Notice of Intent No.: DE-FOA-0002935

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This is a Notice of Intent to Issue: Funding Opportunity Announcement No.: DE-FOA-0002936

Industrial Decarbonization and Emissions Reduction Demonstration-to-Deployment Funding Opportunity Announcement

The Office of Clean Energy Demonstrations (OCED) in collaboration with the Office of Manufacturing and Energy Supply Chains (MESC) intends to issue a Funding Opportunity Announcement (FOA) entitled "Industrial Decarbonization and Emissions Reduction Demonstration-to-Deployment Funding Opportunity Announcement."

OCED anticipates funding high-impact, large-scale, transformational projects to significantly reduce greenhouse gas (GHG) emissions from high-emitting industrial subsectors to build confidence in the technical and commercial viability of emissions reduction technologies and integrated solutions. OCED will support cross-cutting industrial decarbonization approaches via energy efficiency; industrial electrification; low-carbon fuels, feedstocks, and energy sources; and carbon capture and utilization for emissions that are difficult to abate through other pathways. This approach aligns with but is not limited to the Department of Energy's (DOE) Industrial Decarbonization Roadmap.[1]

This Notice of Intent (NOI) describes a preliminary plan that will evolve during the FOA development process.

Statutory Authority

On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act (IIJA, Public Law 117-58), also known as the Bipartisan Infrastructure Law (BIL).[2] On August 16, 2022, the President signed the Inflation Reduction Act of 2022 (IRA, Public Law 117-169).[3] These laws provide a once-in-a-generation investment in infrastructure, designed to modernize and upgrade American infrastructure to enhance United States competitiveness, drive the creation of good-paying union jobs with the free and fair chance for workers to join a union, tackle the climate crisis, and ensure stronger access to economic, environmental, and other benefits for disadvantaged communities.

[1] DOE Industrial Decarbonization Roadmap | Department of Energy
[2] https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf
[3] https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf

TABLE 1 – SUMMARY OF ANTICIPATED PROGRAM SCOPE		
Anticipated DOE Funding Amount:	**Anticipated Project Sizes (DOE share):[4]**	**Potential Projects May Include:**
$0.5B BIL 41008	Approximately $10M - $250M (Approximately 2-10 projects)	• Testing and validation for emissions reducing technologies • Facility projects/retrofits (greenfield or brownfield)
Up to $5.8B IRA 50161[5]	Approximately $35M - $500M (Approximately 35-75 projects)	• Single production line and unit process retrofits • Multi-facility retrofits and/or brownfield development utilizing a common technology base or approach • Multi-facility retrofits and/or brownfield development utilizing common infrastructure (e.g., electrical or thermal inputs, storage and similar)
Statutory Eligibility:		**Program Priorities:**
BIL[6] • A scientist or other individual with knowledge and expertise in emissions reduction, an institution of higher education, a nongovernmental organization; a National Laboratory; a private entity; and a partnership or consortium of 2 or more entities. **IRA Only[7]** • Domestic, non-federal owners or operators of nonpower industrial or manufacturing facility engaged in energy-intensive industrial processes • Projects that seek to demonstrate / deploy advanced industrial technology designed to accelerate GHG emissions reductions towards net-zero		• Direct facility- and product-level GHG emissions reductions expected to be achieved from the project • Industry-wide GHG emissions reduction potential • Greatest benefits and/or impact to facility-adjacent and nearby communities, including creation and retention of quality jobs; diversity, equity, inclusion, and accessibility; and benefits flowing to disadvantaged communities. • Financial and market viability, with priority for partnerships with product purchasers • Replicability and potential for adoption by other facilities • Reductions in air quality impacts, including protection from direct, indirect and cumulative impacts
Eligible Facilities:		
Domestic, non-Federal, nonpower industrial or manufacturing facility engaged in energy-intensive industrial processes, including production processes for iron, steel, steel mill products, aluminum, cement, concrete, glass, pulp, paper, industrial ceramics, chemicals, and other energy intensive industrial processes, as determined by the Secretary.		

