U.S. Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)

Connected Communities 2.0:
Innovations to Manage Growing Transportation, Building, and Industrial Loads to the Grid

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Informational Webinar:	July 29th, 2024; 10:30 a.m. ET
Submission Deadline for Concept Papers:	August 20th, 2024; 5:00 p.m. ET
Submission Deadline for Full Applications:	October 10th, 2024; 5:00 p.m. ET
Expected Date for EERE Selection Notifications:	Winter 2025
Expected Timeframe for Award Negotiations:	Spring 2025

- Informational Webinar Registration Link: https://events.gcc.teams.microsoft.com/event/ec88a42e-242e-4c72-8bf8-62f1fad891dd@6b183ecc-4b55-4ed5-b3f8-7f64be1c4138

- Applicants must submit a Concept Paper by 5:00 p.m. ET on the due date listed above to be eligible to submit a Full Application.

- To apply to this FOA, applicants must register with and submit application materials through EERE eXCHANGE at https://eere-eXCHANGE.energy.gov, EERE's online application portal.

- Applicants must designate primary and backup points-of-contact in EERE eXCHANGE with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the selection.

- **Unique Entity Identifier (UEI) and System for Award Management (SAM) -** Each applicant (unless the applicant is excepted from those requirements under 2 CFR

25.110) is required to: (1) register in the SAM at **https://www.sam.gov** before submitting an application; (2) provide a valid UEI number in the application; and (3) maintain an active SAM registration with current information when the applicant has an active federal award or an application or plan under consideration by a federal awarding agency. DOE may not make a federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

NOTE: Due to the high number of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. If entities have technical difficulties with the UEI validation or SAM registration process they should use the HELP feature on SAM.gov. SAM.gov will address service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue. Additional entity validation resources can be found here: GSAFSD Tier 0 Knowledge Base - Validating your Entity.

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I. Funding Opportunity Description

A. Background and Context

i. Background and Purpose

This Funding Opportunity (FOA) issued by the Office of Energy Efficiency and Renewable Energy is designed to address major new loads from transportation, industry, and buildings on the electric grid by providing new tools for users, planners, and operators of the electric grid. This FOA has two major topical areas:

1. Connected Communities 2.0, focused on technical measures at the grid edge (defined later) in buildings, industry, and transportation to prepare the electric grid for these new loads, and improve the resilience of customers and the grid; and
2. Smart Charge Management (SCM), focused on various unique urban, suburban, and rural use cases to build confidence in SCM as an effective approach for electric vehicles (EVs) to provide flexibility and value to the electric grid.

This FOA, both for Connected Communities 2.0 and SCM, is designed to validate technology in real world situations and share outcomes in ways that will enable these practices to be replicated by other jurisdictions and to inform technical assistance and stakeholder engagement. The learnings from these projects should enable electric system planners and operators, strategic planners, regulators such as Public Utility Commissions (PUCs), and other stakeholders to understand and plan for new load growth and peak loads driven by electrification, growth in manufacturing, and new computing developments; and to plan for physical and cyber threats to reliability and resilience, while keeping costs affordable for customers and ratepayers.

This FOA will support research, development, and demonstration (RD&D) at the grid edge – the portion of the electric grid between the feeder and the plug – to evaluate how to right size future electricity infrastructure using various technical measures, which can also improve customer benefits and grid resilience. Grid edge technical measures include a wide range of technologies such as low power appliances, managed EV charging, demand-flexible building systems, thermal energy networks with energy storage, batteries, and rooftop solar.

This FOA will advance the Nation'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. This FOA supports these administration goals above by funding RD&D to drive innovation that can lead to the deployment of clean energy technologies, which are critical for climate protection.

This FOA has three primary goals for the cohort of awarded projects:

1. Demonstrate how smart and coordinated management of EVs and other Distributed Energy Resources (DERs), including the integration of efficiency, smart electrical panels, solar, heat pumps, controls, EV charging, and storage can together provide grid support, reduce system costs, and improve the economics of customer technology adoption, at a scale sufficient to enable confidence in wide-scale adoption.
2. Demonstrate approaches that enable acceptance by utilities, PUCs, and communities of smart charge management, technical measures at the grid edge, and innovative planning strategies as valid methods towards right sizing investments in the distribution system; and
3. Demonstrate approaches towards improved resilience for communities, end-use customers, and the overall grid in the face of growing loads, extreme weather events, cyber threats, and increasing reliance on the electric grid through the use of grid edge technical measures.

a. Definitions:

This FOA builds on terms that we define here to use in the rest of this document:

Grid Edge: The grid edge describes electrical infrastructure between feeders on the utility side and plugs in customer premises. The grid edge is where changes in electricity use in transportation, managed EV charging, thermal energy networks (TENs), energy storage, distributed solar, and/or integration of additional DERs can be better coordinated and integrated.

Right Sizing: Recognizing that the growth of new loads will lead to a necessary increase in electric infrastructure, the concept of right sizing refers to reducing the amount of needed infrastructure against a counterfactual scenario of "unmitigated

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

expansion". What this means in practice is targeting the use of energy efficiency, power efficiency, managed EV Charging, and DERs to reduce peak loading along with innovative planning tools that use stochastic planning of system components such as transformers to reduce the growth of the system (e.g., a 50% increase in distribution grid infrastructure with efficiency measures instead of a 150% increase in an "unmitigated expansion" scenario).

Smart Charge Management (SCM): Smart Charge Management refers to controlling the amount of power exchanged between chargers and EVs to meet customers' charging needs while also responding to external power demand or pricing signals to provide load management, resilience, or other benefits to customers and the electric grid, including reduced overall grid investment and downward pressure on rates for EV charging.

DERs: Distributed Energy Resources (DERs) include inverter-connected generation and storage systems such as solar PV, battery energy storage, clean hydrogen energy storage, fuel cells, and electric vehicles, as well as building load controls, smart thermostats, heat pumps, heat pump-based systems and water heaters, and continuously variable controllable loads. In Connected Communities 2.0, DERs need to be controllable by either direct communications or an economic signal.

Power Efficiency: Power Efficiency refers to the reduction of peak power needs at the grid edge. Peak power needs drive grid planning in an era where grid capacity is a primary constraint, as more accessible and lower cost energy comes on the grid from renewable resources.

Resilience: The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.[2]

VPPs: Virtual Power Plants (VPPs) are aggregations of DERs that support utility operations by providing the services that would normally be provided by the next power plant coming online or through fuel-based resources, such as:
- Load reduction to avoid brownouts or voltage sag;
- Frequency support services through rapid load up/load down services as well as rectification through inverter embedded sources; and
- Management of harmonics through inverter embedded sources.[3]

[2] U.S. Department of Energy. (2023). Resilience. In Directives Program, Office of Management. https://www.directives.doe.gov/terms_definitions/resilience

[3] U.S. Department of Energy. (2023). Pathways to Commercial Liftoff: Virtual Power Plants. https://liftoff.energy.gov/vpp/

DERs can provide these functions on either side of the meter with appropriate value created for customers by these services.

Thermal Energy Networks: Thermal Energy Networks (TENs) are building heating and cooling networks that leverage thermal assets such as geothermal (i.e., ground-source), combined heat and power, wastewater, low carbon fuel based generation or stranded thermal energy to provide energy-efficient heating and cooling that lowers demand on the local electric infrastructure for residential, commercial, and mixed-use communities and districts. TENs systems can be hybridized with other grid edge solutions or used alone to increase energy resilience, reliability, and durability during extreme events for various geographies and population densities.

Non-Wires Alternatives: Non-Wires Alternatives (NWAs) are electric utility system investments and operating practices that can be used to avoid upgrades on the transmission and distribution systems.[4]

b. Electricity System Background

Achieving the goal of a net zero economy by 2050 with electrified buildings, industry, and transportation will require a zero emissions electric grid. The grid has to change and modernize to enable rapidly changing load patterns. This will require:

1. New forecasting and planning strategies that incorporate temporal variability in distribution circuits;
2. New technology solutions that emphasize power efficiency; and
3. Better coordination of devices and systems that interact at the grid edge in the face of increasing electric demand, customer costs, and temporal mismatch between electricity production and use.

Electric distribution has been the most rapidly growing portion of customer electricity bills over the past decade. There is a growing understanding at the regional, city, and state levels about the planning and expenditure required to ensure a reliable distribution grid. A paucity of data and visibility exacerbates the challenges; examples of such are provided in Appendix O.

Increased demand for electricity coupled with more extreme weather and physical and cyber threats to the electric grid has important implications for customer resilience. Customer resilience means being able to store and cook food, sustain life saving medical needs, stay within survivable temperature, retain mobility, and produce essential goods during and after extreme weather events such as heat

[4] Electricity Advisory Committee. (2012, October 17). Recommendations on Non-Wires Solutions [Letter to US Department of Energy]. https://www.energy.gov/sites/prod/files/EAC%20Paper%20-%20Recommendations%20on%20Non-Wires%20Solutions%20-%20%20Final%20-25-Oct-2012.pdf

waves, hurricanes, wildfires, flooding, and extreme cold. Energy efficiency, flexibility, and demand management at the building and community level can also help offset loads locally and provide additional resilience. For example, highly energy efficient housing can reduce loads and increase passive survivability.

Achieving a more flexible, right sized, and resilient grid will require various grid edge technical measures that can overcome many of the current electricity system limitations. The future grid will require a shift in the ways customers and communities interact with the grid, and the way grid planning and operations practices are carried out.

c. Electric Vehicle Background

The rapid growth of Electric Vehicles (EV) connecting to the electricity grid to recharge will result in new loads that will require new management. Smart Charge Management (SCM) is an approach that can shift and spread these loads to more desirable times for the grid as well as provide grid services such as peak load shaving, demand charge mitigation, voltage support, frequency regulation, and renewable generation integration, to name a few. While various pilots, and programs have demonstrated SCM for EVs connected to electric vehicle supply equipment (EVSE) either at individual charging locations or congregated charging locations across a large distribution network, there are numerous other use cases for SCM that need to be investigated. There is also a need to identify smart charge management approaches that scale and help enable SCM to become the norm, thereby maximizing the value of smart charge management to reduce costs. However, there is uncertainty about the balance between more complex SCM schemes that in theory deliver more grid resources and simpler approaches that may be easier to implement or get large scale consumer support. A key goal of this topic is to understand how to go from isolated pilots or programs to approaches that can be implemented at large scale. Scaling will likely necessitate greater commonality in approaches to have more consistent consumer/automotive experiences. This in turn will necessitate more commonality in how the signals from utilities communicate SCM opportunities to consumers through either their vehicle or the home EVSE equipment used to charge vehicles.

d. DOE Background

DOE is engaged in multiple efforts to develop flexible approaches to accelerate the transition to a modern grid edge and respond to rapidly evolving technology demands. The Office of Energy Efficiency and Renewable Energy (EERE) and Office of Electricity (OE) are supporting integrated energy system planning with a network of technology offices and industry partners. This FOA is one of three FOAs totaling more than $100 million to conduct research, development, and field validations that seek to understand new and more dynamic electric loads, integrate them with the

electric grid, and modernize the grid edge while promoting equitable investments. This FOA is being issued by the Building Technologies Office (BTO) in collaboration with the following offices: Solar Energy Technologies Office (SETO), Vehicle Technologies Office (VTO), Industrial Efficiency and Decarbonization Office (IEDO), Geothermal Technologies Office (GTO), and Office of Electricity (OE). For full scope of office priorities as they relate to Connected Communities 2.0, see Appendix M**.** Examples from prior Connected Communities and related projects are described in Appendix N.

e. Connected Communities Background

This FOA builds upon the foundation of the first Connected Communities FOA launched in 2020. DOE first launched Connected Communities in 2020 and invested $61 million in 10 community projects nationwide. Details of the first Connected Communities project cohort are available in **Appendix N.** While the first version was focused on DER integration to support a more variable grid, this next version focuses on preparing the grid for new loads and extreme weather. For example, the growth of electric transportation in all vehicle classes, along with the installation of heat pumps in buildings, will lead to new load growth and changing load patterns. Large companies now aim to meet sustainability goals by electrifying their buildings, industrial processes, and transportation fleets. Data centers associated with new digital industries are also growing rapidly. All these trends are introducing new loads on the distribution system at growth rates not seen in decades in many parts of the country. This requires us to envision how to right size the future electric system and how to incorporate DERs and grid edge technical measures to address new growth.

This FOA includes both a **Connected Communities 2.0 topic** and a **focused Smart Charge Management (SCM) sub-topic**. It will therefore expand beyond buildings and renewables to add vehicles, industrial loads, and thermal energy networks as potential grid edge technical measures. This FOA incorporates some of the early lessons learned from the first Connected Communities cohort by soliciting projects to create scalable solutions for grid planners to achieve decarbonization and electrification goals, while minimizing impacts to the distribution grid, mitigating grid upgrade needs, and improving customer resilience.

This FOA also incorporates priorities such as the Justice40 Executive Order on Environmental Justice which stipulates that at least 40% of federal climate, clean energy, affordable and sustainable housing, and other investments flow directly to disadvantaged communities.[5] The goals of this order are consistent with those of the Affordable Home Energy Shot, which seeks to reduce the upfront costs of energy

[5] The White House. (n.d.). Justice40: A Whole-of-Government Initiative. White House. Retrieved June 6, 2024, from https://www.whitehouse.gov/environmentaljustice/justice40/

upgrades in homes by 50% and reduce energy bills by 20% within a decade.[6] Recognizing that disadvantaged communities might also have some of the least robust parts of the grid infrastructure, this Connected Communities 2.0 FOA seeks to address disadvantaged community needs through innovative approaches to building, vehicle and grid technology integration and demonstration.

ii. Research, Development, and Demonstration Needs

Achieving the primary desired outcomes requires research, development, and demonstration (RD&D) of technologies and systems that can overcome multiple, complex, and interrelated challenges across current technology, business, regulation, and practice. Consistent with federal strategies and actions to decarbonize the transportation[7], electricity[8], industrial[9], and building[10] sectors, this FOA targets four RD&D areas that are essential for developing the future grid.

For SCM projects:

1. Field validation of SCM for EVs: Subtopic 1A is focused on smart charge management and aims to address the controllability and visibility of EVs to utility operators. If completely unmanaged, EVs plugging into the grid to recharge when people return home or when fleet EVs return to their business at the end of the day could create additional evening peak loads that utilities would have to meet. Simple charge management techniques such as time-of-use rates can shift these loads to later in the night when electricity demand is lower but can also result in "timer peaks," i.e., significant night-time peak loads. However, Smart Charge Management (SCM) is an approach that can shift and spread these loads to more desirable times for the grid. In concert with other DERs, SCM can provide grid services such as peak load shaving., demand charge mitigation, voltage support, frequency regulation, and

[6] U.S. Department of Energy. (2024). Affordable Home Energy Shot. Office of Energy Efficiency and Renewable Energy. https://www.energy.gov/eere/affordable-home-energy-shot

[7] U.S. Department of Energy, U.S. Department of Transportation, U.S. Environmental Protection Agency, & U.S. Department of Housing and Urban Development. (2023). The U.S. National Blueprint for Transportation Decarbonization. https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

[8] U.S. Department of Energy. (2023). On the Path to 100% Clean Electricity. Office of Policy. https://www.energy.gov/sites/default/files/2023-05/DOE%20-%20100%25%20Clean%20Electricity%20-%20Final.pdf

[9] U.S. Department of Energy. (2022). Industrial Decarbonization Roadmap. https://www.energy.gov/industrial-technologies/doe-industrial-decarbonization-roadmap

[10] U.S. Department of Energy. (2024). Decarbonizing the U.S. Economy by 2050: A National Blueprint for the Buildings Sector. Office of Energy Efficiency and Renewable Energy. https://www.energy.gov/eere/decarbonizing-us-economy-2050-national-blueprint-buildings-sector

renewable generation integration, to name a few. These grid services can not only provide benefit to the grid operator but also to the EV owner and charging network operator through lower or more predictable charging costs.

For Connected Communities 2.0 projects:

2. Field validation of grid edge technical measures that reduce the necessary level of investment into distribution infrastructure: Utilities and PUCs have a fiduciary duty to ensure system reliability and energy affordability for customers. Utilities' primary objective is reliability over a 40-year planning period. Using grid edge technical measures to reduce the level of future investment in the distribution grid still requires field validation for the valuation to be accepted by both utilities and PUCs. Field validation is required to understand customer acceptance of the technologies; avoid stranded assets; reduce new grid infrastructure requirements; quantify the impact at scale for developing new customer programs, rates, tariffs, incentives, and/or business models; and lower the risk in utility investment decision making.

3. Demonstration of increased customer benefits and grid resilience using grid edge technical measures, both in front of and behind the meter: Connected Communities 2.0 solutions could improve the resilience of both individual customers and the electric grid by leveraging efficient, dynamic, and flexible grid edge technical solutions. Customer resilience may also be improved through improved envelope and energy efficiency for passive survivability, local energy generation, low power appliances, embedded energy storage, low carbon fuels, and vehicles-to-building technologies. Ultimately, resilience is about providing customers with continuity of services such as food, shelter, and transportation, and, in the case of industries, continuation of production. Microgrids leveraging these technologies can provide for sustenance of services that customers require, such as food, and livable shelters. Metrics and performance indicators for valuing and evaluating resilience in a more holistic and equitable manner need to be developed and standardized so that utilities and PUCs can effectively plan and approve investments.

4. Data collection to assess system readiness for new loads: There is a pervasive lack of data at the grid edge, even for utilities, such as sensing at transformers. This impacts the effectiveness and reliability of controls-based solutions. Distribution operators cannot always access building-level data or controls, even in some demand response programs. More data will also be required to understand how new loads will impact distribution network reliability, explore load minimization technologies, and plan and optimize multiple asset classes (envelopes, DERs, demand flexibility control, etc.) to

increase customer and grid resilience. One emerging avenue is the use of advanced analytics, such as meter–transformer mapping, to identify the strain on the grid at the edge and to identify methods to alleviate that stress.

