RESEARCH CALL TO DOE/FEDERAL LABORATORIES

U. S. Department of Energy
National Energy Technology Laboratory

FY 2023

CESER's Cybersecurity for Distributed Energy Resources (DER)
Research, Development, and Demonstration (RD&D) Research Call

Announcement Type: New

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ISSUING OFFICE: U.S. DEPARTMENT OF ENERGY
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Research Call Issue Date:	**03/08/2023**
Submission Deadline for Concept Papers:	**03/31/2023 at 03:00 PM ET**
Submission Deadline for Full Applications:	**06/02/2023 at 03:00 PM ET**
Expected Date for Concept Paper Notice to Proceed:	**April 2023**
Expected Date for Selection Notifications:	**August 2023**
Expected Date for Award:	**September 2023**

It is strongly recommended that concept paper submissions begin well in advance (at least 48 hours) of the Concept Paper Due Date. ALL concept papers in response to this RC must be submitted to 40125bLabCall@netl.doe.gov***.***

Contents

SECTION I – OVERVIEW AND PURPOSE

SUMMARY

On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act (IIJA). The IIJA is a once-in-a-generation investment in infrastructure, which provides the backbone for a more sustainable, resilient, and equitable economy through enhancing U.S. competitiveness in the world, diversifying regional economies to include supply chain and manufacturing industries, creating good union jobs, and ensuring stronger access to these economic benefits for underserved and disadvantaged communities.

Section 40125(b) of the IIJA will enable participants to develop advanced cybersecurity applications and technologies for the electricity subsector through several activities including research, development, and demonstration (RD&D). Section 40125 (b) authorizes appropriations of $250 million over a 5-year period.

The Department of Energy's (DOE's) National Energy Technology Laboratory (NETL) on behalf of the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) is seeking proposals under this Research Call (RC) to conduct research, development, and demonstrations (RD&D) that will result in cybersecurity tools and technologies for clean energy DER. A focus of DER cybersecurity aligns with CESER's goal "to ensure that cybersecurity is fully engineered from ideation to deployment in relevant clean energy research, development, and deployment efforts." All topic areas included in this National Laboratory RC will be focused on improving clean energy DER cybersecurity.

Partnerships with the national laboratories, private sector, and academia have helped CESER advance tool development, demonstration, and deployment projects for several years. CESER's efforts will build upon those initiatives to address the cybersecurity risks to the electricity subsector.

BACKGROUND INFORMATION

DER delivering clean energy to customers are becoming increasingly common and frequent. DER is being used to improve energy reliability and resilience and to address the increasing threats from climate change such as hurricanes and wildfires. However, as the electric grid undergoes these changes, appropriate cybersecurity considerations and advanced tools to secure DER systems are necessary. FERC Order No. 2222 defines DER as "small-scale power generation or storage technologies (typically from 1 kW to 10,000 kW) that can provide an alternative to or an enhancement of the traditional electric power system. These can be located on an electric utility's distribution system, a subsystem of the utility's distribution system or behind a customer meter. They may include electric storage, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage or electric vehicles and their charging equipment." Only cybersecurity improvements to DER that can be used to support the clean energy transition will be considered under this Research Call.

As part of the whole-of-government approach to advance equity and encourage worker organizing

and collective bargaining,[1,2,3] and in alignment with BIL Section 40125(b), this research call and any related activities will seek to encourage meaningful engagement and participation of workforce organizations, including labor unions, as well as underserved communities and underrepresented groups, including consultation with tribal nations.[4] Consistent with Executive Order 14008,[5] this RC is designed to help meet the goal that 40% of the benefits of the Administration's investments in clean energy and climate solutions be delivered to disadvantaged communities (DACs), as defined by the Department pursuant to the Executive Order and to drive the creation of accessible good-paying jobs with the free and fair chance for workers to join a union.

R&D COMMUNITY BENEFITS PLAN

DOE is committed to investing in research and development (R&D) innovations that deliver benefits to the American public and leads to commercialization of technologies and products that foster sustainable, resilient, and equitable access to clean energy. Further, DOE is committed to supporting the development of more diverse, equitable, inclusive, and accessible workplaces to help maintain the nation's leadership in science and technology.

To support the goal of building a clean and equitable energy economy, projects funded under this BIL RC are expected to (1) advance diversity, equity, inclusion and accessibility (DEIA); (2) contribute to energy equity and the President's goal that 40% of the overall benefits of certain federal investments flow to DACs (the Justice40 Initiative)[6]; and (3) invest in America's workforce.

To ensure these objectives are met, applications must include a Research and Development Community Benefits Plan (R&D Community Benefits Plan[7]) that addresses the objectives stated above. See Section VI and Appendix I for more information on the R&D Community Benefits Plan content requirements.

TOPIC AREA

This RC is specifically focused on addressing RD&D aspects of the Bipartisan Infrastructure Law (BIL) "Section 40125(b): Cybersecurity for the Energy Sector Research, Development, and Demonstration Program" while focusing on the cybersecurity of DER systems, which includes:

- Utility-scale solar, wind, storage, and other clean energy technologies, behind-the-meter

[1] EO 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government" (January 20, 2021).
[2] EO 14025, "Worker Organizing and Empowerment," April 26, 2021.
[3] EO 14052, "Implementation of the Infrastructure Investment and Jobs Act," November 18, 2021.
[4] EO 13175, November 6, 2000 "Consultation and Coordination With Indian Tribal Governments", charges all executive departments and agencies with engaging in regular, meaningful, and robust consultation with Tribal officials in the development of federal policies that have Tribal implications.
[5] EO 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.
[6] The Justice40 initiative, established by E.O. 14008, sets a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. The Justice40 Interim Guidance provides a broad definition of disadvantaged communities (Page 2): https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf.
[7] Most DOE BIL FOAs focused on demonstration and deployment (D&D) also require a Community Benefits Plan; however, the plan content requirements for R&D-focused FOAs vary from the D&D Community Benefits Plan content requirements.

renewables and storage systems, Electric Vehicle (EV) chargers, and customer-owned DERs, and interface devices.

- Distribution Management Systems (DMS), Distributed Energy Resources Management System (DERMS), and DER aggregators.

CESER sought expert insights on research gaps and opportunities for electricity subsector cybersecurity specific to clean energy DER. Collaboration and coordination occurred with the following stakeholders:

1. Department of Homeland Security (DHS)
2. Office of Energy Efficiency & Renewable Energy (EERE) Solar Energy Technology Office (SETO)
3. EERE Wind Energy Technology Office (WETO)
4. Office of Electricity (OE) Energy Storage
5. Grid Deployment Office (GDO)
6. Internal CESER Stakeholders
7. DOE National Laboratories
8. Industry Subject Matter Experts

This stakeholder collaboration has resulted in the following five (5) Topic Areas. Only proposals that specifically address a single Topic Area described in the following section will be accepted under this RC. Applicants may submit multiple proposals; however, each proposal must be unique and a standalone response to the Topic Area.

