U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy

Industrial Efficiency and Decarbonization Office
NATIONAL LABORATORY CALL FOR PROPOSALS

Technical Resources for Industrial Pursuit of Lower Emissions (TRIPLE)
DE-LC-0000019.0001

National Lab Funding for Fiscal Years 2023-2026

This Lab Call is being issued by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Industrial Efficiency and Decarbonization Office (IEDO).

Modifications

Mod. No.	Date	Description of Modification
0001	4/27/2023	On Pages 36 and 41, removed erroneous references to Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs, as the document is not a required element of Applications to this Lab Call.

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I. Lab Call Description

A. Background and Context

i. Overview and Purpose

EERE National Laboratory Guiding Principles require all offices to pursue a merit review of direct-funded National Laboratory work. In line with these principles, the Industrial Efficiency and Decarbonization Office (IEDO) is issuing this Lab Call for fiscal years 2023-2026.

Some DOE/NNSA National Laboratories (also referred to as "labs" or "laboratories") have continuing multi-year projects that have already gone through the merit review process. These will continue to be reviewed through the annual peer review process. Labs should work with IEDO project and program managers to ensure that ongoing projects are included in the annual operating plans (AOP) to meet AOP deadlines. This Lab Call will only pertain to the new topic areas below.

Building a clean and equitable energy economy and addressing the climate crisis is a top priority of the Biden Administration. This Lab Call will advance the Biden Administration's goals to achieve carbon pollution-free electricity by 2035 and to "deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050"[1] to the benefit of all Americans. The Department of Energy is committed to pushing the frontiers of science and engineering, catalyzing clean energy jobs through research, development, demonstration, and deployment (RDD&D), and ensuring environmental justice and inclusion of underserved communities.[2]

The technical assistance activities to be funded under this Lab Call will support the government-wide approach to the climate crisis by driving the innovation that can lead to the deployment of clean energy technologies, which are critical for climate protection. Specifically, this Lab Call will follow the recommendations of DOE's Industrial Decarbonization Roadmap, which identifies four crosscutting decarbonization

[1] Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.

[2] The term "underserved communities" refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the definition of "equity." E.O. 13985. For purposes of this Lab Call, as applicable to geographic communities, applicants can refer to economically distressed communities identified by the Internal Revenue Service as Qualified Opportunity Zones; communities identified as disadvantaged or underserved communities by their respective States; communities identified on the Index of Deep Disadvantage referenced at https://news.umich.edu/new-index-ranks-americas-100-most-disadvantaged-communities/, and communities that otherwise meet the definition of "underserved communities" stated above.

pillars: energy efficiency; industrial electrification; low-carbon fuels, feedstocks, and energy sources (LCFFES); and carbon capture, utilization, and storage (CCUS). This Lab Call supports the Technical Assistance and Workforce Development subprogram's focus on making knowledge and transformational tools accessible to manufacturing organizations to increase the adoption of decarbonization technologies and advanced energy and water efficiency technologies and practices across the industrial sector. The included topic areas will enable expansion and integration of programmatic activities in the areas of energy efficiency, energy management systems, onsite renewables and storage, energy-water nexus, and engaging with underserved communities and underrepresented populations. In addition, this Lab Call will emphasize increasing diversity of research staff, increasing diversity of voices in research design, and/or increasing quantification and emphasis on supporting underserved communities.

The Department of Energy is committed to pushing the frontiers of science and engineering, catalyzing clean energy jobs through research, development, demonstration, and deployment (RDD&D), and ensuring environmental justice and inclusion of underserved communities. For more information about IEDO (formerly the Advanced Manufacturing Office) goals and technical targets, please see the Advanced Manufacturing Office Draft Multi-Year Program Plan. The IEDO Vision and Mission as well as the current funding portfolio can be found on the IEDO web site.

ii. Timeline and Process Logistics

Timeline

KEY DATES	
Lab Call Release Date:	March 21, 2023 12:00 PM ET
PROPOSAL DEADLINE AND DECISION DATES	
Full Application Submission Deadline:	May 19, 2023, 5:00 pm ET
Expected Decision Date:	June 23, 2023 5:00 pm ET
Expected Beginning Award Issue Date:	August 1, 2023 12:00 pm ET

Process Logistics

All communication to IEDO regarding this Lab Call must use IEDOLabCall@ee.doe.gov.

- **PROPOSAL SUBMISSIONS:** To apply to this Lab Call, lab personnel must register (and sign in) with their lab email address and submit application materials through EERE eXCHANGE. Application materials must be submitted through EERE eXCHANGE at https://eere-eXCHANGE.energy.gov, EERE's online application portal. Frequently asked questions for this Lab Call and the EERE

Application process can be found at https://eere-eXCHANGE.energy.gov/FAQ.aspx.

Applicants are responsible for meeting the submission deadlines. DOE strongly encourages all applicants to submit the required information at least 24 hours in advance of the submission deadline. Applicants should not wait until the last minute—internet and data server traffic can be heavy in the last hours before the submission deadline, which may affect the applicants' ability to successfully submit the required information before the deadline.

- **QUESTIONS DURING OPEN LAB CALL PERIOD:** Specific questions about this Lab Call should be submitted via e-mail to IEDOLabCall@ee.doe.gov. IEDO will provide answers related to this Lab Call on EERE eXCHANGE at: https://eere-eXCHANGE.energy.gov. Please note that you must first select the specific opportunity number for this Lab Call in order to view the questions and answers specific to this Lab Call. EERE will attempt to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

  Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-eXCHANGESupport@hq.doe.gov. To ensure fairness for all lab participants, please do not ask individual IEDO staff questions directly.

- **NOTIFICATION OF SELECTION:** When selections are finalized, lab leads will receive an email from IEDOLabCall@ee.doe.gov.

B. Key Considerations and Topic Area(s)

i. Key Considerations

- **AVAILABLE FUNDING:** There is approximately **$9,200,000 in annual funding** available to fund **all** projects solicited in this Lab Call pending appropriations, program direction, and go/no-go decision points.

- **NON-LAB PARTNERS:** Labs partnering with industry, academia or other non-lab entities to perform work under this Lab Call must enter into a Cooperative Research and Development Agreement (CRADA) with those partners within time parameters set forth by the funding program.

- **ELIGIBILITY:** All DOE/National Nuclear Security Agency (NNSA) National Laboratories, are eligible to submit proposals, unless specified otherwise. Proposals that involve more than one laboratory are also allowed. Only one

proposal can be submitted per Laboratory per topic area in this Lab Call. Cost share is not required.

- **DIVERSITY, EQUITY, and INCLUSION:**
  It is the policy of the Biden Administration that:

  > [T]he Federal Government should pursue a comprehensive approach to advancing equity[3] for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our government. Because advancing equity requires a systematic approach to embedding fairness in decision-making processes, executive departments and agencies (agencies) must recognize and work to redress inequities in their policies and programs that serve as barriers to equal opportunity.
  >
  > By advancing equity across the Federal Government, we can create opportunities for the improvement of communities that have been historically underserved, which benefits everyone.[4]
  >
  > As part of this whole of government approach, this Lab Call seeks to encourage the participation of underserved communities and underrepresented[5] groups. Applicants are highly encouraged to include individuals from groups historically underrepresented, in STEM on their project teams. As part of the application, applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Specifically, applicants are required to reference, if available, the existing laboratory Diversity, Equity, and Inclusion Plan and describe within the technical volume the actions the

[3] The term "equity" means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. E.O. 13985.

[4] Executive Order 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government" (Jan. 20, 2021).

[5] Note that Congress recognized in section 305 of the American Innovation and Competitiveness Act of 2017, Public Law 114-329:

> (1) [I]t is critical to our Nation's economic leadership and global competitiveness that the United States educate, train, and retain more scientists, engineers, and computer scientists; (2) there is currently a disconnect between the availability of and growing demand for STEM-skilled workers; (3) historically, underrepresented populations are the largest untapped STEM talent pools in the United States; and (4) given the shifting demographic landscape, the United States should encourage full participation of individuals from underrepresented populations in STEM fields.

applicant will take to foster a welcoming and inclusive environment, support people from underrepresented groups in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be in, or benefit underserved communities (see Project DEIA activities).Because a diverse set of voices at the table in research design and execution has an illustrated impact on innovation, this implementation strategy for the lab-wide plan will be evaluated as part of the technical review process.

Further, Minority Serving Institutions[6], Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or entities located in an underserved community that meet the eligibility requirements are encouraged to participate in an application as a proposed partner to the prime applicant. The Selection Official may consider the inclusion of these types of entities as part of the selection decision. For more information on how these impact scoring, please refer to Section II.2.B.ii.

