



U.S. DEPARTMENT OF
ENERGY

Defense Production Act
to Accelerate Domestic
Manufacturing and Adoption
of Clean Energy Technologies

Summary of Roundtables and RFI Responses

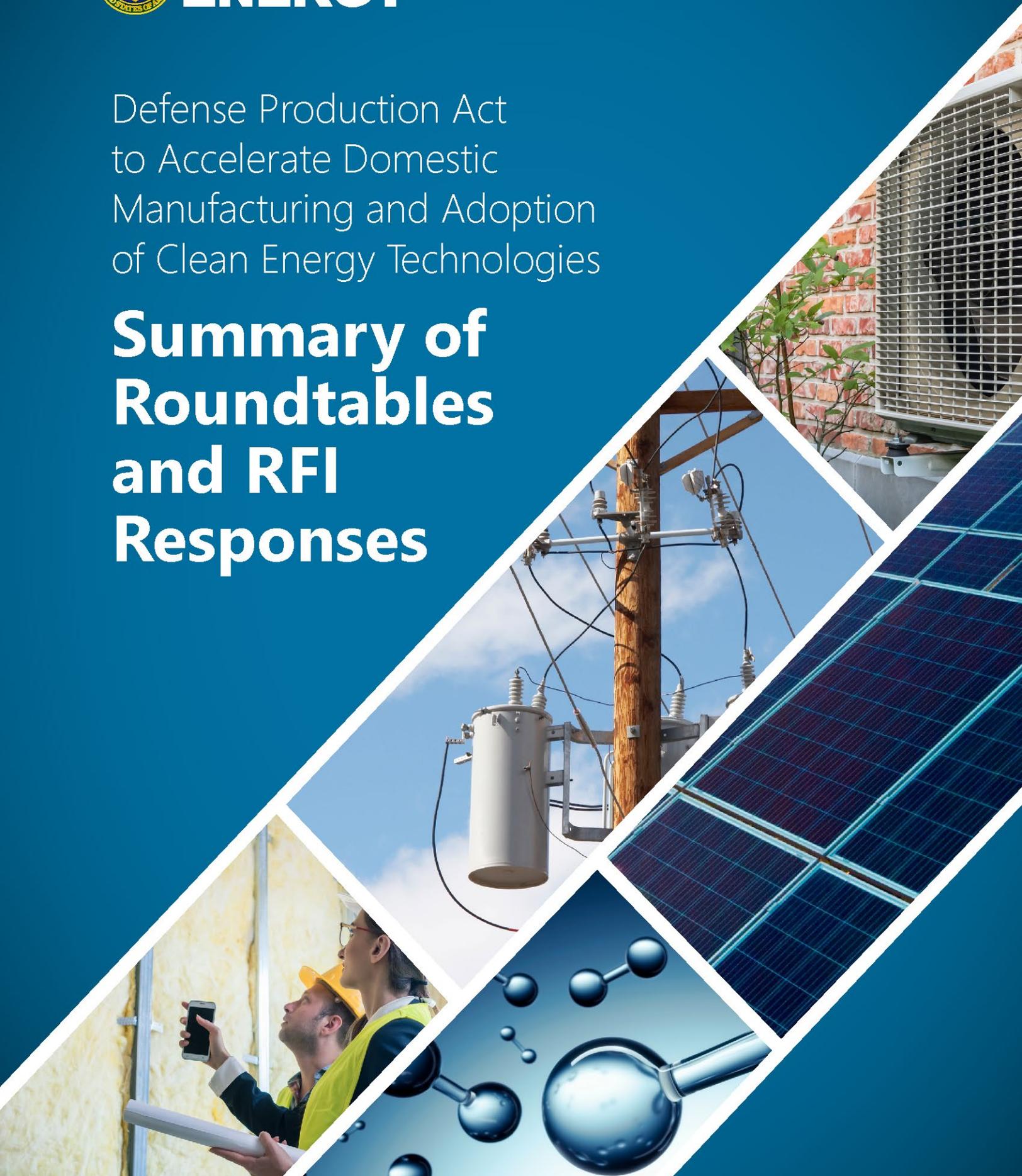


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Overview

On June 6, 2022, President Biden provided the U.S. Department of Energy with [new authorities to use the Defense Production Act \(DPA\)](#) as a tool to accelerate the domestic production of five clean energy technology areas: transformers and grid components; heat pumps; electrolyzers, platinum group metals, and fuel cells for clean hydrogen; solar photovoltaic components; and building insulation.

