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Tying Labor Standards to Clean Energy Incentives

How Biden's Department of Energy Tackled Climate Industrial Policy

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Executive Summary

The Biden administration ushered in the most ambitious era of US industrial policy since the New Deal and the most significant climate legislation on the planet, stimulating investments that would onshore the production and deployment of key technologies essential to the global reduction of greenhouse gases. While not enough to overcome other political forces, this "industry-led, government-enabled" labor- and equity-oriented strategy worked functionally and economically as designed and provides critical lessons for advancing climate policy in the US and elsewhere.

Through landmark legislation—the Inflation Reduction Act, the CHIPS and Science Act, and the Bipartisan Infrastructure Law—the federal government reasserted its role in shaping markets and guiding investment, sparking a green industrial boom. The use of grants, loans, and tax credits defined a modern industrial strategy—one that unleashed record-breaking investments and sought to rebuild the economy "from the bottom up and middle out." In addition to the economic agenda, these investments sought to assert American climate leadership not only by investing in the domestic commercialization and scaling of emission-reducing technologies, but by doing so in a way that would build and strengthen the constituencies that would make clean energy deployment more durable and future climate policy possible.[1]

This paper is the first in a series illustrating where Biden-era pro-worker climate policies have succeeded, where they have fallen short, and what that means for future climate, economic, and industrial policy. This first paper examines how the Biden administration steered the private sector toward green industry and shared prosperity and offers a case study on how the DOE strategically reorganized to operationalize a bold, climate-oriented, worker-friendly industrial strategy. The second paper will reveal the outcomes of these efforts while highlighting key challenges and remaining opportunities. The final paper will provide examples of the spillover effects and expound on forward-thinking solutions for building an economy that meets the needs of working people and the planet.

In the Biden administration, the DOE transformed from an agency focused on energy research and development (R&D) and nuclear defense to one also focused on advanced energy deployment at scale. This transformation coincided with the Biden administration's good jobs agenda, which implemented a three-layered demand-driven strategy: crowd in[2] investment in the US to expand employment in the energy sector, condition funding on high labor standards, and incentivize firms to invest in workers

[1] "Clean energy" was broadly defined as those technologies aligned with a zero-emissions future. This included not only wind and solar but also nuclear, geothermal, carbon capture, direct air capture, EV charging, batteries, energy-efficient appliances, heat pumps, minerals and materials processing, component manufacturing, zero-emission vehicles, and other technologies.
[2] In economics and policy, "crowd in" refers to activities where public investment or intervention stimulates additional private investment, rather than replacing or deterring it.

and training pathways. Taken together, these policy innovations sought to make high-road, place-based, and climate-aligned investment not only possible—but irresistible and irreversible.

Tying climate action to jobs was not new, but the approach the Biden administration pursued represented a marked departure from past approaches emphasizing green job training. The administration placed far greater emphasis on job creation, labor standards, and employer investment in earn-as-you-learn training—efforts to grow the demand for skilled labor in the energy sector and pull workers into and upward in the labor market.

The Biden administration's approach derived from an intentional agenda and clear priorities as well as operational pivots in the face of legislative setbacks and legal constraints. The result was implementation driven largely by incentives rather than mandates or new legislative authorities. Implementation meant using, to the maximum extent, legal and regulatory tools that already existed, as well as executive actions to clarify priorities and drive agency action.

While early actions, commitments, and reporting show extremely promising results, particularly in the crowding in of capital and acceleration of the maturation of technology, the final effectiveness of the incentive-based approach to achieving emission reductions and socioeconomic and labor outcomes should be assessed after (not at the beginning of) implementation, when real outcomes can be measured. A 10-year program of tax incentives to reduce emissions 43–48 percent below peak levels, build infrastructure, and onshore supply chains has only just begun. Throughout the Biden administration, there was an ever-present awareness that transformation of the American economy would take more than a single term, and the goal was to demonstrate enough early benefits across red, blue, and purple states to fortify the plan against political opposition.

Complicating the analysis of outcomes from Biden-era efforts are Trump administration actions to cease data collection, withhold funding, pause and cancel projects, reduce staffing, revoke executive orders, and signal that certain standards set by Biden agencies will not be enforced. Although some Biden-era workforce efforts have been partially realigned with Trump administration priorities, it remains unclear to both funding recipients and outside observers which initiatives will continue.

Introduction: The Biden Administration's Climate Industrial Strategy and Good Jobs Agenda

The Biden administration pitched its Investing in America industrial strategy to the American people as "bottom-up and middle-out economics," a philosophical and values-based framework that highlighted broad benefits for working- and middle-class families.[3] Folded into this was a "blue-collar blueprint to rebuild America" with an explicit focus on leveraging once-in-a-generation investments in infrastructure and industry to grow good union jobs, with a direct pathway to the middle class for workers without a college degree. President Joe Biden would often say in his speeches, "the middle class built America, and unions built the middle class." Aiming to be the most pro-labor president in US history, President Biden was outspoken and consistent in his endorsement of labor unions and desire to grow their ranks.

This bottom-up, middle-out blueprint used clean energy and climate as the vehicles for broader economic and geopolitical goals: national security, US competitiveness, energy security, good jobs, and equity. Clean energy supply chains and critical minerals were strategic assets for reshoring industrial production and bolstering national security. Clean energy innovation and manufacturing would position the US to capture an advantage in the projected $23 trillion global market for clean energy (DOE 2021) and enhance US global competitiveness. Investing in a wide range of clean energy technologies would support energy resilience and affordability in the face of 21st-century energy challenges (e.g., severe weather, ever-increasing demand, geopolitical energy disruptions). A climate focus that stimulated investment and growth—rather than demanding sacrifice—supported the growth of good, mostly blue-collar, union jobs. The Justice40 Initiative and the Interagency Working Group on Energy Communities supported place-based investments that would correct for past inequities, ensure a just energy transition, and drive investment to communities that needed it most.

When Biden became the Democratic nominee for president, he assembled a general campaign platform that drew from the best ideas of his competitors in the Democratic primary—platforms that reflected the work of a wide range of stakeholders and took lessons from past policy failures—to develop a far more integrated, intersectional policy program. Building upon Jay Inslee's Evergreen Action Plan, the momentum behind the Green New Deal,[4] and input from a wide range of environmental, labor, and community stakeholders, candidate Biden's climate platform was rooted in good jobs and equity principles.

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[3] See State of the Union addresses in 2022, 2023, and 2024.
[4] See Wong et al. 2023 for a detailed description of the conceptual antecedents to Biden's climate platform.

On the labor side, President Biden promised to be the most pro-worker, pro-union president in US history, with the campaign goals of passing the Protecting the Right to Organize Act (PRO Act), the most sweeping proposed reform to US labor law since the National Labor Relations Act of 1935, as well as raising the minimum wage, banning captive audience meetings, establishing "card check" as the default for union recognition, and banning "right-to-work" laws (Biden 2024a). These climate and labor ambitions were folded into the Build Back Better agenda, a $3.5 trillion package, which included a $775 billion human infrastructure plank to bolster caregiving and education. The Build Back Better Act included labor reforms and support, including restrictions on union-busting activities and mandatory captive audience meetings, neutrality requirements, tax deductible union dues, $350 million for the National Labor Relations Board, $5 billion for registered apprenticeships, and additional support for labor-management training programs (HR 2021).

During negotiations, much of the original worker-centered agenda was pared back after the American business community mobilized against it (Elrod 2024). To secure votes for an infrastructure package, the Biden administration removed all mention of taxes as well as $400 billion for long-term care, $424 billion for clean energy tax credits, $326 billion for affordable housing and public schools, and $566 billion for domestic manufacturing and research and development. What remained in the Infrastructure Investment and Jobs Act (aka Bipartisan Infrastructure Law (BIL)) was a $1.1 trillion package ($550 billion over 10 years in new spending plus $650 billion in reauthorized existing funding) for electric power distribution and energy projects in addition to roads, bridges, airports, ports, water, and broadband. The BIL included Davis-Bacon provisions[5] but lacked labor standards for industries beyond construction.

Most of the rest of the Biden climate agenda[6] passed through the Inflation Reduction Act (IRA) via budget reconciliation, which is a procedure that bypasses Senate filibuster rules and allows measures to pass with a simple majority. The reconciliation process cannot be used to pass policy items unrelated to the federal budget, so many of the labor reforms envisioned by Biden as a candidate, and gutted from BIL, including the PRO Act, could also not be advanced through reconciliation. But, for the first time labor standards were tied to tax spending: Prevailing wage and apprenticeship bonuses quintupled the value of clean energy tax credits, and domestic content and location bonuses for low-income and energy communities also increased the value of credits. While these were far more limited tools than the sweeping labor law reforms and deep investments in caregiving and social infrastructure that had originally been envisioned, they were still groundbreaking and part of a broader strategy to ensure the energy transition was also a worker empowerment initiative.