Fulfilling these four RD&D needs will require broad partnerships between utilities; building developers; product providers such as automotive and truck OEMs, HVAC manufacturers and appliance manufacturers; community organizations; energy service providers; local authorities for energy policy and code implementation; and, at the center of it all, customers. It will also require creating new internal partnerships within utilities between customer programs, distribution planning, and distribution operations, and between utilities and their governing bodies such as PUCs or municipal agencies.

Leveraging grid edge technical measures can constructively enhance customer comfort and many other benefits ranging from indoor air quality to residents' health, safety, and financial stability, while also improving resilience. Further R&D is required to understand customer motivations, the full scope of non-energy benefits (see Appendix L), and the most effective incentives and customer programs. Strengthening partnerships between community organizations and utilities is crucial to fully understanding the potential of grid edge technical measures for operators and planners.

iii. Technology Space and Strategic Goals

This FOA seeks applications that:

- Help move beyond small scale pilots and provide the learnings necessary to move to larger scale implementation;
- Address practical barriers to implementation that can allow for successful support among customers, utilities, and utility regulators;
- Provide data and analysis on energy use, grid operations, and integration of innovative grid edge technologies;
- Enable learning in this sector through practical demonstrations of grid edge technical measures;
- Develop new frameworks to plan, operate, and regulate the electricity system for grid edge technical measures; and
- Engage broad stakeholder groups to address new load growth and resilience, including system planners and operators, industry, original equipment manufacturers (OEMs), policy makers, regulators, communities, end-use customers, and technology developers;

- Reduce technological and institutional uncertainty and enhance confidence in grid edge technical measures for all communities.

The following list provides a few examples of projects in each category, though respondents can and should suggest other projects that meet the selection criteria. DOE is looking for innovative solutions that clearly outline expected future grid challenges and take data based, and unique approach to resolving these challenges and to right size the future grid.

1. Field validation of SCM for EVs:
   - The overall priority is projects that can demonstrate consistent, wide-scale consumer usage and integration with how home consumers charge their EVs at home and interact with their EVs or EVSE. Priority should be given to approaches that can easily scale across OEMs, EVs, and utilities, allowing managed charging to essentially become the default way that EVs are charged at home and other places where vehicles regularly dwell versus small, one-off programs with higher costs or approaches that each consumer opts into, thereby minimizing scale.
   - Also of interest are aggregations of EVs that can be scaled and integrated to support load shaping, load shifting, or load shedding to provide resiliency; use clean energy price signals or other means to maximize generation from renewables, and implement controls signaling to support demand response events and other grid resiliency activities like voltage support targeted at the distribution system; and/or use-cases that have received less attention, including but not limited to: charging for multifamily housing; curbside charging; lightly loaded long rural feeders; and/or dense urban grids with minimal available grid hosting capacity.

2. Field validation of grid edge technical measures that reduce the necessary level of investment into electric infrastructure, especially in distribution systems:
   - Electrification using a "power efficiency" strategy that minimizes distribution system investments using elements such as envelope improvement/air sealing, smart circuits/panels, low power appliances, 120V heat pumps, efficiency retrofits, building/community scale managed charging to avoid distribution system upgrades;
   - Demonstration of Thermal Energy Networks (TENs) - including geothermal (ground-source), wastewater, and other stranded thermal energy - and thermal energy storage to reduce peak loads in industrial, multifamily and residential communities;
   - Demonstration of DER integration to reduce peak loads in local electric networks with electrified buildings, communities, and industrial facilities, including the enabling of virtual power plants (VPPs);

- Electrification of industrial uses that typically connect to transmission or distribution networks;
- Reducing impact to local electricity systems from decarbonization using hybrid approaches using zero carbon fuels;
- Validation of new stochastic distribution planning tools that can be used to reduce size of distribution systems for electrification;
- Campus/large building/neighborhoods/industrial demonstrations that reduce distribution system upsizing;
- Aggregation of rooftop, community- or utility-owned and controlled solar Photovoltaic (PV), including business models for cooperative leasing, management, and maintenance; and/or
- Integrated gas and electric network planning for decarbonization.

3. Demonstration of increased customer benefits and grid resilience through integrative strategies:
   - Electrified communities, industries, and/or large buildings that leverage innovative microgrid strategies such as directly coupled Direct Current (DC) connection with energy storage, vehicle-to-building (V2B) and vehicle-to-grid (V2G) technologies; or production, storage, and use of clean hydrogen and fuel cells all at distribution scale;
   - High efficiency neighborhood homes and building projects that integrate storage, reduce peak demand and/or size of microgrids, and reflect community needs; and/or
   - Demonstration of Thermal Energy Networks (TENs) that utilize thermal assets such as geothermal (i.e. ground-source), wastewater, or stranded thermal energy to provide energy-efficient heating and cooling, thus lowering demand on the local electricity system for residential, commercial, and mixed-use districts.

4. Data collection to assess system readiness for new loads and potential for innovations in customer technologies that enhance system readiness:
   - Mapping meter data to transformers and understand loading within distribution system elements (transformers, feeders, etc.)
   - Data on electric vehicle charging infrastructure related to the loading on distribution systems
   - Large scale transformer loading data across multiple affordable housing communities;
   - New grid planning tools, and methodologies that can help with scenario and power flow analysis on the grid and utilize these scenarios to project the impact of right sized grid infrastructure.

iv. Partnership Requirements

Bringing together key project partners and stakeholders to engage in conversations and collaborations around the wide range of social, physical, economic, and regulatory issues is a necessary step to achieve the two primary desired objectives. The FOA projects are expected to have utilities as a primary or a substantial contributing partner (including financially), along with other partners who can engage with the local PUCs or the governing authority for the utility. This is to ensure that there is a pathway to implement project findings and work with PUCs for program development or investment analysis. The Project Partners & Stakeholders requirements in Section I.B in the Topic Area below suggests some partnering types but is not comprehensive.

Additional teaming requirements for Sub-topic 1A on SCM are described below in that section.

Selected projects will work as a portfolio to enable this FOA to meet multiple goals. It will allow for selected projects to learn from one another, and to address diverse and heterogeneous energy situations throughout the country. Selections will be made based on portfolio diversity factors. For the full selection criteria see Section V.A and for program policy factors see Section V.C.i. The cohort will be supported by a national coordinator, which will result in additional convening (virtual and in person) and additional uniform reporting requirements across the cohort (Appendix H).

Similarly, the diversity, equity, and inclusion goals of the Biden Administration will be fulfilled by the entire cohort and portfolio of projects. As part of this whole of government approach, this FOA seeks to encourage the participation of underserved communities and underrepresented groups. Applicants are highly encouraged to include individuals from groups historically underrepresented in STEM on their project teams. Minority Serving Institutions, Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or entities located in an underserved community that meet the eligibility requirements (see Section III.) are encouraged to apply as the prime applicant or participate on 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 (See Section V.C.).

Detailed technical descriptions of the specific Topic Areas are provided in the sections that follow.

v. Teaming Partner List

DOE is compiling a Teaming Partner List to facilitate the formation of project teams for this FOA. The Teaming Partner List allows organizations that may wish to participate on a project to express their interest to other applicants and explore potential partnerships. EERE is compiling a Teaming Partner List to facilitate the widest possible participation for this FOA, and strongly encourages teams from different organizations, scientific disciplines, and technology sectors to form interdisciplinary and cross-sector teams that span organizational boundaries in order to enable and accelerate the achievement of scientific and technological outcomes that were previously viewed as extremely difficult, if not impossible. The list allows organizations with topical expertise that wish to participate in an application, but may not wish to apply as the Prime applicant to the FOA, to express their interest to other potential applicants and to explore potential partnerships. It also serves as a resource for Prime applicants seeking specific expertise in potential partner organizations.

The Teaming Partner List will be available on EERE eXCHANGE and will be regularly updated to reflect new teaming partners who provide their organization's information.

SUBMISSION INSTRUCTIONS: View the Teaming Partner List by visiting the EERE eXCHANGE homepage and clicking on "Teaming Partners" within the left-hand navigation pane. This page allows users to view published Teaming Partner Lists. To join the Teaming Partner List, submit a request within eXCHANGE. Select the appropriate Teaming Partner List (TPL-0000052) from the drop-down menu and fill in the following information: Investigator Name, Organization Name, Organization Type, Topic Area, Background and Capabilities, Website, Contact Address, Contact Email, and Contact Phone.

DISCLAIMER: By submitting a request to be included on the Teaming Partner List, the requesting organization consents to the publication of the above-referenced information. By facilitating the Teaming Partner List, DOE is not endorsing, sponsoring, or otherwise evaluating the qualifications or eligibility to participate under this FOA of the individuals and organizations that are identifying themselves for placement on this Teaming Partner List. DOE will not pay for the provision of any information, nor will it compensate any applicants or requesting organizations for the development of such information.

B. Topic Areas

This FOA calls for projects that seek to gather data and leverage grid-edge technical measures to address the goals of decarbonization, improving customer resilience, and

right-sizing grid upgrades to accommodate expected future load growth. Projects should address relevant RD&D needs within the identified areas of (1) field validation of SCM for EVs and scaling to programs, (2) field validation of grid edge technical measures that reduce the necessary level of investment into electric infrastructure, especially in distribution systems; and demonstrate increased customer resilience through integrative strategies, such as energy efficiency, low power usage, smart charge management, storage embedded appliances, and redundant power sources. The FOA will also invest in data collection to assess system readiness for new loads and potential for innovations in customer technologies that enhance system readiness.

Proposed demonstrations should meaningfully address grid issues, particularly for the distribution grid. The demonstration outcomes should ultimately yield methods for evaluating various grid-edge technical measures that are accepted by utilities and regulators with high certainty and can be incorporated into distribution system planning. Energy efficient neighborhoods, buildings and industry, and flexible electric vehicles should be used as foundational resources and utilized to the greatest extent reasonable in project communities. Grid edge technical measures alter not only planning for utilities and regulators, but they also change the way occupants and community members interact with the energy system.

It is critical that as the energy system changes, it continues to serve customer needs, ensure customer security and privacy, and keep energy costs low. In addition to providing existing levels of service to occupants, there is also an opportunity to draw customers and community members into the evolving energy system to better address customer and community non-energy benefits (Appendix L). The project will require coordination between utilities, regulators, technology specialists, community members, relevant workforce, and other stakeholders depending on the project scope. A desired outcome is being able to convert demonstrations into pilots and into programs that scale the results of the work conducted under this FOA.

One specific area of interest on EV Smart Charge Management is funded by Vehicle Technologies Office (VTO) and described as Subtopic 1A below. All of the chosen projects should be performed at sufficient scale to convincingly demonstrate sustained or improved customer resilience in a manner that yields reliable, replicable, and scalable frameworks, especially for subsequent use by utilities and regulators.

For SCM projects, see the requirements in subtopic 1A below.

Topic 1: Connected Communities 2.0

Table 1 lists requirements for all projects not applying under the SCM subtopic. For aspects that encouraged or allowable within the proposed Connected Communities 2.0 projects, see Appendix P.

Table 1. Critical requirements for proposed Connected Communities 2.0 Projects. For encouraged and allowed aspects, see Appendix P.

Category	Description
Requirement Area 1 - Grid Planning and Resilience	
Grid issues and services	Each project must: • Address one or more electric grid challenges as discussed above, accounting for new load growth and the increased integration of renewable energy resources; • Propose a method for evaluating and incorporating the demonstrated grid edge technical measures into long term system planning; and • Include the amount of load reduction, flexibility, and/or local generation needed to provide a viable demonstration of the provision of grid services at a scale meaningful to participate at the distribution grid level over multiple seasons. See Appendix J for more detail. For encouraged and allowable aspects for projects to include, see Appendix P.
Resilience	Each project must: • Incorporate resilience at a defined scale (e.g. Building, Campus, Community, Feeder, Substation, etc.) enhancing the ability to withstand or recover from disruptions. For encouraged and allowable aspects for projects to include, see Appendix P.
Requirement Area 2 – Grid-Edge Technical Measures	
Overall Grid Edge Technical Measures	Each project must: • Include two or more of the measures listed below (A-E) to demonstrate system level integration to optimize distribution system planning and/or offer improved resilience. Projects with greater number of grid edge technical measures will receive priority (outside of the EV sub-topic); and • Include energy efficiency (buildings, industry, and vehicles) alongside two or more of the grid-edge technical measures listed below. Grid Edge Technical Measures include:

	A. Power efficiency technologies behind and in front of the meter that can reduce customer cost for new loads and impact to the utility; B. Energy storage, thermal or electrical; C. Smart inverter-based resources located at customer and/or community level such as rooftop or community PV, electric vehicles providing grid services, etc.; D. Coordinated Controls for Energy Efficient and Flexible Demand Management; and/or E. Local energy systems (microgrids, thermal energy networks) For measure specific definitions, encouragements, and allowances, see Appendix P.
Requirement Area 3 – Project Stakeholder Benefits and Experience	
Utility, grid operator, state/local, & technology stakeholder benefits	Each project must: • Provide benefits to the power grid, building and DER owners, and building occupants in terms of energy use, environmental impact, and infrastructure cost. For encouraged and allowable aspects for projects to include, see Appendix P.
Occupant & Community Benefits	Each project must: • In addition to resilience, prioritize offering at least one additional non-energy quality of life benefit, such as comfort improvements, productivity enhancements, health and safety improvements, asset value increases, access to work, energy burden relief, and/or account for the benefits to the broader society (e.g. public health, environment, economic development, and job impacts, etc.) provided by the proposed community project. For encouraged and allowable aspects for projects to include, see Appendix P.
Occupant Experience	Each project must: • Collect data to understand the availability of building, plant, and vehicle services (e.g. hot water, cooling, vehicle state of charge) and subsequent impacts to occupant experience and comfort, indoor air quality and productivity levels should be documented. (See Appendix H for evaluation and data standards) • Work to ensure the occupant experience is maintained or improved.
Requirement Area 4 – Implementation, Scaling, and Replicability	

Systems Integration	Each project must: • Demonstrate a pathway to adoption such as through customer programs or through new utility planning methodologies; • Have an active, engaged utility partner grid edge technology integration; and • Integrate technologies, building infrastructure, and/or contractual arrangements that are broadly replicable across the U.S. building stock, utilities, and regulatory environments.
Recruitment	Each project must: • Include strategies for recruitment and retention of connected community participants. For encouraged and allowable aspects for projects to include, see Appendix P.
Business Model Innovation	Each project must: • Include business models that can be used to achieve economic viability at scale. Each business model should recognize the technological, financial, and contractual approaches that will be potentially attractive to customers, utilities, energy service providers, and other key stakeholders.
Project Partners & Stakeholders	Each project must: • Include teams composed of critical partners needed to successfully implement the project. It is recognized that teams will differ depending on regional, grid, and community needs. • Include a utility as a project partner. • Include a team member with a strong understanding of the local regulatory landscape to support the scalability of the results. For encouraged teaming aspects, including a definition of an engaged community team member, see Appendix P.
Data & Analysis Methods	Each project must: • Implement a data collection and analysis plan, within this FOA referred to as the Evaluation Plan. Projects will work with the Connected Communities National Coordinator to establish an evaluation and dissemination plan that has consistent criteria and metrics across the cohort. Each plan must address all six evaluation methods and associated data standards (see Appendix H). • Include the data types identified in Table 2: Data Requirements
Scalability & Replicability	Each project must: • Use approaches that can be easily applied and scaled to other communities and distribution networks.

	• Identify challenges and solutions to further scaling the connected community demonstration project. • Include planning guidance (e.g., implementation playbook) for replication and scaling in other communities.
Cybersecurity & Privacy	Each project must: • Include measures that will be utilized in the defense, detection, and mitigation of cybersecurity threats to customers and the grid, as appropriate; and • Identify privacy provisions for the project and how they would be scaled. For encouraged aspects for projects to include, see Appendix P. For detail relating to the cyber security plan, see Appendix I.

Subtopic 1A: Smart Charge Management of Electric Vehicles for Grid Support and Integration

Applicants should note that VTO will fund and manage Subtopic 1A. Grid edge projects in Topic 1 are still encouraged to include EV coordination, management, and integration. Projects that are specifically focused on Smart Charge Management (SCM) should apply in Subtopic 1A, but are encouraged to include other elements as well.

The rapid growth of EVs connecting to the electricity grid to recharge will result in new loads that will require new management. SCM is an approach that can shift and spread these loads to more desirable times for the grid as well as provide grid services such as peak load shaving, demand charge mitigation, voltage support, frequency regulation, and renewable generation integration, to name a few. While various pilots and programs have demonstrated SCM for EVs connected to electric vehicle supply equipment (EVSE) either at individual charging locations or congregated charging locations across a large distribution network, there are numerous other use cases for SCM that need to be investigated.

The objective of this area of interest is to conduct wide-scale demonstrations of SCM in various unique urban, suburban, and rural use cases to create confidence in SCM technology as an approach to effectively utilize the flexibility and value that EVs provide to the grid. SCM entails communication between the vehicles and/or charging equipment and the grid distribution network to balance the charging needs of multiple electric vehicles with the ability of the grid to supply the requested energy. SCM can be used to help ensure electricity rates remain affordable during the EV transition by ensuring effective and optimized use of grid assets and preventing overbuilding.