Over the following months, the U.S. Department of Energy (DOE)—with support from the White House Climate Policy Office—convened a series of roundtable meetings and issued subsequent Requests for Information (RFIs) to gather stakeholder input on how DOE can best implement this new DPA authority, if DPA funding is made available by Congress.

DOE aimed to gather insights on how DPA investments can scale up production in ways that strengthen national security, lower fuel prices, ramp up domestic clean energy industries, create the most family-sustaining (ideally union) jobs, slash climate pollution, and benefit (and avoid harm to) communities—all in the fastest possible timeframe.

This report serves as an executive summary of the key themes and recommendations heard from more than 400 stakeholders throughout this feedback effort.

This report is provided for information-purposes only, and DOE is not bound by its contents.

Roundtables

With support from the White House Climate Policy Office, DOE convened five virtual roundtables over two months. The **roundtables' purpose** was to:

- 1** Gather input and ideas from key stakeholders (industry, unions, trade groups, environmental organizations, energy justice groups, and others) on how the DPA can best be used to accelerate domestic manufacturing and adoption of the target technologies.
- 2** Provide opportunities for stakeholders to describe the current situation and express their needs, ideas, and concerns.

Each roundtable focused on a **specific technology**:



Transformers and Grid Components
August 4



Heat Pumps
August 10



Electrolyzers, Fuel Cells, and Platinum Group Metals
August 17



Solar Photovoltaic Components and Supply Chain
August 24



Building Insulation
September 20

The roundtables convened 379 representatives of technology-relevant companies, labor unions, trade associations, energy and environmental justice groups, environmental organizations, and others, along

with DOE and White House staff. Roundtable participation was limited to ensure a manageable size and effective discussion and participation.

Requests for Information

Following the roundtables, DOE's Office of Policy and Office of Manufacturing and Energy Supply Chains (MESC) released [two requests for information](#) (RFIs) to gather broader public feedback and allow key stakeholders in each of the five technology areas to provide more detailed and specific inputs than the roundtables allowed.

DOE received 118 responses to the Defense Production Act to Accelerate Manufacturing and Deployment of Energy Technologies RFI, which covered four of the five technology areas. It asked 26 questions to gather input on technology supply chain challenges and opportunities; required support for domestic manufacturing, including small- and medium-sized businesses; workforce investment opportunities; and how to ensure equitable access to energy and economic benefits.

DOE received 31 responses to the Defense Production Act to Support Electric Heat Pumps Manufacturing and Deployment RFI, which also served a Notice of Intent (NOI). It described a proposed funding approach to support domestic manufacturing of electric heat pumps, and requested comment on the application process, examples of eligible projects, required funding sizes, and eligibility and selection criteria.

The Inflation Reduction Act (IRA) appropriated \$500 million to carry out DPA activities, which will remain available until September 2024. At the President's determination based on Congressional intent, the U.S. Department of Defense will use \$250 million of the appropriated DPA funds to support critical minerals processing, and DOE will use \$250 million of the appropriated DPA funds to support manufacturing and deployment of electric heat pumps. **The stakeholder input gathered throughout this feedback process is informing DOE investments decisions, as well as allocation of additional funding that Congress may appropriate to carry out DPA activities in the future.**

Summary of Overall Themes and Recommendations Conveyed by Stakeholders

The information below is meant to reflect stakeholder feedback; DOE is not bound by its contents.