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[5] Davis-Bacon and related acts specify that workers on federally supported construction projects are paid weekly at prevailing wage rates determined by the US Department of Labor.
[6] Elements of the CHIPS and Science Act relate to a climate agenda, but more peripherally than the BIL and IRA, which spend directly on clean energy.

Parallel to these legislative efforts, President Biden issued several executive orders. Signed within his first week in office, Tackling the Climate Crisis at Home and Abroad (EO 14008) created the Justice40 Initiative to ensure that benefits of climate-related investments flow to disadvantaged communities and declared 10 times the imperative of retaining and creating good union jobs. The Made in America executive order strengthened Buy America provisions to "help American businesses compete in strategic industries and help America's workers thrive" (EO 14005). Signed in April, EO 14026 raised the minimum wage for federal contractors to enhance productivity by boosting workers' health, morale, and effort (EO 14026). EO 14025 established the White House Task Force on Worker Organizing and Empowerment (also known as the Worker Empowerment Task Force), chaired by Vice President Kamala Harris, with Labor Secretary Marty Walsh as vice chair (EO 14025). The task force delivered over 70 recommendations, including encouraging project labor agreements and registered apprenticeship targets in federal investments. In November 2021, Biden issued EO 14052 to guide implementation of the Infrastructure Investment and Jobs Act (aka the Bipartisan Infrastructure Law), to drive the creation of good-paying union jobs and ensure workers have a free and fair chance to join a union (EO 14052).

Complementing the executive orders, significant interagency collaboration to share resources and best practices led to a wide array of agency actions. In early 2022, the Department of Labor (DOL) launched the Good Jobs Initiative to guide agencies on how to incorporate job quality measures such as fair pay, career pathways, and access for underserved communities into funding and procurement criteria. This was a significant operational pivot after the workforce development funding to expand DOL's programs envisioned in Build Back Better was eliminated. Under this initiative, DOL signed memoranda of understanding (MOUs) with several agencies, including DOE, to work together to confront climate change and economic insecurity by aligning efforts "to attract, train, retain, and empower diverse, qualified, well-compensated workers to jobs in clean energy infrastructure and supply chains" (US DOE and US DOL 2022). An update to the Worker Empowerment Task Force recommendations in March 2023 highlighted agency progress, noting that agencies like DOE had begun embedding job quality standards into BIL- and IRA-funded programs through Community Benefits Plans (CBPs).

This context matters for understanding DOE's approach to labor provisions in its discretionary programs. Far from acting on its own, DOE's integration of wage standards, training partnerships, and labor-management collaboration through CBPs reflected a clear operationalization of congressional intent, backed by executive directives. DOE's labor-focused initiatives were part of a coordinated federal effort to translate narrowed legislative priorities into concrete, pro-worker implementation of Biden's industrial-climate policies.

A Departure from Past Green Jobs Plans

Before Biden, both Presidents Bill Clinton and Barack Obama linked the imperative of addressing climate change to the opportunity for economic growth and job creation. In 1993, at a White House conference on climate change, President Clinton unveiled a plan that "gives us a chance, a very, very good chance to reduce greenhouse gases, grow our economy, and create a new high-skill, high-wage job base in America" (Clinton 1993). President Obama consistently linked clean energy and emission-curbing technology to job creation and supported green jobs initiatives both through federal agencies and under the American Recovery and Reinvestment Act (ARRA). While both Clinton and Obama talked about the job creation potential of domestic clean energy innovation and investments and the need to drive market development (Clinton 1993; Obama 2011),[7] Obama's green jobs efforts centered around education and training. In his view, the promise of good green jobs would be realized by closing workers' skills gaps (Obama 2012).

It can be useful to think about jobs policies and interventions in terms of labor market supply and demand. Supply-side strategies focus on managing the supply of labor through training programs, which pull workers out of the labor market when demand is low (Kleinman Center for Energy Policy 2023), and preparing the workforce to respond to changing markets or technologies (Zabin and MacGillvary 2020). Demand-side strategies—job-creating investments, wage standards, skill requirements, etc.—shape the demand for labor. A healthy workforce system coordinates and calibrates labor supply (training) to demand (job availability) to support continuity and stability of the industries served—outcomes that benefit employers and workers alike. This is the calibrated training provided by union-sponsored registered apprenticeship programs: training only as many people as there are job openings.[8]

Not only does a supply-side strategy risk training workers for jobs that do not exist or creating "skills gaps" that are misaligned with real industry needs, an oversupply of workers relative to demand (i.e., jobs available) tends to strengthen employer leverage, suppress wages, and reduce investment in retention. Policies that expand the demand for workers (relative to supply) tend to strengthen worker bargaining power and support higher wages and other retention strategies by elevating competition between employers. A demand-driven strategy supported by industry-aligned training pathways

[7] "The task is accomplished primarily by harnessing private market forces, by leveraging modest Government expenditures to create a much larger set of private sector investments, and by establishing new public-private partnerships to bring out our best research and our best technologies . . . The energy savings we achieve will lower the cost of doing business in America and make us more competitive on the world market and more prosperous here at home" (Clinton 1993).
"We need to out-innovate, out-educate, and out-build the rest of the world. We have to make America the best place on Earth to do business" (Obama 2011).
[8] See Jones 2023 for a more detailed explanation of how this works.

can deliver both better jobs for workers and more appropriately skilled, stable workforces able to support high-performance industries.

Gordon Lafer's *The Job Training Charade* (2002) critiques the supply focus of US federal job training programs. From the 1960s, as part of broader neoliberal reforms after recessions and high unemployment, policymakers shifted from public job creation to privately managed "training" schemes as a way to avoid addressing systemic economic problems. While myriad examples exist of life-altering training programs for individuals, a policy focus on job training tends to blame economic immobility on workers and their skill gaps instead of on corporate practices, declining labor standards, or economic policy choices.

Under ARRA, green jobs training programs faced significant criticism for training far more workers than there were available jobs, for lacking standardized curricula and clear industry alignment, and for producing minimally qualified workers who struggled to find stable employment (US GAO 2013; Potts 2010). Implementation was chaotic and fractured, and success depended on preexisting relationships and social infrastructure capable of building pathways to employment (Kleinman Center for Energy Policy 2023). The oversupply of trained workers may have also depressed wages, increased job precarity, and resulted in long-term recruitment difficulties in clean energy industries like solar (Jones, Philips, and Zabin 2016).

The Biden administration's climate jobs strategy tilted heavily toward a demand-driven approach, relying on investments with strong labor standards to pull workers into and upward in clean energy–sector employment.

Learning from this, the original Build Back Better proposal included substantial funding for both demand- and supply-side workforce interventions—industrial and infrastructure investments and labor standards to drive demand for skilled workers and workforce education and training funding (Bashay 2021) totaling $35 billion to augment skilled labor supply (Krishnamoorthi 2021). The legislative debates around Build Back Better and the subsequent narrowing of workforce funding in the enacted bills, however, meant that, in practice, the Biden administration's climate jobs strategy tilted heavily toward a demand-driven approach, relying on investments with strong labor standards to pull workers into and upward in clean energy–sector employment. This was a notable departure from previous US federal jobs initiatives.

Without the explicit workforce investments originally envisioned in Build Back Better, DOE and other agencies had to use their program investments to advance workforce goals under their procurement authority, integrating labor standards and workforce development into funding programs. Relative to past efforts, this approach was favored by labor unions representing workers in construction and manufacturing industries, because it tied federal funding to labor standards for the specific funded projects

where the jobs were actually materializing rather than simply producing a surplus of trained workers for the industry writ large.

Beyond providing a more targeted, demand-driven approach to "green job" training, efforts in the Biden administration also sought to correct for a structural problem in clean energy deployment, in that the wages and precarious working conditions, particularly for solar, aligned more with the low-wage service sector than public works or energy sector construction.[9] The Obama approach exacerbated this issue, and without correcting for it, the clean energy transition would continue to erode job quality in the energy sector rather than supporting a bottom-up, middle-out economic transformation.

While the objective was not primarily to transition to a demand-side "green jobs" strategy, it was a useful pivot for addressing core Congressional and administration objectives: to expand higher quality, union jobs in emerging energy sectors, to retain high quality jobs in energy and energy intensive industries, and to ensure that federal investments were delivering to working people.