- **EERE NATIONAL LABORATORY GUIDING PRINCIPLES:** To ensure continued alignment with EERE lab engagement principles, applicants should consider the following when developing their proposals:
    - IEDO strongly encourages projects that bring together multiple labs in a consortia-based approach to meet a high-level strategic goal, leveraging multiple lab capabilities with strong, centralized leadership.
    - To the extent possible and appropriate, IEDO seeks lab projects that involve industry engagement or industry partners.

[6] Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities/Other Minority Institutions) as educational entities recognized by the Office of Civil Rights (OCR), U.S. Department of Education, and identified on the OCR's Department of Education U.S. accredited postsecondary minorities' institution list. See https://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html.

ii. Topic Area Descriptions

Topic 1: Onsite Energy Deployment Program Support

- Eligibility: Eligibility is limited to DOE/NNSA National Laboratories
- Estimated DOE Funding Available: $3,000,000 per year
- Estimated Number of Projects Expected: 1
- Estimated Project Duration: FY23-FY26 (4 years), subject to annual appropriations and congressional direction

Topic Overview

Deployment of onsite clean energy and supporting technologies (e.g., solar photovoltaics, solar thermal, wind power, renewable fuels, geothermal, battery storage, thermal storage, industrial heat pumps, etc.) will play a critical role in achieving President Biden's goal of a 100% clean electrical grid by 2035 and net-zero greenhouse gas (GHG) emissions by 2050. At the same time, many industrial companies are increasingly seeking technical assistance and resources to identify and deploy onsite solutions that produce flexible, reliable, and affordable energy that reduces greenhouse gas emissions and helps achieve corporate sustainability goals.

For more than two decades, DOE's technical assistance efforts have advanced awareness and facilitated increased deployment of combined heat and power (CHP), waste heat to power (WHP) and district energy technologies. To support the evolving needs of the industrial sector, IEDO is leveraging this successful program model to deliver technical assistance for a broader set of onsite solutions. This new onsite energy program aims to:

- Support deployment of onsite clean energy technologies that directly reduce GHG emissions at industrial sites while prioritizing disadvantaged communities and minority-owned businesses
- Assist industry in identifying cost-effective technology options to achieve clean energy targets
- Highlight pathways to accelerate the integration of onsite clean energy technologies and support the development of a highly trained workforce to install, maintain, and operate these technologies
- Engage with strategic stakeholders, including utilities, regulators, and state and local policymakers to identify and reduce barriers to onsite clean energy technology deployment

Through this Lab Call, IEDO is seeking an Onsite Technical Analysis Team that will provide subject matter expertise, research, and analysis for the onsite energy program and the range of technologies that the program will support. These technologies include—but are not limited to—solar photovoltaic, solar thermal, wind power, renewable fuels, geothermal, battery storage, thermal storage, and industrial heat pumps. Proposals from multi-lab teams are encouraged to ensure expertise and capabilities cover a broad range of renewable and storage technologies. The successful lab team will be expected to coordinate with an existing team focused on CHP, microgrids, waste heat, and district energy technologies.[7]

IEDO is currently in the initial stages of developing and launching the onsite energy program. The Onsite Technical Analysis Team will play a key role in the successful implementation of the program by:

- Supporting the onsite energy program launch strategy
- Conducting comprehensive market analysis to identify onsite energy technology opportunities in the industrial sector and inform strategic planning
- Developing protocols and tools for onsite energy technology screenings
- Coordinating activities with the Onsite Energy Technical Assistance Partnership Program
- Developing an initial set of program resources and webpages

Following the successful launch of the onsite energy program, which is expected to begin operating in Fiscal Year 2023, the Onsite Technical Analysis Team will provide longer-term program support, including:

- Conducting onsite technology screenings and advanced analysis for industrial sites
- Conducting research and market analysis to identify priority opportunities for onsite energy technology deployment
- Maintaining onsite energy program resources and developing new resources as needed
- Supporting technical assistance activities and engagements

[7] For more information on existing work, see the CHP Deployment Program website on the Better Buildings Solution Center: https://betterbuildingssolutioncenter.energy.gov/chp

Project Objectives

IEDO expects the successful laboratory to focus on five areas:

1. Conduct market analysis and research for onsite energy technologies
2. Develop protocols and tools for onsite energy technology screenings
3. Conduct renewable energy and storage technology screening analysis
4. Develop and maintain onsite energy program website and resources
5. Support technical assistance and engagements related to renewable energy and storage

This focus will enable IEDO to ensure that the onsite energy program is effective in identifying and supporting opportunities for onsite energy technology deployment at industrial facilities. The assistance sought from the laboratory will also enable IEDO to accelerate the integration of critical renewable energy and energy storage technologies across the industrial sector, propelling our nation towards industrial decarbonization goals.

The successful laboratory will be expected to work closely with the IEDO team overseeing the onsite energy program, to plan out work products that meet IEDO's priorities, define specific milestones for analysis activities, and outline strategic research areas. The laboratory will set up bi-weekly meetings with IEDO staff to review progress and plan for upcoming activities. At the end of each quarter the laboratory will submit a quarterly report with consolidated information on all program activities and current budget status. Specific information on each of the five focus areas is included in the table below.

Table 1: *Onsite Energy Program Focus Areas*

Onsite Energy Market Analysis and Research	• Conduct market analysis that focuses on onsite renewable energy and storage opportunities in the industrial sector, and collect and quantify the following data sets: ○ Existing installations ○ Current industrial energy sector footprint (electric and thermal) ○ Technical and economic potential of different behind-the-meter onsite energy technologies by region and subsector (in present day + market forecast), while

	also considering complementarity of different technology options ○ Industrial energy footprint in combination with data on technical/economic potential to assess scale of opportunity by industrial subsectors and location ○ Descriptions of specific, priority opportunities to meet current industrial electric and thermal demands with onsite resources • Conduct analysis and evaluation of regulatory and market barriers/opportunities for onsite energy technologies in the industrial sector • Contribute to the development of strategic plans for the onsite energy program (updated annually) to guide program activities; strategic planning activities should help IEDO: ○ Prioritize support for the deployment of specific onsite energy technologies where it is most cost-effective ○ Identify and prioritize opportunities to increase engagement in underserved communities and identify opportunities to support minority- and women-owned businesses ○ Clearly describe program goals and milestones
Develop Protocols and Tools for Technology Screenings	• Conduct tools landscape analysis • Comparative analysis of different techno-economic analysis tools for distributed energy resources (REopt, DER-CAM, DER-VET, Homer, System Advisor Model (SAM), TRNSYS, etc.) • Evaluate efficacy of tools for different onsite technologies and industrial system characteristics • Identify opportunities where specific tools should be used based on technology opportunity, site characteristics, etc.

	• Leverage findings from tool landscape analysis to develop a menu of TA offerings and technology screening protocol
	  • Protocol will be used to make onsite technology recommendations based on organization goals and site characteristics
	  • Identify opportunities for technology screening protocol improvement and update protocol as needed

Conduct Onsite Technology Screening Analysis	• Carry out technical screenings for renewable energy and storage technologies ○ Leverage technology screening protocol to evaluate a range of onsite technology options and identify optimal and cost-effective mix of technologies given a site's specific characteristics and goals

Develop and Maintain Program Resources and Website	• Develop and maintain an initial set of resources, such as:
	  ○ State-specific summaries of regional onsite technology opportunities for the industrial sector
	  ○ Onsite technology fact sheets and industrial subsector profiles
	• Develop website for onsite program
	  ○ Web-based platform for organizations to request technical assistance
	  ○ Host webinars and conduct outreach targeted towards priority stakeholders, using audience-specific material
	• Identify resource needs and develop additional resources/tools as needed

Support Technical Assistance	• Provide onsite energy technology subject matter expertise to IEDO and Technical Assistance Partnerships, as needed

Engagements and Activities	• Develop ad hoc analysis for onsite energy technology technical assistance activities, as needed

Project Structure

One DOE/NNSA National Laboratory, or a team of DOE/NNSA National Laboratories, will be expected to support the Onsite Energy Program. Applicants will submit a proposal detailing their team's qualifications and experience with different onsite energy technologies, technical assistance, and deployment programs. Proposals will also include how the team will address the objectives of the program. Laboratory teams may plan to use subcontractors to augment their staff experience. The Lab Call will be open and applications will be due by the date indicated in Exchange and on the cover sheet.

