



CREATING GOOD JOBS, A CLEAN ENVIRONMENT, AND A FAIR AND THRIVING ECONOMY

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[FR Doc. 2025-11379](#): RFI Response to Office of Science and Technology Policy (OSTP) on the development of a National Strategic Plan for Advanced Manufacturing

The BlueGreen Alliance (BGA) unifies labor unions and environmental organizations into a powerful force to fight climate change, protect the health of people and the environment, stand against economic and racial inequality, and create and maintain good-paying, union jobs in communities across the country. We appreciate the opportunity to respond to the U.S. Department of Energy’s (DOE) request for information (RFI) that will help inform their National Strategic Plan for Advanced Manufacturing.

Investment in the manufacturing sector, along with appropriate trade measures, is critical for securing U.S. competitiveness. Manufacturing contributed \$2.3 trillion—over 10%—to U.S. GDP in 2023, and manufacturing companies performed over half of private sector research and development (R&D).^{i,ii} R&D spending has economy-wide benefits including promoting the innovation required to remain competitive in a globalized economy. Countries are competing for new technologies to give their industrial sectors an edge. Solar, wind, and battery capacity are being added to global grids at an unprecedented pace. They have emerged as global economic engines worth trillions of dollars, and countries are fighting for investments in their supply chains.ⁱⁱⁱ There’s also international competition to secure the competitiveness of heavy industries such as steel, aluminum, cement, and chemicals with an increased focus on decarbonization, as industry is projected to be the highest emitting sector globally by the early 2030s.^{iv,v} Clean energy deployment is also increasing the demand for steel, aluminum, and cement, which serve as essential inputs for solar, wind, and battery supply chains.^{vi} The United States cannot remain an economic superpower if we surrender building the technologies of the future to the rest of the world. The COVID-19 pandemic and Russia’s invasion of Ukraine painfully exposed the dangers of relying on vulnerable overseas supply chains for critical goods and energy. China, the European Union (EU), India, Brazil, Japan, and South Korea have all invested billions of dollars into their manufacturing sectors and are well positioned to gain investments that otherwise would have gone to the United States.^{vii} Therefore, it is

imperative that the Trump administration and Congress continue to support our industrial sector to ensure its prosperity.

To this end, BGA offers the following responses to the RFI:

1a. Which emerging science and technology areas (e.g., artificial intelligence) will be key to the next generation of innovative advanced manufacturing technologies, and how will they impact advanced manufacturing?

The next generation of innovative advanced manufacturing will depend heavily on access to reliable, low-carbon electricity. As manufacturing processes become more electrified and incorporate technologies such as artificial intelligence and advanced materials, the demand for clean, consistent power will grow. Renewable energy will play a central role, not only as a cost-competitive source of electricity but also as a prerequisite for competing in global markets where embodied emissions carry increasing weight. As will other forms of clean, firm power generation such as nuclear and geothermal. Policies such as the EU's Carbon Border Adjustment Mechanism (CBAM) underscore the need for U.S. manufacturers to reduce the carbon footprint of their production. Companies that can tap into abundant and affordable renewable power and sources of clean firm power will be best positioned to integrate emerging technologies while maintaining international competitiveness.

1b. What are the primary challenges and barriers that need to be addressed to ensure the successful integration and widespread adoption of emerging technology in manufacturing?

Some of the primary challenges to integrating these technologies stem from both energy and economic pressures. Load growth and rising electricity prices threaten the ability of manufacturers to scale new processes. Without affordable electricity and the widescale deployment of inexpensive low carbon energy, advanced manufacturing technologies may remain prohibitively expensive to deploy at a meaningful scale. Overcoming these barriers will require developing and deploying economically competitive renewable energy projects at scale, investment in modernized energy infrastructure, and policies that ensure reliable access to clean power.

Deploying solar and onshore wind energy is particularly important right now. They are the fastest and cheapest forms of power to bring online, even without government subsidies.^{viii} At the same time, the cost of building new gas-fired power plants has reached its highest level in a decade, driven by record electricity demand and mounting backlogs for turbines.^{ix} New gas turbine orders are predicted to take a minimum of three years to fulfill and just one combined-cycle gas turbine came online in 2024.^x

Another barrier lies in the strain that rising electricity demand places on the grid. The huge increase in construction and operation of power-hungry data centers, new clean

technology manufacturing, and the electrification of energy-intensive industrial processes are driving unprecedented load growth, and without coordinated planning, manufacturers could face reliability and cost challenges that undercut their competitiveness. The administration can play a decisive role here by directing utilities, grid operators, and power marketing administrations (PMAs) to plan for significantly higher levels of demand from advanced manufacturing facilities. Proactive planning would allow grid investments to keep pace with industrial growth rather than lag behind it, avoiding bottlenecks that could delay or derail the deployment of new technologies.