Agencies were tasked with finding ways to do this within the legislative and legal constraints. Reflecting these objectives and constraints, the Department of Energy's labor provisions under the BIL and the IRA used laws already in the books and the dollars provided to the private sector for infrastructure and supply chain projects. DOE addressed workforce supply concerns within the funded projects through the Community Benefits Plan, which required that employers consider upfront their workforce needs and develop strategies to attract, train, and retain the workers they would need. In a departure from past efforts, it put the onus on employers to ensure workforce continuity rather than relying on the "train-and-pray" model that invests public money in training with the hope that trained workers find their way to gainful employment.

The Transformation of an Agency: Implementation at the Department of Energy

Though not always described as such—obscured for both political and cultural reasons—the US federal government has long pursued a targeted industrial strategy, particularly through federally supported R&D.The primary goal of this industrial strategy has been to maintain military and political dominance through technological supremacy (Weiss 2014). Many quintessential "private sector" innovations such as the Apple iPhone were products of public investment in defense-oriented R&D (Mazzucato 2013). GPS, touchscreen technology, the internet, and voice recognition all originated from US government–funded R&D.

[9] See Harris 2022, Scheiber 2021, Vasudevan 2023, Kaori Gurley 2022.

In the wake of the Vietnam War in the 1970s, an effort to distribute some of the responsibilities for national security to civilian agencies resulted in the creation of the Department of Energy. In addition to managing the country's nuclear weapons arsenal and centralizing planning and regulation of energy distribution, DOE oversaw energy technology R&D.

DOE exercised its R&D mission mainly through a network of 17 national labs. With the exception of the National Energy Technology Laboratory (NETL), the national labs are federally owned and privately operated, a public-private partnership model that has proven exceptionally valuable for American innovation, yielding benefits for national security, private-sector commercialization, and US GDP. This model provides the government with nimble research flexibility, access to private-sector talent, shared accountability, reduced liability, and specialized management of expertise at different labs. For the private sector, it creates a talent pipeline of scientists and engineers, de-risks innovation, licenses lab-developed technologies, and supports commercialization.

Before the Build Back Better agenda and the passage of the BIL, IRA, and CHIPS Act made accelerating commercial deployment an explicit focus of a blue-green (i.e., labor-friendly, climate-oriented) industrial strategy, supporting commercial uses for defense-oriented R&D was largely an instrumental objective. R&D conducted through public-private partnerships sustained the transformative technological advances required for military dominance (Weiss 2014). Commercialization was necessary to enlist and maintain partnerships with corporate America, whose talent and capabilities are essential for maintaining an innovation edge. For similar reasons, the federal government has not usually required or received any direct financial return on products developed with federally funded R&D and, until a 2021 DOE licensing policy change, did not require that these technologies be manufactured or produced in the US (GAO 2024).

The operational approach to US industrial strategy helped solidify the enduring narrative that America's business-friendly, free-market environment—rather than intentional government action—was the primary driver of the nation's technology-driven prosperity. Channeling innovation through the private sector both relied upon and reinforced the national myth of private-sector supremacy. Obscuring the federal government's central role in technology development and commercialization was often politically expedient: It made industrial policy more palatable in a country suspicious of state intervention. But the very act of hiding government leadership created a self-reinforcing cycle. The more the government's role is concealed, the more the public perceives the government as incapable of driving industrial renewal. This dynamic weakens recognition of federal contributions, leaving voters skeptical of government solutions.

This cycle likely contributed to the underappreciation of the Biden administration's role in catalyzing unprecedented private investment in clean energy and manufacturing. That lack of recognition, in turn, eroded political support for (or even common knowledge of) the Inflation Reduction Act and factored into the setbacks of the 2024 general election. In short, by relying on a model that channeled federal ambition through private-sector action while downplaying the state's role, US industrial policy both achieved remarkable results and undermined the political durability of its own success.

What an innovation-focused industrial strategy failed to anticipate, and was insufficient to address, was the continued evolution and stability of US-based high-tech manufacturing and supply chains. This oversight resulted in offshoring production and the resulting failure of the US to benefit from the feedback loop between domestic production and innovation. Furthermore, there were no means to counteract the national and economic security–related threats from growing supply-chain vulnerabilities, which came into stark relief during the COVID-19 pandemic.

By relying on a model that channeled federal ambition through private-sector action while downplaying the state's role, US industrial policy both achieved remarkable results and undermined the political durability of its own success.

The Build Back Better agenda articulated a much more visible US industrial strategy, sufficient to compete with rapid Chinese (and other competitors') expansion in strategic markets, albeit one still deferential to private-sector interests and worker and community outcomes. This strategy elevated the role of the federal government in steering, shaping, and incentivizing private investment toward worker-friendly green industrial development. Commercialization and domestic deployment were central—not only because they engaged private-sector ambition but also because full-scale commercial deployment, by producing desirable and affordable technologies for mass markets, was the means to scale emissions-reducing technologies and confront the climate crisis. By prioritizing domestic production and deployment of advanced technologies, the strategy advanced US global competitiveness, positioning American firms to capture a larger share of the projected $23 trillion global clean energy market (Granholm 2021). At the same time, targeted federal investments were designed to reinforce supply chain security and tighten the feedback loop between production and innovation, thereby restoring a US edge in technological leadership.

The "industry-led, government-enabled" approach functioned not only as a mantra but as a governing mindset. Both rhetoric and implementation were critical for productively engaging the private sector. Incentives (grants, loan terms, and tax credits) had to be sufficiently generous, and requirements, such as labor and equity conditions, had to be calibrated to private employer interests and remain flexible enough to entice

industry participation.[10] This tension was evident inside program offices, where staff and leadership grappled with the sometimes competing priorities articulated by Secretary Jennifer Granholm: (1) rapid clean energy deployment and emissions reductions, (2) quality job creation, including opportunities for family-sustaining union jobs, (3) justice and equity, (4) domestic manufacturing and supply chain resilience, and (5) robust household and private-sector uptake of clean energy technologies. At times, resistance to DOE's labor standards or other conditions surfaced in the form of company threats to walk away from federal funding, reinforced by calls from senators unwilling to risk losing project investments in their states.

In addition to tensions over funding, workforce planning revealed the limits of industry cooperation. Several DOE offices combined resources to launch the Battery Workforce Initiative, originally envisioned as a model government/industry/labor "tripartite" planning effort to establish national training standards and industry-recognized credentials for an emerging industry—in this case, the rapidly growing US battery sector. The design was meant to harness the complementary expertise of government, educational institutions, manufacturers, and labor unions to forge workforce partnerships. While manufacturers were willing to share perspectives with their competitors, some were uncomfortable being at the same table with labor unions. Private-sector engagement, including factory visits, was critical for determining the knowledge, skills, and abilities required, so while the initiative continued to tap expertise from government, educational institutions, and labor unions, it had to pivot from creating collaborative tripartite planning to the "industry-led, government-enabled" framing. The shift preserved private-sector buy-in, and the multiparty initiative was successful in developing and launching national training standards, but it did not immediately result in the development of additional labor-industry workforce partnerships.

DOE's approach proved that deployment can happen quickly in ways that work for the private sector, workers, and communities. It's difficult work, but it is not inherently slow.

Industrial policy, an intentional effort on the part of government policymakers to change the sectoral structure of the economy, is, in countries such as China, undertaken through centralized government intervention and targeted public investments. Private businesses are passengers rather than drivers in this approach, and the greater good overrides protections for specifically affected workers and communities (Naughton 2021). Advocates for the "abundance agenda" in the US suggest that the government should support industry to deploy quickly without regard for affected workers and communities (Klein and Thompson 2025). DOE's approach proved that deployment can

[10] Jigar Shah (of the Loan Programs Office) and Vanessa Chan (of the Office of Technology Transitions, as well as chief commercialization officer at DOE) were outspoken leaders on the imperative and challenges of private-sector engagement, and many contracting officers and staff charged with negotiating terms confronted these challenges daily.

happen quickly in ways that work for the private sector, workers, and communities. It's difficult work, but it is not inherently slow.

While balancing these interests required hard work and innovative processes, it did not prevent DOE from committing over $170 billion for grants and loans funded by the BIL and the IRA, releasing 100 percent of the funding opportunities, and committing funds across 99 percent of them—including in many newly authorized programs and managed by newly established offices—in two years (US DOE 2025b).