OCED and MESC were established to build on DOE's expertise in clean energy research and development by expanding DOE's scope of work to fill a critical gap on the path to building a competitive industrial sector, aligning with the goal of net-zero emissions by 2050, and otherwise fulfilling congressional direction codified in BIL and IRA. To accomplish this, OCED and MESC closely collaborate with DOE offices whose missions include advancing the competitiveness, security, and equity of this sector, such as the Industrial Efficiency and Decarbonization Office (IEDO), the Office of Policy (OP) and other applied technology offices. Section 41008 of BIL authorizes appropriations of $500 million (M)[8] for the Industrial Emissions Reduction Technology Development Program at section 454(d)(3) of the Energy Independence and Security Act of 2007 that are appropriated by Title III of Division J of BIL. Section 50161 of IRA appropriates $5.812

[4] Dollar values are approximate
[5] Funds appropriated under 42 U.S.C § 17113b (IRA Section 50161) must be obligated by September 30, 2026.
[6] 42 U.S.C. 17113(a)
[7] 42 U.S.C. § 17113b((b),(g)
[8] 42 U.S.C. § 17113(e)

billion (B)[9] in support of advanced industrial facilities projects. The FOA will be funded through these sections. Projects funded through section 50161 of IRA must have funds obligated by the end of fiscal year 2026 (FY2026 ends on September 30, 2026). Statutory priority consideration factors from IRA[10] will be incorporated into the Selection Criteria for the IRA funds as outlined in Table 1 and in greater detail in the FOA.

Background

The United States (U.S.) can lead in demonstrating advanced industrial technologies and facilities that will strengthen the U.S. industrial base and make a global impact on GHG emissions. This program will help the U.S. develop a more resilient and competitive domestic industrial sector while providing benefits to communities and workers and reducing carbon emissions.

The industrial sector accounts for nearly one-third of the nation's carbon dioxide (CO_2) emissions (Figure 1). It is considered "difficult to decarbonize" due to diverse energy inputs, a wide array of industrial processes and operations, and multiple sources of emissions resulting from fuels for heat and power and from feedstocks and processing operations.[11] However, many technological pathways and innovations exist that could lead to substantial decarbonization of major parts of the industrial sector. Today, federal procurement processes such as Buy Clean, in concert with Build America, Buy America, incentivize the purchase of domestically manufactured materials with lower embodied GHG emissions. Market demand for products made in lower- or zero-carbon production processes is expected to grow substantially in the coming decades. There are also opportunities to build up industrial operations around materials with significant domestic and global demand that have limited U.S. footprints currently.