Approaches used in these demonstrations must be scalable and interoperable, leveraging EVs and/or EVSE from many manufacturers. Demonstrations should also collect data to show the economic value created for all stakeholders with their approach, striving for a model which is widely replicable.

i. Requirements

Applications under this subtopic must include:

- A description of the technology and platform that forms the basis of the SCM System proposed;
- A description of the capabilities of the SCM System including the grid services it will enable and how these services will be achieved;
- A description of the charging locations, i.e., residential, multi-unit dwelling, workplace, retail establishment, other, that the SCM System will cover;
- A description of the communications and controls that will be implemented in the proposed SCM System;
- A description of the cybersecurity measures that will be utilized by the proposed SCM System for defense, detection, and mitigation;
- An estimation of the benefits to the distribution network, charging network operators, and EV owners provided by the proposed SCM System;
- A description of the scalability of the proposed SCM system as EV volumes increase into the millions;
- A detailed demonstration plan, including the distribution grid, charging locations, types, and power rating, the EVs that will participate in the demonstration including the allowable charge rate, and how the benefits of the SCM System will be quantified;
- The anticipated applicability of the proposed SCM System to other distribution networks and utilities;
- Include plans to participate in the VTO Annual Merit Review held in Washington DC and coordination meetings with other DOE funded demonstrations to share challenges and best practices between each other and publicly. A coordinator at a DOE national laboratory will be assigned and used to collect and share select data from related projects to assess their success and share best practices. The role of the coordinator will be to provide technical assistance and support task execution, communications, stakeholder engagement, project evaluations and the publishing of research findings; and
- Include plans to provide inputs to the VTO Annual Progress Report.

ii. Teaming Arrangements

Applicants are encouraged to include one or more of the following entities on their teams:

- EV Original Equipment Manufacturers (OEMs),
- Charging equipment manufacturers,
- Charging network operators,
- Grid services Aggregators,
- DOE National Laboratories,
- Clean Cities and Communities coalitions (https://cleancities.energy.gov/coalitions/locations/)

iii. Data Requirements

All projects are required to produce and collect data to demonstrate the ability of the project to provide the intended energy efficiency, demand flexibility, and grid services. This will be quantified through a measurement and verification process utilizing the evaluation plan, developed with support from the National Coordinator.

In order to measure quantity and "quality" of actual load change and or energy services, it is anticipated that all projects will be equipped with:

- advanced metering infrastructure (AMI) or similar technologies to access customer energy use data with intervals of one hour or less;
- distribution level infrastructure including meters, sensors, or controls to measure electricity use at the service transformer level;
- appliance use data where applicable and appropriate; and
- analytical tools or methods to connect all of this data.

Each project should produce the types of data listed in Table 2.

Table 2: Data Requirements

Data Types
Quantity (e.g. kW, kWh, BTUs, therms) and quality (e.g. duration, response time, power quality/tolerance, persistence) of energy loads and/or generation during time periods of interest;
Non-energy benefits as measured by any or all of the following: comfort and satisfaction; air quality; flexibility and convenience; and other owner, operator, and/or occupant benefits, and society;

Financial costs and benefits (e.g. capital costs, energy costs, disruption, etc.) for project owners, operators, and/or occupants and the grid;
Case studies that will include data trends, research questions and findings, and promising operational practices;
Voltage and reactive power measurements if necessary to validate proposed grid services identified by the applicant.

Applications selected for award negotiations will be required to submit a data management plan and a measurement & verification plan within the first 90 days of award. The data management and analysis plans will need to include an analysis based on the counterfactual situation (e.g., unmitigated grid expansion without these technologies). Intellectual property management plans will also be required on an as needed basis during negotiations, or as a Q1 deliverable, if applicable. These plans will be reviewed for scientific rigor and adherence to best practices and industry standards. Verification of compliance with approved plans will be carried out through on-site and remote review of records. To ensure that data generated and collected by these projects benefits entire industries and fields of knowledge, individual projects will also be responsible for disseminating results to relevant regional and industrial partners. For detailed information on data standards and data collection needs, please refer to Appendix H.

iv. Cohort Approach and National Coordinator

Selected projects will serve as a cohort to share challenges and best practices between each other and publicly. A National Coordinator will be used to support cohort collaboration (including virtual and in person meetings), perform cross cutting analysis based on project data, and amplify successes and best practices. The role of the National Coordinator will be to provide technical assistance and support task execution, communications, stakeholder engagement, project evaluations and the publishing of research findings. Select experts will be identified across the DOE National Laboratories, to provide technical assistance, including system integration and software interoperability test bed recommendations, in support of planning and implementation. Individual researchers at the DOE National Laboratories who are identified to provide TA will be ineligible from competing and require an NDA/COI while the awards are being competed.

In the role of Coordinator, relevant personnel will work with BTO and DOE to facilitate shared learning across both awardees and key stakeholders during project implementation stages (e.g. quarterly cohort webinars, annual summit, stakeholder forums, website with relevant tools and resources). A third party may also serve to

facilitate and coordinate shared learning and to disseminate successes and best practices to wider audiences.

Additional data collection for evaluation will be required to be submitted to the coordinator for dissemination and for cross cutting analysis. Topics of data collection by the coordinator may include customer experience, grid services and energy impacts, benefit-cost analysis, business models, GHG emissions, and resilience. Relevant data standards will be included in the FOA document (Appendix H). The National Coordinator will provide Technical Assistance (TA) to each project through Cooperative Research and Development Agreements (CRADA) or similar partnering agreements using funds directly provided by DOE (not recipient's funds). Full scope of National Coordinator will be finalized post award, pending available funds. The National Coordinator will also work with each awarded team to identify their technology readiness, technical assistance need, and develop individualized support plans. The National Coordinator will also provide policy support such as providing communication and training to regulatory bodies on the project results and outcomes, and guidance around topics such as customer engagement, distributional equity and rates.

In addition, the National Coordinator will support project level evaluation by providing an evaluation protocol, assistance to implement the protocol, measurement plan review, targeted quality assurance and control reviews, and review of evaluation report results. Awardees are expected to collaborate with the National Coordinator to enable these activities.

Connected Community funding agreements are expected to support measurement and verification of technologies and approaches in real world settings, and analysis to capture and disseminate best practices. A small share of funding may be applied to capital improvements that increase energy efficiency and demand flexibility of buildings and the integration and optimization of these resources across multiple buildings and the grid. (Applicants which need to apply a higher share of funds to capital improvements to ensure a successful project will be considered upon full articulation of such need.) The intent of this FOA is not to subsidize the cost of construction of new buildings or major grid upgrades. See section IV.I Funding Restrictions for information about allowable costs.

All work under EERE funding agreements must be performed in the United States. See Section IV.I.iii. and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D. of the FOA):

- Applications that fall outside the technical parameters specified in Sections I.A. and I.B. of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Applications that do not include elements of buildings, industrial plants, vehicles, and/or local generation or storage;
- Applications that do not include energy efficiency, whether for buildings, industry or transportation to achieve the objectives of the FOA;
- Applications proposing only the construction of new buildings or major grid upgrades.
- Applications that lack an engaged utility partner or do not include connections to the local PUC/investment decision authority/community organization.
- Applications that do not have a line of sight and concrete plan for adoption and implementation such as through customer programs or through new distribution planning and analysis methodologies.

D. Diversity, Equity, and Inclusion

It is the policy of the Biden Administration that:

The Federal Government should pursue a comprehensive approach to advancing equity[11] 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.[12]

[11] 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.

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

As part of this whole of government approach, this FOA seeks to encourage the participation of underserved communities[13] and underrepresented groups. Applicants are highly encouraged to include individuals from groups historically underrepresented[14,15] in STEM on their project teams. Applicants are also highly encouraged to engage community groups working in underserved communities who understand the issues and challenges around energy access and affordability. Applications are also encouraged to conduct field validations of the energy technologies and the grid as it specifically applies to underserved areas and communities. Applicants are required to submit a Diversity, Equity, and Inclusion Plan that describes the actions the applicant will take to foster a welcoming and inclusive environment, support people from underrepresented groups in STEM; and the extent the project activities will be located in or benefit underserved communities (See Section IV.D.vii.). The plan should include at least one SMART (Specific, Measurable, Assignable, Realistic and Time-Related) milestone per budget period supported by metrics to measure the success of the proposed actions.

[13] 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 of in the definition of "equity." E.O. 13985. For purposes of this FOA, 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.

[14] According to the National Science Foundation's 2019 report titled, "Women, Minorities and Persons with Disabilities in Science and Engineering", women, persons with disabilities, and underrepresented minority groups—blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives—are vastly underrepresented in the STEM (science, technology, engineering and math) fields that drive the energy sector. That is, their representation in STEM education and STEM employment is smaller than their representation in the U.S. population. https://ncses.nsf.gov/pubs/nsf19304/digest/about-this-report For example, in the U.S., Hispanics, African Americans and American Indians or Alaska Natives make up 24 percent of the overall workforce, yet only account for 9 percent of the country's science and engineering workforce. DOE seeks to inspire underrepresented Americans to pursue careers in energy and support their advancement into leadership positions. https://www.energy.gov/articles/introducing-minorities-energy-initiative

[15] See also. 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.

Further, Minority Serving Institutions[16], Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or entities located in an underserved community that meet the eligibility requirements (see Section III.) are encouraged to participate on 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 (See Section V.C.i.).

E. Authorizing Statutes

The programmatic authorizing statutes include: the Energy Policy Act of 2005 (EPAct 2005), 109 Pub. Law 58 (August 8, 2005), Sections 911 (codified at 42 USC § 16191) and 931(a)(2)(c) (codified at 42 USC § 16231); and the Energy Act of 2020, 116 Pub. Law 260 (December 27, 2020), Section 3004(b) (codified at 42 USC § 16238).

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

EERE expects to make a total of approximately $65M of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 8-20 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between $3M and $6M.

EERE may issue awards in one, multiple, or none of the following topic areas:

[16] 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.

Topic Area Number	Topic Area Title	Anticipated Number of Awards	Anticipated Minimum Award Size for Any One Individual Award (Fed Share)	Anticipated Maximum Award Size for Any One Individual Award (Fed Share)	Approximate Total Federal Funding Available for All Awards	Anticipated Period of Performance (months)
1	Connected Communities 2.0	8-20	$3M	$6M	$50M	36 – 60 months
1A	Smart Charge Management of Electric Vehicles (EVs) for Grid Support and Integration	4-6	$3M	$6M	$15M	36-60 months

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed.

ii. Period of Performance

EERE anticipates making awards that will run from 36 months up to 60 months, comprised of one or more budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and Go/No-Go decision. For a complete list, see Section VI.B.xiv.

iii. New Applications Only

EERE will accept only new applications under this FOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

B. EERE Funding Agreements

Through cooperative agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives. EERE does not use such agreements to acquire property or services for the direct benefit or use of the U. S. government.

i. Cooperative Agreements

EERE generally uses cooperative agreements to provide financial and other support to prime recipients.

Through cooperative agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by federal statute. Under cooperative agreements, the government and prime recipients share responsibility for the direction of projects.

EERE has substantial involvement in all projects funded via cooperative agreement. See Section VI.B.x. of the FOA for more information on what substantial involvement may involve.

ii. Funding Agreements with Federally Funded Research and Development Center (FFRDCs)[17]

In most cases, FFRDCs are funded independently of the remainder of the project team. The FFRDC then executes an agreement with any non-FFRDC project team members to arrange work structure, project execution, and any other matters. Regardless of these arrangements, the entity that applied as the prime recipient for the project will remain the prime recipient for the project. See Section III.E.

III. Eligibility Information

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these eligibility requirements, it will be considered ineligible and removed from further evaluation.

A. Eligible Applicants

i. Domestic Entities

The proposed prime recipient and subrecipient(s) must be domestic entities. The following types of domestic entities are eligible to participate as a prime recipient or subrecipient of this FOA:

1. Institutions of higher education;
2. For-profit entities;
3. Nonprofit entities; and

[17] FFRDCs are public-private partnerships that conduct research for the U.S. government. A listing of FFRDCs can be found at http://www.nsf.gov/statistics/ffrdclist/.

4. State and local governmental entities and federally recognized Indian Tribes (Indian Tribes).

To qualify as a domestic entity, the entity must be organized, chartered, or incorporated (or otherwise formed) under the laws of a particular state or territory of the United States; have majority domestic ownership and control; and have a physical place of business in the United States.

DOE/NNSA FFRDCs except for Lawrence Berkely National Lab (LBNL) are eligible to apply for funding as a subrecipient but are not eligible to apply as a prime recipient. LBNL as a whole will be ineligible due to their role as the Connected Communities National Coordinator, which will support broader EERE level grid edge coordination. Individual researchers at the DOE National Laboratories who are identified to provide TA will be ineligible from competing and require an NDA/COI while the awards are being competed.

Non-DOE/NNSA FFRDCs are eligible to participate as a subrecipient but are not eligible to apply as a prime recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to participate as a subrecipient but are not eligible to apply as a prime recipient.

Entities banned from doing business with the U.S. government such as entities debarred, suspended, or otherwise excluded from or ineligible for participating in federal programs are not eligible.

Nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, are **not** eligible to apply for funding.

ii. Foreign Entities

In general, foreign entities are not eligible to apply as either a prime recipient or subrecipient. In limited circumstances, EERE may approve a waiver to allow a foreign entity to participate as a prime recipient or subrecipient. A foreign entity may submit a Full Application to this FOA, but the Full Application must be accompanied by an explicit written waiver request. Likewise, if the applicant seeks to include a foreign entity as a subrecipient, the applicant must submit a separate explicit written waiver request in the Full Application for each proposed foreign subrecipient.

Appendix C lists the information that must be included in a foreign entity waiver request. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

B. Cost Sharing

Applicants are bound by the cost share proposed in their Full Applications if selected for award negotiations.

- **Cost Sharing Generally**
  A Cost Share Reduction determination has been issued for this funding opportunity announcement pursuant to Section 988(c)(2) of the Energy Policy Act of 2005 that is applicable to eligible entities applying under this funding opportunity. In accordance with the cost share reduction waiver, cost share must be at least 30% of the total allowable costs[18] for commercial application projects[19] and must come from non-federal sources unless otherwise allowed by law.
- **Cost Sharing Under Subtopic 1A**
  The cost share must be at least 50% of the total project costs[20] for demonstration projects[21] The cost share must come from non-federal sources unless otherwise allowed by law.

To help applicants calculate proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices A and B to this FOA.

i. Legal Responsibility

Although the cost share requirement applies to the entire project, including work performed by members of the project team other than the prime recipient, the prime recipient is legally responsible for paying the entire cost share. If the funding agreement is terminated prior to the end of the project period, the prime recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

[18] Total project costs is the sum of the government share, including FFRDC costs if applicable, and the recipient share of project costs.
[19] Energy Policy Act of 2005, Pub. L. 109-58, sec. 988. Also see 2 CFR 200.306 and 2 CFR 910.130 for additional cost sharing requirements.
[20] Total project costs is the sum of the government share, including FFRDC costs if applicable, and the recipient share of project costs.
[21] Energy Policy Act of 2005, Pub. L. 109-58, sec. 988. Also see 2 CFR 200.306 and 2 CFR 910.130 for additional cost sharing requirements.

The prime recipient is solely responsible for managing cost share contributions by the project team and enforcing cost share obligation assumed by project team members in subawards or related agreements.

ii. Cost Share Allocation

Each project team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual project team members may vary, as long as the cost share requirement for the entire project is met.

iii. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable federal cost principles, as described in Section IV.I.i. of the FOA. In addition, cost share must be verifiable upon submission of the Full Application. Cost share may be provided in the form of cash or cash equivalents, or in-kind contributions. Cost share must come from non-federal sources (unless otherwise allowed by law), such as project participants, state or local governments, or other third-party financing. Federal financing, such as DOE Loan Guarantees, cannot be leveraged by applicants to provide the required cost share or otherwise support the same scope that is proposed under a project.

Cost share may be provided by the prime recipient, subrecipients, or third parties (entities that do not have a role in performing the scope of work). Vendors/contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include but are not limited to personnel costs, fringe costs, supply and equipment costs, indirect costs, and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified, and justified but where no actual cash is transacted in securing the good or service comprising the contribution. Allowable in-kind contributions include but are not limited to the donation of volunteer time or the donation of space or use of equipment.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the federal government did not provide the funding to the state or local government.

The recipient and subrecipients may not use the following sources to meet its cost share obligations:

- Revenues or royalties from the prospective operation of an activity beyond the project period;
- Proceeds from the prospective sale of an asset of an activity;
- Federal funding or property (e.g., federal grants, equipment owned by the federal government); or
- Expenditures that were reimbursed under a separate federal program.

Project teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the prime recipient's records, and necessary and reasonable for proper and efficient accomplishment of the project. As all sources of cost share are considered part of total project cost, the cost share dollars will be scrutinized under the same federal regulations as federal dollars to the project. Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR 910.130 for additional cost sharing requirements.

iv. Cost Share Contributions by FFRDCs

Because FFRDCs are funded by the federal government, costs incurred by FFRDCs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor's Management Fee or another non-federal source.

v. Cost Share Verification

Applicants are required to provide written assurance of their proposed cost share contributions in their Full Applications.

Upon selection for award negotiations, applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Appendix A of the FOA.

vi. Cost Share Payment

DOE requires prime recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the prime recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated). As FFRDC funding will be provided directly to the FFRDC(s) by DOE, prime recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim invoicing cost share ratio than the total award ratio.

In limited circumstances, and where it is in the government's interest, the Contracting Officer may approve a request by the prime recipient to meet its cost share requirements on a less frequent basis, such as monthly or quarterly. Regardless of the interval requested, the prime recipient must be up to date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the prime recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they go into effect.

C. Compliance Criteria

All applicant submissions must:

1. Comply with the applicable content and form requirements listed in Section IV. of the FOA;
2. Include all required documents;
3. Be uploaded and submitted to EERE eXCHANGE https://eere-eXCHANGE.energy.gov; and
4. Be submitted by the deadline stated in the FOA.