General Requirements

All applications **must** address the following for all topic areas:

1. Identify improvements over state of the art for the technology area.
2. Identify how the solution is interoperable, scalable, and manageable and does not impede critical energy delivery functions.
3. Identify how the solution is compatible with common methods and best practices such as the Recommended Cybersecurity Practices for Industrial Control Systems or DOE Cybersecurity Considerations for Distributed Energy Resources on the U.S. Electric Grid.
4. Teaming arrangement:
    a. Establish an Industry Advisory Board (IAB) with members representing electric utilities and suppliers of energy delivery systems and components. The board members will provide inputs to ensure developed tools and technologies meet electricity subsector needs; and champion transition of the solutions into real-world energy systems. The board will perform the following functions:
        i. Provide advisory input
        ii. Ensure project activities will be useful to electric utilities
        iii. Approve the project demonstration site or testbed ensuring it accurately replicates “real-world” energy delivery operations
    b. Independent third party to red team test the developed solution to evaluate the developed tool or technology for vulnerabilities and threat vectors.
5. A demonstration of the developed solution needs to be performed to validate electric utility acceptance. A successful demonstration will lend confidence that the cybersecurity

innovation will perform as expected, will reduce the risk that a cyber-incident could disrupt energy delivery, and will not interfere with the function of the energy delivery control system.

6. Include a plan with an estimated timeline outlining a strategy for transitioning solutions into practice for the electricity subsector through commercialization or by making the solution available through open source.
7. Applicants should be aware that selected projects from this RC will be required to report on BIL performance and tracking metrics. See Appendix II for the specific metrics. Additional clarification will be provided during the negotiation process.

Topic Area 1: Real-Time DER Operations Data Analytics using Artificial Intelligence/Machine Learning

Develop tools and technologies that perform real-time, multi-modal cybersecurity data analytics on clean energy DER system operations data combined with the use of Artificial Intelligence/Machine Learning to reveal and mitigate the presence of an adversary. The cybersecurity defense, detection, and recovery solutions must be capable of learning normal DER system behavior, proactively detecting abnormal behavior patterns that signal a cyberattack, and conducting automated mitigation and recovery measures.

Specific Requirements

1. The proposed approach must work with utility stakeholders/partnerships to obtain and use context aware actual DER system data sets where applicable, to improve the efficacy of the cybersecurity solution.
2. Securing Artificial Intelligence [8]
    a. Data acquisition and curation integrity
        i. Addressing data poisoning
        ii. Addressing issues with data collection from multiple sources and formats, identifying missing components of data, removing errors and sources of noise, labeling, data augmentation using real and synthetic data, scaling of data sets. Ensuring the quality and integrity of the data sets. Ensuring that data is not biased.
        iii. System training integrity
        iv. Deployment integrity
        v. Upgrade integrity

Topic Area 2: Adaptable Zero-Trust Architecture for DER Systems

A comprehensive zero-trust architecture in DER operations on OT systems will need to comply with many challenging requirements related to reliability, safety, protocols, products (interoperable with legacy and newer equipment), vendors, and services. Many of the components that make up a zero-trust architecture exist today, however solutions are needed to develop a holistic zero-trust architecture for OT systems. To securely integrate DER systems, asset owners and operators must be able to ensure the system trustworthiness by verifying commands and ensuring integrity. To bolster the electricity subsector's defenses against DER cyber threats, tools and technologies need

[8] ETSI GR SAI 004 v1.1.1

to be developed to establish a zero-trust architecture where a verified trusted relationship can be established. This topic area focuses on the development of tools and technologies to verify trustworthiness within DER operations, ensuring integrity across different functions, business lines, and employees. Scalable authentication mechanisms to verify DER device elements and entities connecting to the increasingly distributed grid network should be considered.

Specific Requirements

1. Proposed solutions must enhance the transition of DER operations to a Zero Trust architecture by addressing capabilities such as:[9]
    a. Continuous monitoring and validation
    b. All traffic and data are always encrypted
    c. Access is authorized continuously
    d. Prevent a cybersecurity breach, but if it occurs, prevent/limit internal lateral movement
    e. Cybersecurity attack mitigation

Topic Area 3: Cybersecurity for Cloud Use in DER applications

Cloud based solutions are being adopted by utilities for planning and non-real time applications for DER, which need to be secured. Cloud service providers have historically focused on data protection, but the use of cloud for DER operations requires other aspects of cybersecurity to be incorporated. This topic area is seeking cybersecurity RD&D to secure data governance and management methods. The research can consider improvements to existing cloud service provider solutions and/or developing novel cybersecurity technologies that minimize cybersecurity vulnerabilities related to the use of computational cloud resources for management systems and that extend to the grid edge, software as a service, infrastructure as a service, and data sharing between organizations.

Specific Requirements

1. Team arrangement:
    a. A cloud service provider must be a partner or on the advisory board.
2. Solutions must leverage modern cloud services and afford protected and real-time data access for all electric utility stakeholders.

Topic Area 4: Develop Security Solutions for Current and Emerging Communication Architectures for DER Systems

Next generation grid architectures are needed to support the influx of DER and device participation at the grid edge and behind the meter. Communications architectures are expanding with continuous bandwidth demands. This topic area addresses the cybersecurity needs for current and emerging grid communication architectures, for example cloud-based platforms or communication service provider network fabrics, that enhance monitoring, control, and protection to reduce the impact of cyber-attacks. Tools and technologies are needed that address the confidentiality, integrity, and availability (CIA) security principles of current and

[9] NIST 800-207 and the DHS CISA Zero Trust Maturity Model were used as a guide to establish the requirements for this new area of technology development.

emerging communications technologies in OT environments at the grid edge and behind the meter, with the following requirements.

Specific Requirements

1. The target communication architecture should have already fulfilled the requirements of IEEE 1547-2018, Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces.
2. The proposed solution should be resistant to attacks such as:[10]
    a. MiTM attacks
    b. Data integrity attack
    c. Data injection attack
    d. Availability attack
    e. DDoS
    f. Firmware attack
    g. Zero-day Exploit
    h. Human errors
    i. Vulnerabilities in other components (61850)

Topic Area 5: Innovative, Real-time or Off-Line Analysis Technologies that Secure Clean Energy Distributed Energy Resources (DER)

This topic area seeks a technical cybersecurity solution to address a research gap in a DER system that has not been covered in Topic Areas 1-4. Develop tools and technologies that strengthen cybersecurity for integration and management of DER systems.

Potential research approaches would reinforce cybersecurity by improving resilience, real-time monitoring grid operations, actively detecting threats, alerting operators, and recommending mitigation steps for ongoing incidents. Additional research approaches could evaluate cybersecurity events through off-line analysis. Further research could develop methods to automate the creation of high-fidelity simulation models of DER integrated systems, including relevant parameter estimation from informative operational data, capable of simulating the infrastructure under the full range of nominal operating conditions with respect to cybersecurity.

Specific Requirements

1. Solutions should consider the DOE Cybersecurity Considerations for Distributed Energy Resources on the U.S. Electric Grid Report published by CESER.

