

Institute for Business
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Berkeley Economy
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Harvard
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GREEN INDUSTRIAL STRATEGY

A NEW PARTNERSHIP
BETWEEN STATE & BUSINESS

Green Industrial Strategy Project

The Green Industrial Strategy (GISt) Project examines how business and government can create, scale, and compete in clean tech markets to accelerate decarbonization. The project is a collaboration between the [Institute for Business in Global Society](#) (BiGS) at Harvard Business School and the [Berkeley Economy and Society Initiative](#) (BESI) at UC Berkeley, with support from the Center for Innovation and Sustainability in Business.

Institute for Business in Global Society

The Harvard Business School Institute for Business in Global Society (BiGS) was established in 2022 and is dedicated to advancing the critical role of business in tackling societal challenges, such as climate change and inequality. Through rigorous research, collaborative global forums, and the democratization of information, BiGS brings together industry leaders, academics, students, and other stakeholders across sectors to reshape the narrative of business for a better world. For more information, visit www.hbs.edu/big.s.

Berkeley Economy and Society Initiative

The Berkeley Economy & Society Initiative (BESI) is a Hewlett Foundation-backed research center at UC Berkeley dedicated to political economy. Their researchers apply political economic reasoning to analyze and develop solutions to the major political problems of our time, focusing on urgent topics related to climate change, technology, and capitalism and democracy. For more information, visit besi.berkeley.edu.



The New Green Industrial Strategy Project

The global contest for economic primacy is being reshaped by the rise of clean energy and leading-edge green industries. What began as a crusade driven by dire climate warnings and ambitious international emissions targets has evolved into a pragmatic race where hard-nosed economic calculations now dominate.

Nations find themselves in a high-stakes sprint for clean-energy leadership, where technological innovation—not just lofty intentions—defines credibility on the world stage. This pursuit of industrial advantage is upending established patterns of competition and raising tough questions about efficiency, fair trade, and national security.

Green industrial strategy is unfolding within a broader economic and political landscape increasingly shaped by environmental and societal concerns. “The convergence of business and society is no longer a philosophical ideal but a practical imperative,” said Debora Spar, Harvard Business School professor and head of its Institute for Business in Global Society (BIGS). She emphasized that companies are now focused on how they can be part of the solution, and on policies that support that role.¹

Against this backdrop, Harvard’s Institute for Business in Global Society (BIGS) and the Berkeley Economy & Society Initiative convened a symposium on April 11, 2025, to explore the shifting landscape of green industrial strategy. The event launched the Green Industrial Strategy (GIST) project, bringing together business leaders, policymakers, and academics to track and debate the trajectory of green technology, industrial policy, and investment worldwide.

“Green industrial strategies are focused on fostering competitive advantage,” said Jonas Meckling, a BIGS fellow and professor at the University of California, Berkeley.

The inaugural GIST symposium tackled themes ranging from private-sector innovation and effective government intervention to the delicate balancing act policymakers face in scaling decarbonization solutions. “The goal of this initiative is twofold: first, to understand the rapidly evolving landscape of green industrial strategy and its implications for business and policy; and second, to build a vibrant community of researchers dedicated to this critical issue,” said Harvard Business School Professor Gunnar Trumbull.

There was broad agreement that surging energy demand, technological competition, and public concern over climate change will continue to drive global growth in renewables, storage, clean transportation, and other green technologies. The symposium highlighted strong momentum behind strategies to create and foster green industries but also underscored concerns about policy durability, geopolitical tensions, and the inherent challenges of systemic transformation.

The stakes are high. If executed well, green industrial strategy could accelerate decarbonization, revitalize industries, create jobs, and secure strategic autonomy in key sectors. But, if mismanaged, it risks fueling protectionism, distorting markets, and undermining its own ambitions. Persistent gaps in research and data on the scope and impact of these policies make the dialogue and community fostered by GIST more vital than ever. Ultimately, the success or failure of the green industrial strategic gambits will depend on the pragmatism, discipline, and vision of policymakers and business leaders around the world.

The initiative aims to analyze green industrial strategy trends, their impact on business and policy, and foster a strong research community.