EERE will not review or consider submissions submitted through means other than EERE eXCHANGE, submissions submitted after the applicable deadline, or incomplete submissions.

Applicants are strongly encouraged to submit their Concept Papers, Full Applications, and Replies to Reviewer Comments at least 48 hours in advance of the submission deadline. Under normal conditions (i.e., at least 48 hours before the submission deadline), applicants should allow at least one hour to submit a Concept Paper, Full

Application, or Reply to Reviewer Comments. Once the Concept Paper, Full Application, or Reply to Reviewer Comments is submitted in EERE eXCHANGE, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made to any of these documents, the applicant must resubmit the Concept Paper, Full Application, or Reply to Reviewer Comments before the applicable deadline. EERE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

D. Responsiveness Criteria

All "Applications Specifically Not of Interest," as described in Section I.C. of the FOA, are deemed nonresponsive and are not reviewed or considered.

E. Other Eligibility Requirements

i. Requirements for DOE/NNSA and Non-DOE/NNSA FFRDCs Included as a Subrecipient

DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a subrecipient on another entity's application subject to the following guidelines:

a. Authorization for non-DOE/NNSA FFRDCs
The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

b. Authorization for DOE/NNSA FFRDCs
The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

> Authorization is granted for the Laboratory to participate in the proposed project. The work proposed for the Laboratory is consistent with or complementary to the missions of the Laboratory and will not adversely impact execution of the DOE assigned programs at the Laboratory.

c. Funding, Cost Share, and Subaward with FFRDCs

The value of and funding for the FFRDC portion of the work will not normally be included in the award. DOE/NNSA FFRDCs participating as a subrecipient on a project will be funded directly through the DOE Work Authorization process in accordance with DOE O 412.1A. Non-DOE/NNSA FFRDCs participating as a subrecipient will be funded through an interagency agreement with the sponsoring agency. Although the FFRDC portion of the work is excluded from the award, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's, the subrecipient's, and the FFRDC's portions of the project.

Unless instructed otherwise by the DOE Grants Officer for the DOE financial assistance award, all FFRDCs are required to enter into a Cooperative Research and Development Agreement[22] (CRADA) or, if the role of the DOE/NNSA FFRDC is limited to technical assistance and intellectual property (IP) is not anticipated to be generated from the DOE/NNSA FFRDC's work, a Technical Assistance Agreement (TAA), with at least the prime recipient.

The CRADA is used to ensure accountability for project work and provide the appropriate management of IP, e.g., data protection and background IP. A Data Management Plan is not suited for this purpose. If IP will not be generated from the DOE/NNSA FFRDC's work, a TAA is sufficient. The CRADA or TAA must be approved by the cognizant DOE/NNSA or other sponsoring agency Contracting Officer for the FFRDC or be compliant with a Master Scope of Work process prior to the FFRDC starting work directly allocable to the FA award. Any questions regarding the use of a CRADA or TAA should be directed to the cognizant DOE intellectual property counsel.

d. Responsibility
The prime recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including but not limited to disputes and claims arising out of any agreement between the prime recipient and the FFRDC.

e. Limit on FFRDC Effort
The FFRDC effort, in aggregate, shall not exceed 50% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

[22] A cooperative research and development agreement is a contractual agreement between a national laboratory contractor and a private company or university to work together on research and development. For more information, see https://www.energy.gov/gc/downloads/doe-cooperative-research-and-development-agreements

F. Limitation on Number of Concept Papers and Full Applications Eligible for Review

An entity may submit more than one Concept Paper and Full Application to this FOA, provided that each application describes a unique, scientifically distinct project and an eligible Concept Paper was submitted for each Full Application.

G. Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to apply in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

A. Application Process

The application process includes 2 submission phases: a Concept Paper phase, and a Full Application phase. **Only applicants who have submitted an eligible Concept Paper will be eligible to submit a Full Application**.

All submissions must conform to the form and content requirements described below, including maximum page lengths.

- Each must be submitted in Adobe PDF format unless stated otherwise;
- Each must be written in English;
- All pages must be formatted to fit on 8.5" x 11" paper with margins not less than one inch on every side. Use Calibri typeface, a black font color, and a font size of 12-point or larger (except in figures or tables, which may be 10-point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement;
- A **control number** will be issued when an applicant begins the EERE eXCHANGE application process. The control number must be included with all application documents. Specifically, the control number must be prominently displayed on the upper right corner of the header of every page and included in the file name (i.e., *Control Number_Applicant Name_Full Application*);
- Page numbers must be included in the footer of every page; and

- Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages.

i. Additional Information on EERE eXCHANGE

EERE eXCHANGE is designed to enforce the deadlines specified in this FOA. The "Apply" and "Submit" buttons will automatically disable at the defined submission deadlines.

Applicants who experience technical difficulties with submission PRIOR to the FOA deadline should contact the EERE eXCHANGE helpdesk for assistance (EERE-eXCHANGESupport@hq.doe.gov).

B. Application Forms

The application forms and instructions are available at EERE Funding Application and Management Forms and on EERE eXCHANGE. To access these materials on EERE eXCHANGE, go to https://eere-eXCHANGE.energy.gov and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE eXCHANGE website is 50MB. Files larger than 50MB cannot be uploaded and hence cannot be submitted for review. If a file is larger than 50MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example:
TechnicalVolume_Part_1
TechnicalVolume_Part_2

DOE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 50MB.

C. Content and Form of the Concept Paper

Each Concept Paper must be limited to a single concept or technology. The Concept Paper must conform to the requirements listed below, including the stated page limits.

Section	Page Limit	Description
Cover Page	1 page maximum	The cover page should include the project title, both the technical and business points of contact, names of all team

		member organizations, the project location(s), and any statements regarding confidentiality.
Technology Description	4 pages maximum	Applicants are required to succinctly describe: • A detailed description of the project, including a description of the electric grid or network infrastructure (e.g., distribution grid), site descriptions (e.g., building and/or plant types, sizes and quantities), grid edge technical measures – including DERs (e.g., types, sizes and quantities), location(s), efficiency improvements, system integration, management and control architecture, local energy networks (e.g., microgrids or thermal energy networks), etc. The proposed technology, including its basic operating principles and how it is unique and innovative; • The proposed technology's target level of performance, including any related performance standards (e.g., DOE ZERH), total load size, and/or estimated load flexibility that will participate in the demonstration (applicants should provide technical data or other support to show how the proposed target could be met); • The current state of the art in the relevant field and application, including key shortcomings, limitations, and challenges; • How the proposed technology will overcome the shortcomings, limitations, and challenges, including: ○ Identifying the data needs and strategies for improving distribution system planning and gaining acceptance by utility and PUC planners; ○ Identifying strategies to access customer energy use data with intervals of one hour or less; and ○ Identifying strategies to improve resilience to the customer and to the grid; • The potential impact that the proposed project would have on the relevant field and application; • How the proposed location of the proposed project will support technology development and long-term success, including; ○ Describing the role of the utility and/or PUC partner(s) on the proposed project's scope of work; • The key technical risks/issues associated with the proposed technology development plan; and • The impact that EERE funding would have on the proposed project.
Addendum	2 pages maximum	Applicants are required to describe succinctly the qualifications, experience, and capabilities of the proposed project team, including:

		• Whether the Principal Investigator (PI) and project team have the skill and expertise needed to successfully execute the project plan; • Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; • Whether the applicant has worked together with its teaming partners on prior projects or programs; • Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort and/or clearly explain how it intends to obtain access to the necessary equipment and facilities; and • Applicants may provide graphs, charts, or other data to supplement their Technology Description.

EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.i. of the FOA. EERE will encourage a subset of applicants to submit Full Applications. Other applicants will be discouraged from submitting a Full Application. See Section VI.A.ii.

i. Technology Description Spreadsheet

Applicants are required to submit the information contained in the Technology Description Spreadsheet along with their Concept Paper. The Technology Description Spreadsheet template, should the applicants choose to use this, has been provided on EERE eXCHANGE at https://eere-eXCHANGE.energy.gov/https://eere-exchange.energy.gov/ and contains all of the information that must be included.

Save and upload the spreadsheet as a single Microsoft Excel file using the following convention for the title: "Control Number_LeadOrganization_TechDescription."

D. Content and Form of the Full Application

Applicants must complete the following application forms found at EERE Funding Application and Management Forms and on the EERE eXCHANGE website at https://eere-eXCHANGE.energy.gov/.

Applicants will have approximately 30 calendar days from receipt of the Concept Paper Encourage/Discourage notification on EERE eXCHANGE to prepare and submit a Full Application. Regardless of the date the applicant receives the Encourage/Discourage notification, the submission deadline for the Full Application remains the date and time stated on the FOA cover page.

All Full Application documents must be marked with the Control Number issued to the applicant.

ii. Full Application Content Requirements

Each Full Application must be limited to a single concept. Full Applications must conform to the following requirements and must not exceed the stated page limits.

Component	File Format	Page Limit	File Name
SF-424: Application for Federal Assistance	PDF	n/a	ControlNumber_LeadOrganization_App424
Technical Volume	PDF	20	ControlNumber_LeadOrganization_TechnicalVolume
Resumes	PDF	3 pages each	ControlNumber_LeadOrganization_Resumes
Letters of Commitment	PDF	1 page each	ControlNumber_LeadOrganization_LOCs
Statement of Project Objectives	MS Word	10	ControlNumber_LeadOrganization_SOPO
Diversity Equity and Inclusion Plan	PDF	0	*Included as part of the Technical Volume, and not as an independent component*
Budget Justification Workbook	MS Excel	n/a	ControlNumber_LeadOrganization_Budget_Justification
Summary/Abstract for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide	MS PowerPoint	1	ControlNumber_LeadOrganization_Slide
Subrecipient Budget Justification (if applicable)	MS Excel	n/a	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
DOE Work Proposal for FFRDC, (see DOE O 412.1A, Attachment 2) (if applicable)	PDF	n/a	ControlNumber_LeadOrganization_WP
Authorization from cognizant Contracting Officer for FFRDC (if applicable)	PDF	n/a	ControlNumber_LeadOrganization_FFRDCAuth
SF-LLL Disclosure of Lobbying Activities	PDF	n/a	ControlNumber_LeadOrganization_SF-LLL
Foreign Entity and Foreign Work Waiver Requests (if applicable)	PDF	n/a	ControlNumber_LeadOrganization_Waiver

Current and Pending Support	PDF	n/a	ControlNumber_LeadOrganization_CPS
Impacted Indian Tribes Documentation	PDF	n/a	ControlNumber_LeadOrganization_ImpactedTribes
Transparency of Foreign Connections	PDF	n/a	ControlNumber_LeadOrganization_TFC
Potentially Duplicative Funding Notice (if applicable)	PDF	n/a	ControlNumber_LeadOrganization_PDFN
Technology Description Spreadsheet	MS Excel	n/a	ControlNumber_LeadOrganization_TechDescription

Note: The maximum file size that can be uploaded to the EERE eXCHANGE website is 50MB. See Section IV.B.

EERE provides detailed guidance on the content and form of each component below.

iii. SF-424: Application for Federal Assistance

Applicants must complete the SF-424 Application for Federal Assistance, which is available on EERE Funding Application and Management Forms.

Effective January 1, 2020, the System for Award Management (SAM) is the central repository for common government-wide certifications and representations required of Federal grants recipients. As registration in SAM is required for eligibility for a federal award and registration must be updated annually, Federal agencies use SAM information to comply with award requirements and avoid increased burden and costs of separate requests for such information, unless the recipient fails to meet a federal award requirement, or there is a need to make updates to their SAM registration for other purposes.

Note: The dates (Block 17) and dollar amounts (Block 18) on the SF-424 are for the complete project period and not just the first project year, first phase, or other subset of the project period.

Save the SF-424 in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_424".

iv. Technical Volume

The Technical Volume must conform to the following content and form requirements. This volume must address the technical review criteria as discussed in Section V.A. of the FOA.

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 20 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all information in the table below. The applicant should consider the weighting of each of the technical review criteria (see Section V.A.ii. of the FOA) when preparing the Technical Volume.

The Technical Volume should clearly describe and expand upon information provided in the Concept Paper.

Technical Volume Content Requirements	
SECTION/PAGE LIMIT	**DESCRIPTION**
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, names of the PI, Senior/Key Personnel and their organizations, the project location(s), and any statements regarding confidentiality.
Project Overview (Approximately 5% of the Technical Volume)	The Project Overview should contain the following information: • Background: The applicant should discuss the background of its organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. • Project Description: ○ Provide a detailed description of the community and technical components of the project, including a description of: ▪ the electric grid or network infrastructure (e.g., distribution grid); ▪ community description (e.g., building and/or plant types, sizes and quantities); ▪ the grid-edge technical measures to be investigated, for example: • electrification measures; • energy efficiency measures; • demand flexibility measures; • advanced energy management; • thermal energy networks; • microgrids; and/or • DERs (e.g., types, sizes and quantities), ▪ location(s); ▪ the building design strategies, technologies and operations that will both improve peak load reduction and resilience; and ▪ total load size and estimated load flexibility that will participate in the demonstration. ○ Identify and describe how the grid-edge technical measures described within the community will be leveraged to addresses the **two primary desired outcomes of the FOA**[23]; and

[23] The two primary desired outcomes of the FOA are (1) Acceptance by utilities and PUCs of grid-edge technical measures and strategies, such as demand flexibility and combinations of behind the meter technologies that enable lower electrical infrastructure upgrade costs, as valid methods to right-size grid investments and achieve decarbonization, and which can be scaled further; and (2) Improved resilience of both customers and the grid in face of more extreme weather, as customers become more reliant on the electric grid.

	○ Identify an engagement plan for the impacted community; • Project Goal: The applicant should explicitly identify the targeted improvements to the baseline technology 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 (Approximately 30% of the Technical Volume)	The Technical Description should contain the following information: • Relevance and Outcomes: The applicant should provide a detailed description of the technology, 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 FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should address the six evaluation criteria described in Appendix H. The applicant should clearly specify the expected outcomes of the project, specifically: ○ How the selected grid edge technical measures will **enable electrification** and **improved customer resilience**. These grid-edge technical measures may include energy efficiency improvements, enabling demand flexibility to provide grid services (especially regarding the distribution grid), thermal networks to address load growth concerns related to heating and cooling, microgrids, DER integration and coordination. As applicable for the included measures, projects should address: ▪ The planned level of energy efficiency performance of the buildings, plants, and/or community and quantity of energy savings (kWh) over an appropriate baseline. The baseline and calculation methodology must be clearly identified in the application. ▪ How the project will provide the amount of load flexibility needed to provide a viable demonstration of the provision of grid services at a scale meaningful to participate at the distribution grid level over multiple seasons. See Appendix J for more detail. ▪ The total load flexibility to be provided by the project (buildings, industry, vehicles, and/or other DERs) for the proposed grid services. Applicants should identify the amount of load flexibility

	needed to provide a viable demonstration of the provision of grid services, along with the planned utility market for participation (especially distribution level), and the seasons the grid services are planned to be provided. ▪ Performance metrics shall be described to quantify the services provided, such as maximum, average, and minimum time dependent flexibility (e.g., kW and % of the applicable electricity network system). ▪ What other DERs and local energy networks, in addition to building load flexibility and energy efficiency, are included. Applicants should provide a description of the types of DERs, installed capacities (as applicable) and quantity of each type (#) included in the project. Building or plant level installations shall be distinguished from community scale installations. ▪ The control and integration strategy to be used for energy efficiency and load flexibility to provide coordinated management across multiple buildings, plants, and/or DERs. o How the evaluated strategies and the data gathered through the community scale demonstration will be leveraged to **improve methods for distribution system planning**. For novel technologies and energy/load management strategies, the application should address how the value to the distribution grid will be measured and verified such that utilities and regulators have accepted, reliable data to base future planning on. o The approach to quantifiably **decrease the set-up time and the challenges associated** with the design, installation, integration and commissioning of hardware, software, controls and communications for novel grid-edge technologies, including thermal networks and improving the grid-interactivity of buildings, industry, and vehicle charging. o The strategies for **recruitment and retention of connected community participants**, including elements of customer segmentation, customer motivation for technology adoption and program enrollment, and changes in customer energy use patterns. o The **benefits to the distribution network, the utility, building and DER owners, building occupants** both in terms of resource and fuel cost savings as well as non-

	energy benefits such as productivity enhancements, health and safety improvements, asset value increases, etc. and the benefits to the broader society (e.g. public health, environment, economic development and job impacts, etc.) provided by the proposed community project. ○ The planned approach to **measure, collect, and analyze data** to demonstrate the ability of the project to reduce load as well as shift load, modulate load, or generate energy. ○ How the **occupant experience** will be maintained or improved by the connected community, including while grid services are being provided. Explain what data will be collected to understand the availability of building services on the occupant experience and how comfort and productivity levels will be documented. ○ How **cybersecurity** will be addressed, include a description of the measures that will be utilized, in the defense, detection, and mitigation of threats covering both the application of the project, and in the connected community design solution as applied at scale. Include a discussion of privacy provisions in the project as well as the connected community design solution as applied at scale. • Feasibility: The applicant should demonstrate the technical feasibility of the proposed connected community 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 approach over current and emerging approaches, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful. • Ensure sufficiency of detail in the application to assess whether the proposed project is viable.
Innovation on Benefits for Community, Energy Justice, Diversity, Equity, and Inclusion (Approximately 15% of the Technical Volume)	• This section is intended to integrate the Diversity, Equity, and Inclusion Plan more thoroughly into the project technical innovation and workplan, and should 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. • Current State and Limitations: the applicant should describe priority non-energy challenges in the impacted community, citing the most rigorous, credible third-party evidence where feasible. ○ This section should draw on the list in Appendix L, and may seek to address more than one such benefit, but there is an expectation that the applicant will only address a subset. ○ Applicants should justify their specific prioritization of proposed benefits as part of this section. • Track Record: the applicant should describe patterns of results, attributable to specific efforts by the lead applicant, partners, and others on the project team, with respect to delivering community benefits, energy justice, and DEI successes related to the proposed benefits and approach. • Novel Approach: the applicant should describe how the proposed work will address the problems described, extending beyond current/prior programs and efforts by organizations operating in the relevant community (whether those organizations are part of the applicant team on not). • This section should include at least one SMART milestone per Budget Period supported by metrics to measure the success of the proposed actions and will be incorporated into the award if selected.
Business Model Innovation and Impact, and Market Transformation Plan (Approximately 15% of the Technical Volume)	• The innovative business models used to leverage grid edge technical measures in these demonstrations will need to be scaled in future grid planning scenarios, recognizing technological, business and contractual approaches that will be potentially attractive to customers, utilities, energy service providers, builders and other key stakeholders. • Market Transformation Plan: The Market Transformation plan should address how the project solutions can be replicated and scaled. The applicant should provide a market transformation plan, including the following: ○ Market Opportunity and Value Proposition: quantify the market opportunity and value proposition for replication of the project solutions in other locations and describe how additional locations for replication and scale will be identified. Include discussion of customer segmentation, how technologies will be adopted, and how energy use patterns will be changed. ○ Risk and Mitigation Strategy: Identify the relevant challenges to replication and scaling including technology,

	cost, market and regulatory barriers etc., and mitigation strategies. ○ Cost-Performance Model: Identify the payback period and the cost and performance that need to be met to achieve it. ○ Where appropriate, include identification of a product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, and product distribution. • Scalability Analysis: Discuss the challenges to scaling the project outcomes to larger communities, additional distribution systems, and other markets and identify the necessary steps required to scale. • Implementation Guidance: Combine key elements of the business model, market transformation plan and scalability analysis to develop an implementation playbook to accelerate and de-risk replication and scaling in project outcomes.
Workplan (Approximately 15% of the Technical Volume)	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. A detailed SOPO is separately requested. 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 FOA. 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 Specific, Measurable, Attainable, Realistic, and Timely (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 FOA, 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 (See Section VI.B.xiv. for more information on the Go/No-Go Review): The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. 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. 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. • Buy America Requirements for Infrastructure Projects: Within the first two pages of the Workplan, include a short statement on whether the project will involve the construction, alteration, and/or repair of infrastructure in the United States. See Appendix D for applicable definitions and other information to inform this statement.