FFRDC/NATIONAL LABORATORY GUIDING PRINCIPLES

To ensure alignment with DOE CESER R&D principles, applicants should consider the following when developing a proposal in response to a Topic Area:

- All projects must include milestones, deliverables, and go/no-go decisions.

[10] DER Communication Networks and Their Security Issues (University of Nevada, 2022)

- Each proposal submitted in response to this RC must include phases/tasks for research and development (R&D), as well as demonstration of the proposed technology under a real-world situation.
- Proposals should be prepared so that R&D and demonstration tasks (along with associated budget estimates) are segregated and can be readily identified.

SECTION II – AWARD INFORMATION

TYPE OF AWARD INSTRUMENT

DOE anticipates providing funding for selected projects to DOE-Sponsored National Laboratories. Any project awarded because of the Research Call will be processed through DOE CESER Headquarters as a Field Work Proposal(FWP), AOP, M&O contract update or any other allowable method deemed appropriate by the Government.

ESTIMATED FUNDING

A total of approximately $40,000,000 is expected to be available for all new awards under this RC. This funding is separate from annual CESER appropriations.

EXPECTED NUMBER OF AWARDS

DOE anticipates making between 12 and 16 awards under this RC depending on the size of the awards.

ANTICIPATED AWARD SIZE

DOE anticipates that it will issue several awards of varying sizes from $2,000,000 to $5,000,000 per award.

PERIOD OF PERFORMANCE

DOE anticipates making awards with an estimated project period not to exceed three (3) years. The DOE reserves the right to set the expected period of performance to meet DOE's objectives.

SECTION III – ELIGIBILITY INFORMATION

ELIGIBLE APPLICANTS

Only DOE sponsored Federally Funded Research and Development Centers (FFRDCs), such as National Laboratories, are eligible to apply for funding as a prime awardee. FFRDCs may also be proposed as a project team member sub-awardee.

Collaboration **must** involve one or more asset owner operators from the electricity subsector. The collaborative asset owner operator may be a member of the IAB described in the General Requirements under the Topic Area section. Sub-awardee participation must be documented

with formal letters of commitment. Letters of commitment are strongly encouraged but not required for the Concept Paper. Letters of commitment are required for the full proposal.

NOTE: NETL is not considered eligible for award under this RC and may not be proposed as a team member on another entity's proposal.

SECTION IV – SUBMISSION REQUIREMENTS

SUBMISSION INSTRUCTIONS

Applicants must first submit Concept Papers. Based on the Concept Paper review, the applicants will be encouraged by DOE to submit a Full Application.

Research Call Concept Paper:

- No more than five (5) page Concept Paper must be submitted electronically to the following email address **no later than March 31, 2023, at 3:00 PM Eastern Daylight Time**:
  - 40125bLabCall@netl.doe.gov
- See Section V for Research Call Concept Paper requirements.

Full Proposal, following notification to proceed from DOE (DOE will not review a full proposal if the applicant did not receive a favorable review of their Research Call Concept Paper):

- A full proposal must be submitted electronically to the following email address **no later than June 2, 2023, at 3:00 PM Eastern Daylight Time**:
  - 40125bLabCall@netl.doe.gov
- See Section VI for Full Proposal requirements.

Due to e-mail attachment constraints, please ensure that the emails including the attachments are less than 25 Megabytes. The applicant is encouraged to request a return notification to verify receipt of proposal.

CONCEPT PAPERS RECEIVED AFTER THE CONCEPT PAPER DEADLINE AND FULL PROPOSALS RECEIVED AFTER THE FULL PROPOSAL DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

SECTION V – CONCEPT PAPER PREPARATION

PREPARATION OF CONCEPT PAPER

The Concept Paper must not exceed **5 pages**, be single spaced, 1" margins (top, bottom, left, right), and when printed will fit on size 8 1/2" by 11" paper. The type must be legible and notsmaller than 11-point font size. The Research Call Concept Paper must address, at a minimum:

1. Description of Proposed Technology with Comparison to the Current State of the Art and Research Gap(s) Addressed (i.e. Why is the technology needed today and how is it different from existing capabilities?)

2. Technical Approach

3. Project Team Members and Estimated Project Cost

The Concept Paper should be saved as a single PDF file under the following file name: “Concept Paper - Lab Name - PI - Topic Area Number”, e.g., “Concept Paper - NETL - Smith – TA2”

SECTION VI – FULL PROPOSAL PREPARATION

PREPARATION OF FULL PROPOSAL *UPON APPROVAL OF CONCEPT PAPER*

It is requested that the Project Narrative not exceed **25 pages** (excluding the field work proposal, resumefile, commitment letters, etc.), be single spaced, 1" margins (top, bottom, left, right), and when printed will fit on size 8 1/2" by 11" paper. The type must be legible and not smaller than 11-point font size.Evaluators will only review the required applications files and will not review any Project Narrative information that is included beyond the 25-page limit. To produce a comprehensive proposal for this Research Call, the applicant should address, at a minimum, the areas listed in the Table of Contents below.

Section	Section Number
Table of Contents	I
List of Tables (if applicable)	II
List of Figures (if applicable)	III
List of Acronyms (if applicable)	IV
Project Narrative	V
Field Work Proposal	VI
Resume File	VII
Commitment Letters	VIII
R&D Community Benefits Plan	IX
Appendices (see below)	As Needed

The entire proposal, that includes all materials included in the Table of Contents, should be saved as a single PDF file under the following file name: “Full Application - Lab Name - PI - Topic Area Number”, e.g., “Full Application - NETL – Smith – TA2”

PROJECT NARRATIVE

The **Project Narrative** must include:

- Project Objectives: This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

- Technical Discussion: The proposed research, development, and demonstration approach to meeting the identified Topic Area should be clearly described. Tasks for research and development of the proposed technology and a verification/demonstration test of the technology in a test bed, laboratory, or other environment that simulates a real-world situation should be specified. Proposals must not include the development of a test bed for the verification/demonstration test.

- Description of Proposed Technology with Comparison to the Current State of the Art and Research Gap(s) Addressed: This section should explain why the technology is needed today and how it differs from existing capabilities.

- Relevance and Outcomes/Impacts: This section should explain the relevance of the effort to the objectives in the RC and the expected outcomes and/or impacts. Where applicable, this section should describe how expected outcomes and/ or impacts address the objectives described in the R&D Community Benefits Plan.

- Roles of Participants: Describe the roles and the work to be performed by each participant, business agreements between the prime applicant and participants, and how the various efforts will be integrated and managed.

- Merit Review Criterion Discussion: This section should be formatted to address each of the merit review criterion and sub-criterion listed in Section VII MERIT REVIEW CRITERIA. Provide sufficient information so that reviewers will be able to evaluate the proposal in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE PROPOSALS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.

- Commercialization and/or transition to practice plan for the proposed technology or methodology must be included.

- Bibliography & References Cited Appendix: Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, booktitle, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal. To reduce the number of files attached to your proposal, please provide the Bibliography and References Cited information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.