DOE Strategic Realignment

With the passage of the BIL, Congress appropriated nearly $76 billion for energy- and minerals-related research, demonstration, technology deployment, and incentives (Infrastructure Investment and Jobs Act of 2021). Roughly $62 billion of that was administered by DOE and directed toward energy infrastructure, clean energy deployment, demonstrations, manufacturing, and related programs. The IRA contributed another $35 billion, bringing the total to $97 billion, plus over $350 billion in new loan authority. With this funding, DOE launched 60 new programs, including 16 demonstration programs and 32 deployment programs, while expanding funding for 12 existing research, development, demonstration, and deployment (RDD&D) programs (see Table 1).

Table 1.

DOE Office	Combined BIL + IRA Funding	Programs & Purpose	Awards (as of January 2025)
Loan Programs Office (LPO) (GAO 2025)	$350B+ (loan authority)	• advanced nuclear, renewable energy, and energy efficiency projects • advanced technology vehicles manufacturing (ATVM), • tribal energy • new and retrofits of new and existing energy infrastructure • advanced fossil energy	53 (totaling ~$108B) (US DOE 2025a)
Office of Clean Energy Demonstrations (OCED) (GAO 2025)	$27B	• advanced nuclear • carbon management • hydrogen hubs • industrial decarbonization • renewables • grid demonstrations	113 (US DOE 2024b)

Office of Manufacturing and Energy Supply Chains (MESC) (US DOE 2024b; Jennings 2024)	$20B	• manufacturing- and supply-chain focused programs, including battery-materials and processing grants, industrial efficiency initiatives, and auto manufacturing conversion	375 (US DOE n.d.g)
Grid Deployment Office (GDO) (US DOE n.d.d)	$22B	• modernize and support resiliency of the electric grid	1121 (US DOE 2024i)
Office of State and Community Energy Programs (SCEP) (US DOE n.d.h)	$12.8B	• Weatherization Assistance Program • State Energy Program • EECBG • home energy rebates • Community Energy Programs • technical assistance	Hundreds (US DOE n.d.h)

This funding expanded DOE's mandate beyond its R&D and nuclear security functions to a more explicit focus on commercialization and deployment. To get to successful deployment, an innovation must navigate both technical and nontechnical adoption barriers. With DOE's expanded role, the agency expanded funding and strategic resources beyond research and development to commercial demonstration and deployment. This involved focusing not only on the technological readiness of an innovation but also on the adoption readiness, both of which are essential for maturation and commercial liftoff. The Office of Technology Transitions outlined this process in a diagram recreated in Figure 1 (US DOE 2024a). It also published 15 "liftoff reports," road maps on what it would take for the technologies to be economically viable and deployed at scale (Deploy24 2024).

Through an industry-led, government-enabled strategy, DOE's role expanded to support technologies across the entire innovation pipeline, from basic science, early-stage R&D (bottom left corner of diagram in Figure 1), and pilot demonstrations (upper left and lower right squares) to full-scale demonstrations (light magenta squares) and commercial deployment (upper right square). It's not that DOE's focal point shifted away from innovation and national security—it's that the agency donned progressive lenses, focusing also on a larger civilian role that included support across several adoption readiness categories. These included value proposition (delivered cost, ease of use, and functional performance), market acceptance (demand maturity, market size, and downstream value chain), resource maturity (supply chain, material sourcing, workforce, permitting, and project development), and license to operate (regulatory and policy environment, environment and safety, and social acceptance). DOE funding opportunities and conditions sought to address not only technology readiness but also adoption readiness.

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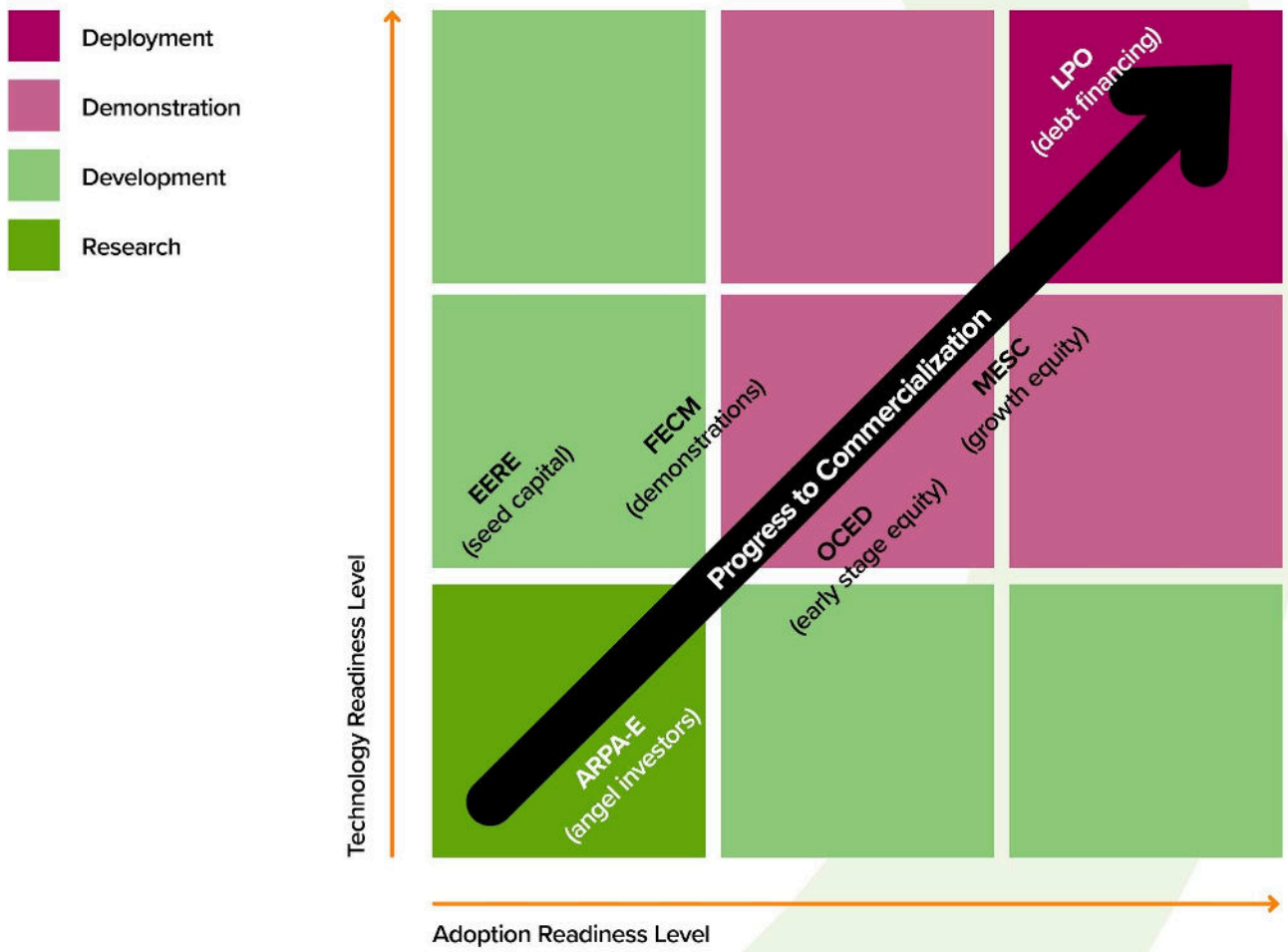
Figure 1.

From Research to Deployment: Steps to Commercialization

ARPA-E	Advanced Research Projects Agency–Energy
EERE	Office of Energy Efficiency and Renewable Energy
FECM	Office of Fossil Energy and Carbon Management
OCED	Office of Clean Energy Demonstrations
MESC	Office of Manufacturing and Energy Supply Chains
LPO	Loan Programs Office



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Source: US Department of Energy

This required deeper engagement with the business community to accelerate and scale commercial deployment, as well as with local government, labor, community groups, tribes, etc. to guide private-sector activity toward more effective deployment, shared prosperity, and broad social acceptance. In this way, the agency expanded its "client base" from scientists, business, universities, and the military industrial complex to a far broader range of energy and supply-chain businesses and civil society (Wilson 1989, 76–8). A new, much broader focus and the inclusion of a range of previously marginalized stakeholders created new tensions Secretary Granholm's DOE had to manage.

