sectors and a National Emissions Trading System. Relying on a mixture of public and private financing, Japan plans to mobilize US\$1 trillion over the next 10 years to help stimulate economic growth via technology and climate finance. A portion of this policy also sets to see Japan restart nuclear power, with the policy aiming for nuclear to comprise approximately 20% of its energy mix by 2030. Japan's GX policy presents an opportunity for investment as many other green policies in the U.S. and EU come under scrutiny.

ALTHOUGH NOT THE HIGHEST IN ABSOLUTE TERMS, JAPAN RANKS AMONG THE TOP EMITTERS PER CAPITA OVER TIME.

JAPAN'S GX PLAN REPRESENTS A LARGER PERCENTAGE OF GDP THAN THE IRA

Source: IEA; Jefferies.

SHOULD INVESTORS LEAVE 1.5°C TARGETS AND DECARBONIZATION BENCHMARKS BEHIND?

Should investors leave 1.5°C targets and decarbonization benchmarks behind?

If we have already breached a 1.5°C scenario, this could have implications for how investors should evaluate and consider investment implications. Here we explore:

- What is happening to the world's carbon budget
- What is needed in a net-zero scenario vs. the current state of decarbonization progress achieved

The World's Carbon Budget

Rising temperatures and a falling budget

Some research shows that we have already breached 1.5°C, and the world is warming faster than scientists expected. Despite this spate of very warm years, it is challenging to draw firm conclusions on the overall rate of global warming based on a time period as short as 15 years. There is evidence of the acceleration of warming, but the strength of the argument depends on the timescales. Atmospheric and sea surface temperatures have been in unprecedented territory for the past 18 months. As a result, efficiency of land and ocean carbon sinks may be declining, potentially impacting rates of warming. If this is the "new normal", then the carbon budget to keep to certain temperature outcomes (1.5°C/2.0°C) will be smaller than we previously thought. Carbon removals will be needed to remain within the carbon budget available. This is happening while political backlashes erupt to a range of issues, including high energy prices and cost associated with the energy transition. Collectively, this increases the chances of a delayed and disorderly scenario.

However, many investors and asset owners are not ready to leave 1.5°C behind just yet. While some early warning indicators may show an accelerated warming, many believe it is important to keep 1.5°C as a North Star. By striving for this target, investors, companies and nations reduce the risk of a more drastic overshoot. Striving for activities and initiatives in line with a net-zero scenario could also reduce the drain on the carbon budget if it is smaller than initially anticipated.

A Tale of Two Transitions

The goal versus the reality of the pursuit of net zero

Despite initiatives enacted, much progress is yet needed to cover where the global decarbonization efforts currently stand (left side) against what is needed to achieve net zero by 2050 (right side).

WHAT NEEDS TO HAPPEN TO ACHIEVE NET ZERO BY 2050

Mb/d - million barrels BCM - billion cubic meters

IS THE ENERGY TRANSITION A VIABLE INVESTMENT THEME?

Is the energy transition a viable investment theme?

Energy transition has been a major focus for investors in recent years, with a particular focus on renewables. However, recent market environments have caused some challenges for transition investments. This has caused the transition to play out at different speeds across different sectors and geographies. Moving forward, investors are likely to apply a more sector- and regional-specific lens to the energy transition theme.

The Energy Transition: An Investor Lens

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0% 2020 2022 2023 2021 2022 2023 2020 2022 2021 2023 2020 2021 2022 2020 2021 2023 Buildings **Energy Transformation** Industry Transport No Technology Readiness Levels (TRL) Concept/Prototype Demonstration Early Adoption Mature

NET-ZERO TECHNOLOGY READINESS LEVELS ACROSS SECTORS (2020-2023)

Source: IEA.

Innovation will be a key factor in the world's ability to reach net-zero targets. Currently \sim 35% of emissions reductions in a net-zero scenario will come from solutions that are still in their prototype phase, down from \sim 50% in 2021. While there is still progress to be made, this increase in readiness levels has allowed for more economically viable solutions to be utilized in companies' decarbonization efforts.