- Facilities & Other Resources Appendix: This information is used to assess the capability of the organizational resources, including sub-awardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Computer, Office, and Other). If appropriate, indicate pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that aredirectly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. To reduce the number of files attached to your proposal, please provide the Facility and Other Resource information as an appendix to your projectnarrative. This appendix will not count in the project narrative page limitation.

- Equipment Appendix: List major items of equipment already available for this project and, if appropriate, identify location and pertinent capabilities. To reduce the numberof files

attached to your proposal, please provide the Equipment information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.

FIELD WORK PROPOSAL

The applicants shall prepare a Field Work Proposal and Detailed Budget Justification. **See Attachment 1 – NL Field Work Proposal and Attachment 2 – Detailed Budget Justification** (example text included).

Proposed Field Work Proposals (FWPs) must be structured to include research & development and demonstration efforts as separate phases and will include a go/no-go decision point prior to initiation of the demonstration phase. A decision will be made by DOE regarding continuation, redirection, or termination of the project at each decision point.

Under the deliverable section of the FWP, please plan to make all project publications and the final report publicly available by submitting these reports to **OSTI.**

RESUME FILE

Provide a resume for each key person proposed, including sub-awardees. A key person is any individual who contributes in a substantive, measurable way to the execution of the project.

Each resume must not exceed 2 pages when printed on 8.5" by 11" paper with 1" margins (top, bottom, left, and right) with font size not smaller than 11-point and should include the following information, if applicable:

- *Education and Training*: Undergraduate, graduate, and postdoctoral training, including institution, major/area, degree, and year.
- *Professional Experience*: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.
- *Publications*: Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or instead of publications.
- *Synergistic Activities*: List no more than 5 professional and scholarly activities related to the effort proposed.

COMMITMENT LETTERS

Include separate Commitment Letter(s) for ***all*** proposed project partners, including other Federally Funded Research and Development Centers (FFRDCs), if applicable.

R&D Community Benefits Plan

The R&D Community Benefits Plan must set forth the applicant's approach to ensuring the Federal investments advance the following three objectives: (1) advance diversity, equity, inclusion and accessibility (DEIA); (2) contribute to energy equity and the goals of the Justice40 Initiative; and (3) invest in America's workforce. The below sections set forth the content requirements for the R&D Community Benefits Plan, which addresses each of the foregoing objectives. Applicants are expected to address all sections.

The applicant's R&D Community Benefits Plan must include at least one Specific, Measurable, Assignable, Relevant, and Timely (SMART) milestone per phase to measure progress on the proposed actions. The R&D Community Benefits Plan will be evaluated as part of the technical review process. If a project is selected, CESER will incorporate the R&D Community Benefits Plan into the award and the recipient must implement its R&D Community Benefits Plan as part of carrying out its project. During the life of the CESER award, CESER will evaluate the recipient's progress, including as part of the Go/No-Go review process.

The plan should be specific to the proposed project and not a restatement of an organizational policies. Applicants should describe the future implications or a milestone-based plan for identifying future implications of their research on energy equity, including, but not limited to, benefits for the U.S. workforce, and energy resilience.

These impacts may be uncertain, occur over a long period of time, and/or have many factors within and outside the specific proposed research. Applicants are encouraged to describe the influencing factors and the most likely workforce implications of the proposed research to advancing energy equity if the research is successful. While some guidance and example activities are provided in Appendix I, applicants are encouraged to leverage promising practices and develop a plan that is tailored for their project.

The R&D Community Benefits Plan must not exceed five (5) pages. It must be submitted in PDF format using the following convention name for the title: "Control Number_LeadOrganization_CBP." This Plan must address the technical review criterion titled, "R&D Community Benefits Plan." See Section VII below for further detail.

The applicant's R&D Community Benefits Plan must address the following three sections:

1) **Diversity, Equity, Inclusion, and Accessibility:**
   To building a clean and equitable energy economy, it is important that there are opportunities for people of all racial, ethnic, socioeconomic and geographic backgrounds, sexual orientation, gender identity, persons with disabilities, and those re-entering the workforce from incarceration. This section of the plan must demonstrate how DEIA is incorporated in the technical project objectives. The plan must identify the specific action the applicant would undertake that integrated into the research goals and project teams, including relevant partnerships. Submitting an institutional DEIA plan without specific integration into the project will be deemed insufficient.

2) **Energy Equity and Justice40 Initiative:**
   This section must articulate the applicant's consideration of long-term equity implications of the research. It must identify how the specific project integrates equity considerations into the project design to support outcomes that increase equity within the energy system should the

innovation be successful. Applicants should provide an overview of benefits to disadvantaged communities (DACs) that the project can deliver, supported by measurable objectives. Identification of applicable benefits that are quantifiable, measurable, and trackable, including, at a minimum, a discussion of the relevance of each of the eight DOE Justice40 Initiative policy priorities outlined below.

Benefits include (but are not limited to) measurable direct or indirect investments or positive project outcomes that achieve or contribute to the following in DACs: (1) a decrease in energy burden; (2) a decrease in environmental exposure and burdens; (3) an increase in access to low-cost capital; (4) an increase in high-quality job creation, the clean energy job pipeline, and job training for individuals; (5) increases in clean energy enterprise creation and contracting (e.g., minority-owned or disadvantaged business enterprises); (6) increases in energy democracy, including community ownership; (7) increased parity in clean energy technology access and adoption; and (8) an increase in energy resilience.

For the purposes of this RC, applicants may elect to focus specifically on: (5) increases in clean energy enterprise creation and contracting (e.g., minority-owned or disadvantaged business enterprises); (7) increased parity in clean energy technology access and adoption; and (8) an increase in energy resilience.

3) **Workforce Implications:**
This section should articulate the applicant's consideration of long-term workforce impacts, opportunities, and needs relevant to the project's research application. It must identify how the application or proposed technology is designed and implemented to include an understanding of the future workforce needs should the resulting innovation be successful.

Section VII – EVALUATION AND SELECTION

INITIAL REVIEW CRITERIA

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that:
(1) the information required by the Research Call has been submitted.
(2) all mandatory requirements are satisfied; and
(3) the proposed project is responsive to the objectives of the Research Call.

Proposals that do not meet the initial criteria may be excluded from review.

CONCEPT PAPER REVIEW

Concept Papers are evaluated based on consideration of the following factors.
All sub-criteria are of equal weight.

CONCEPT PAPER CRITERION: OVERALL RESEARCH CALL RESPONSIVENESS AND VIABILITY OF THE PROJECT (100%)

- The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the Research Call.

- The applicant clearly describes the proposed technology, describes how the technology is unique and innovative, and how the technology will advance the current state-of-the-art.
- The applicant has shown the impact that DOE funding and the proposed project would have on the relevant field and application; and
- The applicant has the qualifications, experience, capabilities, and other resources necessary to complete the proposed project.

FULL APPLICATION MERIT REVIEW CRITERIA

Each proposal submitted in response to this Research Call will be evaluated and scored in accordance with the criteria and weights listed below:

CRITERION 1: TECHNICAL MERIT AND INNOVATION (30%)

This criterion will evaluate the technical merit and feasibility of the proposed concept/project as detailed in the application. This criterion will also be used to gauge the degree of innovation of the proposed solution in comparison to contemporary technology, along with the effectiveness of the proposal in addressing the technical requirements specified in the RC.