The tensions arose because much of the funding from the BIL and the IRA was distributed through loan and competitive grant programs, with direct benefits flowing mainly to relatively few corporations. Yet the coalition responsible for pushing the legislation through Congress included labor, environmental, and other civil society organizations. For both practical and political reasons, the administration sought to be responsive to these groups: practically, because broad stakeholder input produces stronger, more durable projects; politically, because sustaining a climate industrial strategy requires the continued alignment of these diverse constituencies. Achieving a tipping point in climate politics—where the climate enablers outweigh the blockers—depends on this balance.[11]

Corporate capture[12] was lessened, though not entirely avoided. Opposing pressures of business and civil society kept DOE firmly on track with Biden administration policy and expediency priorities. The tug-of-war maintained balance. On one end, DOE program offices—responsible for designing programs, selecting awardees, and negotiating contracts—internalized the needs, constraints, and interests of their business clients. On the other end, dedicated staff offices played a crucial role in counterbalancing this pull, advancing smaller-scale programming and internal advocacy on behalf of energy justice, tribal nations, and labor stakeholders. The result was a hybrid approach: generous grants and favorable loan terms that reflected business imperatives with conditions to address community and worker priorities. This wider engagement didn't make projects politically bulletproof against the Trump fusillade, but it did make them far less likely to fail for preventable reasons.

[11] See Hacker and Pierson 2019 for a discussion on crafting positive policy feedback and Meckling and Goedeking 2023 and Mildenberger 2020 for a discussion of climate politics and how to overcome the gridlock.

[12] "Corporate capture" is a term used to describe situations where large corporations exert outsized influence over public institutions, policymaking, and regulatory processes—often to the detriment of the public interest.

Reorganizing DOE Personnel

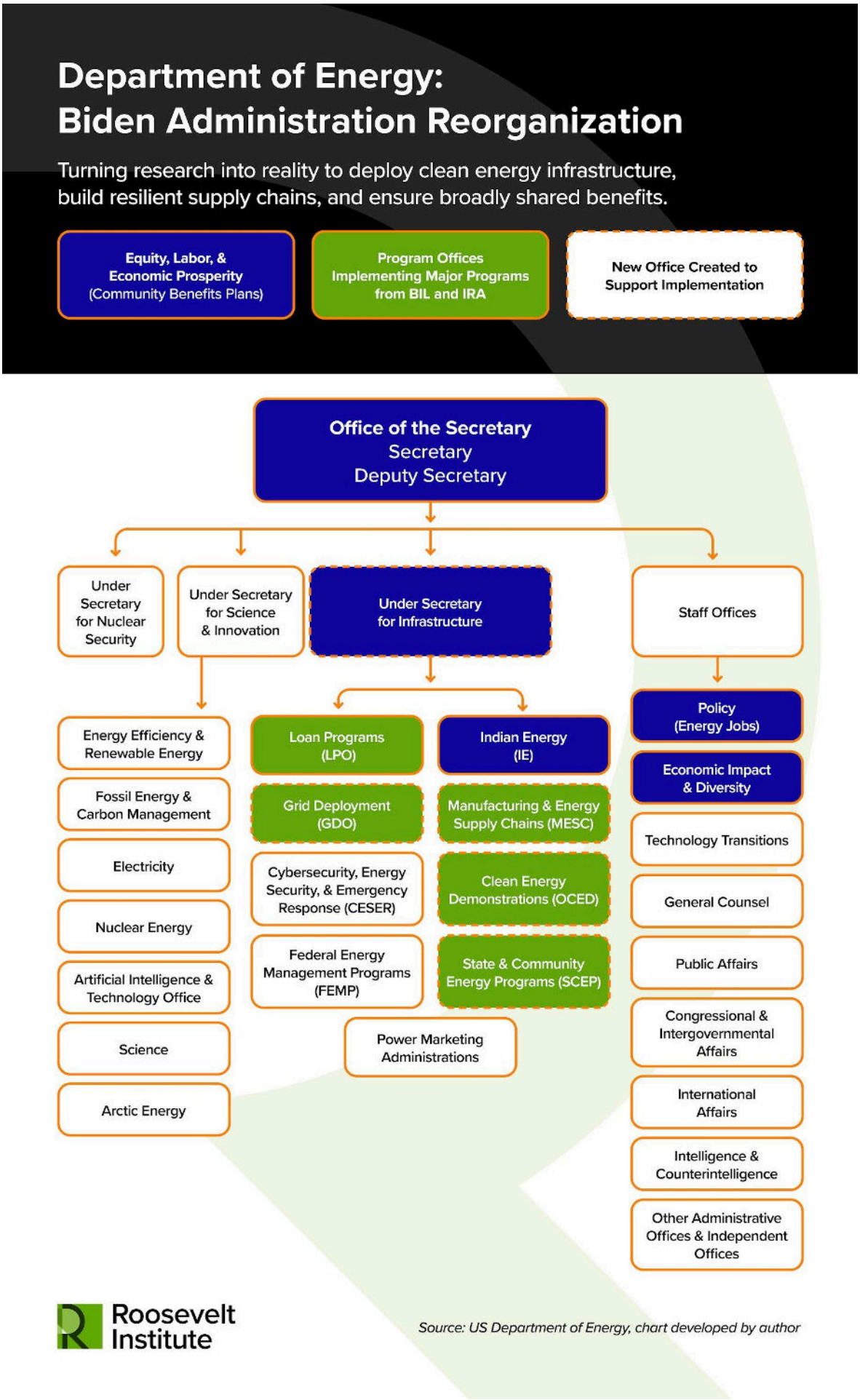
To manage this historic infusion of funds, DOE set up an employment portal to hire up to 1,000 new permanent federal employees to supplement the base 13,000-person staff (Ferris 2022). In addition, DOE underwent a strategic restructuring to support deployment (see Figure 2). DOE previously had three undersecretaries—one for nuclear security; one for energy, who oversaw policy, applied programs, and technology; and one for science, who oversaw basic research and scientific discovery. Under the reorganization, DOE maintained nuclear security, merged energy and science to create a new undersecretary for science and innovation, and created a new undersecretary for infrastructure focused on full-scale deployment and commercialization.

New program offices were also created. In addition to the Office of Clean Energy Demonstrations (OCED) established by Congress in the BIL, DOE set up several new offices to support infrastructure deployment: the Grid Deployment Office to modernize and upgrade the nation's electric transmission lines, the State and Community Energy Program to deploy state and local programs, and the Office of Manufacturing and Energy Supply Chains to establish resilient, domestic clean energy supply chains.[13]

The appropriated funds to DOE from the BIL and the IRA transformed the agency into something more akin to a public-sector start-up than an aging bureaucracy; it was lean, adaptive, and mission-driven. Nearly $100 billion in new grant funding marked a historic pivot from DOE's long-standing identity as a science and innovation agency—anchored by 17 national labs (US DOE n.d.f) and more than 100 active defense (Defense Nuclear Facilities Safety Board n.d.) and legacy nuclear sites (US DOE n.d.e)—to a deployment-driven organization charged with jump-starting socially responsible clean energy infrastructure and domestic supply chain investments, many of them in communities with limited federal presence. The influx in funding and shift in focus gave the agency an unusual degree of operational agility, allowing it to recruit for a broader range of skills and expertise, to expand engagement with local communities, tribes, labor, small businesses, and local governments, and to intentionally embed positive social outcomes into its investments.

[13] Mitch Landrieu, White House senior advisor and infrastructure implementation coordinator, tied the DOE reorg directly to the president's policy agenda: "The Bipartisan Infrastructure Law is an opportunity to deliver on President Biden's commitments on climate, environmental justice, and creating opportunities for good-paying union jobs in clean energy. That's why this [DOE] realignment makes sense right now as we implement this once-in-a-generation investment" (US DOE 2022b).

Figure 2.


Department of Energy:
Biden Administration Reorganization
Turning research into reality to deploy clean energy infrastructure, build resilient supply chains, and ensure broadly shared benefits.
Equity, Labor, & Economic Prosperity (Community Benefits Plans)
Program Offices Implementing Major Programs from BIL and IRA
New Office Created to Support Implementation
Office of the Secretary
Secretary
Deputy Secretary
Under Secretary for Nuclear Security
Under Secretary for Science & Innovation
Under Secretary for Infrastructure
Staff Offices
Energy Efficiency & Renewable Energy
Fossil Energy & Carbon Management
Electricity
Nuclear Energy
Artificial Intelligence & Technology Office
Science
Arctic Energy
Loan Programs (LPO)
Grid Deployment (GDO)
Cybersecurity, Energy Security, & Emergency Response (CESER)
Federal Energy Management Programs (FEMP)
Indian Energy (IE)
Manufacturing & Energy Supply Chains (MESC)
Clean Energy Demonstrations (OCED)
State & Community Energy Programs (SCEP)
Power Marketing Administrations
Policy (Energy Jobs)
Economic Impact & Diversity
Technology Transitions
General Counsel
Public Affairs
Congressional & Intergovernmental Affairs
International Affairs
Intelligence & Counterintelligence
Other Administrative Offices & Independent Offices
Roosevelt Institute
Source: US Department of Energy, chart developed by author

Agencies have their own cultures, which are reinforced by the recruitment and retention of their staff—their personalities, skills, and values. For DOE to pivot to achieve additional goals like quality jobs and environmental justice, the culture needed to shift, hiring not only for private-sector and deployment-oriented skills but also mission-aligned values and ambitious,"can-do" personalities.[14] DOE set out to recruit leaders who did not imagine themselves working in government—people who had assumed federal agencies were too slow-moving and bureaucratic to appreciate and utilize their entrepreneurial talents.[15] DOE also looked for people who were good team players, cooperative, and able to put their own egos aside. The direction from DOE's leadership was to move quickly without sacrificing quality, and quality included incorporation of equity and labor priorities.