Early adoption represents a critical phase before a technology reaches commercial maturity. Examples of technology in the "early adoption" phase include:

Transport

- Hydrogen fuel cars: More auto manufacturers are launching hydrogen models, with Honda launching theirs in 2024 and BMW announcing a model to be released in 2028. (Early adoption since 2020)
- Electric trucks: Sales of electric trucks increased 35% in 2023 compared to 2022. This means for the first time total sales of electric trucks surpassed electric buses, with China leading the market. (Early adoption since 2023)

Energy

• Biorefining: Biorefineries allow for the conversion of biomass resources into multiple biofuels and bio products. (Early adoption since 2023)

Industry

 Continuous monitoring of methane emissions: Monitoring of methane emissions via satellites, drones and towers have helped enable better detection of leaks and quicker repairs. Many major oil and gas players have highlighted these new technologies in their sustainability report as both a cost saver and an effective decarbonization lever.

Investment Returns and Investor Sentiment

Allocating to the companies central to the transition has proved to be a challenge for investors in recent years, but the universe is much bigger than pure-play renewable generation companies. Technology penetration does not necessarily mean strong equity returns: the energy transition is accelerating globally in the real economy. Solar capacity additions have been increasing at 34% CAGR and wind at 19% CAGR (2000-23), and global EV sales have increased by 53% CAGR over the past 10 years. Yet at the same time, owning the largest companies involved in these sectors has been a very poor investment in the equity markets. The transition is unfolding at varying rates across sectors and regions, leading to challenges in the disclosure and comparability of metrics like Green Revenues, Green Capital Expenditure (CapEx) and Green Operating Expenditure (OpEx).

Success for companies in the 2025 landscape will depend on their emphasis on competitiveness, efficiency, access to low-cost energy and expanding capacity that meets customer demand. Significant shifts in macroeconomic conditions are evident, with some technologies and business models reaching pivotal moments. While some are achieving scale, others are experiencing setbacks.

MANY PURE-PLAY TRANSITION COMPANIES ARE NOT DELIVERING A RETURN ON INVESTED CAPITAL > WACC

Source: Jefferies; Bloomberg, November 2024.

Investor sentiment is currently cautious regarding clean energy. While utility-scale deployments are expected to rise in 2025, it is unlikely the sector will see the same level of growth as it has in prior years; 2025 is likely to still be a challenging year as investors and companies wait to see the fate of the IRA, among other global climate policies. However, as additional power is needed to service expanding data center demand, investors will likely rebuild confidence around the sector, particularly as safe harbor considerations linked to the IRA may remain in effect through 2028.

INVESTOR SENTIMENT SURVEY - EXPECTATIONS FOR PERFORMANCE OF CLEAN ENERGY (ICLN) RELATIVE TO S&P500 IN 2025

Source: FactSet; Goldman Sachs.

WHAT IS THE MOST EFFECTIVE WAY FOR AN INVESTOR TO ACHIEVE REAL-WORLD DECARBONIZATION?

What is the most effective way for an investor to achieve real-world decarbonization?

In this section, we walk through our in-house approach to investing and monitoring real-world decarbonization within our portfolios that have integrated client-driven net-zero objectives. This is through the work of our proprietary Net-Zero Alignment Indicator, which utilizes both quantitative and qualitative inputs to derive a forward-looking assessment of a company's readiness to achieve net zero.

Net-Zero Alignment Indicator – How It Works

Our proprietary Indicator assesses issuers' net-zero readiness and guides engagement targets to create a positive feedback loop

The Net-Zero Alignment Indicator (the Indicator) was developed to assess the progress companies are making toward net-zero based on their alignment status. The Indicator was created in partnership with our clients with decarbonization targets, and incorporates specific sub-indicators that were informed by the high-level expectations of the Institutional Investor Group on Climate Change (IIGCC).

¹ As of January 2025 across equity and fixed income. Excludes Cash & Derivatives (including U.S. Treasuries), CLOs and Supranational Debt. Excludes issuers where no sector grouping is available.