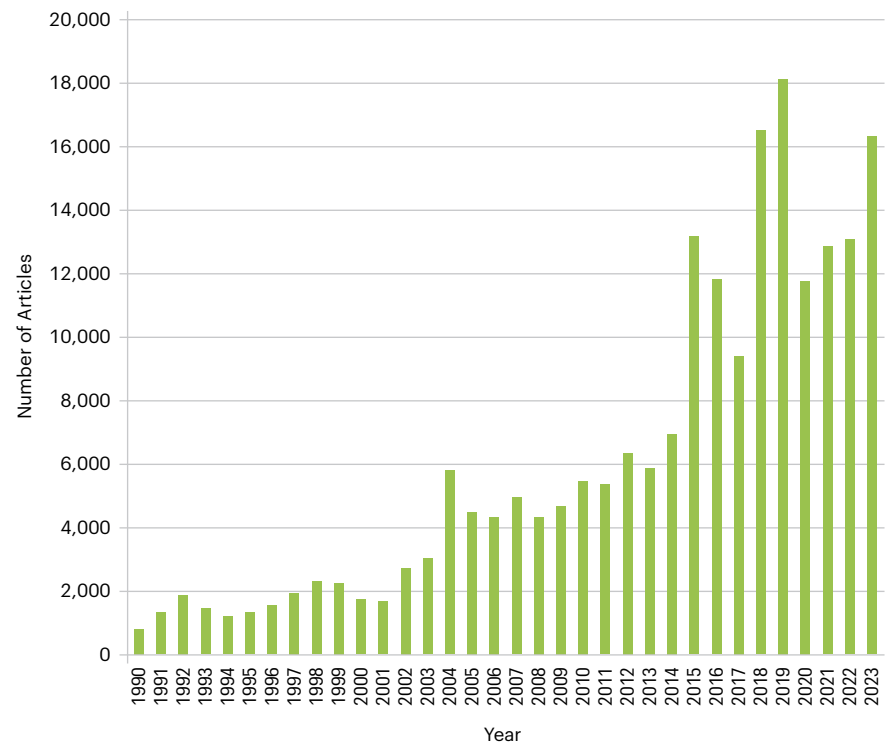
BY DESMOND DODD

The Golden Era of Green Industrial Strategy

For decades, industrial policy languished in the footnotes of economic history, dismissed as a relic of interventionist excess. Today, a new version of it has returned to center stage with a vengeance. From Beijing and Brussels to Washington, policymakers are wielding subsidies, tariffs, and regulations with renewed zeal, especially in pursuit of the elusive promise of a green economic transition.

The urgency is palpable. As the world endures record-breaking heat and intensifying climate impacts, the goal of limiting warming to 1.5°C above pre-industrial levels has become both more critical and more distant. The International Energy Agency warns that while emissions from the energy sector are nearing their peak, current progress remains insufficient to meet the 1.5°C target. Coal, oil, and gas demand will not crest quickly enough to avert the worst consequences of climate change.²

FIGURE 1. Mentions of industrial policy in major business press



Source: Factiva and authors' calculations in Evenett, et al. (2024)

Industrial Policy: From Margins to Mainstream

Industrial policy has surged to the forefront since the 2010s. Rising trade tensions and a pandemic that exposed critical supply chain vulnerabilities have been among factors prompting governments to rethink their hands-off approach at different points. The result is a sharp departure from the free-market orthodoxy that dominated for decades.³

But what is industrial policy, and why does it matter to investors, CEOs, and policymakers? At its core, industrial policy is about governments picking winners—or at least trying to. As the International Monetary Fund notes, it is less about making life easier for business in general, and more about favoring specific firms, industries, or activities through “vertical policies.”⁴

Shared Origins, Divergent Green Outcomes

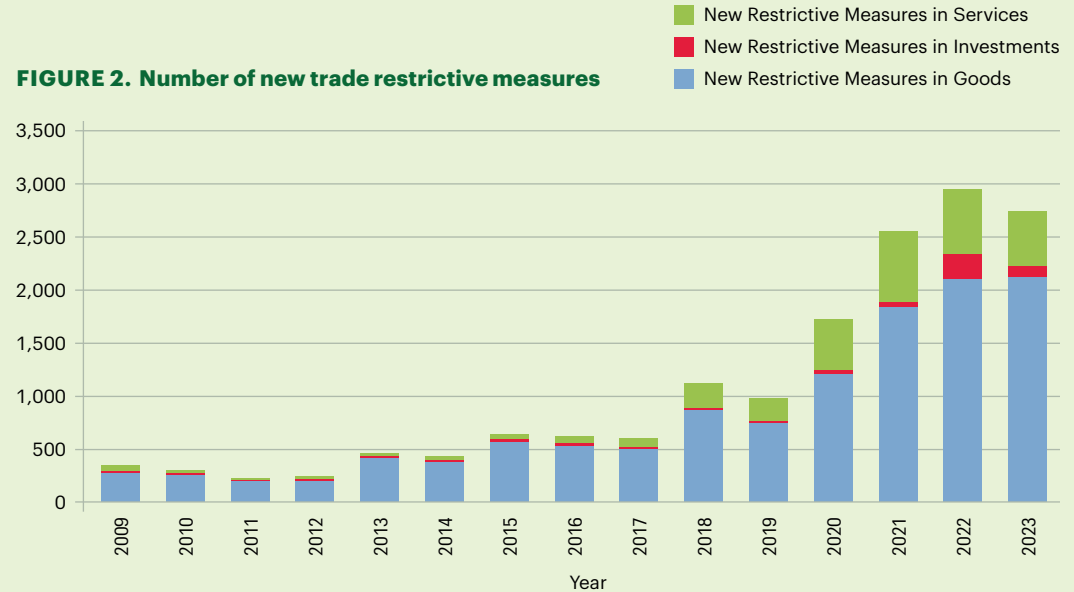
While industrial policy extends beyond the realm of green technologies, its resurgence has coincided with mounting concerns over climate change and the shortcomings of global collective action—placing the energy transition squarely in the spotlight.

Global climate cooperation has been largely inconsistent. That cooperation was initiated at the 1992 Rio Earth Summit while nearly 200 nations pledged in Paris (2015) to pursue a path “well below” 2°C warming, with aspirations of 1.5°C.

Despite aspirational goals, the International Energy Agency (IEA) points out that emissions remain on track to fall short of these targets.⁵ As a result, climate action has transformed into individual countries embedding green goals into industrial policies and financial frameworks. Although this pivot has created competing domestic agendas, it has also resulted in innovative, sector-specific strategies, all competing to benefit from the green transition.

For now, the world is watching as industrial policy moves from the margins to the mainstream—reshaping markets, redrawing alliances, and challenging the very rules that have governed global commerce for a generation.