Invest in education and workforce development to build the manufacturing and deployment expertise needed to seamlessly meet higher domestic demand. In many of the target industries, building the workforce is equally important as expanding manufacturing capacity to accelerate domestic production and adoption. Prioritize training initiatives for under-represented populations and concentrate workforce development programs in environmental justice and low-wealth communities.

Prioritize historically disadvantaged communities and customers both for technology deployment incentive programs (e.g., insulation, heat pump, and solar panel installation) as well as for investment in manufacturing facilities, grid resilience, and complementary infrastructure that bring job creation and economic development. These decisions should simultaneously balance the potential risks of introducing environmental or air quality issues to these communities.

Pursue collaborative, whole-of-government approaches, where possible, that combine DPA incentives with other rebates, tax incentives, and federal/state/local government programs to maximize the potential benefits. For consumer-focused incentives, develop programs that encourage a combination of energy efficiency and health/safety upgrades, e.g., combining heat pump installation with insulation retrofits and weatherization upgrades, and with grid capacity and resilience investments.

Consider income-based incentive programs and minimize the burden for leveraging grants, rebates, and tax incentives. Eligibility and paperwork burdens have historically been a significant barrier to participation for small businesses and manufacturers, building owners, landlords, and homeowners. Simple and clear eligibility and application processes combined with proactive outreach to target communities will expand participation. Incentive programs should include targeted awareness and education campaigns, both to consumers and manufacturers.

Provide technical assistance to support small- and medium-sized businesses in navigating the qualification and application process for federal funding. Provide process training (e.g., webinars and video demonstrations) along with access to support staff that can offer guidance in meeting eligibility requirements and completing the application process.

Pursue a range of short-term and long-term investment actions to address the variety of technological, economic, supply chain, and policy challenges. For example, **direct purchases and purchase commitments for key materials** can create the demand certainty manufacturers may need to expand, while ensuring access to critical supplies and components for downstream manufacturers in the supply chain. **Subsidies or incentives for domestic materials** could address high material prices and lower the cost of manufacturing to improve competitiveness. **Loans and other financial supports to site, plan, and build new facilities** will support a more significant shift in domestic manufacturing capacity, particularly for components with almost exclusively foreign suppliers today.

Examine approaches to encourage raw material or component suppliers to prioritize energy technology manufacturers over customers in other industries during critical supply chain shortages (e.g., recycled glass for fiberglass insulation vs. beer/wine industry; electronics for grid components).

Pursue DPA funding beyond the immediate budget cycle to encourage impactful, long-term shifts in domestic production that will meaningfully support energy security and national security. Significantly expanding manufacturing capacity (e.g., building new facilities, expanding lines, and purchasing specialized equipment) will likely require long-term federal capital, including support for facility investment and purchasing mechanisms that offer demand certainty.

Commit to upholding the Justice40 initiative in awarding DPA funding. Support engagement with small- and medium-sized manufacturers and businesses at all points of project design and execution. Encourage proposals that use small or minority-owned businesses for engineering and design, consulting and advisory services, outreach and marketing, etc. Award projects and fund programs that bring economic investment and jobs into disadvantaged and energy justice communities.

Use the convening power of the federal government to bring together suppliers to identify solutions and technology pathways. Support domestic joint ventures where logical and consider regional roadmaps that help industries leverage existing suppliers to support manufacturing scale-up and allow regional supply chains to coalesce.

Incentivizing foreign companies to invest in U.S. manufacturing facilities or even American companies operating in foreign countries near supply chain sources may be a short-term solution to accelerate domestic supplies. However, much of the long-term focus should be on domestic companies.

Summary of Stakeholder Feedback by Technology Area



Transformers & Electric Grid Components

Overarching Themes from Stakeholder Feedback

There is **insufficient manufacturing capacity** to meet demand in the electric grid component market, leading to **ongoing shortages of transformers and other grid components**.

The grid faces a **wide range of material and component supply chain shortages** from reliance on foreign suppliers, pandemic-related shortages, and Russia's war in the Ukraine.