Equally important is the need to expand clean firm energy resources. Federal funding to accelerate the scale-up of these resources will be critical for industries seeking to fully decarbonize operations. At the same time, prioritizing PMA power sales for globally competitive industries, rather than for customers whose products provide little public benefit, like cryptocurrency miners, would help ensure that low-carbon electricity supplies support sectors most essential to U.S. economic strength and national security. These steps would reduce structural barriers to adoption and create a foundation where emerging manufacturing technologies can thrive.

Another barrier the government should think about is how they can help facilitate effective financing to allow innovative companies to safely cross the "valley of death" on their path to scale. Without these supports, projects face delays, higher costs, and increased risk, which can prevent promising technologies from ever reaching commercial deployment.

It will also be important to ensure workers continue to be equipped with the necessary skills to take advantage of these new advanced technologies. The government must work with companies, labor unions, and high-quality training providers to increase opportunities for workers to receive training so that a skilled workforce ready to fill good construction and manufacturing jobs can help power the industries of the future. Increased investment in labor-management training programs, pre-apprenticeships and apprenticeships, and post-secondary educational programs can help develop a workforce to fill necessary occupations as the industries of the future scale.

4b. How can public-private partnerships be structured to overcome potential hurdles and foster successful collaboration?

Public-private partnerships can overcome hurdles and foster successful collaboration when they are structured to combine robust federal support with clear market signals and coordinated policy frameworks. The government should authorize additional funding for existing manufacturing and industrial decarbonization programs, such as the Industrial Demonstrations Program, the Qualifying Advanced Energy Project Credit (48C), and the Office of Energy Dominance Financing Title 17. These programs have already catalyzed billions in private investment but faced far greater demand than available resources.

Public dollars can also help to incentivize best-practices in the private sector. These can include, but are not limited to, companies committing to union-neutrality, providing communities with a voice in the development of projects in their area, offering living wages and benefits to all their workers, and using cutting edge, clean technology to drive innovation. By ensuring taxpayer money flows to innovative companies that support communities and workers, public-private partnerships can have positive impacts that ripple far beyond the fenceline of a project.

The termination of existing awards under these programs is a short-sighted sabotaging of innovative domestic manufacturing processes and will chill any ability for future federal programs to incentivize private sector investment. Contracts that are rescinded every time political winds shift are useless to parties who may otherwise be interested in partnering with the public sector, and at the very least, this practice will decrease companies' interest in taking on the time and expense of applying to federal programs. Worse still, many companies with now-rescinded awards have already expended significant capital on projects. Now that they are left in the lurch, these investments could be completely wasted, a risk companies will have to weigh moving forward if this practice continues.

6.a. What are the main challenges in attracting, training, and retaining a skilled workforce for advanced manufacturing, and how can they be addressed?

Attracting, training, and retaining a skilled workforce in advanced manufacturing requires a strategy that values workers and strengthens the communities where they live. Good-paying, union jobs must remain at the center of this effort. Subsidies and incentives should be tied to clear commitments to high wages, strong benefits, the right to organize, and the creation or preservation of union jobs. Additionally, reinvesting in existing industrial plants and surrounding communities can ensure they share in the gains of new industrial growth.

Expanding the pool of qualified workers also depends on sustained investments in training, apprenticeships, and credentialing programs that connect directly to long-term career pathways. Women and people of color remain underrepresented in key manufacturing occupations. Addressing this imbalance calls for targeted initiatives such as high-road training partnerships, local hiring efforts, and inclusive recruitment strategies that open access to advancement opportunities. DOE should align its workforce strategy with these priorities by embedding strong labor standards, protecting organizing rights, and building training programs in partnership with industrial unions, which best understand the sector's evolving workforce needs. Finally, any plan must not overlook the incumbent workforce. Existing workers should be first in line for employment and training opportunities, ensuring that those already committed to manufacturing remain central to its future.

6b. How can Federal agencies and federally-funded R&D centers develop, align, and strengthen all levels of advanced manufacturing training, certification, registered apprenticeships, and credentialing programs?