1. Level of the Applicant's/project team's understanding of the state of existing and emerging technology as indicated by the degree of clarity and thoroughness articulated in the description of the proposed solution/approach.
2. Extent to which the proposed technical concept/project is innovative compared to previous and ongoing work, and existing and emerging approaches and technologies.
3. Extent to which the proposed technical concept/project will advance the relevant technology beyond the current level of development.
4. Validity/viability of the proposed technical concept/project as evidenced by peer reviewed or collaborated data, and/or results of previous and ongoing work.
5. Degree to which the proposed technical concept/project addresses the key objectives outlined in the RC.
6. Adequacy of the technology development strategy to move the technology solution and/or methodology to the next logical stage of RD&D.
7. Adequacy and completeness of the approach to address interoperability and cyber security concerns associated with integration of the proposed technical concept/project into the existing environment.

CRITERION 2: SIGNIFICANCE AND IMPACT (30%)

This criterion will evaluate the significance of implementation of the proposed technical concept/project, and the resultant impact to operational efficiency, safety, resiliency, and reliability of energy delivery systems in a cost-effective manner.

1. Extent to which the proposed technical concept/project meets or exceeds the goals specified in the RC and adequacy of the discussion that substantiates the research gap(s) that this project intends to address.
2. Magnitude of the cost-effectiveness and/or performance improvement of the proposed technical concept/project over existing and emerging approaches and technologies.
3. Degree to which the applicant's approach clearly and convincingly conveys the potential for broad adoption and sustainable use of the proposed technical concept/project.
4. Degree to which the applicant's approach clearly and convincingly conveys the potential extent of the expected adoption of the proposed technical concept/project.
5. Degree to which the applicant's approach clearly and convincingly conveys the potential

extent to which the proposed approach fosters collaboration and would lead to dissemination of results and lessons learned to relevant entities not immediately involved with the project.

CRITERION 3: PROJECT EXECUTION (15%)

This criterion will evaluate the degree to which the FWP provides a sufficiently detailed, concise, and understandable description of the tasks, subtasks, milestones, and deliverables by which the overall project scope will be performed, and the project objectives will be achieved. At a minimum, the FWP must address the following:

1. **Objectives** – extent to which the overall objectives of the project, and the objective for each phase of work (if applicable), are clearly described.
2. **Scope of Project** – appropriateness of the focus and effort to achieve the objectives of the proposed technical concept/project.
3. **Tasks (and Subtasks) to be Performed** – extent to which tasks (and subtasks) are clearly defined and organized in a logical sequence that increases the likelihood of achieving the objectives of the proposed technical concept/project. As warranted, go/no-go decision point(s) are to be included that demonstrate meaningful and measurable technical progress and provide justification for the continuance of the proposed technical concept/project.
4. **Technical Deliverables** – appropriateness of proposed deliverables (beyond those required by this RC) and their relevance to the corresponding task.
5. **Briefings/Technical Presentations** – appropriateness of the Applicant's planned briefing(s) and/or technical presentation(s).
6. **Milestone Log** – extent to which each milestone in the Milestone Log is appropriate, specific, measurable, achievable, relevant, timely, verifiable, and shows progress toward achievement of project goals. At a minimum, each milestone must include a description, planned completion date, and verification method.
7. **Project Schedule** – adequacy and relevance of interdependencies between tasks. The schedule must clearly indicate milestones and include a proposed project timeline broken down by phase and task (as identified in the FWP) with team members and their roles. The schedule must also indicate the deliverables, which must include each deliverable's title, associated phase/task, and planned completion date.

CRITERION 4: TEAM AND RESOURCES (10%)

This criterion will evaluate the likelihood that the project team, facilities, and other resources are appropriate and sufficient to achieve the project's proposed goals and objectives.

1. Adequacy and appropriateness of the qualifications, expertise, and experience of key personnel and team members.
2. Availability of key personnel.
3. Degree of demonstrated experience and past collaboration of the project team in completing comparable efforts that yielded successful technology research & development and demonstration (as applicable).
4. Level of dedication of the project team as demonstrated by letters of commitment that clearly identify each participant's role, and contribution.
5. Availability, appropriateness, adequacy, and condition of the R&D and demonstration facilities and equipment.

CRITERION 5: R&D Community Benefits Plan (15%)

The R&D Community Benefits Plan will be evaluated at 15% of the total merit review criteria. Each section of the plan will be evaluated at 5% of the merit criteria, such that full credit can

only be given for plans with technically meritorious approaches in all three areas.

1. The Diversity, Equity, Inclusion, and Accessibility (DEIA) Section of the R&D Community Benefits Plan will be evaluated based on the consideration of the following factors:
    a. Clear articulation of the project's goals related to diversity, equity, inclusion, and accessibility. These are four different, but related, concepts that should not be conflated. That is, you can achieve diversity without equity; all four are necessary for top scores.
    b. Quality of the project's DEIA goals, as measured by the goals' depth, breadth, likelihood of success, inclusion of appropriate and relevant SMART milestones, and overall project integration.
    c. Commitment and ability to track progress towards meeting each of the diversity, equity, inclusion, and accessibility goals.
    d. Extent of engagement of energy providers and/ or utilities that or serve disadvantaged communities and partnerships with underrepresented entities including MSIs, Minority Business Entities, and HBCUs.
2. The Energy Equity & Justice40 Section of the R&D Community Benefits Plan will be evaluated based on consideration of all of the following factors:
    a. Clear workplan tasks, staffing, research, and timeline for evaluating the possible near and long-term implications of the project for the benefit of the American public including, but not limited to the public health and public prosperity benefits.
    b. Approach, methodology, and expertise articulated in the plan for addressing energy equity and justice concerns associated with the technology innovation.
    c. Specific project elements or partnerships that enable proposed application or technology to benefit energy service providers that predominantly serve DACs.
    d. Extent to which the project would contribute to meeting the objective that 40% of the benefits of climate and clean energy investments will flow to DACs.
3. The Workforce Section of the R&D Community Benefits Plan will be evaluated on the following factors:
    a. Clear and comprehensive workplan tasks, staffing, research, and timeline for engaging workforce stakeholders and/or evaluating the possible near and long-term implications of the project for the U.S. workforce.
    b. Approach to document the knowledge, skills, and abilities of the workforce required for successful commercial deployment of innovations resulting from this research.
    c. Likelihood that the plan will result in improved understanding of the workforce implications related to the innovation if successful.