	• 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 (Approximately 20% of the Technical Volume)	The Technical Qualifications and Resources should contain the following information:
	• A description of the project team's unique qualifications and expertise, including those of key subrecipients;
	• A description of the project team's existing equipment and facilities, or equipment or facilities already in place on the proposed project site, 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;
	• Relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives;
	• The time commitment of the key team members to support the project;
	• A description of the technical services to be provided by DOE/NNSA FFRDCs, if applicable;
	• The skills, certifications, or other credentials of the construction and ongoing operations workforce;
	• For multi-organizational projects, describe succinctly:
	  ○ The roles and the work to be performed by the PI and Senior/Key Personnel at the prime and sub levels;
	  ○ Business agreements between the applicant and sub;
	  ○ How the various efforts will be integrated and managed;
	  ○ Process for making decisions on technical direction;

	○ Publication arrangements; ○ Intellectual property issues; and ○ Communication plans

v. Resumes

A resume provides information that reviewers can use to evaluate an individual's relevant skills and the experience of the key project personnel. Applicants must submit a resume (limited to three pages) for each project manager and Senior/Key Personnel that includes the following:

1. Contact information;
2. Education: All academic institutions attended, major/area, degree;
3. Training: (e.g.,) certification or credential from a Registered Apprenticeship or Labor Management Partnership;
4. Professional experience: Beginning with the current position, list professional/academic positions in chronological order with a brief description;
5. List all academic, professional, or institutional appointments, foreign or domestic, at the applicant institution or elsewhere, whether or not remuneration is received, and, whether full-time, part-time, or voluntary over the past 5 years; and
6. There should be no lapses in time over the past 10 years or since age 18, whichever period is shorter.

As an alternative to a resume, it is acceptable to use the biographical sketch format approved by the National Science Foundation (NSF). The biographical sketch format may be generated by the Science Experts Network Curriculum Vita (SciENcv), a cooperative venture maintained at https://www.ncbi.nlm.nih.gov/sciencv/, also available at https://www.nsf.gov/bfa/dias/policy/researchprotection/commonform_biographicalsketch.pdf. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats.

Save the resumes in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Resumes".

vi. Letters of Commitment

Submit letters of commitment from all subrecipient and third-party cost share providers. If applicable, the letter must state that the third party is committed to providing a specific minimum dollar amount or value of in-kind contributions allocated to cost sharing. The following information for each third party contributing to cost sharing should be identified: (1) the name of the organization; (2) the proposed dollar amount to be provided; and (3) the proposed cost sharing type (cash or in-kind contributions). Each letter must not exceed one page.

Save the letters of commitment in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_LOCs".

Letters of support or endorsement for the project from entities that do not have a substantive role in the project will not be accepted.

vii. Statement of Project Objectives (SOPO)

Applicants must complete a SOPO. A SOPO template is available on EERE Funding Application and Management Forms and on EERE eXCHANGE at https://eere-eXCHANGE.energy.gov/. The SOPO, including the Milestone Table, must not exceed 10 pages when printed using standard 8.5" x 11" paper with 1" margins (top, bottom, left, and right) with font not smaller than 12-point (except in figures or tables, which may be 10-point font).

Save the SOPO in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_SOPO".

viii. Diversity, Equity, and Inclusion Plan

Applicants will not be required to submit an independent document containing Diversity, Equity, and Inclusion Plans. Rather, the content requested herein should be integrated within the technical volume, in the section titled "Innovation on Benefits for Community, Energy Justice, Diversity, Equity, and Inclusion".

Within said technical volume section, applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Applicants should describe the actions that will be taken 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 (also see Sections I.A.iii. and I.A.iv).

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, in addition to the ways outlined in the "Innovation on Benefits for Community, Energy Justice, Diversity, Equity, and Inclusion" section of the Technical Volume. These examples should not be considered either comprehensive or prescriptive. Applicants may include appropriate actions not covered by these examples.

a. Include persons from groups underrepresented in STEM as PI, co-PI, and/or other senior personnel;
b. Include persons from groups underrepresented in STEM as student researchers or post-doctoral researchers;
c. Include faculty or students from Minority Serving Institutions as PI/co-PI, senior personnel, and/or student researchers, as applicable;
d. Enhance or collaborate with existing diversity programs at your home organization and/or nearby organizations;
e. Collaborate with students, researchers, and staff in Minority Serving Institutions;
f. Disseminate results of research and development in Minority Serving Institutions or other appropriate institutions serving underserved communities;
g. Implement evidence-based, diversity-focused education programs (such as implicit bias training for staff) in your organization;
h. 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.

The Diversity, Equity, and Inclusion Plan will not be a separate submission. Please see the Technical Volume section "Innovation on Benefits for Community, Energy Justice, Diversity, Equity, and Inclusion".

ix. Budget Justification Workbook

Applicants must complete the Budget Justification Workbook, which is available on EERE Funding Application and Management Forms and on EERE eXCHANGE at https://eere-eXCHANGE.energy.gov/. Applicants must complete each tab of the Budget Justification Workbook for the project, including all work to be performed by the prime recipient and its subrecipients and contractors. Applicants should include costs associated with required annual audits and

incurred cost proposals in their proposed budget documents. The "Instructions and Summary" included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Applicants must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook.

Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title "ControlNumber_LeadOrganization_Budget_Justification".

x. Summary for Public Release

Applicants must submit a one-page summary of their project that is 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, project location(s), 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 business-sensitive information as DOE may make it available to the public after selections are made. The summary must not exceed one 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".

xi. Summary Slide

Applicants must provide a single slide summarizing the proposed project. The Summary Slide template is available on EERE eXCHANGE at https://eere-eXCHANGE.energy.gov/ and must include the following information:

- A project summary;
- Project location (location of work)
- A description of the project's impact;
- Proposed project baseline and goals for specific grid edge technical measures;
- Any key graphics (illustrations, charts and/or tables);
- The project's key innovations;
- Project title, prime recipient, PI, and key partners information; and
- Requested EERE funds and proposed applicant cost share.

Save the Summary Slide in a single Microsoft PowerPoint file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

xii. Subrecipient Budget Justification (if applicable)

Applicants must provide a separate budget justification for each subrecipient that is expected to perform work estimated to be more than $250,000 or 25% of the total work effort, whichever is less. The budget justification must include the same justification information described in the "Budget Justification Workbook" section above.

Save each subrecipient budget justification in a Microsoft Excel file using the following convention for the title:
"ControlNumber_LeadOrganization_Subrecipient_Budget_Justification".

xiii. Budget for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC is to perform a portion of the work, the applicant must provide a DOE work proposal (WP) in accordance with the requirements in DOE Order 412.1A, Work Authorization System, Attachment 2, 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".

xiv. Authorization for Non-DOE/NNSA or DOE/NNSA FFRDCs (if applicable)

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with the contractor's authority under its award.

Save the Authorization in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_FFRDCAuth".

xv. SF-LLL: Disclosure of Lobbying Activities

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://grants.gov/forms/forms-repository/sf-424-individual-family) 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(s) in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_SF-LLL".

xvi. Waiver Requests (if applicable)

Foreign Entity Participation
For projects selected under this FOA, all recipients and subrecipients must qualify as domestic entities. See Section III.A. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix C lists the information that must be included in a waiver request.

Performance of Work in the United States (Foreign Work Waiver Request)
As set forth in Section IV.I.iii., all work for projects selected under this FOA must be performed in the United States. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix C lists the 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".

xvii. Current and Pending Support

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. As part of the application, the Principal Investigator and all Senior/Key Personnel at the applicant and subrecipient level must provide a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All connections with foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding;
- The award or other identifying number;
- The title of the award or activity. If the title of the award or activity is not descriptive, add a brief description of the research being performed that would identify any overlaps or synergies with the proposed research;
- The total cost or value of the award or activity, including direct and indirect costs and cost share. For pending proposals, provide the total amount of requested funding;
- The award period (start date through end date); and
- The person-months of effort per year dedicated to the award or activity.

To identify overlap, duplication of effort, or synergistic efforts, append a description of the other award or activity to the current and pending support.

Details of any obligations, contractual or otherwise, to any program, entity, or organization sponsored by a foreign government must be provided on request to either the applicant institution or DOE. Supporting documents of any identified source of support must be provided to DOE on request, including certified translations of any document.

PIs and Senior/Key Personnel must provide a separate disclosure statement listing the required information above regarding current and pending support. Each individual must sign and date their respective disclosure statement and include the following certification statement:

I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete, and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil, or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the approved common disclosure format available at https://www.nsf.gov/bfa/dias/policy/researchprotection/commonform_cps.pdf. Regardless of the format used, the individual must include a signature, date, and a certification statement using the language included in the paragraph above.

Save the Current and Pending Support in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_CPS".

Definitions:

Current and pending support – (a) All resources made available, or expected to be made available, to an individual in support of the individual's RD&D efforts, regardless of (i) whether the source is foreign or domestic; (ii) whether the resource is made available through the entity applying for an award or directly to the individual; or (iii) whether the resource has monetary value; and (b) includes in-kind contributions requiring a commitment of time and directly supporting the individual's RD&D efforts, such as the provision of office or laboratory space, equipment, supplies, employees, or students. This term has the same meaning as the term Other Support as applied to researchers in NSPM-33: For researchers, Other Support includes all resources made available to a researcher in support of and/or related to all of their professional RD&D efforts, including resources provided directly to the individual or through the organization, and regardless of whether or not they have monetary value (e.g., even if the support received is only in-kind, such as office/laboratory space, equipment, supplies, or employees). This includes resource and/or financial support from all foreign and

domestic entities, including but not limited to gifts provided with terms or conditions, financial support for laboratory personnel, and participation of student and visiting researchers supported by other sources of funding.

Foreign Government-Sponsored Talent Recruitment Program – An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to physically relocate to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to United States entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

Senior/Key Personnel – An individual who contributes in a substantive, meaningful way to the scientific development or execution of a research, development, and demonstration (RD&D) project proposed to be carried out with a DOE award.[24]

xviii. Impacted Indian Tribes Documentation

For any application that potentially impacts Indian Tribes or is on Tribal land[25], including when the potentially impacted Indian Tribe is the applicant, applicants are required to submit additional documentation at the time of application, and possibly during negotiation and prior to award. For any project that potentially impacts Indian Tribes, applicants are required to submit documentation

[24] Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered Senior/Key Personnel if their involvement meets this definition. Consultants, graduate students, and those with a postdoctoral role also may be considered Senior/Key Personnel if they meet this definition.

[25] Tribal land is as defined in 25 U.S.C. §§ 3501(2), (3), (4)(A) and (13)

demonstrating that an authorized representative[26] of each potentially impacted Indian Tribe is, at a minimum, aware of the nature of the application and its potential impacts to the relevant Indian Tribes. The notified authorized representative must be holding their position while the award is open for applications, and documentation must demonstrate affirmative awareness of the application (e.g., a delivery record from certified mail, a reply by the authorized representative).

For any project intended to be sited on Tribal land(s) or intersecting with Tribal subsurface rights, applicants are required to submit documentation demonstrating support from the relevant Indian Tribes at the time of application. Documentation of support submitted at the time of application will be considered to also demonstrate awareness of an Indian Tribe (specified above). Documentation may include either:

- A letter of support from Tribal leadership. The letter must be signed by an authorized representative of the Indian Tribe. The signer(s) must be holding their position while the award is open for applications or negotiations.
- A Tribal Council Resolution, Board resolution (including the Board of Directors of an Alaska Native Corporation (ANC)), or similar act passed by the legislative body of the Tribal government or Board of Directors of an ANC, expressing support for the project.

Applicants are encouraged to reference or include any applicable community benefits agreements in the Tribal support documentation, and to integrate any Tribal support documentation in the community benefits plan as appropriate, For projects not intended to be sited on Tribal land(s) or intersecting with Tribal subsurface rights, but that may have other potential impacts on Tribal resources or reserved rights, letters of support or resolutions of support are strongly encouraged and, depending on the nature of the impact, may be required if selected for negotiation of an agreement. Applicants are encouraged to reach out to Indian Tribes as early as possible in the application process to give Indian Tribes ample time to evaluate and respond.

The following resources may be useful to help determine if a project may impact an Indian Tribe(s) resources or reserved rights and the appropriate contacts. These resources are not exhaustive, and many Indian Tribes have resources or

[26] An authorized representative must be an elected official or designated leader according to the traditions, constitution, or charter of the Indian Tribe, or someone with relevant delegated authority within the Tribal government. Examples include: Chief, Chairman, Chairwoman, Governor, Nation Representative, President, Chief Executive Officer, Chief Financial Officer, Speaker of the Council, Speaker of the Congress, Tribal administrator

reserved rights which extend beyond their Tribal lands, or are covered within treaties, statutes, or case-law. Applicants are encouraged to do additional research:

- Map of Indian Lands: https://bia-geospatial-internal.geoplatform.gov/indianlands/
- Tribal Treaties Database: https://treaties.okstate.edu/
- Directory of federally recognized Tribes and Tribal leaders: https://www.bia.gov/service/tribal-leaders-directory
- Best Practices for Identifying and Protecting Tribal Treaty Rights, Reserved Rights, and other similar rights in federal regulatory actions: https://www.bia.gov/sites/default/files/dup/inline-files/best_practices_guide.pdf

To help determine if an Indian Tribe's resources or reserved rights may be impacted by the project, applicants must address the following elements. If the applicant is an Indian Tribe, these elements should be addressed to ascertain impacts to Indian Tribes other than the applicant. Applicants do not need to reveal specific details about sacred sites such as specific location or specific ceremonies:

- Identify any elements of the project that will occur on or near Indian land, Tribal historic sites, or sacred sites and describe its potential impacts to Indian Tribes. Identify the potentially impacted Indian Tribe(s).
- Identify any [other] proposed actions which may impact an Indian Tribe(s) resources or reserved rights. Tribal resources and reserved rights include, and are not limited to, an Indian Reservation or Land (as defined in 25 U.S.C. § 3501) [or intersecting Tribal sub-surface rights], historic homelands from which they were removed, cultural sites, sacred sites, water rights, mineral and other subsurface rights, fishing rights, and hunting rights. Identify the Tribe(s) potentially impacted and any sources of uncertainty or confidentiality.
- Explain any actions taken by the applicant to mitigate or address any potential impacts identified above, including engaging with the potentially impacted Indian Tribe(s), in the application.

Applicants are required to document any efforts taken to identify any potential impacts to Indian Tribes, Indian lands, Alaska Native regional and village land, traditional homelands, Tribal rights, or Tribal historic sites, or sacred sites. This includes any correspondence with Indian Tribes. These documents should be available on request to DOE. An applicant's failure to submit documentation of an Indian Tribe's awareness, or a letter of support, when required as described above, may constitute grounds for determining an application ineligible, non-

responsive to the FOA/OT solicitation, not subject to further review and/or not otherwise subject to selection or award.

Any application that may potentially impact Indian Tribe(s) may be shared with the potentially impacted Indian Tribe(s). Applicants should include a Notice of Restriction on Disclosure and Use of Data identifying any business sensitive, trade secrets, proprietary, or otherwise confidential information. Such information shall be used or disclosed only for evaluation of the application or to determine whether the proposed project affects an Indian Tribe(s). If an applicant determines an Indian Tribe(s) will be impacted, the applicant must provide information on the project location, potential impacts and how the applicant will engage with Indian Tribe(s), during the period of performance of the agreement, and, if necessary, after the end of the agreement. Approval by DOE must be obtained before any activities take place that could impact Tribal resources or reserved rights, including but not limited to lands, cultural sites, sacred sites, water rights, mineral rights, fishing rights, and hunting rights. DOE will determine if formal government-to-government consultation is needed, and DOE will conduct that consultation accordingly, in addition to any engagement by applicant.