Topic 2: Controlled Environment Agriculture (CEA) Accelerator

- Eligibility: Eligibility is limited to DOE/NNSA National Laboratories
- Estimated DOE Funding Available: $2,000,000
- Estimated Number of Projects Expected: 1
- Estimated Project Duration: FY23-FY25 (2-3 years), subject to annual appropriations and congressional direction

Topic Overview

As described in IEDO's Industrial Decarbonization Roadmap, the food and beverage subsector, which includes the production of fruits and vegetables, is one of the top 5 energy-intensive industries as well as one of the top 5 carbon-emitting industries in the U.S.[8] On an international scale, the United Nation's Intergovernmental Panel on Climate Change has found that agriculture, forestry, and other land use activities accounted for ~13% of CO_2, 44% of CH_4, and 81% of N_2O global emissions during 2007-2016—representing 23% of total net anthropogenic GHGs[9]. Furthermore, the IEDO-funded National Alliance for Water Innovation (NAWI) has identified the U.S. agricultural industry as a user of nearly 280 billion liters of water per day[10], much of which requires significant energy resources to treat and transport across the nation.

Analysis of the energy-water nexus more broadly has shown interdependencies that go beyond the need to improve water supply and quality—but that energy and water are intimately linked to agriculture, which in the 21st century has grown to an industrial scale. Therefore, innovations must address the interdependencies of these three areas—the energy-water-food nexus. IEDO's goals encompass an important role in developing technology solutions to ensure that the modern agricultural sector has the industrial infrastructure, tools, and technologies to meet production demand, and ensure that supply chains supporting agriculture are operating to effectively manage energy use, water use, and GHG emissions.

The food supply chain stretches from on-farm production through manufacturing, distribution, wholesale and retail sales, all the way to consumption and waste disposal. Each of these steps presents technological opportunities for energy and water efficiency improvements, as well as decarbonization opportunities, including:

[8] DOE's Industrial Efficiency and Decarbonization Office, Industrial Decarbonization Roadmap (energy.gov).
[9] United Nations' Intergovernmental Panel on Climate Change, 2021 report.
[10] National Alliance for Water Innovation (NAWI), Technology Roadmap: Agriculture Sector (nrel.gov).

- Reduction of freshwater withdrawals through water recycling and leveraging of alternative water sources;
- Reduction of greenhouse gas emissions in cross-country transportation from farm-to-table;
- Reduction of food waste (and consequently landfill disposal and further methane emissions) both at the wholesale/retail and consumer levels due to inconsistent food quality;
- Increasing food access due to market gaps in existing food distribution business models; and
- Diversifying food supply and promoting production resilience.

One pathway to achieving these opportunities to supplement traditional food production is through **Controlled Environment Agriculture (CEA)**. CEA is a technology-based approach to producing food in a greenhouse or other indoor facility. These built environments are conducive to applications in a wide array of settings including both rural and urban areas, assuming appropriate energy and resource availability. CEA is currently valued at $15.7B globally, with an expectation to reach $31.1B by 2027 according to a recent European Union report citing Research and Markets[11],[12]. In particular, due to increased siting flexibility relative to conventional agriculture, CEA has the potential to enable intrinsically-local means to produce fresh produce near customers, year-round by controlling the environmental factors (e.g. lighting, humidity, temperature, nutrients, etc.) necessary for plant growth. Notably, CEA is deeply dependent on reliable energy resources, and is increasingly requiring robust smart manufacturing interfaces.

Compared to traditional on-field farming, CEA drastically reduces reliance on water per unit of food production by orders of magnitude in addition to producing much higher yields with lower carbon emissions. However, achieving this water reduction requires significantly more energy. **Table 2** shows a case study comparing conventional, open-field farming of lettuce with conditions in a CEA greenhouse and vertical farm over the course of a year. The objective of this topic area is to develop tools and resources that help current and future CEA installations achieve robust water savings while being as energy efficient as possible.

[11] European Institute of Innovation and Technology Food North-West, 2022 report.
[12] Research and Markets, 2022 Indoor Farming Market Global Industry Trends.

Table 2: *Summary of Annual Data for Conventional vs. CEA (Greenhouse and Vertical Farm) Grown Lettuce; adapted from Avgoustaki and Xydis*[13]

For lettuce farming on annual basis	**Conventional (Outdoor Field) Farm**	**Greenhouse**	**Vertical Farm**
Energy Use[14],[15]	0.3 kWh/kg	60-180 kWh/kg	250 kWh/kg
Water Use Efficiency[16],[15]	250 L/kg	20 L/kg	1 L/kg
CO_2 Emissions[17]	540 kg/ton lettuce	352 kg/ton lettuce	158 kg/ton lettuce
Crop Yield [17]	3.9 kg/m^2	41 kg/m^2	80-120 kg/m^2
Typical Transportation Distance[18]	3200 km	800-1600 km	43 km

Despite wide adoption of CEA in many other countries like the Netherlands and Canada, it faces technical and economic challenges in the U.S., discussed at length in a 2021 House Committee hearing[19], including high capital costs, energy demand, and lack of a stable workforce. The CEA industry similarly requires optimizing multiple variables through both hardware (including sensors and controls) and software tools (including data science-driven automation) to yield highly efficient production, as many modern manufacturing practices have embraced. A 2021 workshop conducted by Lawrence Berkeley National Lab in partnership with the U.S. Department of Agriculture (USDA) Agricultural Research Service summarized remaining CEA challenge and opportunity areas that highlight where some of the technology and integration

[13] Avgoustaki *et al.*, *Advances in Food Security and Sustainability*. 2020.
[14] Barbosa *et al*., *Int. J. Environ. Res. Public Health.* 2015; 2015(12):6879–6891.
[15] Graamans *et al., Agr. Syst.* 2017; 160:31–43.
[16] Coyle and Ellison, *Agric. Appl. Econ. Assoc.* 2017; 32(1):1–8.
[17] Gerecsey, OneFarm Report CO2 Emissions Scoping Report; 2018.
[18] Food miles calculations are regionally dependent on farm locations; assumptions and calculators are available in H. Hill's "Food Miles: Background and Marketing" report, produced by the National Center for Appropriate Technology through the ATTRA Sustainable Agriculture program, under a cooperative agreement with USDA Rural Development.

[19] 117th Congress Hearing before the House Committee on Agriculture, 21st Century Food Systems: Controlled Environment Agriculture's Role in Protecting Domestic Food Supply Chains and Infrastructure; 2021.

developments are most needed, shown in **Table 3**: CEA Challenge/Opportunity Areas; identified at the 11/4/21 CEA Workshop by the Lawrence Berkeley National Laboratory and the U.S. Department of Agriculture, Agricultural Research Service at University of Toledo**Table 3**.

Some studies suggest that despite the identified challenges, early markets may be able to tolerate initially higher costs, as some consumers have a growing "willingness to pay" for locally produced food, attributed to: higher value given to quality and nutrition, environmental impacts, and support of local farmers[20]. However, this trend varies from state to state, region to region. Moreover, some key markets may not be able to tolerate higher costs. Food desert[21] communities of the U.S., for example, typically represent distressed regions that could accommodate CEA in a variety of locations, including greenfields, brownfields, urban centers, remote communities, etc., that typically reflect locations least likely to have the capital and means to install and maintain CEA farms with existing local resources.

To address these challenges, IEDO is seeking proposals to launch and support a multi-year CEA Accelerator. The accelerator model is a targeted, partner-focused set of activities designed to demonstrate innovative policies and approaches to accelerate investment in energy efficiency and decarbonization. The goal of this CEA Accelerator is to lower the barrier to entry for CEA technologies and grow energy- and water-efficient CEA facilities in areas identified to need it the most, while optimizing the conservation of resources for these communities.

[20] USDA ERS, Trends in U.S. Local and Regional Food Systems: A Report to Congress; 2015.
[21] USDA ERS, Food Access Research Atlas.

***Table 3**: CEA Challenge/Opportunity Areas; identified at the 11/4/21 CEA Workshop by the Lawrence Berkeley National Laboratory and the U.S. Department of Agriculture, Agricultural Research Service at University of Toledo*

Energy Efficiency

Increase energy efficiency: HVAC (utilize waste heat), lighting (control natural/artificial light, eliminate non-photosynthetic light), building envelope, and other loads.

Water and Waste Management

Optimize zero-discharge operations, precision water treatment for reclamation and recycling of nutrients and chemicals.

Microbiome + Pests, Disease, and Beneficials

Develop systems/approaches for beneficial microbiome dynamics that reflect field-relevant conditions.

Sensors and Testbeds

Bring machine learning and artificial intelligence systems into CEA to track plant health and pest pressure, as well as optimize harvesting.

System Integration and Resilience

Consider systemic impacts, including integration with combined heat and power, district energy, and microgrids.