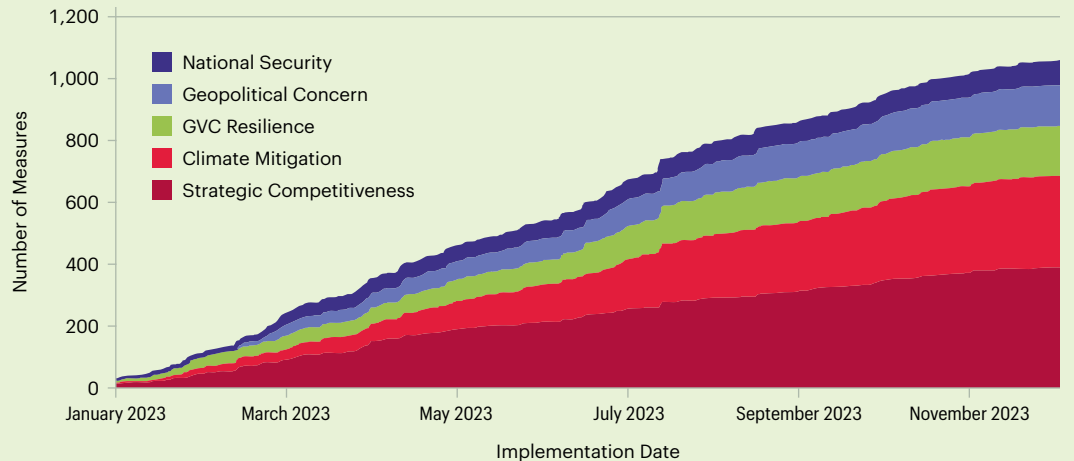
FIGURE 2. Number of new trade restrictive measures



Source: Global Trade Alert, cited by Evenett, et al. (2024)

Note: 2023 includes policies announced through December 6.

FIGURE 3. New industrial policies by stated objective



Source: Evenett, et al. (2024)

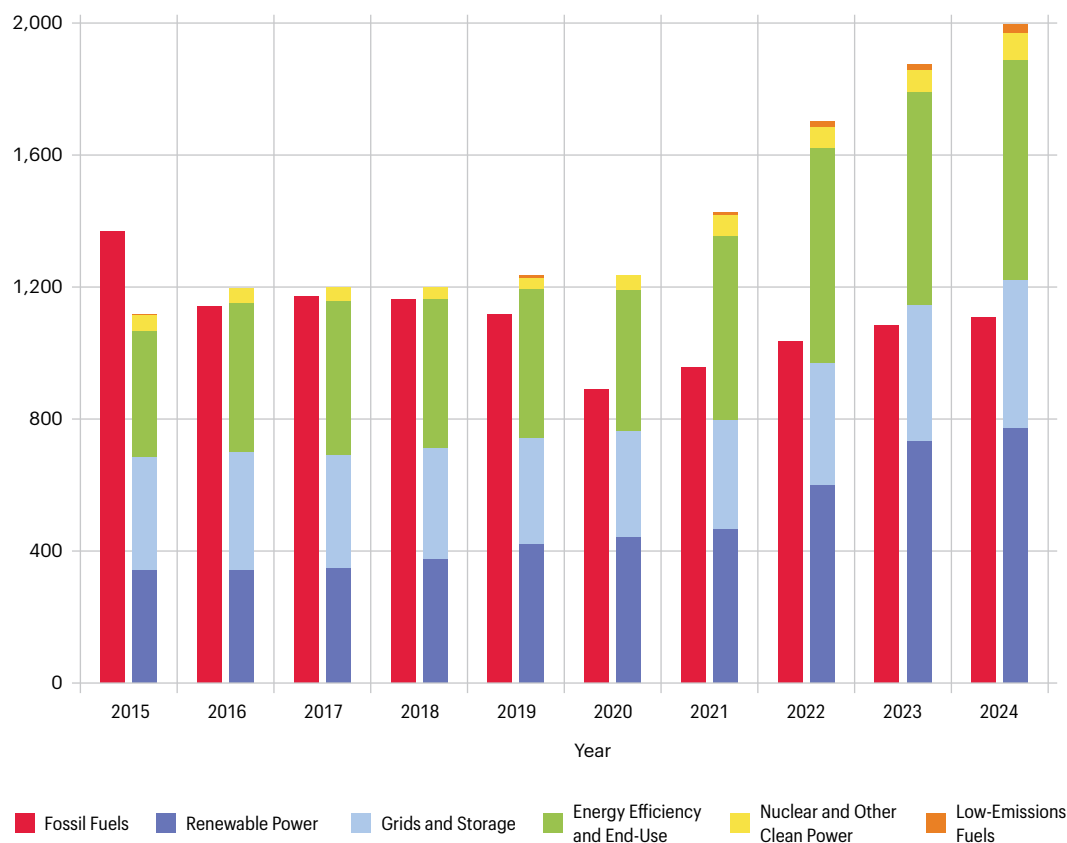
Note: Cumulative stock of measure with IP-related motive. For measures with multiple motives, each motive is given equal weight.

The New Green Playbook

Amid a blistering global climate, governments are ushering in a new era of green industrial strategy that appears driven more by the pursuit of global economic competitiveness and security than by concerns over long-term existential threats. These coordinated approaches by business and government aim to create, scale, and compete in clean technology markets. They are using policies, incentives, and innovation to accelerate decarbonization and reorient industry toward sustainable economic growth and ecological balance. The result is billions of dollars are being directed toward renewable energy, electric vehicles, and other clean technologies.

Often with sweeping ambition, green industrial strategy seeks nothing less than to ignite a new era of economic dynamism—revitalizing manufacturing might, fueling growth on a grand scale, and delivering real, lasting prosperity to communities being left behind or in a position to leverage change. The GIST project examines not only these bold ambitions, but also critical voices and the cold, hard realities confronting all players. These issues were center stage at its inaugural 2025 symposium.

FIGURE 4. Global investment in clean energy and fossil fuels, 2015–2024



Source: IEA (2024)

Appears in [World Energy Investment 2024](#)

Notes: 2024 values are estimated. Low-emissions fuels = modern bioenergy, low-emissions H2 based fuels, and CCUS associated with fossil fuels and also includes direct air capture. Other clean power = fossil fuel power with CCUS, hydrogen, ammonia, and large-scale heat pumps.

