

## The political strategy, climate impact, and contingent success of the Inflation Reduction Act

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For the first time in history, something like the full financial weight of the federal government is now aligned behind the clean energy transition. The 117<sup>th</sup> Congress of the United States (sitting 2021-2022) passed a package of laws — the Infrastructure Investment and Jobs Act ([IIJA](#)), CHIPS and Science Act ([CHIPS](#)) and Inflation Reduction Act ([IRA](#)) — which represent a turning point in the politics of climate and clean energy policy in the United States and the most significant acceleration of the nation's decarbonization to date.

Prior failed attempts at comprehensive federal climate policy (most notably the Waxman-Markey Act of 2009 and its predecessors; see [Jenkins \[2014\]](#)) focused primarily on carbon pricing to increase the private cost of climate pollution and shift economic incentives towards cleaner alternatives. In contrast, **the successful legislative actions of the 117<sup>th</sup> Congress focus on making clean energy (and other climate solutions) cheaper and represent a climate policy strategy centered on public investment, innovation, and industrial policy, rather than carbon pricing or regulation.** These new laws provide [a package](#) of tax credits, grants, rebates, loan programs, and other economic incentives for virtually the entire suite of climate mitigation strategies across all major emitting sectors, including: all forms of carbon-free electricity; clean hydrogen and fuels; carbon capture & storage; electric and fuel cell vehicles; energy efficiency & electrification of building energy needs; industrial decarbonization; and reductions in agricultural greenhouse gas emissions and improvements in land carbon sinks.

These new laws constitute a nascent ‘Climate Industrial Strategy’ and a sizable public investment to accelerate the clean energy transition totaling well over \$500 billion over the next ten years. The Congressional Budget Office [estimates](#) that IRA will provide \$369 billion in direct spending and tax incentives for clean energy and climate mitigation over a decade (2023-2032), while IIJA [includes](#) \$62 billion in funding (mostly to be spent over five years from FY2022-2026) for the U.S. Department of Energy to make key investments in technology demonstrations, place-based hydrogen and direct air capture ‘hubs’, advanced manufacturing, and critical network infrastructure like electricity transmission and CO<sub>2</sub> pipelines, along with an additional \$12.5 billion to expand EV charging networks and electrify school buses, ports, and ferries. Even that sum understates the scale of public investment, as the majority of funds under IRA (\$259 billion of CBO’s total \$369 billion estimate) flow via tax credit programs, which are not constrained by a fixed budget or subject to further appropriations and in many cases persist beyond 2032. Total outlays for IRA tax credits are likely to be materially larger than CBO’s estimates, based on a variety of independent modeling efforts, including the [REPEAT Project](#) which I lead. Finally, CHIPS authorizes [another](#) \$67 billion for energy research and innovation activities, although funding for these measures requires future budget appropriations. CHIPS also [appropriates](#) \$52.7 billion in spending to encourage U.S. semiconductor research, development, manufacturing, and workforce development, which will help expand supply of semiconductor components used widely across the modern economy, including in electric vehicles, EV chargers, and numerous other clean energy components.

This package of laws represents a dramatic acceleration of U.S. decarbonization efforts. [REPEAT Project](#) modeling and analysis estimates that IRA and IIJA will roughly double the pace of U.S. decarbonization to ~4% per year from 2023-2032 and reduce total U.S. greenhouse gas emissions to ~37-41% below 2005 levels by 2030.<sup>1</sup>

Despite historic progress, this substantive acceleration of climate mitigation efforts still falls short of [the United States' target](#) of reducing total greenhouse gas emissions to 50-52% below 2005 levels by 2030 and net-zero by 2050. Further action and accelerated progress are required for the United States to get on the pathway to net-zero emissions.

It is thus critical that this Climate Industrial Strategy is deliberately designed to reinforce feedbacks that have the potential to reshape the political economy of climate policy in the United States and accelerate the clean energy transition. There are multiple channels by which these laws can facilitate accelerated mitigation efforts:

- First, by subsidizing the cost of clean energy and other climate solutions and building critical enabling infrastructure, these laws immediately make it cheaper and easier for all levels of government (and voluntary private sector actors) to increase their climate mitigation ambitions. Whatever level of action made political or economic sense prior to passage of these laws, with the federal government now picking up a substantial portion of the cost, state and local governments are likely to adopt more ambitious decarbonization policies. Relatedly, the new laws lower the cost of compliance for industries and households with any forthcoming federal or state regulations. Since the economic burden imposed by new rules on regulated entities is a key concern in all rulemaking processes, new federal subsidies for a wide range of compliance measures make it more likely that agencies will promulgate more stringent rules (e.g., [forthcoming](#) U.S. Environmental Protection Agency vehicle and power plant emissions rules or state decisions to adopt [California's Advanced Clean Cars II rules](#) to transition to 100% zero-emissions light duty vehicle sales by 2035).
- Second, the laws are expected to drive down the real, unsubsidized cost of multiple key climate mitigation technologies over time. Since the last time Congress tried and failed to pass major climate legislation (2009-2010), RD&D and early market deployment subsidies around the world drove scale-up, maturation, and cost declines [on the order](#) of 90% for solar PV and Lithium-ion batteries and 70% for wind power. Following in this pattern, IIJA funds commercial-scale demonstration and IRA establishes a decade or longer of early market deployment subsidies that are likely to drive similar cost declines and maturation for a range of important nascent clean technologies that need to be ready for wide-scale deployment in the 2030s and 2040s, including: clean hydrogen and clean fuels, carbon capture and carbon dioxide removal, and advanced nuclear, geothermal and long-duration energy storage. Reducing the cost of these key climate mitigation technologies will not only make it easier to enact future U.S. policy, it will also spill over to lower the cost of mitigation for countries around the world, facilitating global decarbonization.