Key Advantages

The indicator's robust approach provides greater insight into creating "transition-informed" products rather than "off-the-shelf" alternatives

	r			
	Science Based Targets Initiative (SBTi)	MSCI's Implied Temperature Rise (ITR)	TPI's Carbon Performance & Management Quality	NB's Net-Zero Alignment Indicator
Output	Framework provides an independent validation of whether company's targets are in alignment with a 1.5°C scenario.	A metric that translates company's future emissions into single temperature outcome based on company's targets and credibility of those targets.	Assessment of company targets' alignment with Paris agreement and the strength of their decarbonization strategy and governance.	Quantitative data overlain with qualitative analyst input to assess company's "climate transition" readiness across six sub- indicators.
Benefits	 Provides evidence that targets are science-based Widely utilized and understood by investors 	 Single data point easily used to assess company alignment with Paris agreement Comparability between different companies 	 Sector-specific considerations when looking at materiality of emissions Emphasis of governance of climate strategies 	 Utilizes forward- looking metrics and analyst insights Deep sector-specific knowledge applied by analysts Active engagement undertaken based on net-zero alignment status
Challenges	 Does not provide insight into feasibility of company achieving their target Single-point in time assessment Skewed toward European firms (61% of companies with validated targets) 	 Inconsistent results when compared to other vendors Lack of clarity in methodology Reliant on backward- looking metrics Sensitive to MSCI assumptions 	 Assessment of process and ambition are separated into different outputs Data sometimes incomplete or outdated Limited scope (focus on high emitting sectors) 	 Response to Challenges Utilizes multiple data sources to address anomalies Incorporates assessment of strategy and capital allocation Robust coverage across equity and fixed income holdings

Suitability for GFANZ's "Transition-Informed" Indices							
Transition- potential	×	\checkmark	\checkmark	\checkmark			
Transition- engaged	×	×	×	\checkmark			
Net-zero	×	×	×	\checkmark			

Source: GFANZ <u>https://assets.bbhub.io/company/sites/63/2022/09/Recommendations-and-Guidance-on-Financial-Institution-Net-zero-Transition-Plans-November-2022.pdf</u>.

Global Alignment Snapshot

Net-zero alignment status of the MSCI World Index

Through our proprietary Net-Zero Alignment Indicator, we have seen a deterioration in alignment as companies pull back on commitments and targets.

ALIGNMENT STATUS MSCI WORLD (EQUAL WEIGHTED) – YEAR-ON-YEAR CHANGE 2023¹ TO 2024²

Year-on-year changes in the net-zero alignment status of MSCI World constituents vary by sector. The most dramatic downgrade in statuses between 2023 and 2024 was seen in the financials and information technology sectors. Many financial firms have taken a step back from net-zero commitments, particularly in the U.S. Hyperscalers, on the other hand, are combatting higher-than-expected emissions due to elevated energy demands from data centers and AI.

ALIGNMENT STATUS MSCI WORLD (EQUAL WEIGHTED) BY SECTOR – END OF YEAR 2024²

¹ As of December 29, 2023.

² As of December 31, 2024.

The Indicator in Action

Analyst input and active engagement has provided forward-looking insights on alignment

By incorporating real-time analyst insights into a company's alignment assessment, the Indicator is able to bridge the information gap where quantitative data may lag. This helps to better inform engagement with companies on their climate transition plans and enable investment insights for portfolios with client-directed climate objectives.

Company	Historical Alignment Status ¹	Summary
NextEra Energy Current Status: Aligned	18 17 ^{18 22} 25 27 28 26	NextEra continues to advance its renewable energy capabilities and has maintained its Aligned status. NextEra provides robust disclosure around its decarbonization strategy including quantified targets to shift its energy mix.
Ford Motor Co. Current Status: Aligning	25 24 25 ^{27 28} 23	Ford has made strides in recent years in reducing its Scope 1 and Scope 2 emissions in addition to providing a detailed fleet electrification rollout. However, recently announced delays to their electrification strategy has brought its status from Aligned to Aligning.
Chevron Corp Current Status: Committed to Aligning	<u>17 19 18 19 17 18 19 18</u> 16	Chevron has made progress on its climate transition journey, however, its lack of a quantified decarbonization strategy in comparison to peers has brought its status down to Committed to Aligning.