Steering DOE in a New Direction: Community Benefits Plans

But it wasn't only about getting the right people on the bus and growing the fleet; in fact, relatively few positions were created in the program offices to advance social and economic policy priorities. So, in addition to the structural realignment and hiring, Secretary Granholm established a working group with the agency's senior leaders to advance the administration's equity, labor, and place-based economic development goals. This group, called Equity, Labor, and Economic Prosperity, was cochaired by the secretary's senior advisors for place-based economic development, equity and justice, tribal energy, and labor and coordinated with all of the BIL program implementing offices. The marquee effort of this group was the Community Benefits Plan (CBP) framework, which required that 20 percent of the points used to score proposals would be based on voluntary commitments to community and labor engagement, job quality, Justice40, and diversity, equity, inclusion, and accessibility (DEIA). In addition to this metric for grants, Community Benefits Plans would be required for all LPO loans.

The CBP framework (see Figure 3) was an effort to adopt a uniform implementable standard across more than 80 funding programs, while maintaining flexibility for funding recipients to respond to priorities in ways that suited their projects and business models.

Whereas the White House had maintained different silos for advancing the Justice40 Initiative through the Council on Environmental Quality, labor standards through the National Economic Council, and workforce development through the Domestic Policy Council, DOE—charged by Congress to leverage spending to drive social justice outcomes—brought these efforts under a single umbrella. There were several reasons for this unified approach.

[14] For broader discussion on federal hiring strategy, see Tucker and Nayak 2020.
[15] See Jigar Shah interview on *Watt It Takes* (Shah 2025) and Vanessa Chan interview on *Volts* (Chan 2024).

First, the underlying goals of racial and economic equity are interrelated and therefore should be pursued under a common strategy. Addressing job quality with strong labor standards could perpetuate existing patterns of occupational segregation if better-paying, more stable employment opportunities were accessible only to already well-represented populations. As energy sector jobs were expanding rapidly, meeting employer demand would require drawing workers from a wider range of backgrounds. In other words, DEIA initiatives were neither feel-good exercises nor unlawful quotas but rather essential strategies to develop and recruit enough skilled workers.

Second, DOE staff recognized that opposition, whether from a local community coalition or group of labor unions, could slow or stall implementation. The way to address this is to proactively create an accountability plan for local engagement and responsiveness to community needs and priorities. Third, the clear policy direction was to ensure the climate industrial strategy led to broadly shared economic benefits. The majority of funds would be awarded to private-sector, for-profit entities, which was in line with commercialization goals, but it was necessary to ensure these grants and loans were investments in bottom-up, middle-out economic transformation. CBPs were a way to address all three goals.

DEIA initiatives were neither feel-good exercises nor unlawful quotas but rather essential strategies to develop and recruit enough skilled workers.

There were also practical reasons for integrated CBPs. DOE was undergoing a historic transition from an R&D and nuclear security organization to an organization focused on clean energy commercialization and deployment. While parts of DOE had deep experience designing and administering funding programs, they had been focused on science and innovation. Expanding the merit criteria used to evaluate funding proposals to include social considerations was a significant departure from past practices but viewed as a key enabler of effective implementation. Formally and specifically including these criteria, and assigning points to social considerations, clearly positioned these criteria alongside the more traditional technical merits of a proposal that are important for project success: financing, customers, team qualifications, market potential, technology impact, etc. Additionally, by linking the jobs and justice considerations under the CBP, they could collectively amount to 20 percent of a proposal's total score, encouraging more holistic solutions rather than pitting these two priorities against each other.

Figure 3.

Four Pillars of Community Benefit Plans

- Meaningful engagement with community and labor partners leading to formal agreements with accountability to affected stakeholders
- Quality jobs to attract and retain skilled workers and ensure workers have a voice on the job over decisions that affect them
- Equitable access to wealth-building opportunities (teaming, access to quality jobs, business and contracting opportunities, etc.)
- At least 40% of overall benefits of certain federal investments flow to disadvantaged communities

Roosevelt Institute

Source: US Department of Energy

Community Benefits Plans were intentionally flexible to generate the best approaches from applicants and their partners. In most cases, CBPs comprised 20 percent of a proposal's score, which was split into four equally weighted intersecting sections that work together to ensure project success, the efficient and effective use of taxpayer funds, timely implementation of projects, and the acceleration of private-sector uptake in projects funded by BIL and IRA (US DOE n.d.a).

DOE provided numerous webinars and guidance documents to help applicants craft strong CBPs.[16] It also provided a template for applicants to develop CBPs.[17] The template included many sample commitments that demonstrated the kinds of proactive labor and community engagement planning and practices that could result in strong local support and smooth project implementation, including free and fair opportunities for workers to organize and engage in collective bargaining, wages and benefits pegged to 75th percentile, workforce training partnerships, and health and safety plans. It specifically sought to create proposals that expand good jobs through explicit strategies and actions designed to foster safe and healthy work environments, reduce the risk of work slowdowns or stoppages, ensure the efficient and effective use of taxpayer funds, and attract, train, and retain a skilled, diverse workforce.

Implementation of the Good Jobs Agenda: Navigating Legal and Practical Constraints

By explicitly framing the clean energy transition as good for working families and an opportunity to drive union job creation, the Biden administration sought to move beyond the wedge politics and decades-old "environment versus jobs" debate, deliberately changing the narrative of climate action from sacrifice to opportunity. President Biden, Secretary Granholm, and others in the administration consistently linked climate and clean energy to the growth of union jobs: "When I hear 'climate,' I think 'jobs'—good-paying union jobs" (Biden 2021).

But saying it doesn't make it so. In the implementation phase, DOE had to push the president's vision through the prism of constraints—legal, resource, cultural, staffing—splitting the laser focus into a colorful array of tactics and actions, which included doubling down on compliance and enforcement of requirements, conditioning public funding on strong voluntary commitments to good jobs, and providing generous tax incentives to entice compliance with union-pattern pay and training standards.

Unlike the closest historic analogue—the New Deal, which included the government directly hiring millions of workers—Biden's blueprint depended almost exclusively on

[16] See US DOE 2024d, US DOE 2024e, US DOE 2024f, US DOE 2024, US DOE 2024h, US DOE 2022a, US DOE n.d.a, US DOE n.d.b; US DOE n.d.c; US DOE 2023.
[17] The template can be downloaded here: US DOE 2024c.

private investors and employers being willing to start and expand new businesses and create jobs. And the legal authority to support the growth of union jobs was limited and based on nearly century-old laws, whose powers have been eroded by the courts.

The Davis-Bacon Act (DBA) of 1931 established wage floors for federally supported construction activity, which does not guarantee union jobs but rather levels the playing field so that skilled union workers who command higher wages are able to effectively compete against nonunion workers (Davis-Bacon Act of 1931). In this way, DBA helps stabilize and retain a skilled workforce in a volatile industry of inherently temporary and geographically dispersed projects.

The National Labor Relations Act (NRLA) of 1935 is a powerful law that protects workers' rights to organize, form unions, and bargain collectively as well as defines and prohibits unfair labor practices of employers (National Labor Relations Act of 1935).[18] The NRLA makes clear that the policy of the US government is to encourage collective bargaining and protect workers' rights to organize, but whether jobs are unionized is not up to the federal government or employers but rather a majority of workers.

The Procurement Act of 1949 gives the executive branch wide discretion to adopt labor standards to protect the government's operational or financial interests when it is spending its own money, but agencies cannot adopt labor standards as broad labor or social policy (Federal Property and Administrative Services Act of 1949). A Supreme Court decision on a case known as Boston Harbor (1993) distinguished between the government acting as a regulator and as a proprietary market participant (*Building & Constr. Trades Council v. Associated Builders & Contractors of MA/RI, Inc.* 1993). When an agency is a market participant in procuring services or investing in projects, the agency is allowed to adopt labor standards that protect its specific proprietary interests.[19] Even as a market participant, agencies cannot dictate that the jobs be union jobs or that firms commit to collective bargaining agreements; they can only set the conditions to protect their interests, reduce risks, and increase likelihood of successful implementation.