Long-term demand certainty is important to enable manufacturers to expand operations into the future.

Component availability is critical for the **infrastructure upgrades needed to maintain grid resilience, enable electrification, and bring economic and environmental benefits**.

- Distribution power transformers (DPT) and large power transformers (LPT) are in critically short supply. An extended supply crunch has resulted in a 4x increase in wait time for DPTs, from 3-6 months before 2022 to 1-2 years currently. LPTs have wait times of 2+ years.
- More than 70% of U.S. transmission and power transformers are 25+ years old, while increasing demand requires a 60% expansion of U.S. transmission systems by 2030 and 3x by 2050.
- Access to grain-oriented electrical steel (GOES)—a critical component for transformers and other key components—is extremely restricted.
- Shortages of amorphous steel, aluminum, and copper also affect grid component manufacture.
- Component shortages along the entire supply chain (e.g., meters, bucket trucks, cable, conductors, valves) create cascading delays in manufacturing and installation.
- While there is clear short-term demand for transformers and other components, the market is cyclical. Manufacturers considering expansion are uncertain that demand will be strong enough at the end of a time- and capital-intensive investment to justify the expansion. Actions to stabilize demand over longer time horizons and guarantee customers can improve the likelihood of manufacturing expansion.
- The Defense Production Act could support demand and lower build costs on new or expanded production facilities that are more efficient and built to higher standards.
- Infrastructure upgrades are needed to meet increasing demands due to load electrification, increasing extreme weather events and threats of physical attacks. These risks can exacerbate existing shortages.
- Facilities and infrastructure improvements should target disadvantaged and previously ignored communities.

Policies that inhibit supply and create market instability should be reconsidered.

- Buy America needs to be defined more clearly and enforced more consistently to avoid market distortions.
- Tariffs and quotas can constrain supply or have limited effectiveness due to loopholes in trade practices.
- Foreign competitors are flooding the market.

Key Stakeholder Recommendations to DOE

- Support **new or expanded domestic manufacturing facilities** with subsidies, tax incentives, purchase commitments, and other medium- or long-term financial support. Demand certainty and capital investment is particularly needed for manufacturers to expand large power transformer production, given the high cost and long lead time to design/build a facility. DPA funding should also support the purchase and installation of specialized equipment for component production.
- Support the **second-tier supply base**—the components crucial to building grid infrastructure—and incentivize new market entrants, especially to expand domestic GOES production and other electrical quality steels. Create a virtual reserve mechanism by allowing the federal government to service as a purchaser of last resort for grid components. Buy down the cost of transformers and grid components through direct subsidies or low-cost loans, without increasing consumer cost. Target materials and technologies needed for grid resilience and efficiency upgrades, such as semi-conductors, solid-state electronics, capacitors, etc. Prioritize materials for transformer production over electric vehicle manufacturing. Consider how to incentivize foreign vendors to establish U.S. facilities in the near term.
- **Pursue near-term solutions to address the urgent supply chain issues** for transformers, components, and raw materials. The backlog of unmet demand is creating grid reliability and resilience risks that are further magnified by extreme weather events and physical security risks.
- Target **historically disadvantaged** and **environmental justice communities** for development of new manufacturing facilities and build them to higher emissions standards. Support economic growth by concentrating workforce training and IJA funding for infrastructure development (transportation, housing, etc.) in these same communities. Support strategic replacement of aging grid assets. Leverage Project Labor Agreements and Community Benefit Agreements.
- Make **long-term investments in education and workforce development programs** to address the present labor shortage and build the skilled, long-term workforce to meet future requirements. Leverage inclusive opportunities such as apprenticeships, partnerships with community colleges/universities, and training incentives for union members.
- Consider the **Buy American Act** to support short term supply (by offering waivers) and generate long term demand (by requiring domestic products for government-funded projects or facilities).
- **Encourage innovation** that would help drive cleaner energy production processes, accelerate the use of renewable energy, de-risk investment in distributed energy technologies, and improve the reliability and cost of modernized grid components.
- Create a clear communication or ongoing convening **to give voice to manufacturer concerns** and offer clarity on government programs and incentives.
- Support **standardization of distribution transformer design** through innovative designs.