Project Objectives

While various companies and organizations have begun developing and sharing CEA best practices, there is a need for technical assistance that can be customized to individual, specific communities to de-risk the opportunities CEA can offer. IEDO expects the CEA accelerator to characterize market barriers and identify technical and market solutions to overcome them, including cataloguing relevant CEA technologies like the suite of 'smart' capabilities for automated indoor farm monitoring and operation, and integrated energy systems such as combined heat and power (CHP)

integrated with CEA. Though much of the indoor farming discussions often center around vertical farming for urban areas[22], IEDO also expects the CEA accelerator to address a variety of community types, including rural areas, and addressing utilization of a variety of built environment infrastructure beyond the vertical farm model.

The CEA Accelerator has 4 core task objectives:

1. **Design an outreach plan with milestones to recruit and convene a diverse group of stakeholders relevant to the accelerator's goals;**
2. **Develop tools to assess CEA feasibility in different communities**;
3. **Connect community partners to DOE resources**; and
4. **Engage future CEA stakeholders and workforce**.

The selected national laboratory, or laboratory team, will be expected to work closely with the IEDO team that oversees the CEA portfolio, to plan out work products that meet IEDO's priorities, and define specific milestones for outreach activities. The initial target timeframe is a 2-year accelerator.

The project team will need the capability to gather relevant data and conduct analysis to create tools designed to determine if a site is suitable for CEA (including cost and labor). The project team should expect to work with the USDA[23] and the cooperative extension system, in addition to convening community partners.

The project team should have or develop the knowledge and mechanisms to share DOE resources available to the community partners, including but not limited to funding opportunities offered through EERE offices, the DOE Office of Intergovernmental and External Affairs, the Office of Technology Transitions, the Office of Clean Energy Demonstrations, and others.

Finally, the successful lab will support stakeholder engagement efforts with local communities, state energy and agricultural offices, economic development agencies, and other organizations to develop the area's workforce capacity in high-tech jobs. Understanding the suite of functional business models that could be adapted to specific locations, the food supply chain players therein, and the unique circumstances given different nuances of cost and workforce, is the ultimate end goal. Specific information on each of the four task objectives of this Lab Call is included in **Table 4** below.

[22] Food and Agriculture Organization of the United Nations, Vertical Farming; 2021.
[23] USDA agencies, https://www.usda.gov/our-agency/agencies.

Table 4: CEA Accelerator Objectives with Deliverables

1. Design an outreach plan with milestones to recruit and convene a diverse group of stakeholders relevant to the accelerator's goals *(accelerator pre-launch)*	**Defining accelerator milestones**
	• Establish a milestone target for the number of community partners to recruit prior to the accelerator's launch.
	• Strategize the accelerator work activities and desired outcomes, planning for initially a two-year accelerator period. This should include setting up a meeting cadence with IEDO staff to review activity and budget plans, and submitting status report-outs. Also required is an exchange of a status report from the community partners to the lab on data collection, and lab product deliverables for the partner at the end of the accelerator.
	• Define the lab's work products for community partners, including the required feasibility screening tool (Objective 2) and screening of at least 5 geographically unique communities (e.g. rural, urban, island community). Other work products could include auxiliary resources like a best practice webinar series, one-on-one community partner profiles, online platform for information exchange, and a partner-convening conference.
	Identifying partners and USDA point of contact(s)
	• Ensure partners represent a diverse set of stakeholders. IEDO expects at least 15-20 partners will need to be identified to effectively represent key stakeholders. These include but are not limited to:
	  ○ City or county-level governments and regional communities with a desire to build CEA who currently do not have it;
	  ○ Communities with CEA (at least one community partner should represent an existing CEA installation);
	  ○ Organizations supporting these entities;
	  ○ CEA companies;
	  ○ Technology vendors; and
	  ○ Food distributors[24].
	• Identify relevant USDA offices to consult with during the accelerator. Examples of USDA offices include the Natural

[24] USDA Farm to School Census data suggests the top three local food procurement sources are from distributors, producers, and food processors and manufacturers; 2019.

	Resources Conservation Service, Rural Development, the National Institute for Food and Agriculture, and the Agricultural Research Service. • Leverage DOE's regional specialists and the USDA's Rural Partners Network, the Environmental Protection Agency's Local Food Local Places, and Urban Agriculture Service Centers to encourage communities in food desert regions to apply to be an accelerator partner, and use these networks to amplify potential CEA impact. **Establishing communication feedback loops** • Define the structure of consulting and cadence with the USDA office(s) and/or cooperative extension system. • Determine the most effective mechanisms of feedback to and from community partners.
2. Develop tool to assess CEA feasibility in different communities	**Researching CEA barriers and developing a technology catalogue** • Perform analysis and evaluation of regulatory and market (technical, economic, social) barriers for CEA. • Compile database of existing and emerging CEA technologies and integrated systems, including their accompanying energy consumption data, renewables connectivity, and cost if applicable. Leverage the DOE's Combined Heat and Power Technical Assistance Partnerships (CHP TAPs) to assist with specific geographical needs and state energy regulations. **Baselining community partner needs** • Survey sites for existing capabilities such as proximity and connection to the grid and for existing resources, such as CHP, etc. to maximize co-location resources and resiliency benefits. • Identify new or underutilized opportunities for leveraging alternative energy and water sources and assess feasibility of their use within communities. • Assess factors like population size, investment level, building retrofit potential, and viable crop types (in partnership with USDA and extension systems). **Developing, testing, and validating the feasibility tool** • Develop a tool to assess CEA feasibility in different communities. Test the screening tool with at least 5

	geographically diverse community partners and compare the results to partners that already have CEA installations to help de-bug and validate the tool's accuracy. • Conduct technoeconomic analysis of different communities' potential to build CEA using available commercial technologies and integration pathways. • Compare differences and common threads between the various community partners (e.g. geographical and market considerations) which affect CEA's return on investment in their area.
3. Connect community partners to DOE resources	**Sharing feasibility screening results with community partners** • Provide community partners with multiple CEA installation pathways, including technoeconomic analysis of different technology scenarios. • Work with partners that have existing CEA installations to learn how they can better optimize their facility operations. **Educating partners on best practices for energy and water savings** • Leverage DOE's Better Building, Better Plants programs including the Energy Management Program and the CHP TAPs to provide energy and water management instruction that can improve facility efficiency. • Connect partners with relevant DOE institutes and hubs (e.g. Clean Energy Smart Manufacturing Innovation Institute, CESMII[25], and NAWI) to cultivate cross-partnerships and share relevant lessons learned. **Elucidating government resources** • Share funding and training opportunities relevant to CEA, including RD&D and technical assistance from DOE offices as well as other government agencies such as the USDA. This should include program-specific initiatives, in addition to technology-agnostic programs like Small Business Innovation Research / Small Business Technology Transfer (SBIR/STTR), Lab-Embedded Entrepreneurship Program (LEEP), and Energy I-Corps.

[25] The Smart Manufacturing Institute, CESMII.

	• Screen at least 5 geographically diverse (e.g. urban/rural, southeast/pacific northwest, etc.) community partner facilities for potential impacts of other energy and water-saving opportunities beyond CEA feasibility. • Help communities better understand government processes and how to develop competitive funding applications.
4. Engage future CEA stakeholders and workforce	**Convene multiple stakeholders to grow a sustainable workforce** • Open communication channels with workers, consumers, and future technologists (i.e. educational institutions) on challenge and opportunity areas (see **Table 3**) through applicant-defined mechanisms from Objective 1, like workshops and webinars. • Host a concluding forum to convene the diverse community partners and external stakeholders to explore the accelerator's results and the many energy and non-energy challenges and benefits of CEA.

In a wider cooperative effort that leverages the technology and deployment strengths IEDO already has, DOE can start to engage diverse partners from across the food supply chain to accelerate CEA integration into different communities. These efforts align DOE priorities, which seek to decarbonize the transportation and industrial sector while reducing the carbon footprint of buildings and enabling a net-zero agricultural sector.

Project Structure

One DOE/NNSA National Laboratory, or a team of DOE/NNSA National Laboratories, will be expected to support the CEA Accelerator in identifying and supporting multiple community partners, with consulting from the USDA. Each DOE National Laboratory team should submit a proposal detailing their team's qualifications and experience with CEA technologies, CEA production systems, and anticipated screening analyses (including cost-benefit analysis for a site). Proposals should also include how the team will address the four objectives of the program. Laboratory teams may plan to use subcontractors to augment their staff experience. The Lab Call will be open and applications will be due by the date indicated in Exchange and on the cover sheet.