Policy, Innovation, and Collaboration in Action

Green industrial strategy is not simply a matter of government policy; it is also driven by entrepreneurial risk-taking, cross-sector collaboration, and the emergence of new markets that reward innovation. China has woven green priorities into industrial masterplans like “Made in China 2025,” fueling a surge in innovation through public and private investment across advanced manufacturing, clean energy, and digital infrastructure. The Inflation Reduction Act in the United States and the European Union’s Clean Industrial Deal have driven policies and financial incentives, unleashing billions of public and private dollars and euros for renewable energy and clean manufacturing.

In some cases, private capital is leading the way, shaping the transition in parallel with public policy. Breakthrough Energy, a climate alliance led by Bill Gates, is a leading example of an initiative that pools investment and demand to accelerate the commercialization of complex, high-impact technologies, from advanced batteries to low-carbon steel. The European Battery Alliance unites governments, industry, and researchers in a public-private effort to build a sustainable battery supply chain.

Diverse players from traditional fossil fuel markets are forming powerful public-private alliances to reposition their economies for the energy transition. Saudi Arabia’s Public Investment Fund is a principal backer of the NEOM Green Hydrogen Company, which is building the world’s largest carbon-free hydrogen facility. In the United Arab Emirates, the sovereign wealth fund Mubadala Investment Company owns Masdar, which is rapidly expanding its multi-billion-dollar investments in solar, battery, and wind projects across the Middle East and worldwide.

Promise Meets Pitfalls and Policy Divides

Even as broader market trends propel clean energy growth, skeptics remain cautious about near-term prospects amid trade uncertainty and policies that still favor fossil fuels. The general resurgence of industrial policy is not without controversy. At the recent GIST symposium, business leaders and experts debating the future of green industrial strategy revealed deep divisions. What makes for a good green industrial strategy? Is this a bold new path to prosperity, or a recipe for protectionism and inefficiency? The answers remain elusive.

All nations face the same core challenges: the need for stable policy, real market demand, resilient infrastructure, and a workforce prepared for transition. The symposium highlighted the delicate balance between government intervention and market forces. Policy can accelerate innovation, or policy uncertainty or inconsistency, such as doubts over the durability of incentives, can stall investment and planning. The promise of clean technology is checked by hard realities: high costs, supply chain vulnerabilities, and the imperative of maintaining reliable energy systems.

Private capital is leading the way, shaping the transition in parallel with public policy.

Strategy as Cure for Slow Green Takeoff?

Proponents argue that green industrial strategy can help overcome coordination problems that plague emerging technologies. By reducing costs and risks, governments can encourage firms to invest in innovations like electric vehicle infrastructure, which might otherwise be stymied by a collective wait-and-see approach.

Buoyed by long-standing government support in China and Europe, and with a newly resurgent U.S. industry, global investment in the low-carbon energy transition has been rising consistently in recent years. It topped \$2 trillion for the first time in 2024 and has been exceeding investment in fossil fuel energy consistently since 2016.⁶

Skeptics warn, though, that even the most ambitious recent policies, such as Biden-era U.S. initiatives, may fall short of delivering a competitive edge while producing only modest reductions in carbon emissions relative to the scale of investment. Some advocates claim that the surge in renewables should be viewed in the short term not as a wholesale replacement of traditional energy sources, but as an addition to the existing energy mix.⁷ Fiscal constraints and the risk of misallocated subsidies further complicate the picture, especially for countries with less economic firepower.

FIGURE 5. Industrial vs. environmental logics in climate policy

	Industrial Policy	Environmental Policy
Goals	Competitiveness/growth + GHG abatement	GHG abatement
Instruments	Targets, regulation, investments, focus on “public investment + standards”	Targets, regulation, investments, focus on “pricing + standards”
Distributional Effects	Concentrated benefits	Concentrated costs

Source: Meckling, Jonas, Making Industrial Policy Work for Decarbonization, 2021

Global investment in low-carbon energy transition topped \$2 trillion in 2024, exceeding fossil fuel investments.

China's Head Start

At one end of the spectrum on green industrial strategy stands China, a giant straddling the global clean industrial landscape. By the time the Paris Agreement established Nationally Determined Contributions for emissions reductions in 2015, China had already outlined its own climate strategy. Following the global financial crisis of 2008, China launched a RMB 4 trillion (USD 586 billion) stimulus, with about a third for green initiatives like energy efficiency, pollution control, rail, and grid upgrades.