¹ From January 2023 through December 2024.

SHOULD INVESTORS GIVE MUCH GREATER FOCUS TO ADAPTATION AND RESILIENCE?

Increasing Disasters, Increasing Costs

The economic impacts of climate change are already being felt

Source: Munich Re, <u>https://ourworldindata.org/natural-disasters</u>.

The world faced a number of natural disasters over the past year, including everything from wildfires to hurricanes to floods. Global economic losses from natural disasters in 2024 were estimated to reach at least \$368 billion and exceeded the 21st-century average (\$324 billion) and median (\$329 billion) on a price-inflated basis. Economic losses emanating solely from weather-related disasters reached \$348 billion, while earthquakes generated losses well below average at approximately \$20 billion.

GLOBAL ECONOMIC LOSSES FROM NATURAL DISASTERS (2024 \$BN)

Source: Aon Catastrophe Insight.

Adaptation

A rising theme regardless of climate outcome

The insurance conglomerate SwissRe warns that a global temperature rise of 3.2°C by 2050 could wipe 17% from global GDP. However, widespread climate adaptation measures can have a positive impact on growth, especially in G-20 economies.

A survey of EU and U.S. corporations by the European Investment Bank (EIB) in November 2024 indicated that over 60% of firms reported being directly impacted by physical risks; 29% in Europe and 36% in the U.S. reported investing in solutions to avoid or reduce exposure to physical risks. Climate risks are particularly high for companies that have long-lived fixed assets, offices or operations in regions that are increasingly exposed to natural hazards such as drought and extreme heat, higher dependencies on natural resources (including water) and value chains exposed to the above.

According to a study conducted by S&P Global, extreme heat represents the largest financial impact for most sectors in the 2050s, however water stress, drought and flooding also will be significant. The potential financial impact of climate hazards could influence where a company decides to develop operations and/or where investors allocate capital.

CERTAIN SECTORS FACE HIGHER FINANCIAL IMPACT TO THEIR ASSETS DUE TO NATURAL HAZARDS

Weighted average financial impact on assets owned by companies in the S&P Global 1200 by sector (%) in the 2050s

Source: S&P Global; Jefferies; World Resources Institute; IPCC.

Resilient Returns

The investment case for climate adaptation

Research from Tailwind indicates that governments, consumers and corporates drove US\$4tn worth of spend on adaptation and resilience solutions and activities globally in 2023. Governments spent the most (US\$737bn), followed by consumers (US\$647bn) and then corporates (US\$58bn).

Adaptation ideas can provide a source of diversification away from the focus of traditional climate finance while also offering a potential "triple dividend": avoiding future losses, generating positive returns, and delivering social & environmental benefits.

However, adaptation tends to be less attractive to investors than mitigation because results and returns are harder to predict and measure. Some adaptation and resilience investments, such as public infrastructure with a multidecade operational lifetime, may not generate a return for investors, while others argue building resilience to physical climate risks means addressing a full system, not just an individual company's assets.

ESTIMATED GLOBAL SPEND ON ADAPTATION BY SECTOR IN 2023 WAS US\$1.4TN, INCLUDING GOVERNMENTS, CORPORATES AND CONSUMERS (FIGURES IN BILLIONS)

Source: Tailwind Climate; World Resources Institute; IPCC.

One of the most cited barriers for investing in adaptation is the lack of understanding and standardized definitions of what is and is not adaptation finance. Unlike mitigation, adaptation is location-specific and dynamic. There is a growing body of adaptation taxonomies such as Climate Bonds Initiative's (CBI) Resilience Taxonomy (CBRT) and Tailwinds Taxonomy for Adaptation and Resilience Investments. Utilizing taxonomies like the one below can help better define the adaptation theme's investable universe. This can help identify investable opportunities outside of the standard infrastructure products many think of when considering adaptation investments.