Topic 3: Multiple Benefits Resources

- Eligibility: Eligibility is limited to DOE/NNSA National Laboratories
- Estimated DOE Funding Available: $2,200,000
- Estimated Number of Projects Expected: 1
- Estimated Project Duration: FY23-FY25 (2-3 years), subject to annual appropriations and congressional direction

Topic Overview

Research has shown that energy efficiency implementation in manufacturing can yield additional, quantifiable benefits in areas such as maintenance, production, and environmental performance. However, these types of benefits don't often get identified or estimated during energy efficiency assessments on industrial processes or systems. In addition, these types of benefits are often omitted from conventional performance metrics, leading to overly modest payback calculations and an imperfect understanding of the impact of energy efficiency in manufacturing. If non-energy related or multiple benefits of energy efficiency measures were to be found and quantified in industrial energy assessments, the true magnitude of energy efficiency measures could be understood, leading to better and more accurate return on investment estimates for energy efficiency projects. According to the International Energy Agency report "Capturing the Multiple Benefits of Energy Efficiency (2014)," the monetary value of non-energy benefits stemming from industrial energy efficiency implementation could be in the range of 40% to 50% of the value of energy savings per measure, which could lower energy-efficiency project paybacks by more than half.

IEDO's predecessor office, the Advanced Manufacturing Office (AMO) has supported research into non-energy benefits for more than two decades. AMO's efforts have advanced awareness of the potential to improve return on investment metrics of energy-saving projects when non-energy benefits are integrated with the energy savings in such ROI calculations. Up until now, these analyses have focused on completed projects and the non-energy benefits were estimated *after* project implementation. The next step is to identify non energy benefits *before* project implementation so that plant personnel who need to submit project justifications for energy-saving/decarbonization projects can compete effectively for financial resources with other projects that get submitted in areas such as safety or productivity.

Technical assistance is needed to understand how to uncover and quantify multiple benefits of energy-efficiency investments in manufacturing plants. Energy assessments offer a prime opportunity to identify and quantify multiple benefits. To help achieve this a set of resources is needed to 1) acquire and redevelop a software tool used to

analyze non-energy benefits, 2) develop a protocol for identifying non-energy benefits, 3) integrate non-energy benefits into common ROI metrics, 4) develop a training platform to enable companies and individuals who perform energy assessments to include multiple benefits of energy efficiency in project evaluations. The training platform will need to use the tool and protocol to analyze energy-saving projects for non-energy impacts/potential benefits and how to communicate the integration of non-energy benefits in the investment evaluations of energy efficiency measures effectively. By integrating multiple benefit analyses in energy assessments and assessment reports it is expected that the business case for energy efficiency will be bolstered leading to greater implementation of energy efficiency/decarbonization projects in manufacturing.

Project Objectives

To further the commercial adoption of multiple benefits considerations, IEDO seeks a National Laboratory project team to focus on three areas in support of technical assistance efforts: 1) development of software tools, 2) generation of guidance materials, and 3) training of stakeholders. This focus will enable IEDO to provide effective resources for identifying and capturing non-energy benefits that can be integrated into commercial project justifications within U.S. manufacturing plants.

The overall objective of these activities is to create a set of tools and methodologies that facilitate the identification of non-energy benefits during energy and/or decarbonization assessments. Although guidance exists on identifying energy savings during energy assessments, there is little existing guidance for how to identify non-energy benefits during energy assessments. The tools and methodologies to be generated need to combine an approach for uncovering non-energy benefits with existing protocols and methodologies for finding energy and decarbonization savings to provide a comprehensive analysis of energy efficiency measures. The resources should be sophisticated yet easy enough to use so that anyone performing an energy assessment, from subject matter experts (SME) to plant-level personnel, can use them to identify non-energy benefits and integrate such benefits into the energy efficiency project recommendations that are generated in an energy assessment.

If successful, the materials generated through the project activities will help plant personnel submit strong, internal energy-saving project proposals that facilitate internal approval and result in greater implementation rates of energy-saving and decarbonization projects. Currently, and based on most energy assessments, personnel in manufacturing plants only have estimated energy and energy cost savings to enter

into their respective organization's ROI metrics.[26] The integration of non-energy benefits in corporate ROI calculations should enhance project justification proposals to senior management, finance, and any other stakeholder groups whose concurrence is needed to approve the implementation of energy efficiency/decarbonization projects.

Efforts outside of the US have previously shown the potential for success of the multiple benefits approach. In particular, the MBenefits project was a 5-year effort funded by the European Union (EU) Horizon 2020 program to determine how to identify and quantify non-energy benefits at the time of an energy assessment so that the business case for energy efficiency projects would reflect the full impact(s) of the project.[27] Lessons learned from the MBenefits project their stakeholders may be valuable to inform the activities anticipated in this project, particularly with respect to developing the training and business decision-making guidance that will be needed as part of the set of resources.

Table 5: *Multiple Benefits Activities*

Software tool development	• Identify key software platforms, e.g., MEASUR system tools and Manufacturing Execution Systems (MES) or Human-Machine Interface (HMI) platforms such as FactoryTalk, that could accommodate non-energy benefit modules • Procure the MBenefits tool developed by the University of Lausanne, Switzerland. • Redevelop the MBenefits tool into an open source, online platform • Incorporate assessment protocols that enable users to identify non-energy benefits while performing an energy assessment • Incorporate presentation templates into the tool that facilitate presentation of proposed energy-saving projects to senior management and similar stakeholders • Ensure operability between the software tool and other DOE tools, e.g., MEASUR, and any other software platforms such as BMS, MES and HMI platforms.

[26] Recognizing the Value of Energy Efficiency's Multiple Benefits. Russell, Chris et al. ACEEE Report IE1502 (Recognizing the Value of Energy Efficiency's Multiple Benefits (aceee.org)).
[27] https://www.mbenefits.ch/

	• Develop a smartphone app that can be used in conjunction with the tool • Ensure diversity, equity and inclusion are integrated throughout the platform
Guidance materials	Create a Toolkit based on the Lessons Learned that includes: • Generate a list of commonly found non-energy benefits • Generate an assessment protocol showing how SMEs and plant personnel can identify non-energy benefits • Discuss how to integrate non-energy benefits into common ROI metrics. Note, some savings may not last as long as energy savings and some non-energy benefits will be considered revenues. • Create a library of white papers on all the non-energy benefits-related research
Training of stakeholders	Develop Engagement Strategies that enable DOE to: • Engage with stakeholder organizations to configure the existing online training module for U.S. industrial audiences • Identify pedagogical techniques and educational frameworks that are appropriate to all the different audiences that will be impacted by the multiple benefits resources • Identify strategic outreach and collaboration opportunities with federal and other partners developing multiple benefits programming, including the ACEEE, the National Institute of Standards and Technology, state energy offices, trade, and professional associations such as the Compressed Air Challenge that perform professional/continuing education for industrial/manufacturing workers

Project Structure

The selected DOE/NNSA National Laboratory, or a team of DOE/NNSA National Laboratories, will be expected to support the Multiple Benefits resource development. This is expected to be a highly interactive process where the awarded laboratory will

collaborate directly with a team of IEDO staff to develop the resources. The Laboratory will submit a proposal detailing how their team will address the objectives of the project.

It is important that the Multiple Benefits resources maximize and build on existing IEDO content and resources to take full advantage of the investments that DOE has already made in these resources. The laboratory should also consider other government and private multiple benefits research (Library of Multiple Benefits (https://www.mbenefits.ch)) and activities to ensure that IEDO does not duplicate existing resources and to build partnerships with outside stakeholders that can be leveraged to meet IEDO's Multiple Benefits goals. Proposals will be selected based upon their approach to support IEDO's objectives, as well as the partnership's credentials and resources. IEDO will prioritize proposals that demonstrate innovative approaches, that maximize industry participation, and that increase diversity by reaching out to disadvantaged groups.

The Multiple Benefits resources must address the following key elements:

1) Software tool:
    a. Functional requirements:
        i. End users: The tool will be targeted towards a wide range of end users including professional engineers, subject matter experts, plant-level employees, and programmatic staffs.
        ii. Operational performance: The tool must be usable and scalable by the audiences mentioned above on commonly used information/communications technologies such as personal computers and smart phones.
        iii. Features and functionality: The tool must meet DOE cybersecurity standards, be compatible with the newest operating systems, be open sourced, and be interoperable with other software platforms such as MEASUR.
        iv. Support requirements: The tool shall be supported by the successful laboratory. This support may come in the form of FAQs, a "support desk," user tutorials and any other content or material that enable end users to use the tool successfully.
    b. Legal
        i. The tool will comply with any and all legal requirements as outlined by DOE's Office of General Counsel.

ii. The MBenefits tool will be acquired by the successful laboratory before being redeveloped. Any and all changes, rights, privileges, and liabilities of the newly developed tool shall be approved by DOE.

c. Tool Deployment

i. The tool will be delivered in two phases in order to mitigate risk, validate critical functionality and in a manner that is least disruptive to operations, training requirements, and end user experiences.