Productivity growth driven by technical innovation is the foundation of long-term competitiveness, yet U.S. manufacturing productivity has slowed in recent years across both established and emerging industries.^{xi} Reversing this trend requires steady collaboration between the federal government and the industrial sector on shared R&D priorities. By providing consistent funding for R&D and supporting early-stage technology projects, particularly those in the early technology readiness levels, DOE can accelerate deployment of critical technologies. These investments should also be paired with rules ensuring that federally funded technologies are manufactured domestically.

Alongside R&D investment, a parallel commitment to workforce training is essential. The surge in demand for manufacturing workers brought on by new industrial investments risks leaving up to 1.1 million positions unfilled if training pipelines do not expand.^{xii} Most of these roles will require post-secondary education or training beyond high school, but not a four-year degree, making apprenticeships, pre-apprenticeships, and other credentialing programs critical. By investing in these pathways, federal agencies can ensure that more workers are prepared to meet industry needs.

Developing strong industry partnerships can strengthen these efforts. Local hiring initiatives and collaboration with states, many of which are already prioritizing skills training, can validate industry-specific credentials, align training with real-world practices, and create clear advancement paths for workers. Just as important, the quality of these jobs must be protected. Strong labor and equity standards, including protections for organizing, support for union apprenticeship programs, and commitments to living wages, are vital to ensure the creation of good jobs and simultaneously are good business practice. Evidence shows that high-road labor strategies improve productivity, reduce turnover, and ensure projects are completed more efficiently.^{xiii}

7a. In what ways can the Federal government assist in the development of advanced manufacturing clusters and technology hubs nationwide, beyond funding needs?

The Hydrogen Hubs, Direct Air Capture (DAC) Hubs, and CHIPS programs funded by the Bipartisan Infrastructure Law and CHIPS and Science Act represent investments in U.S. innovation that can help the U.S. develop world-leading hydrogen, carbon management, and semiconductor industries, which will result in significant downstream benefits to the wider manufacturing and industrial ecosystem.

Domestic production of low-emissions hydrogen is essential for sustaining a competitive domestic steel industry as global buyers demand cleaner supply chains. DAC offers a parallel opportunity. If the U.S. maintains early, targeted investments, it can lead the world in developing carbon dioxide removal technologies. These technologies face long

timelines to commercialization so federal support at the demonstration stage is particularly important.

Hydrogen and DAC Hubs—alongside the Tech Hubs funded by the CHIPS and Science Act—are set to generate substantial economic benefits across multiple layers of the economy. During construction, with the use of Project Labor Agreements, these programs can support thousands of high-paying union jobs. Once operational, the hubs will sustain long-term employment in plant operations, maintenance, R&D, and supply chain management. Incorporating union-affiliated training programs, registered apprenticeships, and labor-management training programs will be instrumental in meeting the workforce demands and ensuring that the workers building and operating hydrogen and DAC projects have access to good-paying, union jobs. By anchoring these opportunities regionally, the hubs stimulate broader industrial ecosystems, attract complementary businesses, and foster resilient, innovation-driven local economies.

Continuing these hub programs ensures that the United States will remain competitive as these industries scale in the decades to come. The federal government should continue to de-risk these technologies and establish the infrastructure and knowledge networks that allow hydrogen, DAC, and semiconductor production to grow into world-leading domestic industries.

8a. What are the primary vulnerabilities and weaknesses within the current domestic supply chains?

Policymakers' attempts to strengthen domestic supply chains highlight how difficult it is to reshore manufacturing once it has moved overseas. The recent repeal of policies supporting emerging clean technology industries, such as solar and batteries, risk permanently undermining the country's ability to produce them. According to recent research by BGA, while we have made a lot of progress expanding solar module production, the United States still has limited capacity to produce cells, and no capacity to produce ingots and wafers.^{xiv} This gap is unsurprising given the massive capital commitment required to set up new factories within the PV module supply chain. Firms are more likely to commit to onshoring the most downstream segment—modules—before they commit to the upstream of the supply chain. This dynamic is especially evident with cells, where the United States only recently onshored its first cell manufacturing facility since 2019. More cell manufacturing was expected to follow over the next half decade, driven by strong demand signals. Unfortunately, the passage of the One Big Beautiful Bill Act introduced immense uncertainty for the sector. By removing solar energy from the technology neutral tax credit after 2027—and thereby ending the domestic content bonus—the law weakens the long-term demand signals for new solar manufacturing.