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[18] "It is declared to be the policy of the United States to eliminate the causes of certain substantial obstructions to the free flow of commerce and to mitigate and eliminate these obstructions when they have occurred by encouraging the practice and procedure of collective bargaining and by protecting the exercise by workers of full freedom of association, self-organization, and designation of representatives of their own choosing" (National Labor Relations Act of 1935).

[19] Agency authority is increasingly being questioned (and limited) in the courts through the "major questions" doctrine, which states that Congress should clearly authorize agencies to exercise their powers on questions of "vast economic or political significance" and that courts should not defer to agency interpretation. In *West Virginia v. EPA*, the US Supreme Court relied on the "major questions" doctrine in deciding that the Environmental Protection Agency was not given Congressional authority to cap emissions (*West Virginia v. EPA* 2022). The Fifth Circuit Court of Appeals used the "major questions" doctrine to limit procurement authority when it upheld a lower court's decision to disallow Biden administration COVID-19 vaccine mandates for the employees of federal contractors (Weiss 2022).

When an agency acts as a market participant, it is not acting as a regulator and cannot establish labor standards that apply uniformly across programs, or even across projects. Every labor requirement has to reflect a case-by-case evaluation of the project specifics. When the project specifics merit increased requirements, project proponents may then resist, arguing they are being singled out to adhere to more stringent conditions.

The DBA, the NRLA, and the Procurement Act offer advantages to both industry and the broader economy. The DBA stabilizes the construction industry made volatile by the temporary and intermittent nature of construction projects. The NRLA reduces obstructions to the free flow of commerce, reduces labor disputes, and increases the purchasing power of wage earners. The Procurement Act allows agencies to mitigate risks of labor shortages, workplace health and safety incidents, inadequate training, labor strife, and community opposition—all of which could delay or derail projects whose timely implementation is instrumental for accomplishing the multifaceted goals of legislation being implemented. The Biden administration used these economic justifications, as well as evidence from state and local initiatives and private-sector validation, as it sought to pull every available lever to empower workers, level the playing field with employers, and support labor union expansion.

Implementing the president's blueprint relied on the successful, rapid, and simultaneous deployment of thousands of private-sector projects. Without a concerted labor and workforce strategy that engaged the labor and its training apparatus, projects could fail. If enough failed, the whole plan could crumble. On the flip side, if the labor standards and conditions were too onerous, the administration could fail to engage the private sector at the scale needed, and the whole plan could crumble. The challenge was to make upfront workforce planning, labor and community partnerships, collective bargaining, and high-road business models the path of least resistance for private investors and employers, leading to "no regrets" business decisions that supported rapid implementation.

Operationalizing the Good Jobs Agenda Within DOE

The Office of Energy Jobs (OEJ) was set up to centralize labor and jobs policy expertise and serve the entire agency. Specifically, OEJ was charged with five tasks: (1) publish the annual US Energy and Employment Report, (2) facilitate productive labor engagement across DOE, (3) develop labor standards to ensure DOE's funding supported the administration's Good Jobs agenda, (4) build agency capacity to support job quality, and (5) coordinate the 21st Century Workforce Advisory Board, as directed by the BIL. OEJ was housed in the Office of Policy. In addition to several political positions, the office was allocated several senior and mid-level staff positions to account for the specialized expertise required. The OEJ also recruited fellows through several fellowship programs designed for entry-level to senior-level individuals to support intersecting pillars of

work: (1) Research and Analysis, (2) Stakeholder Engagement, (3) Labor Standards, (4) Workforce Strategy, and (5) Just Transition.

As part of the task of building agency capacity, OEJ engaged program office directors and coordinated with the staff and contractors housed in DOE's various program and staff offices working on good jobs, workforce development, and stakeholder engagement. In addition, DOE and DOL signed an MOU in early 2022 to facilitate coordination and cross-agency consultation (US DOE and US DOL 2022).

If day-to-day practices, processes, and rituals perpetuate organizational culture, shifting the DOE culture required not only hiring good jobs experts but weaving job quality and job access priorities deep into the bureaucratic fabric. Working closely with legal counsel, procurement experts, and program offices, OEJ had to develop and socialize simple, uniform, and turnkey guidance and processes that enabled the thousands of staff and contractors moving projects forward to advance the good jobs goals. This required continuous training and baking certain steps into the institutionalized processes:

- designing CBP templates and training materials (US DOE 2024; US DOE n.d.a)
- reviewing, scoring, and negotiating CBPs (US DOE 2024j)
- developing reporting processes and templates to track outcomes (US DOE n.d.i)
- requiring workforce continuity plans to ensure adequate upfront investments in workforce development to support both construction and manufacturing (US DOE n.d.j; US DOE n.d.k)

In addition, key initiatives complemented these efforts:

- revamping and centralizing DBA compliance
- ensuring DOE leaders met with workers, apprentices, and union leaders while traveling
- inventorying, categorizing, and identifying gaps in 10 years of DOE workforce investments (US DOE 2024k)
- piloting new approaches to workforce development (NETL n.d.)
- coordinating a new federal advisory committee to develop an agency-wide strategy for a 21st-century energy workforce (Ahmed et al. 2024)

Despite these efforts, the process of changing organizational culture took time and effort. The findings of Stanley Rothman and S. Robert Lichter, based on interviews with

senior career administrators in the late 1970s, remain strikingly relevant nearly 50 years later. As James Q. Wilson summarized in *Bureaucracy*, Rothman and Lichter found that administrators tend to hold socially liberal views (support for abortion rights, concern for the environment) while remaining broadly comfortable with markets and skeptical of regulation: "The great majority believed that private enterprise is fair to workers and that less regulation of business would be good for the country" (Wilson 1989, 42). This outlook, not unique to government bureaucrats, was nevertheless perpetuated by the long partnerships of many DOE offices with industry.

Within an organization that had long worked most closely with industry and had recently recruited staff from finance and tech sectors to support project due diligence, many had internalized common corporate viewpoints. Labor considerations were acknowledged as politically salient but often treated as marginal to DOE's "real" mission of deployment and emissions reductions. Efforts to engage staff on the importance of job quality and equitable access as part of the solution to workforce shortages found some traction—by tapping into concerns about supply-chain bottlenecks—but the instinctive response was often the traditional one: that more training programs (not job quality improvements) were the answer to labor shortages.

As more staff and contractors with implementation experience were hired, pockets of support emerged. Within a couple of years, staff and contractors across DOE's offices came to understand and appreciate how the conditions supported strong projects, and they participated in good faith in developing projects that had meaningful labor-related commitments. This is important for labor and civil society stakeholders to understand: Policy victories are important, but personnel strategy, agency structure, and internal education and advocacy ultimately determine whether implementation checks the necessary boxes or advances the policy agenda.

DOE's success was measured by whether it spurred and accelerated private-sector action. To do that, it needed hundreds of companies with strong projects (which included labor and workforce commitments) to participate in grants and loans. Under pressure to get deals done, some DOE staff may have viewed labor standards as adding yet more friction to award negotiations, and sometimes these criteria were not pursued as fully as they could have been. Legal constraints further limited what DOE could require.

Still, within these cultural and statutory limits, DOE used education, persuasion, and incentives that encouraged enhanced job quality commitments and labor agreements from many funding recipients. Many companies rose to the challenge, showing curiosity and openness to labor partnerships they had previously been warned to avoid. This was a meaningful achievement under difficult circumstances. Crucially, this experience demonstrated that job quality need not be treated as extraneous to industrial strategy; with the right tools, it could be woven directly into the fabric of

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clean energy deployment. The next paper in this series will detail the results and early outcomes from this experiment.

Conclusion

The Biden administration's eight-year strategy for a blue-green industrial transformation was cut short, and the outlook for announced investments is increasingly uncertain. Recent changes to the Inflation Reduction Act under the 2025 budget reconciliation bill, along with new tariffs, are shifting the financial calculus for many clean energy projects. Meanwhile, signals from the Trump administration's DOE suggest a rollback of implementation: Plans to renegotiate or cancel awards and a memo that Community Benefits Plans (CBPs) won't be enforced raise serious questions about the translation of Biden-era commitments into actual outcomes for workers. Companies that have secured grants or closed loans now face a period of limbo while DOE reevaluates selections. This uncertainty has paused work on the ground and put both projects and the communities and workers they were meant to benefit at risk.

Crucially, this experience demonstrated that job quality need not be treated as extraneous to industrial strategy; with the right tools, it could be woven directly into the fabric of clean energy deployment.