1. Phase 1 will be for DOE and other contractors that support/manage DOE Technical Partnerships programs.

2. Phase 2 will be for general public end users. Phase 2 will occur after all critical functionality has been validated.

ii. Testing requirements

1. Phase 1 testing will assess the consistency, robustness, and usability of the tool.

2. Phase 2 testing will assess compatibility and interoperability with other platforms such as MEASUR.

2) Guidance and training materials/content:

a. All guidance and training materials will support the project objectives of the Lab Call.

i. Training will include training on the software tool and non-energy benefits protocol.

ii. Training must be consistent with best pedagogical/adult learning practices.

iii. Training may include credentialing of end users that wish to become certified practitioners in the tool.

iv. Training and guidance shall inform other Technical Partnerships programmatic resources, e.g., treasure hunt toolkit, 50001 Ready

Topic 4: Workforce Development Consortium

- Eligibility: Eligibility is limited to DOE/NNSA National Laboratories
- Estimated DOE Funding Available: $2,000,000 per year
- Estimated Number of Projects Expected: 1
- Estimated Project Duration: FY23-FY25 (2-3 years), subject to annual appropriations and congressional direction

Topic Overview

The US manufacturing sector is facing a labor shortage, with over 800,000 job openings in 2022 and a potential shortfall of 2.1 million by 2030[28]. In addition, entry- and mid-level jobs in manufacturing need more skills than ever, as future jobs become more computer- and technology-oriented and new processes are introduced to limit carbon emissions. In the topic areas of sustainability, energy efficiency, and decarbonization in manufacturing and industry broadly, there is an overall lack of curricula, training programs, and certifications.

Administration and DOE priorities include:

- Championing a motivated, diverse, multi-generational workforce.
- Building a trained workforce and creating millions of good-paying, middle-class clean energy-focused jobs with the choice to join a union and help Americans develop the skills they need to secure these jobs.
- Contributing to priorities around diversity and inclusion of underserved communities through a targeted approach to extend workforce opportunities to demographics that are underrepresented in the manufacturing workforce.
- Supporting diversity in STEM and Clean Energy Industries.
- Supporting energy efficiency and carbon reduction goals such as decarbonizing energy intensive and high GHG industries by 50% by 2035 compared to a 2020 baseline.

In the summer of 2021, the Advanced Manufacturing Office (AMO) held a series of Education and Workforce Development (EWD) workshops to help understand what resources, skill sets, pedagogical approaches, and frameworks are needed to educate the industrial workforce and to brainstorm delivery pathways and techniques that AMO could use to maximize knowledge sharing and understanding within companies, educational organizations, and other workforce stakeholders. In addition, the workshops helped gather input on gaps in current EWD programs in advanced

[28] Wellener, Paul, Victor Reyes, Heather Ashton, and Chad Moutray. 2021. "Creating Pathways for Tomorrow's Workforce Today." Deloitte Insights and The Manufacturing Institute, May 4, 2021. https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diversity.html

manufacturing, identify where AMO could fill a niche, and gain insight on where AMO investments could have the most impact. Based on outcomes from these workshops, as well as additional stakeholder meetings, AMO assessed the current state of the manufacturing workforce and education landscape, summarized recent and current EWD activities run or funded by AMO and other federal agencies, and identified gaps and barriers. The top gaps and challenges were found to be a labor shortage, skills deficiencies, negative industry perception, and lack of curricula in sustainability, energy efficiency, and decarbonization.

Since the reorganization of AMO into IEDO and the Advanced Materials and Manufacturing Technologies Office (AMMTO), IEDO's EWD interests have shifted to focus on workforce programs supporting energy efficiency, electrification, and the transition to low-carbon fuels and feedstocks in the industrial sector. Future activities will build on existing Technical Assistance skills development programs and materials to foster increasing private-sector efficiency improvements in their industrial facilities.

IEDO's EWD objectives are strongly aligned with broader national strategies, including DOE's Industrial Decarbonization Roadmap and the National Strategy for Advanced Manufacturing. The Industrial Decarbonization Roadmap identified the development of a skilled workforce that can effectively use technology to minimize emissions and energy use as a cross-cutting barrier for decarbonizing the US industrial sector. The complementary National Strategy for Advanced Manufacturing highlighted growth of the advanced manufacturing workforce as one of three main goals. Specific recommendations included broadening and diversifying the demographic base of the advanced manufacturing workforce through engaging disadvantaged communities (DACs); scaling, developing, and promoting advanced manufacturing education and training programs; and strengthening connections between employers and education organizations through expanded on-the-job-training and apprenticeship programs.

Project Objectives

Building on these identified challenges and the recommendations for addressing them, IEDO seeks a National Laboratory project team to launch a workforce development consortium. This activity will convene and support three-to-five manufacturing workforce organizations running existing regional- or industry-specific programs that can be scaled to national reach and/or broad sectoral coverage. Consortium members will use funding to develop, expand, and/or scale successful and innovative education and workforce development programs, embedding energy efficiency and decarbonization into industry-focused training programs. Potential consortium members include—but are not limited to—manufacturing education and training

organizations; trade, industry, and labor groups; and diversity organizations, and/or professional societies/associations.

The successful laboratory team will be expected to work closely with IEDO to develop and release a consortium request for proposals (RFP). The project team will competitively select respondents to the RFP in collaboration with IEDO, who will be funded through subcontracts. The laboratory will set up bi-weekly meetings with IEDO staff to review progress and plan for upcoming activities of the consortium. At the end of each quarter the laboratory will submit a quarterly report with consolidated information on all program activities and current budget status.

The overall objective of this activity is to leverage existing workforce initiatives and material that have been developed to enhance the accessibility for manufacturers seeking to develop a workforce in energy efficiency, electrification, and the transition to low-carbon fuels and feedstocks in the industrial sector. Activities of funded partners in the Workforce Consortium should focus on activities that include, but are not limited to:

- Retraining and upskilling programs for current and future workers that incorporate energy efficiency;
- Expanding/updating career and technical education (CTE) programs, in partnership with community colleges and/or technical/vocational schools; and
- Expanding Registered Apprenticeship programs / competency models that include energy efficiency and decarbonization topics.

Table 6: *Workforce Development Consortium Activities*

Design and launch consortium	• Work with IEDO to develop the workforce consortium goals and strategic approach • Competitively select consortium partners for engagement and funding • Structure meeting and reporting schedules for funded partners • Ensure diversity, equity and inclusion are integrated throughout the consortium

Communication and outreach	• Identify potential consortium partners and communicate about the selection process • Engage with organizations that focus on training and education in DACs, and/or whose efforts seek to broaden and diversify the demographic base of the manufacturing workforce • After launching the consortium, identify additional partners and strategic collaboration opportunities to drive higher impact
Peer learning	• Propose/design mechanisms to bring together partners and other relevant stakeholders to share best practices and learn from each other
Expansion plan	• Propose plans for scaling and expanding the consortium based on lessons learned, pending future year funding • Consider how to grow the consortium, whether through adding participants, supporting different activities, or some combination thereof

Project Structure

One DOE/NNSA National Laboratory, or a team of DOE/NNSA National Laboratories, will be expected to support the Workforce Consortium. Applicants will submit a proposal detailing their team's qualifications and experience with EWD programs, bringing together diverse stakeholders, and helping organizations expand existing activities. This is expected to be a highly interactive process where the awarded laboratory or laboratory team will collaborate directly with a team of IEDO staff to develop the consortium and partner selection process.

Proposals should include a diversity, equity, inclusion, and accessibility (DEIA) plan and describe how the consortium RFP, released by the awarded laboratory/laboratory team, will encourage proposals from organizations that specifically focus on expanding training in disadvantaged communities (DACs). The lab team will also be expected to conduct outreach to organizations who seek to broaden and diversity the demographic base of the manufacturing workforce, as well as Minority Serving Institutions (MSIs) including Historically Black Colleges and Universities (HBCUs). In addition, IEDO has

received congressional direction[29] to consider direct involvement with the American Indian Higher Education Consortium/Tribal Colleges and Universities (AIHEC/TCU) Advanced Manufacturing Network Initiative. The lab team will be expected to reach out to the AIHEC/TCU Advanced Manufacturing Network Initiative about the consortium opportunity as a potential participant.

II. Application Submission and Review Information

A. Application and Submission Details

i. Application Process

To apply to this Lab Call, applicants must register with their lab email address and submit application materials through EERE eXCHANGE at https://eere-eXCHANGE.energy.gov, EERE's online application portal. Beginning on July 8, 2022*, eXCHANGE will be updated to integrate with Login.gov. As of August 5, 2022*, potential applicants will be required to have a Login.gov account to access EERE eXCHANGE. As part of the eXCHANGE registration process, users will be directed to create an account in https://login.gov/. Please note that the email address associated with Login.gov must match the email address associated with the eXCHANGE account. For more information, refer to the Exchange Multi-Factor Authentication (MFA) Quick Guide in the Manuals section of eXCHANGE.