Electric Heat Pumps

Overarching Themes from Stakeholder Feedback

The **cost and complexity of switching** to a heat pump system is a key barrier, coupled with customers and contractors who lack sufficient **awareness of heat pump use and benefits**.

- Customer and community education campaigns on heat pumps are needed to raise awareness of their efficacy, the installation process, and the benefits to switching.
- Transitioning to a heat pump may require upgrading of electrical panels, duct work, weatherization, insulation, and other retrofitting. Combined incentives for complementary upgrades may address this barrier and compound the energy efficiency benefits.

There is a **significant labor shortage** for heat pump manufacturing and a lack of contractors with the training to promote and install heat pumps.

- Focusing on low-income communities, environmental justice, communities of color, and funding/financial assistance to help them gain access to efficient utilities, workforce training, and other benefits

Industry must overcome the **historical perceptions that electricity is an inferior energy source** with customers, contractors, and Heating, Ventilation, and Air Conditioning (HVAC_ technicians.

Grid capacity may be a limiting factor to increased electrification in some areas.

- Combine heat pump incentives with other resilience upgrades to local grid infrastructure to withstand seasonal loads.

There is **untapped potential for electrification** beyond single-family homes.

- Landlords are less likely to choose heat pumps, as the energy costs are paid by renters and decoupled from the equipment purchase decision.
- Industry has the technology to make systems for larger buildings, but demand is limited.

Key Stakeholder Recommendations to DOE

- Invest in **diverse training avenues** (internships, apprenticeships, high school/community college partnerships, etc.) and target workforce development programs to underrepresented communities. Training should target both manufacturing and installation jobs.
- Support **education and awareness campaigns** that highlight recent technology innovations and the efficiency and climate benefits of switching to heat pump systems. Develop outreach and incentive programs to encourage specific technology transfers (e.g., gas furnace to air handler), targeting communities that currently have a high use of natural gas or other fossil fuel sources.
- Provide **income-based grants, rebates, and other incentives** for heat pump installation to home and building owners, targeting environmental justice communities, low-income owners, and rental communities, especially in regions with high potential for emissions savings. Make **direct purchases or purchase commitments**, and leverage existing assistance programs (e.g., Weatherization Assistance Program, Low Income Home Energy Assistance Program, state energy programs) to ensure access for historically disadvantaged communities.
- **Integrate DPA funding with state-level programs**, incentives, and subsidies, and streamline the process to access programs and incentives. **Combine DPA incentives with funding for complementary upgrades** (e.g., panel upgrades, weatherization) to achieve multiple efficiency upgrades.
- Provide economic supports (e.g., loans, grants) to manufacturers to **expand capacity for energy-efficient units** with variable speed compressors.



Electrolyzers, Fuel Cells, & Platinum Group Metals

Overarching Themes from Stakeholder Feedback

Rapid expansion of domestic production will require **highly specialized training** of factory and service workers.

- Investment and workforce development should target energy and environmental justice communities to transition workers to long-term clean energy jobs.

Using DPA to address market challenges will **stabilize business risk** and accelerate the building of manufacturing necessary to realize community benefits.

- Focus support on parts of the value chain that give the U.S. a competitive advantage.
- DPA investment could secure supply and drive down costs to allow market forces to take over.

Platinum group metals (PGM) are in limited supply globally, and the ability to domestically mine raw materials is very limited.

- A domestic recycling program is necessary to ensure adequate supply.
- Incentivize a “closed-loop” system to ensure PGMs stay in the United States.