When evaluating outcomes, it's also important to account for challenges and trends that predated the Biden presidency. The NLRA has been weakened by court rulings, and the legislative solution—the Protecting the Right to Organize (PRO) Act, first introduced in 2019 and twice passed by the House of Representatives—has remained stalled. The Biden agenda could have been transformative, even if the data reflect a slowing, rather than a full reversal, of long-standing trends. For example, the number of union members grew from 2020 to 2023, even as union density has declined due to even greater overall job growth (US DOL 2025). The IRA stimulated unprecedented investment in US manufacturing, but US manufacturing jobs continue to fall due to greater automation and higher productivity (Elrod 2024). Job quality in key sectors, like manufacturing, remains lower than it was decades ago (Jacobs et al. 2016; Ruckelshaus and Leberstein 2014), and even as incomes grew for low-wage earners, income inequality continues to increase (Elrod 2024).

Lingering Unknowns

Beyond political reversals, key uncertainties remain about the policy innovations themselves—what worked, under what conditions, and what lessons should be carried forward?

- **Unionization Trends:** The DOE's 2024 *US Energy and Employment Report* tracked rising unionization rates in clean energy. However, the paper notes that the increase is driven largely by utility-scale solar in union-stronghold states and expansion in the already heavily unionized utility industry. What effects did the president and cabinet's prioritization and bully pulpit have in the industry?
- **Demographic Trends:** Did any of the Biden policy interventions broaden the employment pipelines to grow and expand the available workforce for the sector? If so, in what occupations and industries, and what stimulated the shift?
- **Durability of CBPs:** If the new administration does not enforce CBP commitments post-award, will project developers maintain their promises voluntarily? Which commitments—such as community engagement, workforce pipelines, or local hiring—are self-sustaining because they are built into implementation logic?
- **Manufacturing Labor Conditions:** Are energy manufacturers adopting high-road practices (e.g., neutrality agreements, robust benefits, worker voice in health and safety) voluntarily? What mechanisms or pressures (e.g., investor expectations, supply chain standards, state-level policy) are driving those decisions?
- **Geographic Variation:** How do labor and community standards play out in right-to-work states vs. union-friendly states? What role does local labor market infrastructure (e.g., apprenticeship programs, labor-community coalitions) play in shaping outcomes?
- **Investor Perspective:** Do private investors view strong CBPs and labor performance as a risk—introducing potential delays or costs—or as a value proposition that strengthens project delivery and community support?

Bigger picture, in the context of current debates around the so-called abundance agenda, the key questions are:

- **Funding Conditions:** How does community and worker engagement lead to better, more streamlined implementation? When does increased engagement create friction, elevate everyone's voice as a potential veto, and/or lead to gridlock?

- **Role of Government in Policy Implementation:** What other government levers are effective in streamlining high-quality, high-impact, socially-responsible private-sector implementation? What could be accomplished through direct government investment and intervention rather than relying on the private sector? What are the highest-impact, most visible opportunities to demonstrate federal government competence in solving large societal issues?

Successes

After decades of policy setbacks, a government-led, labor- and equity-centered, incentive-oriented approach finally broke through gridlock on the climate crisis. A broad coalition of labor, equity, environmental, and clean energy advocates pushed for what became the most consequential climate legislation in the world, bringing the US within striking distance of its Paris Agreement commitment: reducing emissions 50 percent below peak levels by 2035 (Bistline et al. 2023). These reductions would not be achieved through regulation or carbon pricing but through generous incentives that stimulated and scaled private sector activity—building energy infrastructure, commercializing technology, and onshoring clean energy supply chains. These investments would ensure that the future energy system would be clean, resilient, secure, and affordable. Additionally, they would position the United States as a global competitor for a large share of the growing market for clean energy so that it would reap long-term economic and employment returns from its initial investments.

Key legislative milestones include the Bipartisan Infrastructure Law (BIL) and CHIPS and Science Act, both bipartisan, and the Inflation Reduction Act (IRA), passed with a simple majority and tiebreaking vote of Vice President Harris through budget reconciliation. DOE referred to this trio as the backbone, the brain, and the lungs of US climate action (Bistline et al. 2023). The majority of federal support for the climate-related provisions came through the tax code, but, for the first time, these laws conditioned tax credits on labor standards to improve job quality, stabilize training in construction, and ensure that workers benefited directly from investments. DOE also embedded labor and equity provisions in its grant and loan programs. Despite passing no significant new legislation to advance labor and equity goals, the federal government effectively used executive orders and existing authorities to steer investments to support the president's bottom-up, middle-out economic and climate agendas.

While this approach carried its own operational tensions, the tensions did not gridlock progress. DOE underwent a strategic reorganization, hired over one thousand staff, designed funding opportunities, reviewed and selected proposals, and negotiated funding agreements for 75 new programs, sending billions of dollars into communities all across the United States. It established an agency-wide approach to ensure the benefits of investments would be shared with workers and communities long left behind. It expanded its clientele through intensive and authentic engagement to serve

businesses, local governments, labor unions, tribes, and community groups. The agency hoped for more time but planned for durability in the face of political upheaval.

Leadership, staffing, and structure were critical to these successes. DOE's transformation offers a blueprint for implementing incentive-based green industrial policy coupled with a good jobs agenda. Yet even exemplary implementation could not fully insulate the administration from political vulnerabilities or maintain support for its key provisions.

Lessons

Several lessons for future policymakers and climate advocates that crystallized in the Biden administration and 2024 election are worth incorporating into future climate strategy.

1) **Industrial policy and infrastructure policy have been powerful climate tools.** Even when combating climate change wasn't the stated policy objective, these measures have driven the largest investments and emission reductions.

2) **Technology policy that stretches from R&D through deployment continues to be essential for reducing emissions.** Once a clean energy technology matures, it will be evaluated in the market on its energy and economic merits (i.e., cost, speed of construction, flexibility, etc.). But getting a technology ready both for technological and operational deployment will be essential.

3) **Opportunity rather than sacrifice has been the most powerful climate lever.** Fiscal policy spurred clean energy innovation, diffusion, and investment, all while promoting economic growth and full employment.

4) **Labor is an essential ally for climate-beneficial policy.** Labor- and equity-centered policies are critical to building the political support and real-world economic momentum needed for strong climate action. Even market-based solutions depend on strong policy signals. In the 2025 budget reconciliation process, in which key clean energy provisions of the IRA were gutted or amended as to be obsolete, labor unions rallied bipartisan support for the prevailing wage and apprenticeship incentives. The oil and gas industry understands the strength of a political alliance with organized labor, and the sooner the clean energy industry matures in its political strategy and partnerships, the better for the economy and the climate.

5) **More collaborative and tripartite workforce planning is needed, coupled with investments for industry-labor training partnerships and on-the-job training.** Policies that drive the demand for skilled workers are valuable for improving job quality via increased competition for workers, but coordinated planning and

training is necessary to build and expand new high-road industries as well as inclusive access to jobs.

Several lessons from Biden administration implementation that would help future administrations be more politically successful include:

1) **The economy is only perceived to be as strong as its weakest link.** President Biden oversaw record low unemployment and record high wage growth, but persistent high costs for housing, energy, childcare, and food undermined economic security and created political vulnerability.

2) **Government visibility and direct investment build support for federal programs.** While partnering with the private sector has been culturally and politically pragmatic, as well as necessary to scale climate technologies, it cedes credit for transformational investments to private businesses. Visible public investments, job creation, and ownership are vital to maintain trust, demonstrate impact, and reassert the government's role in delivering economic security and opportunity.

3) **Federal policies can serve as models for states (and vice versa).** Best practices such as interagency MOUs and conditional funding piloted by federal agencies can be adopted by state governments to advance climate, labor, and equity goals. Likewise, innovations at the state and local levels can advance future federal efforts.

4) **Federal staff recruitment and training is necessary for implementation of a policy agenda.** Advocates often think that the policy or executive order is the win, but without agency capacity, knowledge, and skills, implementation falls short. In particular, labor representation in both political and career positions is underdeveloped.

5) **Possible roles for the federal government in US industrial policy expanded under Biden and continue to expand under Trump.** Shifting norms require big, bold, future-oriented ideas.

In sum, the Biden administration's approach demonstrates that incentive-based, labor- and equity-conscious industrial policy, implemented with capable agencies and broad coalitions, can simultaneously drive emissions reductions, economic growth, and good jobs—even in a politically fragmented environment. These results will be detailed in the second paper in this series. The US experience provides a road map for future climate governance, highlighting both the promise and the limits of this approach.

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