All submissions must conform to the guidelines for format and length, and be submitted at, or prior to, the deadline listed.

Applicants will be required to include project information and details in eXCHANGE that will be used to develop and accelerate negotiations of FY 23-26 AOPs if selected. Appendix A provides a worksheet to guide applicants through this process in eXCHANGE. Any information the applicant considers to be of significance for the review process must be included in the proposal, as reviewers will not have access to the AOP development information entered in eXCHANGE.

ii. General Proposal Requirements

[29] Energy and Water Development and Related Agencies Appropriations Bill, 2023

* Please note that these dates are tentative and subject to change.

Proposals should be formatted for 8.5 x 11 paper, single spaced, and have 1-inch margins on each side. Typeface size should be 12-point font, except tables and figures, which may be in 10-point font.

iii. Proposal Content

Proposal content aligns with content required in the EERE AOP project forms, with additional information to assist reviewers in evaluating technical details. The narrative should build on the information provided as part of the EERE eXCHANGE template. **Applicants must include all content they wish to have reviewed in the proposal (proposal reviewers will not review any information provided in eXCHANGE for AOP development).**

Full Applications

Each application must be limited to a single concept or project topic area. Unrelated concepts and projects should not be consolidated into a single application. EERE will not review or consider ineligible Full Applications.

Full Applications must conform to the following requirements:

SECTION	FILE FORMAT	PAGE LIMIT	FILE NAME
Technical Volume	PDF	15	ControlNumber_LeadOrganization_TechnicalVolume
Resumes	PDF	10	ControlNumber_LeadOrganization_Resumes
Letters of Commitment	PDF	5	ControlNumber_LeadOrganization_LOCs
Summary/Abstract for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide	MS PowerPoint	1	ControlNumber_LeadOrganization_Slide
DOE Work Proposal for FFRDC, if applicable (see DOE O 412.1A, Attachment 3)	PDF	N/A	ControlNumber_LeadOrganization_WP
SF-LLL Disclosure of Lobbying Activities	PDF	N/A	ControlNumber_LeadOrganization_SF-LLL
Diversity, Equity, and Inclusion (DEIA) Implementation Plan	PDF	5	ControlNumber_LeadOrganization_DEIAIP

Technical Volume

The Technical Volume must be submitted in PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. Save the Technical Volume in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_TechnicalVolume".

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. However, EERE and reviewers are under no obligation to review cited sources.

The Technical Volume to the Full Application may not be more than 15 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the evaluation criteria when preparing the Technical Volume.

The Technical Volume must conform to the following content requirements:

SECTION / PAGE LIMIT	DESCRIPTION
Cover Page 1	The cover page should include the project title, the specific Lab Call Topic Area being addressed, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Project Overview 1	The Project Overview should contain the following information: • Background: The applicant should discuss the background of their organization, including the history, successes, and current status relevant to the technical topic being addressed in the Full Application. • Project Goal: The applicant should explicitly identify the targeted improvements to be achieved through the project and the critical success factors in achieving that goal. • DOE Impact: The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives.

Technical Description, Innovation, and Impact [30% of technical volume (3-4 pages)]	The Technical Description should contain the following information: • Relevance and Outcomes: The applicant should provide a detailed description of the proposed project, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the Lab Call, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project. • Feasibility: The applicant should demonstrate the technical feasibility of the proposed project and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. • Innovation and Impacts: The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed project, the advantages of proposed project over alternative approaches, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful.
Workplan [40% of technical volume (5-7 pages)]	The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Milestones, Go/No-Go Decision Points, and Project Schedule. The Workplan should contain the following information: • Project Objectives: The applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes. • Technical Scope Summary: The applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on Go/No-Go decision points). The applicant should describe the specific expected end result of each performance period. • WBS and Task Description Summary: The Workplan should describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard WBS for any project. The Workplan shall contain a concise description of the specific activities to be conducted over the life of the project. The description shall be a full explanation and disclosure of the project being proposed (i.e., a statement such as "we will then complete a proprietary process" is unacceptable). It is the applicant's responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this Lab Call. The summary provided should be

	consistent with the SOPO. The SOPO will contain a more detailed description of the WBS and tasks.
	• Milestone Summary: The applicant should provide a summary of appropriate milestones throughout the project to demonstrate success. A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART milestones should be Specific, Measurable, Achievable, Relevant, and Timely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the Lab Call, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The applicant should also provide the means by which the milestone will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO.
	• Go/No-Go Decision Points: The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. A Go/No-Go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See Section VI.B.xiv. The applicant should also provide the specific technical criteria to be used to evaluate the project at the Go/No-Go decision point. The summary provided should be consistent with the SOPO. Go/No-Go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone.
	• End of Project Goal: The applicant should provide a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO.
	• Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points.
	• Project Management: The applicant should discuss the team's proposed management plan, including the following:
	  ○ The overall approach to and organization for managing the work
	  ○ The roles of each project team member
	  ○ Any critical handoffs/interdependencies among project team members
	  ○ The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices

	○ The approach to project risk management ○ A description of how project changes will be handled ○ If applicable, the approach to Quality Assurance/Control ○ How communications will be maintained among project team members
Technical Qualifications and Resources [20% of technical volume (2-4 pages)]	The Technical Qualifications and Resources should contain the following information: • Describe the project team's unique qualifications and expertise, including those of key subrecipients. • Describe the project team's existing equipment and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. • This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. • For multi-organizational or multi-investigator projects, describe succinctly: ○ The roles and the work to be performed by each PI and Key Participant; ○ Business agreements between the applicant and each PI and Key Participant; ○ How the various efforts will be integrated and managed; ○ Process for making decisions on scientific/technical direction; ○ Publication arrangements; ○ Intellectual Property issues; and ○ Communication plans

Resumes

Applicants are required to submit 1-page resumes for key participating team members. Multi-page resumes are not allowed. Save the resumes in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Resumes".

Letters of Commitment

Submit letters of commitment from all subrecipient and third-party entities. If applicable, also include any letters of commitment from partners/end users (2-page maximum per letter). Save the letters of commitment in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_LOCs".

Summary/Abstract for Public Release

Applicants are required to submit a single page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed a single page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Summary".

Summary Slide

Applicants are required to provide a single MS Powerpoint slide summarizing the proposed project. This slide is used during the evaluation process.

The Summary Slide template requires the following information:

- A project summary;
- A description of the project's impact;
- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project's key idea/takeaway;
- Project title, prime recipient, Principal Investigator, and Key Participant information; and
- Requested EERE funds.

Save the Summary Slide in a single page MS Powerpoint file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

Budget for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, the applicant must provide a DOE WP in accordance with the requirements in DOE Order 412.1A, Work Authorization System, Attachment 3, available at https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a-chg1-AdmChg Save the WP in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_WP".

SF-LLL: Disclosure of Lobbying Activities

Prime recipients and subrecipients may not use any federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Prime recipients and subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities" (https://www.grants.gov/web/grants/forms/sf-424-individual-family.html) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

- An officer or employee of any federal agency;
- A Member of Congress;
- An officer or employee of Congress; or
- An employee of a Member of Congress.

Save the SF-LLL in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_SF-LLL"

Waiver Requests: Foreign Work

1. **Performance of Work in the United States (Foreign Work Waiver)**
   All work under this EERE Lab Call must be performed in the United States. Appendix B lists the necessary information that must be included in a foreign work waiver request.

Save the Waivers in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Waiver".

Data Management Plan

Each proposal under this Lab Call must have a data management plan (DMP). A DMP explains how, when appropriate, data generated in the course of the proposed work will be shared and preserved in order to validate the results of the work or how the results could be validated if the data is not shared or preserved. The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications.

A lab may have a previously DOE approved DMP, such as a lab-wide DMP, and to the extent that the DMP applies to the proposal submitted under this Lab Call, the lab may rely on that DMP to satisfy the DMP requirement of this Lab Call. If there is no existing DMP that can apply and the applicant fails to submit a DMP as part of the proposal, then the default DMP for the proposal is the following:

> For any publication that includes results of the project, the underlying research data will be made available according to the policies of the

publishing media. Where no such policy exists, the applicant must indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

Save the DMP in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_DMP".

Diversity, Equity, Inclusion, and Accessibility (DEIA) Implementation Plan

As part of the application, applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Specifically, applicants are required to submit a description of how the project will support or implement the lab-wide Diversity, Equity, and Inclusion Plan and describe the actions the applicant will take to foster a welcoming and inclusive environment, support people from groups underrepresented in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be located in or benefit underserved communities. The plan should include SMART milestones supported by metrics to measure the success of the proposed actions.