OTHER PROGRAM FACTORS

The following program factors may be used by the Selection Official during the selection process that are not indicators of the applicant's merit. These factors may assist in determining which of the ranked proposals shall receive DOE funding support:

1. It may be desirable to select a project or group of projects that represents a diversity of

technical approaches and applications;

2. It may be desirable to support complementary and/or duplicative efforts or projects, which, when taken together, will best achieve the DOE program objectives;
3. It may be desirable to select a project or group of projects that represents a diversity of Applicant organizations, extent of demonstration, technology maturities, and geographic locations;
4. It may be desirable to select projects of less technical merit than other projects if such a selection will optimize the use of available funds by allowing more projects to be supported and not be detrimental to the overall objectives of the program;
5. The degree to which the proposed project will accelerate transformational technological advances in partnership with energy market actors (e.g. rural electric cooperatives, municipal utilities, etc.), areas that industry by itself is not likely to undertake because of technical and financial capacity limitations;
6. The degree to which the proposed partnerships with underrepresented institutions, businesses, and/ or universities, including but not limited to, Minority Serving Institutions (e.g. Historically Black Colleges and Universities (HBCUs)/Other Minority Institutions), Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or companies that primarily serve disadvantaged communities (DACs).[11]
7. The degree to which the proposed project, when compared to the existing DOE project portfolio and other projects to be selected from the subject RC, contributes to the total portfolio meeting the goals reflected in the Community Benefits Plan criteria

SECTION VIII – OTHER INFORMATION

CYBERSECURITY PLAN

In accordance with BIL section 40126, applicants selected for award negotiations must submit an acceptable cybersecurity plan to DOE prior to receiving funding.[12] These plans are intended to foster a cybersecurity-by-design approach for BIL efforts. The Department will also use these plans to ensure effective integration and coordination across its research, development, and demonstration programs. **A cybersecurity plan is NOT required as part of the application submission for this Research Call, but all projects selected under this Research Call will be required to submit a cybersecurity plan during the award negotiation phase.**

The Department recommends using open guidance and standards such as the National Institute of Standards and Technology's (NIST) Cybersecurity Framework (CSF) and the DOE Cybersecurity Capability Maturity Model (C2M2).[13] The cybersecurity plan created pursuant to BIL section 40126 should document

[11] Pursuant to E.O. 14008 and the Office of Management and Budget's Interim Justice40 Implementation Guidance M-21-28, DOE has developed a definition and tools to locate and identify DACs. These resources can be located at https://energyjustice.egs.anl.gov/. DOE will also recognize DACs as defined and identified by the White House Council of Environmental Quality's Climate and Economic Justice Screening Tool (CEJST), which can be located at https://screeningtool.geoplatform.gov/.

[12] 42 U.S.C. § 18725

[13] NERC critical infrastructure protection (CIP) standards for entities responsible for the availability and reliability of the bulk electric system. NIST IR 7628: 2 Smart grid cyber security strategy and requirements.

any deviation from open standards, as well as the utilization of proprietary standards where the awardee determines that such deviation is necessary.

- Cybersecurity plans should be commensurate to the threats and vulnerabilities associated with the proposed efforts and demonstrate the cybersecurity maturity of the project.
- Cybersecurity plans may cover a range of topics relevant to the proposed project, e.g., software development lifecycle, third-party risks, and incident reporting.
- At a minimum, cybersecurity plans should address questions noted in BIL section 40126 (b) 'Contents of Cybersecurity Plan'.[14]

A draft version of supplementary guidance on the cybersecurity plan requirement will be available at https://www.energy.gov/ceser/bipartisan-infrastructure-law-implementation.

MODIFICATIONS

Notices of any modifications to this Research Call will be sent via e-mail directly to the National Laboratories. The e-mail will contain a web link to the modified version located at the NETL and/or CESER websites.

GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all proposals received in response to this Research Call and to select any proposal, in whole or in part, as a basis for negotiation and/or award.

If selected for award, DOE reserves the right to request additional or clarifying information from non-government sub-awardees.

QUESTIONS/AGENCY CONTACTS

Specific questions about this research call should be submitted via e-mail to 40125bLabCall@netl.doe.gov. To keep all interested entities informed, DOE/NETL will send all sanitized questions and answers (Q & A) to all primary applicants via periodic e-mail communication from 40125bLabCall@netl.doe.gov. To ensure fairness across all labs, DOE/NETL

NIST SP800-53, Recommended Security Controls for Federal Information Systems and Organizations: Catalog of security controls in 18 categories, along with profiles for low-, moderate-, and high-impact systems. NIST SP800-82, Guide to Industrial Control Systems (ICS) Security. NIST SP800-39, Integrated Enterprise-Wide Risk Management: Organization, mission, and information system view. AMI System Security Requirements: Security requirements for advanced metering infrastructure. ISO (International Organization for Standardization) 27001, Information Security Management Systems: Guidance on establishing governance and control over security activities (this document must be purchased). IEEE (Institute of Electrical and Electronics Engineers) 1686-2007, Standard for Substation Intelligent Electronic Devices (IEDs) Cyber Security Capabilities (this document must be purchased). DOE Cybersecurity Capability Maturity Model (C2M2).

[14] 42 U.S.C. § 18725

staff cannot answer questions directly to the Lab asking the question while the research call remains open.

APPENDIX I – R&D COMMUNITY BENEFITS PLAN GUIDANCE

The DOE is committed to pushing the frontiers of science and engineering; catalyzing high- quality domestic clean energy jobs through research, development, demonstration, and deployment; and ensuring energy equity and energy justice[15] for disadvantaged communities. Therefore, and in accordance with the Administration's priority to empower workers and harness opportunities to create good union jobs as stated in EO 14008 (Executive Order on Tackling the Climate Crisis at Home and Abroad),[16] it is important to consider the impacts of the successful commercial deployment of any innovations resulting from this RC on current and future workforce.

The goal of the three-section R&D Community Benefits Plan is to allow the application to illustrate engagement in critical thought about implications of how the proposed work will benefit the broadest swaths of American people and lead to broadly shared prosperity, including for workers and disadvantaged communities[17]. The sections of the R&D Community Benefits Plans are considered together because there may be significant overlap between audiences considered in workforce and disadvantaged communities.

Example DEIA, Energy Equity, and Workforce Plan Elements

Outlined below are examples of activities that applicants might consider when developing their R&D Community Benefits Plan. Applicants are not required to implement any of these specific examples and should propose the Plan that best fits their research goals, institutional environment, team composition, and other factors. Creativity is encouraged.

DEIA

DOE strongly encourages applicants to involve individuals and entities from disadvantaged communities. Tapping all of the available talent requires intentional approaches and yields broad benefits.

Equity extends beyond diversity to equitable treatment. Equitable access to opportunity for members of the project team is paramount. This includes ensuring that all members of the team, including students, are paid a living wage, provided appropriate working conditions, and provided appropriate benefits. In the execution of their project plan, applicants are asked to describe efforts in diversity, equity, inclusion, and accessibility. In this context, efforts toward DEIA are defined as:[18]

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[15] At DOE, we define energy justice as "the goal of achieving equity in both the social and economic participation in the energy system, while also remediating social, economic, and health burdens on those disproportionately harmed by the energy system" (Initiative for Energy Justice, 2019). Aligned with that document, the remainder of this document refers to this as, 'energy equity,' and is meant to encompass energy justice as well as DOE's efforts related to Justice40. https://www.energy.gov/diversity/articles/how-energy-justice-presidential-initiatives-and- executive-orders-shape-equity

[16] https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and- abroad

[17] See footnote 2 for guidance on the definition and tools to locate and identify disadvantaged communities.