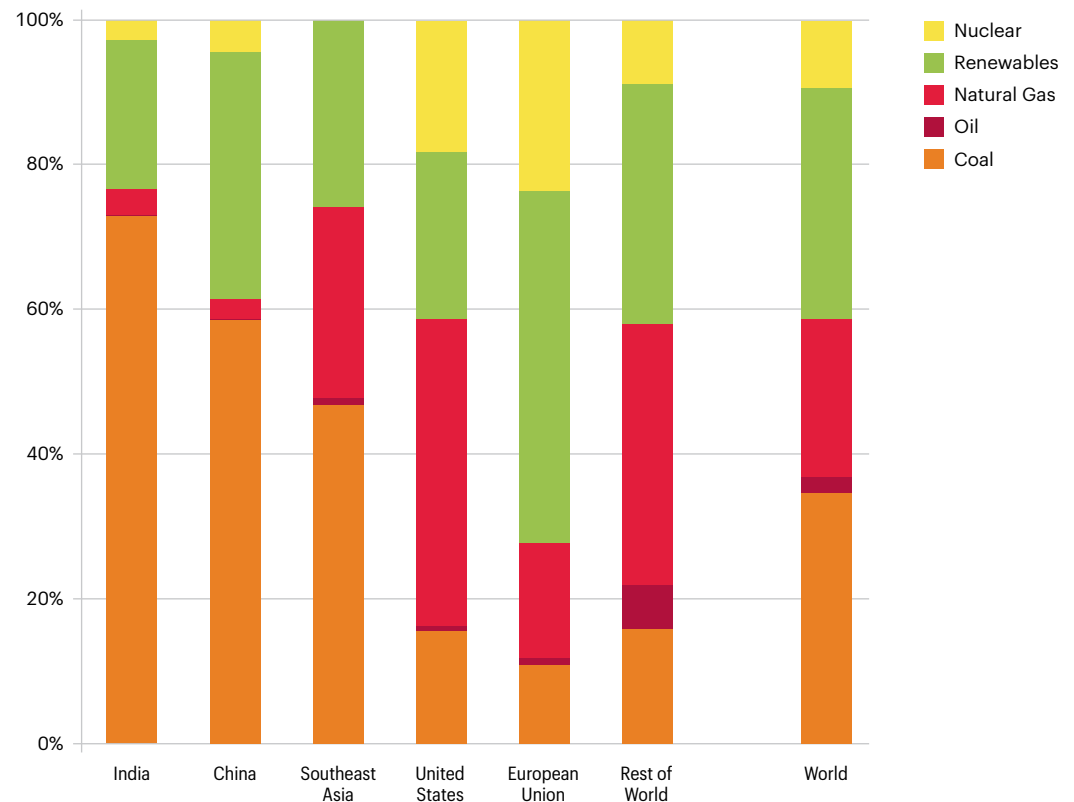
The initial strategy spurred higher energy demand and emissions, but also laid groundwork for long-term decarbonization, as later Five-Year Plans set binding targets for energy intensity and non-fossil fuel use. China's approach to decarbonization continued to evolve through a blend of economic stimulus, industrial expansion, and incremental green policy reforms.

China's coal-driven economy is still responsible for a third of global CO₂ emissions, yet it is also by far the world's largest investor in the green energy transition. In 2024 alone, China invested \$818 billion in new green projects, accounting for nearly 40% of total global investment in clean energy.⁸

As one policy expert described it, China pursues "a state-led, all-government effort," orchestrating intense and grueling internal competition, while also lavishing enormous generosity to support private sector leaders as they emerge. Consistent long-term policies are intended not only to mitigate climate change, but to position the Chinese economy with a competitive edge in emerging green industries.

This centralized approach has propelled China to dominance in sectors such as solar panel manufacturing, battery production, and electric vehicle markets. Long-term strategic planning, massive investment, and a willingness to deploy industrial policy tools on a scale unmatched elsewhere has given China this advantage, noted one expert.

FIGURE 6. Electricity generation mix for selected regions, 2024



Source: IEA. CC BY 4.0

Multiple Models Under Real-World Testing

The range of national approaches that have developed is striking. The United States and European Union followed up on Paris with comprehensive legislation at different speeds and approaches, while other economies have pursued tailored transition plans.

Until 2025, the U.S. and EU were choosing different tools for the same job. America's Inflation Reduction Act unleashed subsidies and tax credits to supercharge clean tech investment, though political shifts create uncertainty. Europe relies more on regulation and carbon pricing, with its Carbon Border Adjustment Mechanism, set to launch in 2026, intended to protect local industries while encouraging global suppliers to reduce emissions.



America's Late Surge

Historically, the United States lacked comprehensive policies around climate or promoting an energy transition, resulting in domestic manufacturing and supply chain gaps. Coming late to the game, it entered with a more market-oriented, albeit still interventionist, approach. Spurred by the Biden administration, the Infrastructure Investment and Jobs Act added to the Inflation Reduction Act and other legislation that sought to further incentivize clean energy manufacturing and deployment.

Private investors responded. The U.S. share of global energy transition investment rose from 8.8% in 2022 to 16% by 2024.⁹ Solar, wind, storage, electric vehicles, and other clean technologies saw a surge from recent investments.

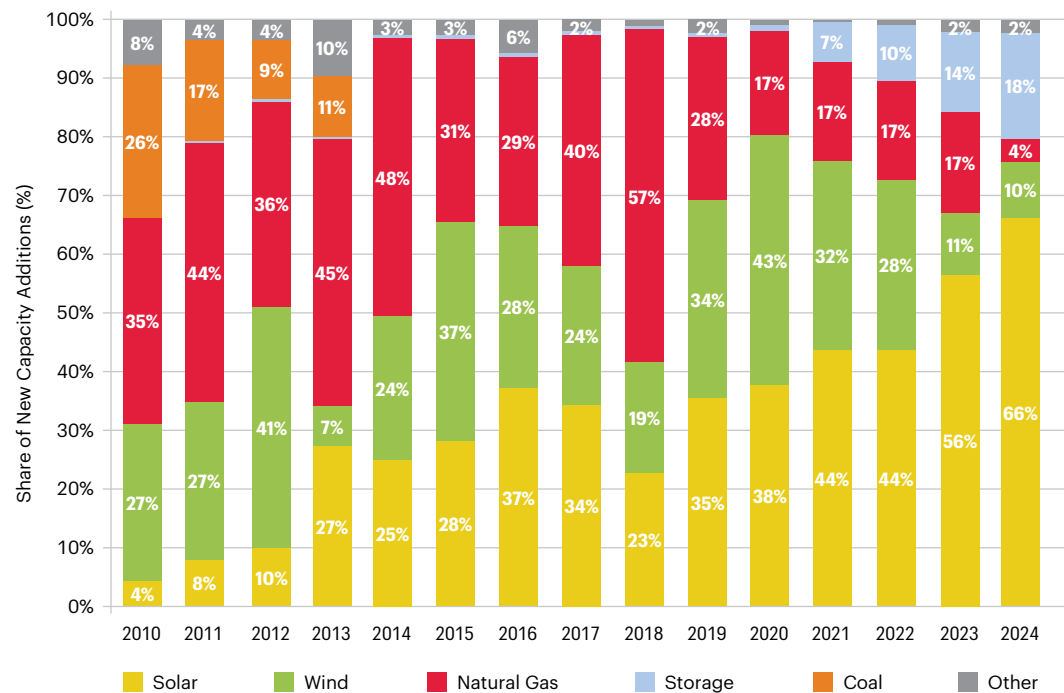
“Government policies have been instrumental in crafting frameworks that steer private investments toward a climate-friendly energy transition, sparking a significant response from business,” Meckling said.