The Diversity, Equity, Inclusion, and Accessibility (DEIA) Implementation plan should reference the lab DEIA plan if available, and contain the following information:

- Equity Impacts: the impacts of the proposed project on underserved communities, including social and environmental impacts.
- Benefits: The overall benefits of the proposed project, if funded, to underserved communities; and
- How diversity, equity, and inclusion objectives will be incorporated in the project.

The following is a non-exhaustive list of actions that can serve as examples of ways the proposed project could incorporate diversity, equity, and inclusion elements. These examples should not be considered either comprehensive or prescriptive. Applicants are encouraged to propose appropriate actions not covered by these examples.

a. Diversity on the research team
    i. Implement evidence-based, diversity-focused education programs (such as implicit bias training for staff) in your organization;
    ii. Identify Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses and Veteran Owned Businesses to solicit as vendors and sub-contractors for bids on supplies, services and equipment;

iii. Include faculty or students from Minority Serving Institutions as PI/co-PI, senior personnel, and/or student researchers;
iv. Enhance or collaborate with existing diversity programs at your home organization and/or nearby organizations; and
v. Collaborate with students, researchers, and staff in Minority Serving Institutions.

b. Explicit diversity in research impact
   i. Illustrated outcome impact in underserved communities; and
   ii. Disseminate results of research and development in Minority Serving Institutions or other appropriate institutions serving underserved communities;
c. Explicit diversity in research design. Inclusion of a broad community, academic, policymaking staff in research design and execution phase

Save the Diversity, Equity, Inclusion and Accessibility (DEIA) Implementation Plan in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_DEIAIP".

Treatment of Application Information

Proprietary Information

In general, DOE will use data and other information contained in proposals only for evaluation purposes, unless such information is generally available to the public or is already the property of the government.

Proposals should not include trade secrets or commercial or financial information that is privileged or confidential unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the Lab Call.

Proposals containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If a proposal contains confidential, proprietary, or privileged information, it must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

> **1. Notice of Restriction on Disclosure and Use of Data:**
> Pages [List Applicable Pages] of this proposal may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this Lab

Call. The government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure" and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

B. Application Review Details

i. Merit Review and Selection Process

Upon receipt and review for initial compliance with requirements, all proposals received in eXCHANGE by the deadline will undergo a thorough technical review. IEDO will use expert reviewers familiar with the IEDO portfolio, goals, and objectives. IEDO will collect and collate review scores and comments for use in making final project selections. The IEDO Selection Official will consider the merit review results to make the final project selections. For transparency, IEDO will provide summaries of the review results to assist labs in understanding how their submission reviewed and aid in improving future work.

ii. Technical Review Criteria

Final Applications

Applications will be evaluated against the merit review criteria shown below:

Criterion 1: Technical Merit, Innovation, and Impact (50%)

This criterion involves consideration of the following factors:

Technical Merit and Innovation

- Extent to which the proposed project is innovative;
- Degree to which the current state and the proposed advancement are clearly described;
- Extent to which the application specifically and convincingly demonstrates how the applicant will move the state-of-the-art to the proposed advancement; and
- Sufficiency of technical detail in the application to assess whether the proposed work is meritorious and revolutionary, including relevant data, calculations and discussion of prior work in the literature with analyses that support the viability of the proposed work.

Impact of Technology Advancement

- How the project supports the topic area objectives; and
- The potential impact of the project on advancing the state-of-the-art.

Criterion 2: Project Workplan (25%)

This criterion involves consideration of the following factors:

Research Approach, Workplan and SOPO

- Degree to which the approach and critical path have been clearly described and thoughtfully considered; and
- Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan and SOPO will succeed in meeting the project goals.

Identification of Technical Risks

- Discussion and demonstrated understanding of the key risk areas involved in the proposed work and the quality of the mitigation strategies to address them.

Baseline, Metrics, and Deliverables

- The level of clarity in the definition of the baseline, metrics, and milestones; and
- Relative to a clearly defined baseline, the strength of the quantifiable metrics, milestones, and a mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Criterion 3: Team and Resources (15%)

This criterion involves consideration of the following factors:

- The capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposed work with a high probability of success. The qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- The degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further development and commercial deployment of technologies/programs;
- The level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
- The reasonableness of the budget and spend plan for the proposed project and objectives.

Criterion 4: Diversity, Equity, and Inclusion (10%)

This criterion involves consideration of the following factors:

- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and
- Extent to which the project benefits underserved communities.

iii. Selection for Award Negotiation

IEDO carefully considers all of the information obtained through the proposal process and makes an independent assessment of each compliant and responsive proposal based on the criteria set forth in this Lab Call. IEDO may select or not select a proposal for negotiations. IEDO may also postpone a final selection determination on one or more proposals until a later date, subject to availability of funds and other factors. IEDO will notify applicants if they are, or are not, selected for award negotiation.

iv. Selection Notification

IEDO anticipates completing the project selection process and notifying labs of selections during the week of June 23, 2023 **(subject to change)**.

IEDO will notify lab leads of selection results from IEDOLabCall@ee.doe.gov and will provide lab leads with summaries of anonymized review comments for each proposal submitted.

v. Questions and Agency Contacts

Specific questions about this Lab Call should be submitted via e-mail to IEDOLabCall@ee.doe.gov. To ensure fairness across all labs, individual IEDO staff cannot answer questions while the Lab Call remains open. To keep all labs informed, IEDO will post all questions and answers on EERE eXCHANGE.

Appendix A: Lab Call Full Application Worksheet for eXCHANGE

Lab Call Full Application Worksheet

IMPORTANT: This document is provided as a courtesy to allow Lab Call applicants to collaborate offline to develop Full Applications for Lab Calls. All information must be entered into the eXCHANGE system and cannot be submitted with this document.

Please contact ITSIHelp@ee.doe.gov with any questions.

Project General Information

Control Number:

Applicant (Name and Email):

Organization Name:

Project Title:

Topic:

Project Start Date:

Project End Date:

Partner Laboratories:

Partner Laboratory	Email	First Name	Last Name

Is this a continuation of an existing project?

WBS Number:

Fiscal Year Existing Project:

Project Overview (Multi-year):

Project Objectives (Multi-year):

Contact Information

Lab Lead Point of Contact and Business Contact Information

Name:

Email:

Title:

Address:

Phone:

Fax:

Financials

Please add a separate table for each partner laboratory.

Lead Laboratory Name:

Year	Planned Project Costs
2021	
2022	
2023	
Subtotal	

Partner Laboratory (If Applicable) Name:

Year	Planned Project Costs
2021	
2022	
2023	
Subtotal	

Total Planned Project Costs:

Performers

Please add a separate table for each partner laboratory.

Lead Laboratory Name:

Subcontractor Name	Sub Type	Start Date	End Date	2021 Planned Costs	2022 Planned Costs	2023 Planned Costs	Total Funding
Subcontractor Subtotal							

Partner Laboratory (If Applicable) Name:

Subcontractor Name	Sub Type	Start Date	End Date	2021 Planned Costs	2022 Planned Costs	2023 Planned Costs	Total Funding
Subcontractor Subtotal							

Total Planned Project Costs:

Project Plan

Project Tasks:

Task Number	Title	Description	Team Members	Planned Costs	Start Date	End Date

Project Milestones:

Item Number	Type	Title	Description	End Date	Team Members	Criteria

Risks

Project Tasks:

Risk Name	Description	Response Plan	Severity	Probability	Response	Source	Classification	Team Members	Target Completion Date

Project Impacts

Deliverable/Product or "Output" Description:

Audience/Customer:

Audience/Customer Use:

Communications/Outreach Strategy:

Does this project involve significant industry engagement?

Description of Engagement:

Associated CRADAs?

CRADA Text

Appendix B: Waiver Requests and Approval Processes: Performance of Work in the United States (Foreign Work Waiver)

Waiver for Performance of Work in the United States (Foreign Work Waiver)

All work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of EERE that it would further the purposes of this Lab Call and is otherwise in the economic interests of the United States to perform work outside of the United States. A request to waive the *Performance of Work in the United States* requirement must include the following:

- The rationale for performing the work outside the U.S. ("foreign work");
- A description of the work proposed to be performed outside the U.S.;
- An explanation as to how the foreign work is essential to the project;
- A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the U.S. economy;
- The associated benefits to be realized and the contribution to the project from the foreign work;
- How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
- How the foreign work will promote domestic American manufacturing of products and/or services;
- A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
- The total estimated cost of the proposed foreign work;
- The countries in which the foreign work is proposed to be performed; and
- The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.