Additionally, distribution and large power transformers are facing shortages that are raising costs and introducing lengthy lead times for utilities. The specific challenges faced by transformers are multifaceted and include electricity load growth, high capital costs, labor shortages, unreliable demand forecasts, increased instances of extreme weather

events, and aging infrastructure. In particular, electricity load growth is playing a key role in the supply chain disruptions and is leading to increased electricity prices at a time of rising load growth.

8b. What programs and policies need to be implemented to develop and re-shore a resilient domestic advanced manufacturing supply chain and industrial base?

Establish an Executive Branch Coordinating Entity

Create a White House office or interagency council dedicated to aligning federal manufacturing, energy, and technology initiatives. This body would oversee Manufacturing USA, DOE demonstration programs, U.S. Department of Defense (DOD) industrial base authorities, National Science Foundation/CHIPS Act investments, and other industrial priorities to ensure coherence and minimize duplication. The model should resemble a National Industrial Strategy Council with authority to set priorities and coordinate budgets across agencies.

Expand and Strengthen the Manufacturing USA Network

Grow the program to cover additional advanced technology areas where global leadership is still contested (e.g., semiconductors, biomanufacturing, critical minerals). Expansion should include:

- Closer integration with workforce and labor partnerships, including apprenticeship pipelines and regional training programs.
- Linkages with federal procurement needs so institute innovations have clear commercialization pathways.
- Stronger financing models that incentivize state governments, corporations, and philanthropy to provide matching funds.

Create an Industrial Finance Corporation (IFC)

Establish a federally chartered institution similar to the Development Finance Corporation but domestically focused with broad authority to finance advanced technology manufacturing. The IFC should be empowered to deploy purchase guarantees, concessional loans, loan loss reserves, and equity investments to scale technologies from pilot to commercialization.

Invest in Grid Manufacturing and Deployment

Provide dedicated funding streams for domestic production of transformers, switchgear, and other critical grid components, paired with incentives for advanced grid technologies such as digital substations and high-voltage direct current (HVDC). These investments not only enhance U.S. grid resilience but also lower energy costs—a critical enabler for competitive domestic manufacturing.

Align Electricity Tariffs and Industrial Policy with Load Growth

Consider industrial electricity tariff structures that prioritize large load growth tied to manufacturing expansion. Affordable power for industry is a key ingredient for industrial development. By linking grid modernization with industrial development, the United

States can ensure new clean power investments directly enable competitive production clusters, emphasizing the importance of cheap electricity in supporting industrial leadership. Manufacturing facilities should not automatically be subject to the same regulations or rate structures established for new artificial intelligence (AI) data centers. Policy mechanisms like “large load tariffs” may not be equally feasible for both industries.

Coordinated RDD&D for Next-Generation Chemistries

Launch a government-wide initiative to accelerate the research, development, demonstration, and deployment (RDD&D) of next-generation battery technologies (e.g., solid-state, sodium-ion, iron-air). Special focus should be placed on helping start-ups bridge the “valley of death” by providing access to shared demonstration facilities, scaled pilot lines, and federal offtake agreements.

Stabilize Critical Mineral and Material Prices

Develop tools such as strategic stockpiles, long-term procurement contracts, and hedging facilities that provide price stability for critical minerals. This will encourage upstream investment while giving downstream manufacturers the predictability needed for long-term planning.

Pursue Holistic Investment Packages

Structure integrated deals similar to the MP Materials model that combine federal financing, procurement guarantees, and regulatory clarity. Such packages can reduce risk for investors while ensuring that public support translates into secure domestic supply chains. Because the federal government is assuming some project risk, integrated deals also guarantee the opportunity for shared upside between private and public entities.

Fund Clean Industrial Hubs

Establish regional clean industrial hubs that integrate clean firm power (advanced nuclear, geothermal, long-duration storage) with industrial facilities producing clean steel, cement, chemicals, and other core materials. By co-locating clean energy supply with industrial demand, these hubs would accelerate decarbonization, reduce costs, and foster globally competitive U.S. industrial clusters.

Coordinate Innovation with Deployment

Ensure that DOE demonstration funding and Manufacturing USA institutes are aligned with these hubs, creating a pipeline from research to commercial-scale deployment. This would provide U.S. industry with a durable competitive advantage.

Leverage Federal Procurement Tools

By leveraging purchasing power, the government can create reliable markets for low-embodied carbon materials and set expectations for industry adoption. To make these tools effective, policies must send a consistent and harmonized signal. This includes establishing unified cross-agency standards that recognize distinct emissions profiles of different materials and industrial processes for products like iron and steel, while also coordinating closely with state and local governments to improve both data collection and

policy alignment. Finally, the government should expand its procurement toolkit to include mechanisms such as advanced market commitments and contracts for difference. These demand-side policies can guarantee buyers for emerging low-embodied carbon materials and give companies the business certainty they need to make costly capital investments. Together, these measures create a framework where public and private actors share risk, align incentives, and accelerate the growth of more resilient manufacturing.