Save the Impacted Indian Tribes Documentation in a single PDF using the following convention for the title" ControlNumber_LeadOrganization_ImpactedTribes".

xix. Transparency of Foreign Connections

Applicants must provide the following as it relates to the proposed recipient and subrecipients. Include a separate disclosure for the applicant and each proposed subrecipient. U.S. National Laboratories, domestic government entities, and institutions of higher education are only required to respond to items 1, 2 and 9, and if applying as to serve as the prime recipient, must provide complete responses for project team members that are not U.S. National Laboratories, domestic government entities, or institutions of higher education.

1. Entity name, website address, and physical address;
2. The identity of all owners, principal investigators, project managers, and Senior/Key Personnel who are a party to any *Foreign Government-Sponsored Talent Recruitment Program* of a foreign country of risk (i.e., China, Iran, North Korea, and Russia);
3. The existence of any joint venture or subsidiary that is based in, funded by, or has a foreign affiliation with any foreign country of risk, including the People's Republic of China;

4. Any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an enterprise owned by a foreign state or any foreign entity;
5. Percentage, if any, that the proposed recipient or subrecipient has foreign ownership or control;
6. Percentage, if any, that the proposed recipient or subrecipient is wholly or partially owned, directly or indirectly, by an entity in a foreign country of risk;
7. Percentage, if any, of venture capital or institutional investment by an entity that has a general partner or individual holding a leadership role in such entity who has a foreign affiliation with any foreign country of risk;
8. Any technology licensing or intellectual property sales to a foreign country of risk, during the 5-year period preceding submission of the proposal;
9. Any foreign equipment that will be used on the project:
    a. Equipment originally made or manufactured in a foreign country of risk (including relabeled or rebranded equipment).
    b. Coded equipment where the source code is written in a foreign country of risk.
    c. Equipment from a foreign country of risk that will be connected to the internet or other remote communication system.
    d. Any companies from a foreign country of risk that will have physical or remote access to any part of the equipment used on the project after delivery.
10. Any foreign business entity, offshore entity, or entity outside the United States related to the proposed recipient or subrecipient;
11. Complete list of all directors (and board observers), including their full name, citizenship and shareholder affiliation, date of appointment, duration of term, as well as a description of observer rights as applicable;
12. Complete capitalization table for your entity, including all equity interests (including LLC and partnership interests, as well as derivative securities). Include both the number of shares issued to each equity holder, as well as the percentage of that series and all equity on a fully diluted basis. Identify the principal place of incorporation (or organization) for each equity holder. If the equity holder is a natural person, identify the citizenship(s). If the recipient or subrecipient is a publicly traded company, provide the above information for shareholders with an interest greater than 5%;
13. A summary table identifying all rounds of financing, the purchase dates, the investors for each round, and all the associated governance and

information rights obtained by investors during each round of financing; and

14. An organization chart to illustrate the relationship between your entity and the immediate parent, ultimate parent, and any intermediate parent, as well as any subsidiary or affiliates. Identify where each entity is incorporated.

DOE reserves the right to request additional or clarifying information based on the information submitted.

Save the Transparency of Foreign Connections information in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_TFC."

xx. Potentially Duplicative Funding Notice (if applicable)

If the applicant or project team member has other active awards of federal funds, the applicant must determine whether the activities of those awards potentially overlap with the activities set forth in its application to this FOA. If there is a potential overlap, the applicant must notify DOE in writing of the potential overlap and state how it will ensure any project funds (i.e., recipient cost share and federal funds) will not be used for identical cost items under multiple awards. Likewise, for projects that receive funding under this FOA, if a recipient or project team member receives any other award of federal funds for activities that potentially overlap with the activities funded under the DOE award, the recipient must promptly notify DOE in writing of the potential overlap and state whether project funds from any of those other federal awards have been, are being, or are to be used (in whole or in part) for one or more of the identical cost items under the DOE award. If there are identical cost items, the recipient must promptly notify the Contracting Officer in writing of the potential duplication and eliminate any inappropriate duplication of funding.

Save the Potentially Duplicative Funding Notice in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_PDFN."

xxi. Technology Description Spreadsheet

Applicants are required to submit the information contained in the Technology Description Spreadsheet along with their Full Application. The Technology Description Spreadsheet template, should the applicants choose to use this, has been provided is available on EERE eXCHANGE at https://eere-

eXCHANGE.energy.gov/ and contains all of the information that must be included.

Save the Technology Description Spreadsheet as a single Microsoft Excel file using the following convention for the title: "Control Number_LeadOrganization_TechDescription."

E. Post Selection Information Requests

If selected for award negotiations, EERE reserves the right to require that selected applicants provide additional or clarifying information regarding the application submissions, the project, the project team, the award requirements, and any other matters related to anticipated award. The following is a list of examples of information that may be required:

- Personnel proposed to work on the project and collaborating organizations (See Section VI.B.xix. Participants and Collaborating Organizations);
- Current and Pending Support (See Sections IV.D.xvi. and VI.B.xx. Current and Pending Support);
- An Intellectual Property Management Plan (if applicable) describing how the project team/consortia members will handle intellectual property rights and issues between themselves while ensuring compliance with federal intellectual property laws, regulations, and policies;
- A Data Management Plan describing how all research data displayed in publications resulting from the proposed work will be digitally accessible at the time of publications, in accordance with Section VI.B.xxiii.;
- An Open-Source Software Distribution Plan (if applicable) describing how software produced under this FOA will be distributed, in accordance with Section VI.B.xxiv.;
- Indirect cost information;
- Other budget information;
- Letters of Commitment from third parties contributing to cost share, if applicable;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Information for the DOE Office of Civil Rights to process assurance reviews under 10 CFR 1040;
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Environmental Questionnaire;
- Cooperative Research and Development Agreement (if applicable) if working with an FFRDC

F. Unique Entity Identifier (UEI) and System for Award Management (SAM)

Each applicant (unless the applicant is an individual or federal awarding agency that is excepted from those requirements under 2 CFR 25.110(b) or (c), or has an exception approved by the federal awarding agency under 2 CFR 25.110(d)) is required to: (1) register in the SAM at https://www.sam.gov before submitting an application; (2) provide a valid UEI in the application; and (3) maintain an active SAM registration with current information at all times during which it has an active federal award or an application or plan under consideration by a federal awarding agency. DOE may not make a federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements. If an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

NOTE: Due to the high demand of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. If entities have technical difficulties with the UEI validation or SAM registration process they should use the HELP feature on SAM.gov. SAM.gov will work entity service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue. Additional entity validation resources can be found here: GSAFSD Tier 0 Knowledge Base - Validating your Entity.

G. Submission Dates and Times

All required submissions must be submitted in EERE eXCHANGE no later than 5 p.m. ET on the dates provided on the cover page of this FOA.

H. Intergovernmental Review

This FOA is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

I. Funding Restrictions

i. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable federal cost principles. Pursuant to 2 CFR 910.352, the cost principles in the Federal Acquisition Regulations (48 CFR 31.2) apply to for-profit entities. The cost principles contained in 2 CFR Part 200, Subpart E apply to all entities other than for-profits.

ii. Pre-Award Costs

Applicants selected for award negotiations (selectees) must request prior written approval to charge pre-award costs. Pre-award costs are those incurred prior to the effective date of the federal award directly pursuant to the negotiation and in anticipation of the federal award where such costs are necessary for efficient and timely performance of the scope of work. Such costs are allowable only to the extent that they would have been allowable if incurred after the date of the federal award and **only** with the written approval of the federal awarding agency, through the Contracting Officer.

Pre-award costs cannot be incurred prior to the Selection Official signing the Selection Statement and Analysis.

Pre-award expenditures are made at the selectee's risk. EERE is not obligated to reimburse costs: (1) in the absence of appropriations; (2) if an award is not made; or (3) if an award is made for a lesser amount than the selectee anticipated.

1. **National Environmental Policy Act (NEPA) Requirements Related to Pre-Award Costs**

   EERE's decision whether and how to distribute federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.

   EERE does not guarantee or assume any obligation to reimburse pre-award costs incurred prior to receiving written authorization from the Contracting Officer. If the applicant elects to undertake activities that DOE determines may have an adverse effect on the environment or limit the choice of

reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving federal funding for their project and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer overrides the requirement to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives. Likewise, if an application is selected for negotiation of award, and the prime recipient elects to undertake activities that are not authorized for federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the prime recipient is doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

iii. Performance of Work in the United States (Foreign Work Waiver)

1. **Requirement**
   All work performed under EERE awards must be performed in the United States. The prime recipient must flow down this requirement to its subrecipients.

2. **Failure to Comply**
   If the prime recipient fails to comply with the Performance of Work in the United States requirement, EERE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The prime recipient is responsible should any work under this award be performed outside the United States, absent a waiver, regardless of whether the work is performed by the prime recipient, subrecipients, contractors or other project partners.

3. **Waiver**
   To seek a foreign work waiver, the applicant must submit a written waiver request to EERE. Appendix C lists the information that must be included in a request for a foreign work waiver.

   Save the waiver request(s) in a single PDF file. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

iv. Construction

Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

v. Foreign Travel

Foreign travel costs are not allowable under this FOA.

vi. Equipment and Supplies

To the greatest extent practicable, all equipment and products purchased with funds made available under this FOA should be American-made. This requirement does not apply to used or leased equipment.

vii. Build America Buy America Requirements for Infrastructure Projects

Pursuant to the Build America Buy America Act, subtitle IX of BIL (Buy America, or BABA) and in accordance with 2 CFR Part 184, no funds for federal financial assistance, which is subject to BABA requirements, may be used for a project unless:

- All iron and steel used in the infrastructure work are produced in the United States;
- All manufactured products used in the project are produced in the United States; and
- All construction materials used in the infrastructure work are manufactured in the United States.

Whether a given project must apply this requirement is project-specific and dependent on several factors, such as the recipient's entity type, whether the work involves "infrastructure," as defined in Section 70914 of the BIL, and whether the infrastructure in question is publicly owned or serves a public function.

Applicants are strongly encouraged to consult Appendix D of this FOA to determine whether their project may have to apply this requirement, both to make an early determination as to the need of a waiver, as well as to determine what impact, if any, this requirement may have on the proposed project's budget.

BABA requirements apply to DOE prime recipients that are "non-Federal entities." In accordance with OMB Memorandum M-24-02 and 2 CFR 200.1, the term “non-Federal entity” includes states, local governments, territories, Indian Tribes, Institutes of Higher Education or non-profit organizations. DOE does not apply BABA requirements to for-profit entities. A Program Policy Factor that the Selection Official may consider in determining which Full Applications to select for award negotiations that by for-profit entities may be applied pursuant to Section V.C.i., Program Policy Factors. The relevant Program Policy Factor considers the degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials in its project.

Subawards should conform to the terms of the prime award from which they flow; in other words, for-profit prime recipients are not required to flow down these Buy America requirements to subrecipients, even if those subrecipients are non-Federal entities as defined above. Conversely, prime recipients which are non-Federal entities must flow the Buy America requirements down to all subrecipients, even if those subrecipients are for-profit entities.

The DOE financial assistance agreement will require each recipient to: (1) fulfill the commitments made in its application regarding the procurement of U.S.-produced products and (2) fulfill the commitments made in its application regarding the procurement of other key component metals and domestically manufactured products that are deemed available in sufficient and reasonably available quantities or of a satisfactory quality at the time of award negotiation. Applicants may seek waivers of these requirements in very limited circumstances and for good cause shown. Further details on requesting a waiver can be found in Appendix D and the terms and conditions of an award.

Applicants are strongly encouraged to consult Appendix D for more information.

viii. Lobbying

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.

Recipients and subrecipients are required to complete and submit SF-LLL, “Disclosure of Lobbying Activities” (https://www.grants.gov/forms/forms-repository/sf-424-individual-family) 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.

ix. Risk Assessment

Pursuant to 2 CFR 200.206, DOE will conduct an additional review of the risk posed by applications submitted under this FOA. Such risk assessment will consider:

1. Financial stability;
2. Quality of management systems and ability to meet the management standards prescribed in 2 CFR 200 as amended and adopted by 2 CFR 910;
3. History of performance;
4. Audit reports and findings; and
5. The applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-federal entities.

DOE may make use of other publicly available information and the history of an applicant's performance under DOE or other federal agency awards.

Depending on the severity of the findings and whether the findings were resolved, DOE may elect not to fund the applicant.

In addition to this review, DOE must comply with the guidelines on government-wide suspension and debarment in 2 CFR 180 and must require non-federal entities to comply with these provisions. These provisions restrict federal awards, subawards and contracts with certain parties that are debarred, suspended, or otherwise excluded from or ineligible for participation in federal programs or activities.

Further, as DOE invests in critical infrastructure and funds critical and emerging technology areas, DOE also considers possible vectors of undue foreign government influence in evaluating risk. If high risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant. As part of the research, technology, and economic security risk review, DOE may contact the applicant and/or proposed project team members for additional information to

inform the review. This risk review is conducted separately from the technical merit review.

x. Invoice Review and Approval

DOE employs a risk-based approach to determine the level of supporting documentation required for approving invoice payments. Recipients may be required to provide some or all of the following items with their requests for reimbursement:

- Summary of costs by cost categories;
- Timesheets or personnel hours report;
- Invoices/receipts for all travel, equipment, supplies, contractual, and other costs;
- UCC filing proof for equipment acquired with project funds by for-profit recipients and subrecipients;
- Explanation of cost share for invoicing period;
- Analogous information for some subrecipients; and
- Other items as required by DOE.

xi. Prohibition Related to Foreign Government-Sponsored Talent Recruitment Programs

a. Prohibition

Persons participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk* are prohibited from participating in projects selected for federal funding under this FOA. Should an award result from this FOA, the recipient must exercise ongoing due diligence to reasonably ensure that no individuals participating on the DOE-funded project are participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. Consequences for violations of this prohibition will be determined according to applicable law, regulations, and policy. Further, the recipient must notify DOE within five (5) business days upon learning that an individual on the project team is or is believed to be participating in a foreign government talent recruitment program of a foreign country of risk. DOE may modify and add requirements related to this prohibition to the extent required by law.

b. Definitions

1. **Foreign Government-Sponsored Talent Recruitment Program.** An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit

science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

2. **Foreign Country of Risk.** DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

xii. Affirmative Action and Pay Transparency Requirements

All applicants must comply with all applicable federal labor and employment laws, including but not limited to Title VII of the Civil Rights Act of 1964, the Fair Labor Standards Act, the Occupational Safety and Health Act, and the National Labor Relations Act, which protects employees' right to bargain collectively and engage in concerted activities for the purpose of workers' mutual aid or protection.

All federally assisted construction contracts exceeding $10,000 annually will be subject to the requirements of Executive Order 11246, Equal Employment Opportunity:

(1) Recipients, subrecipients, contractors, and subcontractors are prohibited from discriminating in employment decisions on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin.

(2) Recipients and contractors are required to take affirmative action to ensure that equal opportunity is provided in all aspects of their

employment. This includes flowing down the appropriate language to all subrecipients, contractors, and subcontractors.

(3) Recipients, subrecipients, contractors, and subcontractors are prohibited from taking adverse employment actions against applicants and employees for asking about, discussing, or sharing information about their pay or, under certain circumstances, the pay of their co-workers.

Department of Labor's (DOL) Office of Federal Contractor Compliance Programs (OFCCP) uses a neutral process to schedule compliance evaluations. Consult OFCCP's Technical Assistance Guide[27] to gain an understanding of the requirements and possible actions the recipients, subrecipients, contractors, and subcontractors must take. Additional guidance may also be found in the National Policy Assurances, produced by DOE.

xiii. Foreign Collaboration Considerations

c. Consideration of new collaborations with foreign entities, organizations, and governments. The recipient will be required to provide DOE with advanced written notification of any potential collaboration with foreign entities, organizations, or governments in connection with its DOE-funded award scope. The recipient will then be required to await further guidance from DOE prior to contacting the proposed foreign entity, organization, or government regarding the potential collaboration or negotiating the terms of any potential agreement.

d. Existing collaborations with foreign entities, organizations, and governments. The recipient will be required to provide DOE with a written list of all existing foreign collaborations in which it has entered in connection with its DOE-funded award scope.

e. Description of collaborations that should be reported. In general, a collaboration will involve some provision of a thing of value to, or from, the recipient. A thing of value includes but may not be limited to all resources made available to, or from, the recipient in support of and/or related to the DOE award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on the DOE award but resulting in

[27] See OFCCP's Technical Assistance Guide at: https://www.dol.gov/sites/dolgov/files/ofccp/Construction/files/ConstructionTAG.pdf?msclkid=9e397d68c4b111ec9d8e6fecb6c710ec Also see the National Policy Assurances http://www.nsf.gov/awards/managing/rtc.jsp

provision of a thing of value from or to the DOE award must also be reported. Collaborations do not include routine workshops, conferences, use of the recipient's services and facilities by foreign investigators resulting from its standard published process for evaluating requests for access, or the routine use of foreign facilities by awardee staff in accordance with the recipient's standard policies and procedures.