Key Stakeholder Recommendations to DOE

- Incorporate **recycling or resource recovery into hydrogen hubs** and networks to demonstrate the viability of closed-loop recycling with the purpose of keeping PGMs domestically owned.
- Develop a **strategic reserve of critical raw materials and components** (like the U.S. oil reserve) that are domestically sourced where possible.
- Implement **purchase commitments for electrolyzers to build demand** to incentivize U.S. manufacturing. Consider purchase agreements for green hydrogen produced from 100% recycled PGM-content electrolyzers and/or 0% PGM electrolyzers to create market pull.
- Provide **grants or low-interest loans for specialized manufacturing equipment**, allowing manufacturers to increase capacity in anticipation of market growth.
- Support education and workforce development programs that **build the jobs pipeline from the fossil fuel industry to green hydrogen**. Invest in highly skilled training programs and provide manufacturers with resources to conduct specialized training. Target workforce development to disadvantaged communities, communities of color, and environmental justice communities.
- Fund **Research, Development, and Demonstration (RD&D) for non-PGM or lower-PGM catalysts** to minimize dependency on foreign catalyst materials and encourage a U.S.-based catalyst ecosystem. Fund **RD&D for non-PEM electrolysis methods**, other hydrogen production methods, and over advances to maximize performance, increase durability, and lower cost.
- Prioritize DPA funding to **expand capacity for technologies where the United States is well-positioned to compete**. For materials and stack components where it is not, provide incentives for global allies to sell in the U.S.



Solar Photovoltaic (PV) Supply Chain & Deployment

Overarching Themes from Stakeholder Feedback

Domestic production is significantly and negatively impacted by **Chinese competition and associated tariffs and anti-competitive actions**.

- China's large market share is aided by their low costs of labor and deployable capital, while the United States faces higher labor and energy costs, low access to labor, and longer permitting timelines.

Significant capital investments are needed to start or expand domestic production and manufacturing. Sufficient incentives exist to ensure domestic demand.

- Small investments are unlikely to meaningfully impact domestic production capabilities or capacity for the solar supply chain.
- Sustained, long-term certainty of funding (of 5-10+ years) are necessary to start or expand domestic manufacturing for most components.

A low supply of wafers, polysilicon, and other components, in addition to long lead time for production, affects domestic capacity for solar production.

- Existing incentives and/or tariffs may prioritize domestic module production over the upstream supply chain components, leaving gaps in the domestic supply chain.
- Manufacturers are almost exclusively dependent on Chinese manufacturers for the equipment required to produce silicon ingots and wafers.

Workforce training and development will be critical to expanding domestic solar production.

- Comprehensive training programs are needed to build a workforce skilled in solar component manufacturing, targeting disadvantaged communities and communities currently dependent on fossil fuel jobs.

Key Stakeholder Recommendations to DOE

- Encourage private investment by **using DPA funds to de-risk investment in new manufacturing capabilities**, domestic supply chains for equipment, and solar technology innovations.
- **Significant funding (\$200 Million+) for capital grants to rapidly restart or expand capacity in upstream segments** (e.g., polysilicon ingots, wafers, cells, and solar glass) should be the priority for DPA investments. Expanding upstream segment capacity is capital intensive, and it is foundational for the entire solar supply chain.
 - This funding scenario would be more impactful than grants for specialized equipment or purchase commitments for domestic modules.
 - If significant funding levels are unavailable, focus should be placed on pilots to demonstrate new technologies or materials; modernization and efficiency upgrades to current manufacturing, Research and Development (R&D) and feasibility studies; and low-cost loans.