The U.S. solar industry, for example, exceeded projections in the wake of incentives. Solar accounted for 80% of new American electricity capacity and 66% of all new electricity-generating capacity added to the grid in 2024. Solar equipment manufacturing is rapidly expanding in tandem and concentrated mainly in parts of the country where voters have long been skeptical of climate activism.¹⁰

Doubts persist about the IRA's long-term durability, especially given the unpredictability of American politics since the shift in 2025 to the Trump administration, which has dismissed

clean energy as a policy priority, and implemented measures to boost fossil fuel production. “The durability of the Biden administration’s policies is a key question,” said a research fellow familiar with the issue. The policies were intended to build lasting constituencies capable of bridging partisan divides, but it remains unclear whether this strategy has succeeded—leaving uncertain the long-term prospects for sustained progress on climate action.

FIGURE 7. New U.S. electricity-generating capacity additions, 2010–2024



Source: Wood Mackenzie

Note: Starting with the Q2 2024 report, capacity additions for the solar, wind, and storage technologies are sourced from Wood Mackenzie data while all other technologies are sourced from the U.S. Energy Information Administration.

Transatlantic Cooperation Amid Competition

The transatlantic partnership faces new strains under a second Trump administration as the U.S. and EU pursue divergent paths toward a green economy. With American policy unpredictability creating headaches for long-term green investments, Europeans question whether the U.S. remains a reliable climate partner. As one legal policy expert put it, the unpredictability of U.S. policy is a headache for anyone planning the long-term investments that green industries demand. Yet both sides share a pressing concern: China's commanding lead in green technology supply chains, from solar panels to batteries and key minerals.

These differences in approach between the U.S. and Europe reflect deeper political and legal realities on each side of the Atlantic. Both approaches face the challenge of scaling up supply chains and reducing costs in markets dominated by Chinese suppliers. Innovation offers the best hope for narrowing this gap, as demonstrated by green steel projects leveraging local resources to approach cost parity with conventional production.

A leading policy expert argued that the sheer scale of capital now flowing into green industries on both sides of the Atlantic is cause for hope. She lamented wasted efforts in recent years that could have created more synergies. The failure of the U.S.-EU green steel deal, for example, was a missed opportunity to harmonize emissions limits and ease trade tensions, she said.

Despite differences in policy tools and ongoing trade disputes, the stakes may be high enough to prevent rivalry from derailing progress. Both the U.S. and EU share fundamental interests in building resilient, diversified supply chains and reducing dependence on single suppliers.

Navigating Green Supply Chains

The race to decarbonize has transformed global supply chains into a complex, ongoing challenge. Industries and governments are urgently working to secure their position in a green future, reshaping supply chains through every decision, innovation, and policy change. Suppliers of essential materials for green technologies must now rethink their roles and help steer entire industries in new directions.

The scrambles to procure rare minerals such as lithium, copper, and nickel—resources often concentrated in just a few countries—offer high-profile examples of nations racing to secure reliable supplies. As trade tensions rise, ensuring access to these critical materials is now a top priority for governments around the world.

Companies at the center of the green transformation face both challenges and opportunities. One executive described how commodity suppliers are investing in digital tracking and sustainability certifications to meet growing demands for transparency, noting it is a major shift but strengthens relationships, saying, “Creating reliable, low-carbon supply chains requires both time and trust. You can't rush the process.”

Another CEO explained how leveraging renewable energy to produce green hydrogen dramatically reduces emissions, positioning her company's products as preferred choices for climate-conscious markets.

The global division of labor in green industries continues to evolve, with developing countries having opportunities to leapfrog directly to renewables if given proper support and international cooperation.

The U.S. and EU share interests in building resilient, diversified supply chains.

Scaling Green Success Stories

The first wave of green technologies has reached a crucial inflection point. Solar panels and electric vehicles, once premium products for early adopters, now match or undercut traditional alternatives in price. However, industry leaders emphasize that moving from technological maturity to widespread adoption still faces significant hurdles.