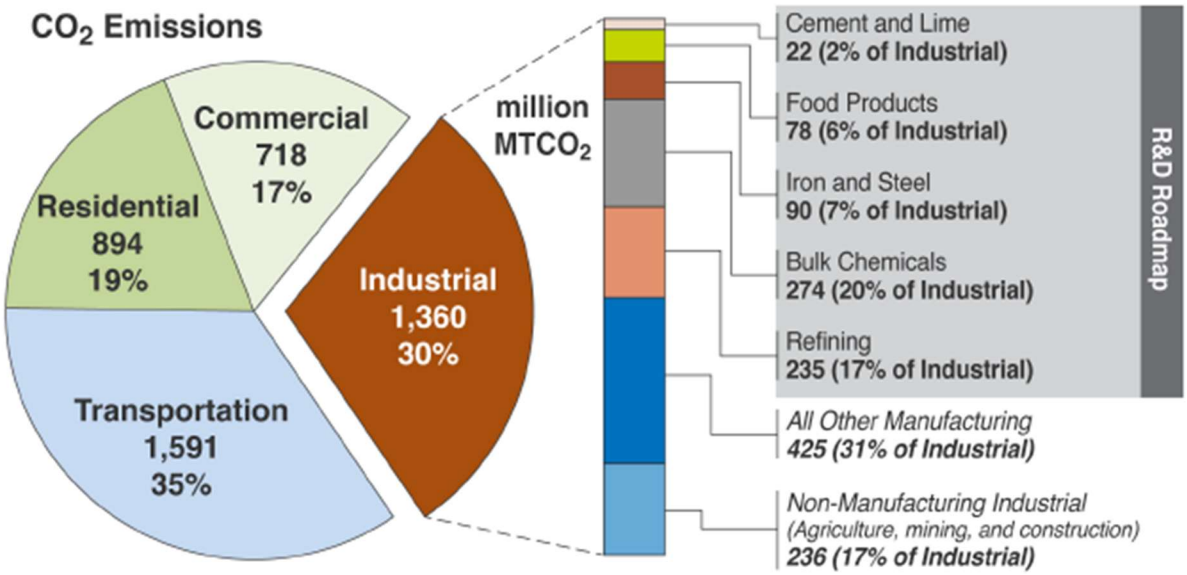

Figure 1. U.S. primary energy-related CO_2 emissions, in millions of tons, by end use sector (left pie chart) and a breakout by industrial subsector (right stacked chart) in 2020 from DOE's *Industrial Decarbonization Roadmap*. GHG emission data published by the Environmental Protection Agency (FLIGHT Tool, ghgdata.epa.gov) shows that chemicals, metals, and cement are among the largest emitters. [See Footnote 1, page 6]

[9] 42 U.S.C. § 17113b(a)
[10] 42 U.S.C. § 17113b(d)
[11] DOE Industrial Decarbonization Roadmap | Department of Energy

In addition to reducing GHG emissions, advanced industrial technologies supported by this program can and should provide meaningful benefits to host communities and workforces. Section 50161 of IRA supports this goal by giving priority to projects that "*provide the greatest benefit for the greatest number of people within the area in which the eligible facility is located*".[12] Industrial processes can produce air pollutants with harmful impacts on respiratory and cardiovascular health. In the U.S., racial and ethnic minority groups and lower-income groups are disproportionately exposed to high levels of air pollution and, consequently, experience higher rates of adverse health impacts compared to the general population.[13] In addition, projects that provide good jobs, healthy and safe workplaces, workforce education and training, and workers' free and fair choice to join a union[14] offer substantial community benefits and are necessary for efficient and effective implementation.

Projects funded through the anticipated FOA are expected to:

- Achieve significant emissions reduction in nonpower industrial sectors in support of the Biden Administration's decarbonization goals of a 50-52% reduction in GHG emissions from 2005 levels by 2030, a carbon-pollution-free power sector by 2035, and a net-zero GHG emissions economy by 2050;[15,16]
- Bolster the technological and economic competitiveness of industry and manufacturing in the U.S.;[17,18]
- Increase the viability and competitiveness of U.S. industrial technology exports;[19]
- Provide meaningful benefits (such as reducing emissions of non-GHG pollutants) to host communities including nearby disadvantaged communities; strengthen economic prosperity by expanding good jobs that are accessible to all workers; and minimizing and mitigating potential negative impacts.[20]

Implementation Approach

This FOA is expected to make available up to a total of approximately $500M in BIL federal funds and up to $5.8B in IRA federal funds through financial assistance for competitively selected, cost-shared projects. Any remaining funding that is not awarded through this FOA may be released through other competitive mechanisms addressing high priority gaps later in FY2023. All projects will likely require a minimum of 50% non-federal cost share (50% of the total project cost, including both DOE share and recipient cost share).[21]

BIL funds may support industrial technology testing and validation, as well as projects that include integrated, facility-level technology retrofits or brownfield projects subject to the number, quality,