[18] https://www.whitehouse.gov/wp-content/uploads/2021/11/Strategic-Plan-to-Advance-Diversity-Equity- Inclusion-and-Accessibility-in-the-Federal-Workforce-11.23.21.pdf

1) the practice of including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures, and beliefs of the American people,
2) the consistent and systematic fair, just, and impartial treatment of all individuals, including protecting workers rights and adhering to Equal Employment Opportunity laws,
3) the recognition, appreciation, and use of the talents and skills of employees of all backgrounds, and
4) the provision of accommodations so that all people, including people with disabilities, can fully and independently access facilities, information and communication technology, programs, and services.

Successful plans will not only describe how the project team seeks to increase DEIA, but will describe the overall approaches to retention, engagement, professional development, and career advancement. Specifically, they will demonstrate clear approaches to ensure all team members' strengths are meaningfully leveraged and all members are provided opportunities and paths for career development, especially including paths for interns and trainees to secure permanent positions. Diversity should be considered at all levels of the project team, not just leveraging early career individuals to meet diversity goals.

DOE strongly encourages applicants to consider partnerships as a means of promoting diversity, equity, inclusion, accessibility, justice, and workforce participation. Minority Serving Institutions, Minority Business Enterprises, Minority Owned Businesses, Disability Owned Business, Women Owned Businesses, Native American-owned Businesses, Veteran Owned Businesses, or entities located in an underserved community that meet the eligibility requirements are encouraged to lead these partnerships as the prime applicant or participate on an application as a proposed partner to the prime applicant.

When crafting the DEIA section of the Plan, applicants should describe the ways in which they will act to promote each of the four DEIA efforts above into their investigation. It is important to note that diversity, equity, inclusion, and accessibility are four different, but related, concepts that should not be conflated. That is, you can achieve diversity without equity; all four must be addressed. Applicants could discuss how the proposed investigation could contribute to training and developing a diverse scientific workforce. Applicants could describe the efforts they plan to take, or will continue to take, to create an inclusive workplace, free from retaliation, harassment, and discrimination. Applicants could outline any barriers to creating an equitable and inclusive workplace and address the ways in which the team will work to overcome these barriers within the bounds of the specific research project. The plan could detail specific efforts to inform project team members in any capacity of their labor rights and rights under Equal Employment Opportunity laws, and their free and fair chance to join a union. Note that this inclusion of informing project team members is also incorporated into awards through the National Policy Assurances.

Equal treatment of workers, including students, is necessary but overcoming institutional bias requires intentionally reducing sometimes hidden barriers to equal

opportunity. Applicants could consider measures like childcare, flexible schedules, paid parental leave, pay transparency, and other supports to ensure that societal barriers are not hindering realization of DEIA intentions. Some of these considerations may result in common approaches in different sections of the plan, and that is acceptable, as long as the submission is not a singular approach to all sections.

CESER especially encourages applicants to form partnerships with diverse and often underrepresented institutions, such as Minority Serving Institutions, labor unions, and community colleges that otherwise meet the eligibility requirements. Underrepresented institutions that meet the eligibility requirements are encouraged to lead these partnerships as the prime applicant. The DEIA section of the Plan could include engagement with underrepresented institutions to broaden the participation of disadvantaged communities and/or with local stakeholders, such as residents and businesses, entities that carry out workforce development programs, labor unions, local government, and community-based organizations that represent, support, or work with disadvantaged communities. Applicants should ensure there is transparency, accountability, and follow-through when engaging with community members and stakeholders.

Specific examples include:

- Building collaborations and partnerships with researchers and staff at Minority Serving Institutions
- Addressing barriers identified in climate surveys to remove inequities
- Providing anti-bias training and education in the project design and implementation teams
- Offering training, mentorship, education, and other support to students and early/mid-career professionals from disadvantaged communities
- Providing efforts toward improving a workplace culture of inclusion
- Developing technology and technology integration innovations to meet the needs of disadvantaged communities
- Creating partnerships with local communities, especially under-resourced and disadvantaged communities
- Voluntary recognition of a union and informing employees of their rights, regardless of their classification
- Making research products and engagement materials accessible in a greater variety of formats to increase accessibility of research outputs
- Implementing training or distributing materials to reduce stigma towards individuals with disabilities
- Designing technologies that strategically fit within the existing workforce for installation and maintenance of the potential innovation

Energy Equity

The Energy Equity section should articulate how project proposals will drive equitable access to, participation in, and distribution of the benefits produced from successful technology innovations to disadvantaged communities and groups. Intentional inclusion of energy equity requires evaluating the anticipated long-term costs and benefits that will accrue to disadvantaged groups as a result of the project, and how research

questions and project plans are designed for and support historically disadvantaged communities' engagement in clean energy decisions. Similar to potential cost reductions or groundbreaking research findings resulting from the research, energy equity and justice benefits may be uncertain, occur over a long period of time, and have many factors within and outside the specific proposed research influencing them.

Applicants should describe the influencing factors, and the most likely energy equity implications of the proposed research. Applicants should describe any long-term constraints the proposed technology may pose to communities' access to natural resources and Tribal Cultural resources. There may be existing equity research available to use and citation in this description or the applicant could describe milestone-based efforts toward developing that understanding through this innovation. These near and long term outcomes may include, but are not limited to: a decrease in the percent of income a household spends on energy costs (energy burden[19]); an increase in access to low-cost capital; a decrease in environmental exposure and burdens; increases in clean energy enterprise creation and contracting (e.g., women or minority-owned business enterprises); increased parity in clean energy technology access and adoption; increases in energy democracy, including community ownership; and an increase in energy resilience.

Specific examples include:

- Describing how a successful innovation will support economic development in diverse geographic or demographic communities
- Creating a plan to engage equity and justice stakeholders in evaluating the broader impacts of the innovation or in the development of the research methodology
- Describe how the proposed research strategy and methodology was informed by input from a wide variety of stakeholders
- A literature review of the equity and justice implications of the outcomes of the specific research if the innovation is successful or a plan with dedicated budget and expertise (staffing or subawardee) to evaluate the potential equity implications of successful innovation outcomes.

Workforce

The Workforce section of the R&D Community Benefits Plan should articulate the future workforce implications of the innovation or a milestone-driven plan for understanding those implications. This includes documenting the skills, knowledge, and abilities that would be required of workers installing, maintaining, and operating the technology that may be derivative of the applicant's research, as well as the training pathways and their accessibility for workers to acquire the necessary skills. There may be field-specific or relevant existing research that could be cited in this section. In addition, applicants could detail the process they will use to evaluate long-term impacts on jobs, including job growth or job loss, a change in job quality, disruptions to existing industry and resulting changes to relationships between employers and employees and improvements or reductions in the ability of workers to

[19] Energy burden is defined as the percentage of gross household income spent on energy costs: https://www.energy.gov/eere/slsc/low-income-community-energy-solutions

organize for collective representation, and anything else that could result in changes to regional or national labor markets.