In the U.S., for example, nearly 50 gigawatts of new solar industry capacity was installed in 2024, a 21% increase from 2023 and the largest single-year addition by any energy technology in more than two decades, according to a report prepared for the Solar Energy Industries Association. Domestic manufacturing capacity grew 190%, from 14.5 gigawatts at the end of 2023 to 42.1 gigawatts by the close of 2024.¹¹

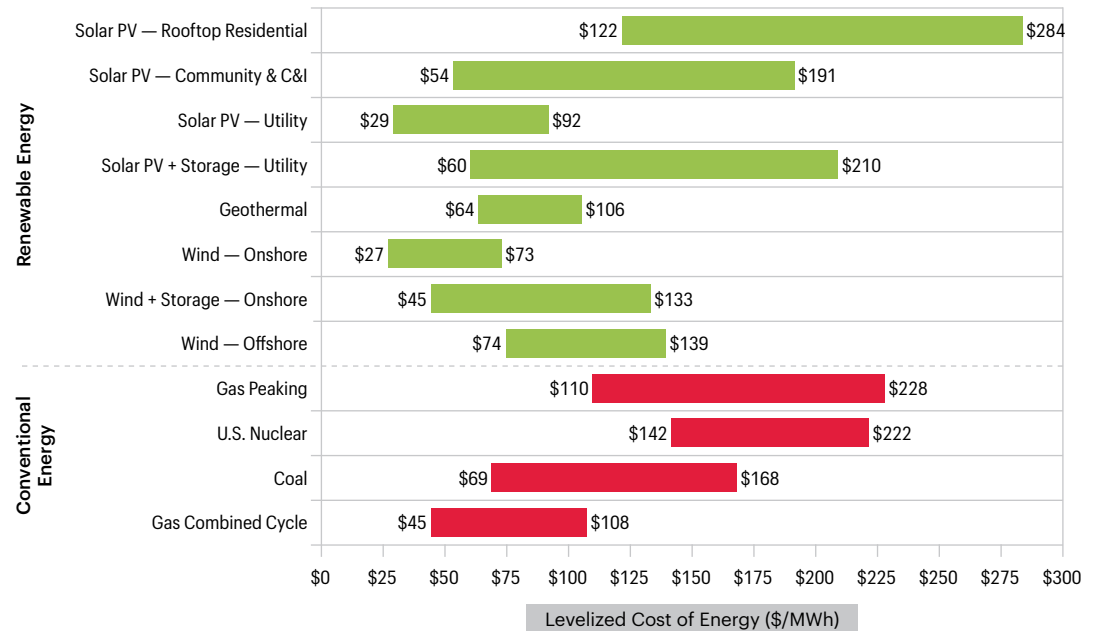
India's solar sector is also experiencing rapid growth. India's installed solar capacity surpassed 105 GW in March 2025, accounting for 22% of the nation's total power capacity.¹² The Modi government has ambitious target for renewables to make up 50% of generation capacity by 2030, a goal that appears within reach given current momentum.¹³

One renewables industry executive voiced concerns, however, noting that Indian domestic manufacturing remains heavily reliant on Chinese technology, which is considered "4–5 generations ahead" in certain areas. This technological gap underscores the challenges India faces as it pushes to meet ambitious government targets. Business leaders caution that bridging the technology gap with China will be crucial for India to sustain its leadership in the global green transition.

Another rapidly growing sector, the electric vehicle landscape reveals stark regional disparities. A auto industry executive highlighted a clear "North-South, East-West divide" in Europe, for example, in adoption rates—from Norway's impressive 90% to Southern Europe's modest 10–20%. Unlike

FIGURE 8. Levelized cost of energy comparison, 2024
Selected renewable energy generation technologies remain cost-competitive with conventional generation technologies under certain circumstances

Source: Lazard, Levelized Cost of Energy+, 2024



China's centralized approach, local politics in Europe and America can impede charging infrastructure development that has impact on consumer uptake of new technologies. For U.S. automakers, the electric vehicle transition represents both technological and cultural challenges, with workforce resistance complicating factory conversions.

Infrastructure concerns span all markets. When government policies are consistent, they prove transformative. One example cited is India's program allowing citizens to sell excess solar energy back to the grid, which has made home solar panels self-funding within 18 months.

Nascent Technologies: Hydrogen and Storage at the Crossroads

Hydrogen and grid-scale energy storage represent promising but still costly technologies that may prove critical for hard-to-decarbonize sectors. Industry executives and investors emphasize that moving these technologies from niche pilots to mainstream markets requires not just innovation but sustained policy support and real customer demand.

Hydrogen faces significant hurdles despite its potential as a versatile fuel. “Green” hydrogen—produced using new-generation hydrolyzers powered with renewable electricity—remains expensive and lacks infrastructure for production, storage, and transport. A venture capitalist highlighted the “incumbency bias” in tax codes that favors established energy sources and stressed that “lack of demand” represents the biggest barrier: “Nothing makes a project go faster than a customer that says I will buy.”

Grid-scale storage technologies face similar challenges. While lithium-ion batteries have advanced rapidly, they typically provide only a few hours of backup power, insufficient for longer-duration needs. At the same time, an energy delivery executive cautioned against overly idealistic market designs that can kill emerging solutions, citing a \$50 million battery project that effectively replaced a new transmission line.

Government policy has been crucial in jumpstarting these markets. The Inflation Reduction Act has spurred investment in the U.S., but as in other subsectors uncertainty about its longevity creates investor hesitation. The panel’s consensus was clear: scaling hydrogen and grid-scale storage requires coordinated government action to bridge cost gaps, create demand, and invest in infrastructure.

Meeting the Moment During a Crucial Transition

The inaugural GIST symposium highlighted the complexities of advancing green industrial strategy. The event marked a successful start for GIST as a productive and objective forum for convening a cross section of business, policy, and academic players in the evolving landscape of green industry. It highlighted how China’s centralized system and long-term planning have enabled rapid progress through policy continuity and coordinated national strategies. Other major economies face political and structural constraints that complicate swift responses.

A key takeaway is that success depends on integration—aligning policy, market incentives, infrastructure, and workforce development, while fostering international cooperation amid rising competition. The global race for clean energy leadership is as much about effective execution as ambition, with fragmented markets, infrastructure bottlenecks, and policy risks posing ongoing challenges. China’s dominance in manufacturing and technology underscores the need for supply chain resilience and innovation elsewhere.