[12] 42 U.S.C. § 17113b(d)(2)
[13] Liu, et al. "Disparities in Air Pollution Exposure in the United States by Race/Ethnicity and Income, 1990–2010." *Environmental Health Perspectives* (2021). https://doi.org/10.1289/EHP8584; Tessum, et al. "PM2.5 polluters disproportionately and systemically affect people of color in the United States." *Science Advances* (2021). https://doi.org/10.1126/sciadv.abf4491
[14] Executive Order (EO) 14005, Ensuring the Future Is Made in All of America by All of America's Workers; EO 14008, Tackling the Climate Crisis at Home and Abroad; EO 14017, America's Supply Chains; EO 14025, Worker Organizing and Empowerment; EO 14036, Promoting Competition in the American Economy; and EO 14052, Implementing the Infrastructure Investment and Jobs Act
[15] EO 14030, Climate-Related Financial Risk; EO 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability
[16] FACT SHEET: President Biden sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies
[17] 42 U.S.C. § 17113(b)(1)(A)
[18] Buy Clean Initiative
[19] 42 U.S.C. § 17113(b)(1)(B)
[20] Community Benefits Plan Frequently Asked Questions (FAQs) | Department of Energy
[21] 42 U.S.C. § 17113(d)(5); 42 U.S.C. § 17113b(e)

and funding needs of applications received. DOE is interested in integrated testing and validation in full-scale, operational facilities, as well as smaller-scale testing and validation projects at a lower technical maturity in support of intended deployment of new technologies. DOE anticipates project costs to generally range from approximately $10M – $250M DOE share for each award.

IRA funds may support projects that include large-scale demonstrations, retrofits, and related supportive activities, subject to the number, quality, and funding needs of applications received. DOE anticipates project costs to generally range from approximately $35M to $500M DOE share for each award. The specific funding ranges for each topic area will be defined in the FOA.

The implementation approach may vary depending on the size and complexity of the project. For the smaller projects that may be supported through the BIL funding, DOE would tailor its oversight process commensurate with the project risks. The larger, more complex projects that may be supported either through BIL or IRA funding are anticipated to be awarded through a FOA covering the following four phases (see Figure 2):

- Phase 1 – Detailed Project Planning
- Phase 2 – Project Development, Permitting, and Financing
- Phase 3 – Installation, Integration, and Construction
- Phase 4 – Ramp-Up and Sustained Operations

To facilitate long term project planning, such as securing potential strategic partners or commercial third-party financing, DOE envisions that the FOA will solicit applications that present plans for all four phases of the project. While only Phase 1 will be funded initially for selected applicants, additional funding for subsequent phases will be released based on successful completion of Go/No-Go decisions, subject to the continued availability of the $500M of BIL funds and $5.8B of IRA funds appropriated by Congress for the purpose of this program. DOE will review and evaluate progress and deliverables against expected milestones. Projects may be discontinued during or at the end of any phase at the sole discretion of DOE if the Go/No-Go criteria, project, or program requirements are not met.

More details on activities and deliverables likely expected to be completed in each phase will be provided in the FOA or during pre-award and pre-phase negotiations. Phase lengths and specific scope may be adjusted based on the readiness and status of the proposed project and applicant team, as well as the project specifics (e.g., retrofit versus new construction). It may be possible to accelerate Phase 1 and Phase 2 if substantial work has already been conducted that meets required standards for the relevant phase.

If funded through all four phases, it is envisioned that the demonstrations will reach technical and commercial viability by the end of their period of performance under this FOA. DOE will prioritize projects that show a clear intent to integrate demonstrated technologies into long-term, sustained operations to produce products. Though the Department's goal will be to support projects that will operate into the future, DOE may require disposition and decommissioning plans as part of decision points to mitigate the risk for stranded assets.

Figure 2. Example OCED project phases.

Achieving DOE's broad end goals will necessitate review and evaluation of proposed project characteristics that include cost, schedule, and scope; technology; environmental; business; market; financial; management; community support; or other factors. Each subsequent phase will be structured to ensure that each project meets a standard level of maturity, employs a robust execution approach, delivers meaningful community benefits while minimizing negative impacts, and that technical and non-technical project risk is adequately and appropriately managed throughout DOE's engagement.