V. Application Review Information

A. Technical Review Criteria

i. Concept Papers

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

Concept Paper Criterion: Overall FOA Responsiveness and Viability of the Project (Weight: 100%)
This criterion involves consideration of the following factors:

- The applicant clearly describes the proposed connected community project, including the technologies and approach being demonstrated, grid services provided, location, building/plant/vehicle use types, systems, business models, and all other salient information;
- The applicant clearly describes how the connected community project data will be leveraged to develop **methods to right-size grid investments** – especially distribution grid investments – while decarbonizing and electrifying buildings, industry, and transportation, as well as to achieve power sector decarbonization; and
- The applicant clearly describes how the connected community project will **sustain or improve customer resilience** in a manner that yields reliable, replicable, and scalable frameworks, especially for utilities, regulators, and other to leverage in future planning scenarios;
- The project has potential to be replicated, scaled, and validated;
- The applicant clearly describes how the technology is unique and innovative, and how the technology will advance the current state of the art;
- The applicant describes a strategy for community engagement and how the project addresses concerns of energy equity and community benefits more broadly;

- The applicant has identified risks and challenges of the technology, regulatory and financial aspects of the proposal including possible mitigation strategies, and has shown the impact that EERE funding and the proposed project would have on the relevant field and application;
- The applicant has the qualifications, experience, capabilities, and other resources necessary to complete the proposed project; and
- The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the FOA.

ii. Full Applications

Applications will be evaluated against the technical review criteria shown below. All sub-criteria are of equal weight.

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 demonstration meaningfully **addresses grid issues, particularly for the distribution grid**, and clearly describes how demonstrated technical measures and data, including offering grid services, will be leveraged to **influence future grid planning**;
- Degree to which the current state of relevant grid planning practices are clearly described;
- Degree to which proposed **grid edge technical measures** – including but not limited to energy efficiency (active and passive measures), [28] electrification solutions[29], energy management,[30] demand flexibility improvements, thermal networks, and/or integration of additional DERs – are clearly described and impactful, including the extent to which the project **leverages these measures to addresses** the goals of **decarbonization**, improved customer **resilience**, and **right-sizing distribution grid upgrades** to accommodate increased demand due to electrification;
- Extent to which the application describes a viable technical solution; and
- Extent to which project has buy-in from needed stakeholders to ensure success of the demonstration.

Impact of Technology Advancement

[28] E.g. envelope retrofits, HVAC system upgrades, and heat pump water heater replacements
[29] E.g. replacing boilers with heat pumps
[30] E.g. through advanced building controls or managed EV charging

- Extent to which the application specifically and convincingly demonstrates at a sufficient scale how the connected community project will provide utilities and regulators with accepted grid-edge strategies and demand flexibility evaluation **methods to right-size grid investments** – especially distribution grid investments – while decarbonizing buildings, industry, and transportation, as well as to achieve power sector decarbonization;
- Extent to which the application specifically and convincingly demonstrates at sufficient scale how the connected community project will **sustain or improve customer resilience** in a manner that yields reliable, replicable, and scalable frameworks, especially for utilities, regulators, and other grid planners to leverage;
- How the project **supports the objectives of this FOA, as well as the technical specifications and metrics**; i.e., extent to which the technical solution enables better distribution system planning for expected future load growth (especially by leveraging a variety of grid-edge technical measures), sustains or improves customer resilience, and maintains or enhances building/plant/vehicle (end use) services to occupants (e.g., occupant comfort, health and productivity), protects data privacy, and provides cybersecurity in the project demonstration and in a scalable implementation of the technology solution;
- Extent to which the proposed connected community solution has the potential to be **replicable**, **scalable** and **advance the state-of-the-art**;
- Extent to which the connected community includes **emission reduction strategies** in building or system types that are beyond standard practice; and
- Extent to which the project facilitates stakeholder relationships across new or existing stakeholders to gain technical buy-in and increase potential for future deployments.

Business Model Innovation and Impact and Market Transformation Plan

- Degree to which the results of the project will advance business models for customers, utilities, energy service providers, local energy communities, and other key stakeholders and reflect new technological, financial, and contractual approaches; and
- Degree to which the plan identifies a reasonable path toward commercial viability including but not limited to market opportunity, value proposition, competitive differentiation, scalability and distribution channels for the proposed technology or approach, cost and performance drivers, infrastructure and workforce requirements, U.S. manufacturing plan, and legal/regulatory considerations including utility rate structures, intellectual property, cyber security, and privacy.

Innovation and Merit re: Community Benefits, Energy Justice, Diversity, Equity, and Inclusion

- Degree to which the application proposes clear and impactful community benefits, including workforce dimensions and evidence of having consulted with the community in question to understand their needs and priorities, including a clear description of the current state, a rationale for prioritizing specific approaches beyond prior or existing programs, and a compelling argument why the proposed solution will succeed;
- Extent to which the project benefits underserved communities, as defined in Appendix L;
- The quality and extent to which the project's performance indicators reflect proposed benefits to the community and to diversity, equity and inclusion;
- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and

Project Management

- Adequacy of proposed project management systems including the ability to track scope, cost, and schedule progress and changes;
- Reasonableness of budget and spend plan as detailed in the budget justification workbook for proposed project and objectives;
- Adequacy of contingency funding based on quality of cost estimate and identified risks;
- Adequacy, reasonableness, and soundness of the project schedule, as well as periodic Go/No-Go decisions prior to a budget period continuation application, interim milestones, and metrics to track process;
- Adequacy of the identification of risks, including labor and community opposition or disputes, and "timely" and appropriate strategies for mitigation and resolution; and
- Soundness of a plan to expeditiously address environmental, siting, and other regulatory requirements for the project, including evaluation of resilience to climate change.

Criterion 2: Project Research and Execution Plan (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 including technology integration, control optimization strategies, target market adoption and incentives, regulatory opportunities and barriers, and occupant preferences;

- The degree to which **regional regulatory landscape** is clearly articulated and how the project can help incorporate the priorities of this FOA into that landscape;
- 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; and
- Credibility of the workplan and engagement strategy with respect to community benefits, energy justice, diversity, equity, and inclusion.

Identification of Technical Risks

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

Baseline, Metrics, and Deliverables

- Level of clarity in the definition of the baseline, metrics, and milestones;
- The specificity, credibility, and usefulness of the evaluation plan for the project team, National Coordinator, and DOE, including the degree to which the development of an **evaluation plan** (including the six evaluation criteria: energy impacts, occupant and stakeholder experience, benefit-cost analysis across stakeholder groups, business model evaluation, GHG emission impacts, and resilience and other community benefits; Appendix H) and the **milestones and deliverables associated with the six evaluation criteria** are integrated into the workplan;
- Rigor and usefulness of performance indicators related to community benefits, energy justice, diversity, equity, and inclusion; and
- Relative to a clearly defined project baseline, the strength of the quantifiable metrics, milestones, and mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Criterion 3: Team and Resources (25%)

This criterion involves consideration of the following factors:

- Capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposed work with a high probability of success. This will be judged by the qualifications, relevant expertise, and time commitment of the individuals on the team, including the level commitment of an engaged utility partner or Principal Investigator;
- Diversity of expertise and perspectives of the team and the inclusion of key industry and community partners that will amplify impact;

- Quality and sufficiency of the facilities, sites, and recruitment plan to support the work;
- Degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further demonstration, development, and commercial deployment of the proposed technologies;
- Level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
- Reasonableness of the budget and spend plan for the proposed project and objectives.

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "DOE Merit Review Guide for Financial Assistance," effective September 2020, which is available at: https://www.energy.gov/management/articles/merit-review-guide-financial-assistance-and-unsolicited-proposals-current.

C. Other Selection Factors

i. Program Policy Factors

In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Full Applications to select for award negotiations:

- The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
- The degree to which the proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives;
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers;
- The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;

- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);
- The degree to which the proposed project incorporates applicant or team members from Minority Serving Institutions (e.g., Historically Black Colleges and Universities (HBCUs)/Other Minority Institutions (OMIs)); and partnerships with Minority Business Enterprises, minority-owned businesses, woman-owned businesses, veteran-owned businesses, or Indian Tribes;
- The degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials;
- The degree to which the proposed project avoids duplication/overlap with other publicly or privately funded work, including duplication with other DOE-funded efforts;
- The degree to which the proposed project has broad public support and engagement from the communities most directly impacted by the project;
- The degree to which the project promotes increased coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer; and
- Whether the proposed project will occur in a Qualified Opportunity Zone or otherwise advance the goals of Qualified Opportunity Zones.[31] The goals include spurring economic development and job creation in distressed communities throughout the United States.

D. Evaluation and Selection Process

i. Overview

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions are conducted by reviewers that are experts in the subject matter of the FOA. Ultimately, the Selection Official considers the recommendations of the reviewers, along with other considerations such as program policy factors and risk reviews, in determining which applications to select.

[31] Opportunity zones were added to the Internal Revenue Code by section 13823 of the Tax Cuts and Jobs Act of 2017, codified at 26 U.S.C. 1400Z-1. The list of designated Qualified Opportunity Zones can be found in IRS Notices 2018-48 (PDF) and 2019-42 (PDF). Further, a visual map of the census tracts designated as Qualified Opportunity Zones may also be found at Opportunity Zones Resources. Also see, frequently asked questions about Qualified Opportunity Zones.

ii. Pre-Selection Clarification

EERE may determine that pre-selection clarifications are necessary from one or more applicants. Pre-selection clarifications are distinct from and less formal than pre-selection interviews. These pre-selection clarifications will solely be for the purposes of clarifying the application. The pre-selection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE's written clarification questions or video or conference calls with EERE representatives.

The information provided by applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE's selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

EERE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

iii. Recipient Responsibility and Qualifications

DOE, prior to making a federal award with a total amount of federal share greater than the simplified acquisition threshold, is required to review and consider any responsibility and qualification information about the applicant that is in the entity information domain in SAM.gov (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the entity information domain in SAM.gov and comment on any information about itself that a federal awarding agency previously entered and is currently in the entity information domain in SAM.gov.

DOE will consider any written comments by the applicant, in addition to the other information in the entity information domain in SAM.gov, in making a judgment about the applicant's integrity, business ethics, and record of performance under federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.206.

iv. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, risk reviews, and the amount of funds available in arriving at selections for this FOA.

E. Anticipated Notice of Selection and Award Negotiation Dates

EERE anticipates notifying applicants selected for negotiation of award and negotiating awards by the dates provided on the cover page of this FOA.

VI. Award Administration Information

A. Award Notices

i. Ineligible Submissions

Ineligible Concept Papers and Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE eXCHANGE. The notification letter will state the basis upon which the Concept Paper or the Full Application is ineligible and not considered for further review.

ii. Concept Paper Notifications

EERE will notify applicants of its determination to encourage or discourage the submission of a Full Application. EERE will post these notifications to EERE eXCHANGE. EERE may include general comments provided from reviewers on an applicant's Concept Paper in the encourage/discourage notifications.

Applicants may submit a Full Application even if they receive a notification discouraging them from doing so. By discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project. Such assessments do not necessarily reflect judgments on the merits of the proposed project. The purpose of the Concept Paper phase is to save applicants the considerable time and expense of preparing a Full Application that is unlikely to be selected for award negotiations.

A notification encouraging the submission of a Full Application does not authorize the applicant to commence performance of the project.

iii. Full Application Notifications

EERE will notify applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE eXCHANGE. The notification letter will inform the applicant whether or not its Full Application was selected for award negotiations. Alternatively, EERE may notify one or more applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

iv. Applicants Selected for Award Negotiations

DOE may stagger its selection determinations. As a result, some applicants may receive their notification letter in advance of other Applicants. Successful applicants will receive written notification that they have been selected for award negotiations. Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by EERE to issue an award nor is it a guarantee of federal government funding. Applicants do not receive an award unless and until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the prime recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE eXCHANGE with whom EERE will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant fails to do so or if award negotiations are otherwise unsuccessful, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

Please refer to Section IV.I.ii. of the FOA for guidance on pre-award costs.

v. Alternate Selection Determinations

In some instances, an applicant may receive a notification that its application was not selected for award and EERE designated the application to be an

alternate. As an alternate, EERE may consider the Full Application for federal funding in the future. A notification letter stating the Full Application is designated as an alternate does not authorize the applicant to commence performance of the project. EERE may ultimately determine to select or not select the Full Application for award negotiations.

vi. Unsuccessful Applicants

EERE shall promptly notify in writing each applicant whose application has not been selected for award or whose application cannot be funded because of the unavailability of appropriated funds.

B. Administrative and National Policy Requirements

i. Registration Requirements

There are several one-time actions applicants must take before applying to this FOA. Some of these may take several weeks, so it is vital applicants build in enough time to complete them. Failure to complete these actions could interfere with application or negotiation deadlines or the ability to receive an award if selected. These requirements are as follows:

1. **EERE Funding Opportunity Exchange (eXCHANGE)**
   Register and create an account on EERE eXCHANGE at https://eere-eXCHANGE.energy.gov. This account will allow the user to apply to any open EERE FOAs that are currently in EERE eXCHANGE.

   To access EERE eXCHANGE, potential applicants must have a Login.gov account. As part of the eXCHANGE registration process, new users will be directed to create an account in 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.

   Each organization or business unit, whether acting as a team or a single entity, should use only one account as the contact point for each submission. Applicants must also designate backup points of contact. **This step is required to apply to this FOA.** The eXCHANGE registration does not have a delay; however, **the remaining registration requirements below could take**

several weeks to process and are necessary for a potential applicant to receive an award under this FOA.

2. **System for Award Management**
   Register with the SAM at https://www.sam.gov. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called a Marketing Partner ID Number (MPIN) are important steps in SAM registration. Please update your SAM registration annually.

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

4. **Grants.gov**
   Register in Grants.gov (http://www.grants.gov) to receive automatic updates when Amendments to this FOA are posted. Please note that Concept Papers, and Full Applications will not be accepted through Grants.gov.

Electronic Authorization of Applications and Award Documents
Submission of an application and supplemental information under this FOA through electronic systems used by the DOE, including EERE eXCHANGE and FedConnect.net, constitutes the authorized representative's approval and electronic signature.

ii. Award Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR Part 200 as amended by 2 CFR Part 910.

iii. Foreign National Participation

All applicants selected for an award under this FOA and project participants (including subrecipients and contractors) who anticipate involving foreign nationals in the performance of an award, may be required to provide DOE with specific information about each foreign national to satisfy requirements for foreign national participation. A "foreign national" is defined as any person who is not a United States citizen by birth or without U.S. citizenship or nationality (may include a stateless person).. The volume and type of information collected

may depend on various factors associated with the award. DOE concurrence may be required before a foreign national can participate in the performance of any work under an award.

DOE may elect to deny a foreign national's participation in the award. Likewise, DOE may elect to deny a foreign national's access to a DOE site, information, technologies, equipment, programs, or personnel.

iv. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier subrecipients. Prime recipients must report the executive compensation for their own executives as part of their registration profile in SAM.

v. National Policy Requirements

The National Policy Assurances that are incorporated as a term and condition of award are located at: http://www.nsf.gov/awards/managing/rtc.jsp.

vi. Environmental Review in Accordance with National Environmental Policy Act (NEPA)

EERE's decision whether and how to distribute federal funds under this FOA is subject to NEPA (42 U.S.C. 4321, *et seq.*). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at https://www.energy.gov/nepa.

While NEPA compliance is a federal agency responsibility and the ultimate decisions remain with the federal agency, all applicants selected for award negotiations and recipients of an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project. If DOE determines certain documents must be prepared to complete the NEPA review process, the recipient may be required to prepare the documents and the costs to prepare the necessary documents may be included as part of the project costs. DOE will independently evaluate the environmental document and will take responsibility for the contents, including

ensuring the professional integrity of the discussion and analysis, as required by NEPA.

National Historic Preservation Act (NHPA)

DOE must comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA) prior to deciding whether or how to distribute federal funds. Section 106 requires DOE to identify and consider adverse effects to historic properties that are listed in or eligible for listing in the National Register of Historic Places. DOE will perform a NHPA review under the umbrella of its NEPA review and will require applicants to assist in this review and consider impacts to historic, Tribal and cultural resources.

vii. Flood Resilience

Executive Order 11988, Floodplain Management, requires agencies engage in a decision-making process to evaluate the potential effects of any action it may take in a floodplain and to avoid development in a floodplain to the extent possible. DOE procedures for implementing the Executive Order are in 10 CFR part 1022. Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input reinstated by Executive Order 14030, Climate-Related Financial Risk), directs federal agencies to "expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended." The higher flood elevation is based on one of three approaches: climate-informed science (preferred), freeboard value, or 0.2% annual flood change (500-year floodplain).

Selectees will be required to indicate whether the proposed project location(s) is within a floodplain, how the floodplain was defined, and how the project's design has been modified to reduce the risk of flood loss and minimize the impact of floods on human safety, health, and welfare. Information to assist in the implementation of these requirements is available at:

- https://www.energy.gov/nepa/articles/eo-13690-establishing-federal-flood-risk-management-standard-and-process-further
- https://www.fema.gov/floodplain-management/intergovernmental/white-house-flood-resilience-interagency-working-group
- http://floodstandard.climate.gov

viii. Applicant Representations and Certifications

1. **Lobbying Restrictions**
   By accepting funds under this award, the prime recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. § 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

2. **Corporate Felony Conviction and Federal Tax Liability Representations**
   In submitting an application to this FOA, the applicant represents that:

   a. It is **not** a corporation that has been convicted of a felony criminal violation under any federal law within the preceding 24 months; and

   b. It is **not** a corporation that has any unpaid federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

   For purposes of these representations, a corporation is any for-profit or nonprofit entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations].

3. **Nondisclosure and Confidentiality Agreements Representations**
   In submitting an application to this FOA the applicant represents that:

   a. It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.

   b. It **does not and will not** use any federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
   (1) *''These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities*

created by existing statute or Executive Order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive Orders and statutory provisions are incorporated into this agreement and are controlling."