Ensuring the benefits of green growth reach workers and communities remains a critical test. As green industrial investments accelerate, the path forward will require pragmatism, patience, and tough trade-offs. The GIST program launches at a pivotal moment, aiming to help key players navigate and interpret these evolving developments to make better-informed decisions.

Endnotes

1 This event was conducted under the Chatham House Rule, which allows participants to use the information received but prohibits revealing the identity or affiliation of speakers or other participants. Therefore, direct quotes and other points raised by non-HBS participants are not attributed. Any direct attributions have been made only with the explicit consent of the individual cited, and indirect references are intentionally vague to protect participants' identities.

2 IEA (2025), [Global Energy Review 2025](#), IEA, Paris.

3 Evenett, Simon; Jakubik, Adam; Martin, Fernando; and Ruta, Michele, *The Return of Industrial Policy in Data*, IMF Working Paper, January 2024.

4 [Evenett et al. \(2024\)](#).

5 International Energy Agency (2021), [Net Zero by 2050](#), IEA, Paris.

6 IEA (2024), *World Energy Investment 2024, Global investment in clean energy and fossil fuels, 2015–2024*, IEA, Paris.

7 Yergin, Daniel, et al., [The Troubled Energy Transition](#), *Foreign Affairs*, March/April 2025.

8 Bloomberg NEF, [Energy Transition Investment Trends 2025](#).

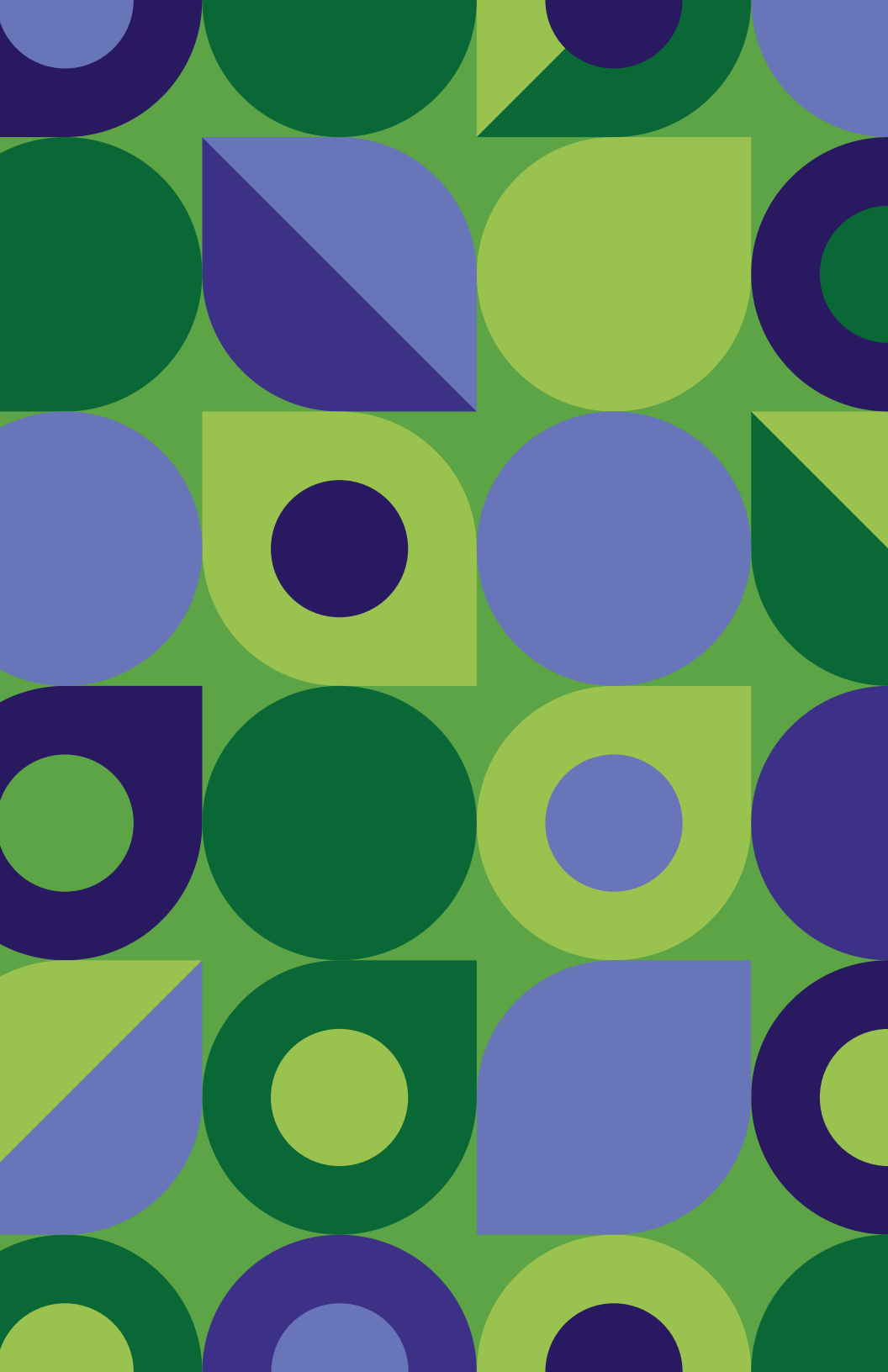
9 Bloomberg NEF, [Energy Transition Investment Trends 2025](#).

10 Wood Mackenzie, U.S. Solar Market Insight, [2024 Year in Review](#).

11 Wood Mackenzie, U.S. Solar Market Insight, [2024 Year in Review](#).

12 [Solarquarter research](#).

13 [Renewable Watch](#).



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