Topic Areas

Industrial GHG emissions are generated through a wide variety of processes and therefore no single technology solution exists to address them. DOE will take a broad, multifaceted approach to solving industrial decarbonization challenges in alignment with Congressional intent and input from industry. DOE anticipates funding multiple categories of projects via Topic Areas aligned with BIL and IRA funding sources. Potential project types may include:

- Projects that test and validate emissions-reducing technologies, including using modeling and simulations to optimize energy efficiency, and monitoring and communication through smart manufacturing technologies;[22]
- World-leading, first-of-a-kind, facility infrastructure projects, resulting in significant emissions reductions up to net-zero operations;
- Facility-level overhaul retrofits for existing facilities or accelerated/ongoing new builds;
- Upgrades and retrofits to target deep decarbonization and validate technologies within critical unit operations or single process lines; and,
- Multi-facility retrofits utilizing a common technology base or approach, or utilizing common infrastructure (e.g., electrical or thermal inputs, storage).

Areas of Interest (AOI) may include high-emissions industrial production processes in iron, steel, steel mill products, aluminum, cement, concrete, glass, pulp, paper, industrial ceramics, chemicals, and other energy-intensive industrial sectors. In addition to the industry-specific opportunities, which require process-specific solutions, crosscutting opportunities to minimize the GHG emissions across the sector or sectors will be considered. These AOIs will be based on

[22] 42 U.S.C. §17113(c)

statutory language,[23] analysis of the highest emitting industries, and the best opportunities for deep decarbonization and advances in U.S. industrial competitiveness.

In targeting high-emissions industries, DOE intends to support the de-risking and installation of advanced industrial technologies[24] by incentivizing eligible facilities to pursue projects with the potential to decrease GHG emissions through widespread adoption. To implement statutory priorities, this FOA will aim to achieve emissions reduction in medium- and high- temperature heat generation, leverage smart manufacturing principles to improve energy efficiency, assist in the development of a circular economy through sustainable chemistry and engineering, and facilitate the development of technologies that lead to net-zero emissions in nonpower industrial sectors, while minimizing waste and harmful emissions.[25]

Program Priorities

DOE will align with statutory requirements, and intends to prioritize transformative at-scale projects that:

- Demonstrate and validate technical and commercial viability of technologies and integrated solutions;
- Minimize facility- and product-level GHG emissions to drive toward low- and zero-carbon solutions and accelerate the market for clean materials;
- Justify the projects' ability to facilitate the greatest benefit for the greatest number of people within the area in which the eligible facility is located;[26]
- Identify likely partnerships with participants to purchase the eligible facility's outputs during or after the project;[27]
- Support replicability, scalability, and adoption potential to accelerate the overall industry transition to net-zero without creating other negative outcomes, such as increased non-GHG emissions; and,
- Contribute to a diversified, risk-based portfolio of industrial decarbonization projects across DOE provisions and programs.

In addition to these priorities, programmatic considerations for evaluating applications will include **technical merit and impact, financial and market viability, workplan, project team and partners, and community benefits plan**.

To support the goals of building a clean and equitable energy economy, DOE will require a Community Benefits Plan and its implementation that:

- Supports meaningful community and labor engagement;
- Invests in America's workforce and support good jobs;
- Advances diversity, equity, inclusion, and accessibility; and,
- Contributes to the President's goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities (the Justice40 Initiative).[28]