- Prioritize funding to build or restart idled capacity in disadvantaged communities, training and leveraging a local workforce.
- The next most impactful capital investment would likely be **directly purchasing or subsidizing the cost of specialized equipment—whether foreign or domestic.**
 - Consider waiving tariffs to expand access to equipment manufactured overseas by U.S. manufacturers to jump start domestic production.
- **Fund comprehensive training programs to develop a skilled solar manufacturing and installation workforce** and incentives (e.g., loan forgiveness) to attract candidates to long-term manufacturing careers. Building the workforce should be treated with the same priority as building new manufacturing facilities.
- **Create incentives for global companies** to make investments in U.S. solar manufacturing.
- **Appoint a “Solar Czar”** to lead whole-of-government solar efforts, coordinating with relevant stakeholders and state officials.
- **Work with state and local governments to encourage solar commitments**, organizing a government buyer’s consortium for domestic production.
- Prioritize federal purchases for **PV modules certified to the EPEAT PV ecolabel**, where U.S. manufacturers have potential to be market leaders.
- **Invest in R&D for solar technology innovations** that may influence future equipment requirements.



Insulation

Overarching Themes from Stakeholder Feedback

Workforce education and training will be needed if retrofit demand rises to deliver the installation workforce needed, both for retrofit contractors and energy auditors.

- Combining insulation training with related interior trades will create a more well-rounded workforce.

Consumers lack awareness of the energy efficiency benefits of insulation upgrades and incentives available.

- Critical to this is landlord education, as renters make up many residents in disadvantaged and environmental justice communities.
- Landlords are reluctant to pay the upgrade costs when their renters see the long-term energy savings.

Demonstration projects can promote builder and community awareness of retrofit benefits and serve as workforce training tools.

- Conduct demonstrations with a range of industrial, commercial, and residential building types that offer the most significant emissions savings from envelope retrofits.

There are global **supply chain constraints on raw materials** and rising material costs.

- Multi-industry demand for recycled content (e.g., glass, cardboard) will require greater recycling in American communities and fewer exports.
- Availability of raw materials such as flame retardants, cellulose, and polyurethane foam catalysts is constrained.

Key Stakeholder Recommendations to DOE

- **Provide federal assistance for industry workforce hiring, education, and retention**, including demonstration projects to help produce case studies for workforce training, and re-skilling and up-skilling programs to increase supply of insulation trade laborers.
- **Create income-based retrofit programs** to deploy retrofits in the most underserved communities. Provide incentives for landlords and owners of multi-family housing units to upgrade building envelopes, even when they pass through energy costs to renters. **Make purchase commitments** to provide demand certainty as part of these programs.
- Launch a **substantial consumer education and awareness campaign** in coordination with home improvement retailers, to intentionally increase consumer demand. Pair this with **well-advertised consumer rebates or tax incentive programs** to motivate building owners, and rebates to contractors for growing their sales of energy-efficient materials. Simplify the process to access these incentives.
- Provide **insulation product manufacturers with “carbon credits”** that translate to actual financial/tax incentive benefits for manufacturing process upgrades and efficiency improvements.

- **Offer low-cost loans or grants to manufacturers, especially small- and medium-sized businesses**, to help companies expand production capacity and reduce their product/process carbon emissions. Smaller loans that are more accessible to more businesses may be more beneficial than a few large loans. Encourage loans that expand production of materials that sequester carbon or have lower life cycle emissions.
- **Develop or support tools that make it easier to determine the life cycle benefits and emissions savings** of envelope upgrades and retrofits. Require environmental product declarations (EPDs) for all products and support their creation if so needed.
- **Serve as a government-wide leader in building energy efficiency** that advocates for complementary government policies and programs, which could include the following:
 - **Update FHA code references and standards** to match the 2021 IECC, encourage state and local code adoption, and consider incentives to builders to surpass baseline efficiency requirements. Update HUD standards for manufactured housing.
 - **Require energy-related disclosures during home sales** that make energy and heating/cooling costs more visible to prospective buyers, and consider **mortgage financing reform or incentives** for federally subsidized mortgages that provide rate discounts for homes that meet certain efficiency criteria.
 - Coordinate with FEMA and HUD to **support better weatherization of buildings being part of long-term disaster mitigation efforts** that those agencies fund.
 - Collaborate with research and demonstration programs to **ensure adequate funding/resource support for emerging insulation products/technologies**.



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For more information, visit: <https://www.energy.gov/mesc/enhanced-use-defense-production-act-1950>

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