Support Federal Manufacturing Incentives

The 45X Advanced Manufacturing Production Tax Credit provided the largest ever investment in U.S. manufacturing of clean energy technologies and is responsible for billions of dollars of announcements in the solar, battery, wind, and critical material supply chains. The administration should move quickly to release clear guidance on compliance with the new foreign supply chain restrictions for tax credits, as these incentives are vital to scaling up domestic manufacturing, and certainty is needed to sustain the strong progress already underway. Continuing the critical minerals component of the 45X tax credit past 2031 would also help strengthen U.S. industry and ensure the United States does not cede ground to foreign competitors. It is a critical component of reshoring clean technology supply chains by ensuring that U.S. production is competitive with imports. Recently, the bipartisan Credit Incentives for Resilient Critical Utility Infrastructure and Transformers (CIRCUIT) Act, introduced in February 2025, proposed expanding the 45X Advanced Manufacturing Production Tax Credit to provide much-needed additional investment in domestic manufacturing of critical energy infrastructure. The act would spur U.S. production of electric grid distribution transformers. There are growing supply chain issues for distribution transformers, which play a key role in distributing power safely to homes and businesses.

10. What are examples of public-private partnership models (at the international, national, state, and/or local level) that could be expanded to facilitate manufacturing technology development, technology transition to market, and workforce development?

In July 2025, MP Materials announced a landmark public-private partnership with DOD to strengthen U.S. supplies of rare earth elements. Federal agencies have long supported critical minerals through loans and grants, but this arrangement marked the first time the government took an equity stake in a producer. DOD's decision to purchase \$400 million in shares made it the largest single shareholder in MP Materials. The agreement also included a 10-year offtake contract with a price floor and a separate decade-long commitment to secure contracts for the company's entire magnet output.

The deal responds directly to a serious bottleneck in the supply chain, where excessive dependence on a single country for rare earths has created strategic vulnerabilities. The partnership illustrates how industrial policy can adapt to the specific conditions of a critical industry. DOD put together a flexible package—equity, long-term contracts, and demand guarantees—that sends a strong signal to private investors. This targeted

intervention seems to properly align government resources with industry needs and could be an effective model to emulate.

The deal's ultimate value, however, is far from certain. Rare earths are indispensable to both national security and energy dominance. They power vital clean energy technologies. If government-backed arrangements end up diverting these materials away from energy projects, they risk slowing deployment at precisely the moment when momentum must accelerate. The role of public-private partnerships should be to expand supply and reduce strategic vulnerabilities, not to undermine clean energy buildout by artificially constraining access to the minerals it requires. The government should use these partnerships strategically across all sectors in ways that reduce risk rather than picking winners and losers.

11. The current 2022-2026 National Strategy for Advanced Manufacturing has three top-level goals, each with objectives and priorities: (1) Develop and implement advanced manufacturing technologies; (2) Grow the advanced manufacturing workforce; and (3) Build resilience into manufacturing supply chains and ecosystems.

b. What emerging needs or opportunities might require the addition of new top-level goals, and why?

The federal government must prioritize sector-specific investments to decarbonize and reduce co-pollutants from low embodied carbon materials. Decarbonizing aluminum, steel, cement, chemicals, and other energy-intensive materials demands tailored plans and investment strategies, since each sector requires unique technological solutions and confronts distinct investment barriers. Policymakers should consider implementing new production tax credits, investment incentives, and federal support for energy subsidies and workforce development to address these challenges.

The nation urgently needs a comprehensive strategy for responsible mining and critical minerals. Current mining and critical minerals policy remains disjointed, inadequate, and hampered by a patchwork of laws and regulations. As the country dramatically expands renewable energy and storage capacity, demand for critical minerals will surge correspondingly. A robust national critical minerals strategy must embrace environmentally, economically, and socially responsible mining practices to anchor clean technology manufacturing in the United States.

This strategy should incentivize and enhance the use of responsibly produced critical minerals and metals. The government must jumpstart responsible domestic critical materials recycling projects while promoting circular economy principles. Additionally, federal action should spur reclamation, remediation, and repurposing of industrial sites to drive economic development in communities that have suffered from industrial decline.

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