[23] 42 U.S.C. § 17113(c)(1); 42 U.S.C. § 17113b(g)(3)
[24] 42 U.S.C. § 17113b(g)(1)
[25] 42 U.S.C. § 17113(c)
[26] 42 U.S.C. § 17113b(d)(2)
[27] 42 U.S.C. § 17113b(d)(3)
[28] The Justice40 initiative, established by section 223 of EO 14008, sets a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. Pursuant to E.O. 14008 and the Office of Management and Budget's Interim Justice40 Implementation Guidance M-21-28, DOE has developed a definition and tools to locate and identify disadvantaged communities. These resources can be located at https://energyjustice.egs.anl.gov/. DOE will also recognize disadvantaged

DOE will look for applications that account for a region's overall capabilities and shared assets, and leverage synergies across public and private efforts at all levels, to the extent allowed by law. The Department will look for plans with a high probability of success across technology, environmental, and regional economic development measures, and where applicable, consult other relevant federal agencies for analytical support in making these determinations. Guidance on specific application and reporting requirements will be included in the FOA but examples are available on OCED Exchange.[29]

DOE anticipates providing awards to teams that are led by a single entity. All applicants are encouraged to partner with experts in technical engineering support or analysis, lifecycle analysis, and/or community benefits if none exist within the applicant's team.

Additional details on Selection Criteria will be provided in the FOA.

Submission and Registration Requirements for Full Application

OCED envisions awarding multiple financial assistance awards in the form of cooperative agreements. The FOA will be released on or about March 2023 and will likely require concept papers. DOE will issue notifications as to whether respondents are encouraged or discouraged to submit full FOA applications based on concept paper reviews. An encourage/discourage notification does not preclude any entity that submitted a concept paper from submitting a full application. Applicants must submit a concept paper to be eligible to submit a full application, which will be requested following the concept paper notifications. OCED intends to announce selections in late 2023.[30]

This Notice is issued so that interested parties are aware of the OCED's intention to issue this FOA in the near term. All the information contained in this Notice is subject to change. **OCED will not accept questions at this time regarding issuance of the potential FOA. Details on how to submit questions and comments will be provided in the FOA, when issued.**

OCED plans to issue the FOA via the OCED eXCHANGE website https://oced-eXCHANGE.energy.gov/. If applicants wish to receive official notifications and information from OCED regarding this FOA, they should register in OCED eXCHANGE. When the FOA is released, applications will be accepted only through OCED eXCHANGE.

In anticipation of the FOA being released, applicants are advised to complete the following steps, which are required for application submission:

- Register and create an account in OCED eXCHANGE at https://oced-eXCHANGE.energy.gov. This account will allow the user to apply to any open OCED FOAs that are currently in OCED eXCHANGE. Please note that potential applicants must create an account in OCED eXCHANGE even if the organization has already registered for an EERE eXCHANGE account. It is recommended that each organization or business unit, whether

communities as defined and identified by the White House Council of Environmental Quality's Climate and Economic Justice Screening Tool (CEJST), which can be located at https://screeningtool.geoplatform.gov/. DOE's Justice40 Implementation Guidance is located at https://www.energy.gov/sites/default/files/2022-07/Final%20DOE%20Justice40%20General%20Guidance%20072522.pdf .

[29] See for example Community Benefits Plan Guidance for DE-FOA-0002779 (Clean Hydrogen Hubs under Application Forms and Templates); available for download at https://oced-exchange.energy.gov

[30] Please note that these dates are tentative and subject to change.

acting as a team or a single entity, use only one account as the contact point for each submission. Questions related to the registration process and use of the OCED Exchange website should be submitted to: OCED-ExchangeSupport@hq.doe.gov

- Register with the System for Award Management (SAM) at https://www.sam.gov. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called a Marketing Partner Identification Number (MPIN) are important steps in SAM registration. Please update your SAM registration annually. Upon registration, SAM will automatically assign a Unique Entity ID (UEI).

- Register in FedConnect at https://www.fedconnect.net/. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

- Register in Grants.gov to receive automatic updates when amendments to a FOA are posted. However, please note that applications will not be accepted through Grants.gov. http://www.grants.gov/. All applications must be submitted through OCED eXCHANGE.