			Wh					
Sectors	Cold Stress	Flood Damage	Heat Stress	Storm Damage	Mass Movement Damage	Multi- Hazard	Water Stress	Wildfire Damage
Agriculture						Company A		
Manufacturing								
Energy								
Waste								
Transportation								
Buildings			Company C					
Financials								
Professional Services							Company B	
ICT								
Engineering								
Health Care								
Commercial Trade								
Water Supply								

ADAPTATION TAXONOMIES OFFER INVESTMENT INSIGHTS ACROSS SECTORS AND HAZARDS

Investable Opportunities

Company A Agriculture

Investment Thesis: Precision agriculture technology enables farmers to use fewer materials while maximizing crop

materials while maximizing crop yields amid heat and water stress

Company B Environmental Consulting

Investment Thesis: Design solutions for coastal resilience, disaster response and water treatment, enabling clients to navigate environmental challenges

Company C HVAC

Investment Thesis:

A substantial role to play in reducing emissions associated with building heating & cooling, which represent ~15% of global energy use

APPENDIX

Energy Transition Dashboard

Underlying data

Metrics	2021	2022	2023	2024	Indicator	Source
Global Temperature Rise						
Global Greenhouse Gas Emissions (GT CO ₂)	55.9	56.3	57.1		Negative Momentum	The MSCI Sustainability Institute Net-Zero Tracker
YoY change		0.70%	1.40%			
Avg Global Temperature (Land and Ocean) (Degrees Celsius)	0.87	0.9	1.19	1.29	Negative Momentum	Climate at a Glance Global Time Series National Centers for Environmental Information (NCEI) (noaa.gov)
YoY change		3.30%	24.40%	7.80%		
Global Energy Demand						
Renewable Electricity Generation Share (%)	27.90%	29.40%	30.30%	32.10%	Positive Momentum	<u>Share of renewable electricity gen-</u> eration by technology, 2000-2030 – Charts – Data & Statistics – IEA
YoY change		5.10%	3.00%	5.6% E		
Global Coal Consumption (Mt)	8084	8473	8688	8769	Negative Momentum	<u>Global coal consumption, 2000-</u> 2026 – Charts – Data & Statistics – IEA
YoY change		4.60%	2.50%	0.9% E		
Annual Oil Demand Growth (mb/d)	5.7	2.2	2.2	1.2	Neutral	Annual oil demand growth, 2011- 2025 – Charts – Data & Statistics – IEA
YoY change		-159.10%	0.00%	-83.3% E		
Electric vehicles % of sales share	9%	14%	18%		Positive Momentum	<u>Trends in electric cars – Global EV</u> Outlook 2024 – Analysis – IEA
YoY change		35.70%	22.20%			
Capacity additions for CO ₂ capture projects (Mt CO ₂ per year)	0.35	1.01	6.17	18.7	Negative Momentum	Capacity additions for CO2 cap- ture projects by announced start date, 2017-2026 – Charts – Data & Statistics – IEA
Acceleration needed to stay on track for NZE scenario				100-120x		
YoY change		65.30%	83.60%	67.0% E		

Metrics	2021	2022	2023	2024	Indicator	Source
Global Energy Capex						
Clean Energy Capex	1408	1617	1740		Positive Momentum	Global energy investment in clean energy and in fossil fuels, 2015- 2023 – Charts – Data & Statistics - IEA
YoY change		12.90%	7.10%			
Carbon-Intensive Energy Capex	914	1002	1050		Neutral	Global energy investment in clean energy and in fossil fuels, 2015- 2023 – Charts – Data & Statistics - IEA
YoY change		8.80%	4.60%			
Technology Readiness Levels (% of technologies at Early Adoption stage or higher)	31%	34%	38%		Positive Momentum	<u>ETP Clean Energy Technology</u> Guide – Data Tools - IEA
YoY change		9.40%	10.60%			
Global Economic Losses from Natural Disaster (\$bn)	410	365	397	368	Negative Momentum	Aon 2025 Climate and Catastrophe Insight
21st century average	324					
YoY change		-12.30%	8.10%	-7.9% E		

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