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<sup>1</sup> REPEAT Project (2023, forthcoming), "Final Report: The Climate and Energy Impacts of the Inflation Reduction Act of 2022 and Infrastructure Investment and Jobs Act of 2021," see [repeatproject.org](#) for publication in March 2023. Note that REPEAT Project's [preliminary analysis](#) published in 2022 estimated the laws would reduce U.S. GHG emissions to 42-43% below 2005 levels by 2030. Emissions figures are inclusive of net land carbon sinks and employ CO<sub>2</sub>-equivalent accounting as based on IPCC AR4 100-year global warming potential as per conventions of the U.S. [EPA Inventory of Greenhouse Gas Emissions and Sinks](#).

- Third, the laws can deliver real tangible improvements in quality of life and economic opportunities that can reshape political constituencies and expand support for the clean energy transition. These Climate Industrial Strategy laws provide robust support for the development of American manufacturing of solar, wind, battery and electric vehicle components and assembly as well as critical minerals processing. Since passage of IRA, firms have already announced \$56 billion in [planned investment](#) in 65 related manufacturing projects across the United States, directly supporting over 50,000 new jobs. REPEAT Project [estimates](#) that nearly one million jobs will be supported in manufacturing wind and solar PV components by 2032, with hundreds of thousands more in battery and EV manufacturing. IRA also employs grants, loan guarantees, and tax incentives that will drive hundreds of billions of dollars in cumulative clean energy investment in American “energy communities” over the next decade, giving communities historically reliant on fossil energy extraction, processing, or transportation for their economic livelihoods a new economic stake in the clean energy transition. Finally, IRA will deliver significant improvements in air quality and public health outcomes, particularly for environmentally overburdened communities. A package of more than \$60 billion in environmental justice provisions focus on reducing harmful pollution, ensuring more equitable access to renewable energy, energy efficiency and building electrification opportunities, and improving public health and climate resiliency. Across the United States, REPEAT Project estimates that IIJA and IRA will prevent over more than 35,000 premature deaths over the next decade alone.
- Fourth, the laws are likely to significantly strengthen concentrated clean energy interests. In the last decade, the solar and wind industries have already grown from nascent, costly, “alternative energy” technologies when the Waxman-Markey Act was debated to well-established industries supporting hundreds of billions of dollars of annual investment globally. As a result, these interests could now wield real political influence that played an important role in the passage of IRA and IIJA. Over the next decade, Credit Suisse [estimates](#) that IRA will drive roughly \$1.7 trillion in total clean energy spending, substantially growing these clean energy industries and establishing new subsectors like clean hydrogen, carbon capture, transport & storage, and others. The automotive industry is now in the midst of a wholesale transition to electric drivetrains that is likely to be substantially complete by the mid-2030s. The economic interests of these concentrated interests will be aligned with the continuation of clean energy and climate policies, strengthening political coalitions for additional policy in the future, while helping defend against retrenchment.

Thus, the passage of IIJA, CHIPS, and IRA is likely to reflect a key acceleration of the ‘green spiral’ ([Kelsey, 2014](#)) or the policy sequencing feedbacks ([Meckling et al. 2017](#); [Pahle et al. 2018](#)) that can induce more ambitious policies and sustain and accelerate U.S. climate mitigation over time.

Despite the historic progress represented by the trio of laws enacted by the 117<sup>th</sup> Congress, their impact remains highly contingent on successful implementation and proactive efforts to overcome several key bottlenecks that could slow the pace of decarbonization.

These laws primarily establish the *financial* incentives for accelerated climate progress. But they are far from a complete industrial strategy, nor do they instantly create

the kind of state and institutional capacity required to successfully execute such a strategy. Successful implementation of the various new tax credits, grant and loan programs, and other policies created by these laws will require hundreds if not thousands of diligent civil servants at the federal level as well as corresponding engagement and action from state and local governments, given that many programs are implemented by these subnational actors. Additionally, civil society actors will need to be vigilant and amply-resourced to secure broad public benefits from these programs and mitigate widespread opportunities for regulatory capture by narrow interests.

Unless proactively addressed, several rate-limiting constraints may also impede progress. These include the challenge of planning, siting, and permitting new infrastructure at record pace. Based on REPEAT Project results, wind and solar capacity additions through 2030 must average double the peak annual rates achieved to date and then accelerate to about 3.5-times peak rates from 2031-2035. Electricity transmission networks must expand at double the rate averaged over the past decade; failing to do so could [jeopardize as much as 80% of the emissions reductions](#) that IRA could achieve. New industrial clusters to produce and harness clean hydrogen and capture CO<sub>2</sub> emissions and new pipeline networks to safely transport these gases are needed, as are injection sites and geologic basins to safely store hundreds of millions of tons of CO<sub>2</sub> annually. Dozens of new factories to produce electric vehicles, batteries, wind turbines, solar panels, and their components must be constructed and global supply chains reorganized to support these rapidly growing sectors while lessening the United States' dependence on 'Factory China.' And millions of workers must be recruited and trained to staff the construction of this infrastructure and work these factory floors. If any of these elements—planning and permitting; network expansion; supply chains; workforce development—proceeds too slowly, it could become a critical constraint on the pace of decarbonization and the uptake of the financial incentives established by IRA.

The Inflation Reduction Act, along with the Infrastructure Investment and Jobs Act and CHIPS and Science Act, represent an inflection point for U.S. climate mitigation efforts. Yet as this historic period of federal policy making closes, much work remains to make the most of this contingent success.