For additional support with developing the Workforce section of a R&D Community Benefits Plan, please refer to the DOE's Community Benefits Plan Frequently Asked Questions (FAQs) webpage (https://www.energy.gov/bil/community-benefits-plan-frequently-asked- questions-faqs). This new resource, though created primarily for demonstration and deployment projects funded by the Bipartisan Infrastructure Law (BIL), may be useful for R&D projects which is the main subject of this template.

Applicants will find section 2 of the FAQ ("Investing in America's Workforce") particularly helpful for understanding key federal policies, terms and concepts, as well as workforce development strategies relevant to examination of the workforce implications of applicants' proposed research.

Specific examples include:

- Outlining the challenges and opportunities for commercializing the technology in the US
- Creating a literature review of the workforce implications of the outcomes of the specific research if the innovation is successful or a plan with dedicated budget and expertise (staffing or subawardee) to evaluate the potential equity implications of successful innovation outcomes
- Creating a plan and milestones for assessing how a successful innovation will have implications for job savings or loss, either at the macroeconomic level or within specific industries
- Describing how the project will support training of workforce to address needs of successful innovation
- Voluntary recognition of a union and informing employees of their rights, regardless of their classification
- Creating a plan to evaluate how a successful innovation, will result in potential workforce shifts between industries or geographies.

Inclusion of SMART milestones

CESER requires that the applicant's R&D Community Benefits Plan include one Specific, Measurable, Achievable, Relevant and Timely (SMART) milestone for each phase. An exemplar SMART milestone clearly answers the following questions:

- What needs to be accomplished?
- What measures and deliverables will be used to track progress toward accomplishment?
- What evidence suggests that the accomplishment is achievable?
- Why choose this milestone?
- When will the milestone be reached?

APPENDIX II – BIL PERFORMANCE AND TRACKING METRICS

Metric Name	Required?	Collection and Reporting Requirements	Frequency
Direct Jobs Creation	If Applicable	The direct jobs metric includes reporting on the quality of the jobs created through BIL by collecting data such as wages, benefits, job classification, and whether a job is covered by a collective bargaining agreement. Direct jobs should be reported for all BIL programs, except for those related to prizes and rebates. Number of full-time equivalent jobs and number of individuals employed should be reported across the following three ways in which direct jobs should be communicated. 1. Total number of direct jobs, and by rate of pay and employee demographics. 2. Number and percent of direct jobs with access to fringe benefits and by the value of those benefits. 1. Number of and percent of jobs covered under a collective bargaining agreement for jobs reported through payroll compliance.	Quarterly Duration of award
Funding allocated to Disadvantaged, Energy, Rural, & Tribal Communities	If Applicable	Funding to disadvantaged, fossil energy, tribal, and rural communities should be reported separately by community. Information on disadvantaged communities can be found here. The total funding to communities of interest is the sum of all the following funding types: • Funding for infrastructure for which funding recipients have reported potential benefits to a community of interest. • Salary for employees and registered apprentices, by community of interest based on residence zip code. • Funding to MSIs including funding for capital investments and to students for stipends, internships, or training. Based on DOE's Justice40 guidance, benefits to MSIs count toward the Department's Justice40 goal and are therefore allocated to the total funding to disadvantaged communities. Similarly, benefits to Tribal Colleges and Universities (TCUs) would be allocated to tribal communities. • Funding to small disadvantaged businesses (SDBs) as defined by the U.S. Small Business Administration, and small self-identified minority owned and LGBTQ+ owned businesses. For the purposes of this guidance, benefits to SDBs are allocated to the total funding to disadvantaged communities.	Quarterly Duration of award
Funding to Businesses by Ownership	If Applicable	Funding to business by ownership and classification (i.e., small businesses) should be tracked for any provision where a prime recipient or subrecipient may be a business. The value of funding will be reported by ownership category (i.e., women, minorities, LGBTQ+ persons, veterans, or veterans with a disability) and for all small businesses, small disadvantaged businesses (SDB), and for small businesses by ownership type.	Quarterly Duration of award

Metric Name	Required?	Collection and Reporting Requirements	Frequency
Funding to MSIs	If Applicable	BIL funding can elevate and fund institutions that serve and have strong ties with communities of interest. While funding to MSIs will be incorporated in funding to disadvantaged communities; funding provided to MSIs should also be tracked separately. Funding to minority serving institutions will be reported in three ways, 1. percent of funding for colleges and universities that is distributed to MSIs, 2. the total dollar value of partnerships, contracts, grants, or cooperative agreements with MSIs, and, 3. the number of contracts or subawards.	Quarterly Duration of award
Community and Stakeholder Engagement	If Applicable	Community and stakeholder engagement is often thought of as an event or a series of events during which an impacted community is informed and potentially consulted about a project. DOE is adopting a Spectrum of Community Engagement to Ownership that is more expansive than pervious practices and encompasses moving towards involving, collaborating and deferring to the community such that project teams build trust, ongoing relationships, and partnerships with impacted communities, whose input will then be taken into account in key project decisions such as siting, design, implementation, and continuous improvement. Activities that include building, expanding, or retrofitting a facility should report on community and stakeholder engagement. Community and stakeholder engagement will be reported in the following ways, 1. Number of community members or stakeholders engaged, 2. Number of community members or stakeholders engaged that are from communities of interest (individually and collectively), and, 3. Number of projects and percent of total funding that operated under a negotiated Community Benefits Agreement	Quarterly Duration of award
Non-DOE Investment	Yes	Non-DOE Investment is the sum of the following: • BIL matching funds (i.e., cost share) and any other third-party cash or in-kind contributions (e.g., property or services), • the value of all repaid government loans, • the differential between the value of a product purchased with a rebate and the value of the rebate, • the total value of transmission capacity constructed, or value of transmission capacity expanded, whose installation was supported by a capacity contract or a public-private partnership, • private capital loaned to support commercial and residential audits and retrofits, • funding invested by partners in Energy Savings Performance Contracts (ESPCs), and,	Quarterly Duration of award

Metric Name	Required?	Collection and Reporting Requirements	Frequency
		• operating costs of nuclear plants supported by the Civilian Nuclear Credit (CNC) program.	
Follow-on-Funding	Yes	Follow-on-funding refers to private funding received by a recipient for a technology or product supported by DOE subsequent to the initial award.	Quarterly For the duration of the award and for at least 5 years post completion.
Intellectual Property (IP) Generation	Yes	Intellectual Property (IP) Generation is reported as three values: 1. Number of patents filled 2. Number of patents issued 3. The number of invention disclosures for products that received BIL funds for their development	Annually For the duration of the award and for at least 10 years post completion.
Intellectual Property (IP) Utilization	Yes	IP Utilization is reported as three values, number of technologies supported through BIL funding that are, 1. Number of commercialized technologies 2. Number of licensed technologies 3. Number of technologies not licensed	Annually For the duration of the award and for at least 10 years post completion.