(2) The limitation above shall not contravene requirements applicable to Standard Form 312 Classified Information Nondisclosure Agreement (https://fas.org/sgp/othergov/sf312.pdf), Form 4414 Sensitive Compartmented Information Disclosure Agreement (https://fas.org/sgp/othergov/intel/sf4414.pdf), or any other form issued by a federal department or agency governing the nondisclosure of classified information.

(3) Notwithstanding the provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States government, may contain provisions appropriate to the activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the U.S. Department of Justice, that are essential to reporting a substantial violation of law.

ix. Statement of Federal Stewardship

EERE will exercise normal federal stewardship in overseeing the project activities performed under EERE awards. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing assistance and/or temporary intervention in unusual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the project objectives have been accomplished.

x. Statement of Substantial Involvement

EERE has substantial involvement in work performed under awards made as a result of this FOA. EERE does not limit its involvement to the administrative requirements of the award. Instead, EERE has substantial involvement in the direction and redirection of the technical aspects of the project. Substantial involvement includes, but is not limited to, the following:

1. EERE shares responsibility with the recipient for the management, control, direction, and performance of the project.

2. EERE may intervene in the conduct or performance of work under this award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.

3. EERE may redirect or discontinue funding the project based on the outcome of EERE's evaluation of the project at the Go/No-Go decision point(s).

4. EERE participates in major project decision-making processes.

xi. Subject Invention Utilization Reporting

To ensure that prime recipients, subrecipients, and contractors holding title to subject inventions are taking the appropriate steps to commercialize subject inventions, EERE may require that each prime recipient holding title to a subject invention submit annual reports for ten (10) years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by prime recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross royalties received by the prime recipient, and such other data and information as EERE may specify.

xii. Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

xiii. Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist, attached to the award agreement.

xiv. Go/No-Go Review

Each project selected under this FOA will be subject to a periodic project evaluation referred to as a Go/No-Go Review. A Go/No-Go Review 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 beginning the execution of future phases. At the Go/No-Go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. Federal funding beyond the Go/No-Go decision point (continuation funding) is contingent upon (1) availability of federal funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) recipient's technical progress compared to the Milestone Summary Table stated in Attachment 1 of the award; (4) recipient's submittal of required reports; (5) recipient's compliance with the terms and conditions of the award; (6) EERE's Go/No-Go decision; (7) the recipient's submission of a continuation application;[32] and (8) written approval of the continuation application by the Contracting Officer.

As a result of the Go/No-Go Review, DOE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the

[32] A continuation application is a non-competitive application for an additional budget period within a previously approved project period. At least ninety (90) days before the end of each budget period, the recipient must submit its continuation application, which includes the following information:

i. A progress report on the project objectives, including significant findings, conclusions, or developments, and an estimate of any unobligated balances remaining at the end of the budget period. If the remaining unobligated balance is estimated to exceed 20 percent of the funds available for the budget period, explain why the excess funds have not been obligated and how they will be used in the next budget period.
ii. A detailed budget and supporting justification if there are changes to the negotiated budget, or a budget for the upcoming budget period was not approved at the time of award.
iii. A description of any planned changes from the SOPO and/or Milestone Summary Table.

project because of insufficient progress, change in strategic direction, or lack of funding.

The Go/No-Go decision is distinct from a non-compliance determination. In the event a recipient fails to comply with the requirements of an award, EERE may take appropriate action, including but not limited to, redirecting, suspending, or terminating the award.

xv. Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the U.S. government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

xvi. Uniform Commercial Code (UCC) Financing Statements

Per 2 CFR 910.360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with federal funds, and when the federal share of the financial assistance agreement is more than $1 million the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, UCC financing statement(s) for all equipment in excess of $5,000 purchased with project funds. These financing statement(s) must be approved in writing by the Contracting Officer prior to the recording, and they shall provide notice that the recipient's title to all equipment (not real property) purchased with federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements or additional recordings, including appropriate continuation statements, as necessary or as the Contracting Officer may direct.

xvii. Real Property and Equipment

Real property and equipment purchased with project funds (federal share and recipient cost share) are subject to the requirements at 2 CFR 200.310, 200.311, 200.313, and 200.316 (non-federal entities, except for-profit entities) and 2 CFR 910.360 (for-profit entities).

For projects selected for awards under this FOA, the recipients may (1) take disposition action on the real property and equipment; or (2) continue to use the real property and equipment after the conclusion of the award period of performance with Contracting Officer approval. The recipient's written request for Continued Use must identify the property and include: a summary of how the property will be used (must align with the authorized project purposes); a proposed use period, (e.g., perpetuity, until fully depreciated, or a calendar date when the recipient expects to submit disposition instructions); acknowledgement that the recipient shall not sell or encumber the property or permit any encumbrance without prior written DOE approval; current fair market value of the property; and an estimated useful life or depreciation schedule for equipment.

When the property is no longer needed for authorized project purposes, the recipient must request disposition instructions from DOE. For-profit entity disposition requirements are set forth in 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 – 200.316.

xviii. Implementation of Executive Order 13798, Promoting Free Speech and Religious Liberty

States, local governments, and other public entities may not condition subawards in a manner that would discriminate against or otherwise disadvantage subrecipients based on their religious character.

xix. Participants and Collaborating Organizations

If selected for award negotiations, the selected applicant must submit a list of personnel who are proposed to work on the project, both at the recipient and subrecipient level and a list of proposed collaborating organizations prior to award. Recipients will have an ongoing responsibility to notify DOE of changes to the personnel and collaborating organizations and submit updated information during the life of the award.

xx. Current and Pending Support

If selected for award negotiations, within 30 days of the selection notice, the selectee must submit: 1) current and pending support disclosures and resumes for any new PIs or Senior/Key Personnel, and 2) updated disclosures if there have been any changes to the current and pending support submitted with the application. Throughout the life of the award, the recipient has an ongoing responsibility to submit: 1) current and pending support disclosure statements and resumes for any new PI and Senior/Key Personnel, and 2) updated disclosures if there are changes to the current and pending support previously submitted to DOE. Also see Section IV.D.xvii.

xxi. U.S. Manufacturing Commitments

A primary objective of DOE's multi-billion-dollar research, development and demonstration investments is to cultivate new research and development ecosystems, manufacturing capabilities, and supply chains for and by United States industry and labor. Therefore, in exchange for receiving taxpayer dollars to support an applicant's project, the applicant/recipient and any subrecipient and contractor must agree to a U.S. Competitiveness provision requiring that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the applicant/recipient can show to the satisfaction of DOE that it is not commercially feasible. Award terms, including the specific U.S. Competitiveness Provision applicable to the various types of recipients and projects, are available at: https://www.energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

Please note that a subject invention is any invention conceived or first actually reduced to practice in performance of work under an award. An invention is any invention or discovery which is or may be patentable. The recipient includes any awardee, recipient, sub-awardee, or sub-recipient.

As noted in the U.S. Competitiveness Provision, if an entity cannot meet the requirements of the U.S. Competitiveness Provision, the entity may request a modification or waiver of the U.S. Competitiveness Provision. For example, the entity may propose modifying the language of the U.S. Competitiveness Provision in order to change the scope of the requirements or to provide more specifics on the application of the requirements for a particular technology. As another example, the entity may request that the U.S. Competitiveness Provision be waived in lieu of a net benefits statement or United States manufacturing

plan. The statement or plan would contain specific and enforceable commitments that would be beneficial to the United States economy and competitiveness. Examples of such commitments could include manufacturing specific products in the United States, making a specific investment in a new or existing United States manufacturing facility, keeping certain activities based in the United States or supporting a certain number of jobs in the United States related to the technology. DOE may, in its sole discretion, determine that the proposed modification or waiver promotes commercialization and provides substantial United States economic benefits, and grant the request. If granted, DOE will modify the award terms and conditions for the requesting entity accordingly.

More information and guidance on the waiver and modification request process can be found in the DOE Financial Assistance Letter on this topic, available at https://www.energy.gov/management/pf-2022-09-fal-2022-01-implementation-doe-determination-exceptional-circumstances-under. Additional information on DOE's Commitment to Domestic Manufacturing for DOE-funded R&D is available at https://www.energy.gov/gc/us-manufacturing.

The U.S. Competitiveness Provision is implemented by DOE pursuant to a Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act and DOE Patent Waivers. See Section VIII.J. Title to Subject Inventions of this FOA for more information on the DEC and DOE Patent Waivers.

xxii. Interim Conflict of Interest Policy for Financial Assistance

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy)[33] is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. The term "Investigator" means the PI and any other person, regardless of title or position, who is responsible for the purpose, design, conduct, or reporting of a project funded by DOE or proposed for funding by DOE. Recipients must flow down the requirements of the interim COI Policy to any subrecipient non-federal entities. Further, for DOE funded projects, the recipient must include all financial conflicts of interest (FCOI) (i.e., managed and unmanaged/ unmanageable) in its initial and ongoing FCOI reports.

[33] DOE's interim COI Policy can be found at PF 2022-17 FAL 2022-02 Department of Energy Interim Conflict of Interest Policy Requirements for Financial Assistance.

It is understood that non-federal entities and individuals receiving DOE financial assistance awards will need sufficient time to come into full compliance with DOE's interim COI Policy. To provide some flexibility, DOE allows for a staggered implementation. Specifically, prior to award, applicants selected for award negotiations must: ensure all Investigators complete their significant financial disclosures; review the disclosures; determine whether a FCOI exists; develop and implement a management plan for FCOIs; and provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/ unmanageable). Recipients will have 180 days from the date of the award to come into full compliance with the other requirements set forth in DOE's interim COI Policy. Prior to award, the applicant must certify that it is, or will be within 180 days of the award, compliant with all requirements in the COI Policy.

xxiii. Data Management Plan

Each applicant whose Full Application is selected for award negotiations will be required to submit a Data Management Plan (DMP) during the award negotiations phase. A DMP explains how, when appropriate, data generated in the course of the work performed under an EERE award will be shared and preserved to validate the results of the proposed 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.

The DMP is now a check box in the Pre-Award Information Sheet that is required by all selectees after they receive the Selection Notification Letter. A supplemental DMP can be submitted by teams if they feel the need to provide more explanation or detail a more complicated plan, but this is not required.

xxiv. Open-Source Software Distribution Plan (if applicable)

Applicants are encouraged but not required to make any software developed under an award open source to improve scalability and increase replication. An Open-Source Software Distribution Plan (OSSDP) is required for those applicants who choose to make any portion, or all, of their software open source. If an applicant desires to submit an OSSDP for consideration, the OSSDP must be submitted during award negotiations. This plan describes how software produced under this FOA will be distributed. Guidance for preparing an OSSDP is included in the FOA.

xxv. Fraud, Waste, and Abuse

The mission of the DOE Office of Inspector General (OIG) is to strengthen the integrity, economy, and efficiency of the Department's programs and operations including deterring and detecting fraud, waste, abuse, and mismanagement. The OIG accomplishes this mission primarily through investigations, audits, and inspections of DOE activities to include grants, cooperative agreements, loans, and contracts.

The OIG maintains a hotline for reporting allegations of fraud, waste, abuse, or mismanagement. To report such allegations, please visit https://www.energy.gov/ig/ig-hotline.

Additionally, recipients of DOE awards must be cognizant of the requirements of 2 CFR 200.113 Mandatory disclosures, which states:

> The non-Federal entity or applicant for a federal award must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award. Non-Federal entities that have received a federal award including the term and condition outlined in appendix XII of 2 CFR Part 200 are required to report certain civil, criminal, or administrative proceedings to SAM.gov. Failure to make required disclosures can result in any of the remedies described in 2 CFR 200.339. (See also 2 CFR part 180, 31 U.S.C. § 3321, and 41 U.S.C. § 2313.) [85 FR 49539, Aug. 13, 2020]

Applicants and subrecipients (if applicable) are encouraged to allocate sufficient costs in the project budget to cover the costs associated for personnel and data infrastructure needs to support performance management and program evaluation needs, including but not limited to independent program and project audits to mitigate risks for fraud, waste, and abuse.

xxvi. Human Subjects Research

Research involving human subjects, biospecimens, or identifiable private information conducted with DOE funding is subject to the requirements of DOE Order 443.1C, Protection of Human Research Subjects, 45 CFR Part 46, Protection of Human Subjects (subpart A which is referred to as the "Common Rule"), and 10 CFR Part 745, Protection of Human Subjects. Additional information on the DOE Human Subjects Research Program can be found at:

HUMAN SUBJECTS Human Subjects Pr... | U.S. DOE Office of Science (SC) (osti.gov).

VII. Questions/Agency Contacts

Upon the issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the FOA except through the established question and answer process described below. Questions regarding this FOA must be submitted to CCPilotsFOA@ee.doe.gov no later than three (3) business days prior to the application due date and time. Please note, feedback on individual concepts will not be provided through Q&A.

All questions and answers related to this FOA will be posted on EERE eXCHANGE at: https://eere-exchange.energy.gov. **You must first select the FOA Number to view the questions and answers specific to this FOA**. EERE will attempt to respond to a question within three (3) business days unless a similar question and answer has 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.

VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on EERE eXCHANGE and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. Government Right to Reject or Negotiate

EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. Commitment of Public Funds

The Contracting Officer is the only individual who can make awards or commit the government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.

D. Treatment of Application Information

Applicants should not include trade secrets or business-sensitive, proprietary, or otherwise confidential information in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA. Applicants are advised to not include any critically sensitive proprietary detail.

If an application includes trade secrets or business-sensitive, proprietary, or otherwise confidential information, it is furnished to the federal government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, EERE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for merit review of the application or as otherwise authorized by law. This restriction does not limit the federal government's right to use the information if it is obtained from another source.

If an applicant chooses to submit trade secrets or business-sensitive, proprietary, or otherwise confidential information, the applicant must provide **two copies** of the submission (e.g., Concept Paper, Full Application). The first copy should be marked "non-confidential," with the information believed to be confidential deleted. The second copy should be marked "confidential" and must clearly and conspicuously identify the trade secrets or business-sensitive, proprietary, or otherwise confidential information and must be 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 federal government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose as authorized by law.

The cover sheet of the Full Application, and other applicant submission must be marked as follows and identify the specific pages containing trade secrets or business-sensitive, proprietary, or otherwise confidential information:

> **Notice of Restriction on Disclosure and Use of Data:**
> Pages [list applicable pages] of this document may contain trade secrets or business-sensitive, proprietary, or otherwise confidential information

that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance agreement between the submitter and the government. The government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

In addition, (1) the header and footer of every page that contains trade secrets or business-sensitive, proprietary, or otherwise confidential information must be marked as follows: "Contains Trade Secrets or Business-Sensitive, Proprietary, or Otherwise Confidential Information Exempt from Public Disclosure," and (2) every line or paragraph containing such information must be clearly marked with double brackets or highlighting. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

E. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, the Go/No-Go Reviews, and Peer Reviews, the government may seek the advice of qualified non-federal personnel as reviewers. The government may also use non-federal personnel to conduct routine, nondiscretionary administrative activities, including EERE contractors. The applicant, by submitting its application, consents to the use of non-federal reviewers/administrators. Non-federal reviewers must sign conflict of interest (COI) and non-disclosure acknowledgements (NDA) prior to reviewing an application. Non-federal personnel conducting administrative activities must sign an NDA.

F. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned, or pending legislation.

G. Notice of Right to Conduct a Review of Financial Capability

EERE reserves the right to conduct an independent third-party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization).

H. Requirement for Full and Complete Disclosure

Applicants are required to make a full and complete disclosure of all information requested. Any failure to make a full and complete disclosure of the requested information may result in:

- The cancellation of award negotiations;
- The modification, suspension, and/or termination of a funding agreement;
- The initiation of debarment proceedings, debarment, and/or a declaration of ineligibility for receipt of federal contracts, subcontracts, and financial assistance and benefits; and
- Civil and/or criminal penalties.

I. Retention of Submissions

EERE expects to retain copies of all Full Applications and other submissions. No submissions will be returned. By applying to EERE for funding, applicants consent to EERE's retention of their submissions.

J. Title to Subject Inventions

Ownership of subject inventions is governed pursuant to the authorities listed below:

- Domestic Small Businesses, Educational Institutions, and Nonprofits: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), domestic small businesses, educational institutions, and nonprofits may elect to retain title to their subject inventions;
- All other parties: The federal Non-Nuclear Energy Act of 1974, 42. U.S.C. § 5908, provides that the government obtains title to new inventions unless a waiver is granted (see below);
- Class Patent Waiver: DOE has issued a class waiver that applies to this FOA. Under this class waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. To avail itself of the class waiver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States.
- Advance and Identified Waivers: Applicants not covered by a Class Patent Waiver or the Bayh-Dole Act may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual

subject inventions that are disclosed to EERE within the timeframes set forth in the award's intellectual property terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

- DEC: On June 07, 2021, DOE approved a Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act to further promote domestic manufacture of DOE science and energy technologies. In accordance with this DEC, all awards, including sub-awards, under this FOA shall include the U.S. Competitiveness Provision in accordance with Section VI.B.xxi. U.S. Manufacturing Commitments of this FOA. A copy of the DEC can be found at https://www.energy.gov/gc/determination-exceptional-circumstances-decs. Pursuant to 37 CFR § 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.
- DOE may issue and publish further DECs on the website above prior to the issuance of awards under this FOA. DOE may require additional submissions or requirements as authorized by any applicable DEC.

K. Government Rights in Subject Inventions

Where prime recipients, subrecipients, and contractors retain title to subject inventions, the U.S. government retains certain rights.

i. Government Use License

The U.S. government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to government contractors.

ii. March-In Rights

The U.S. government retains march-in rights with respect to all subject inventions. Through "march-in rights," the government may require a prime recipient or subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the government may grant licenses for use of the subject invention when a prime recipient, subrecipient, or their assignees and exclusive licensees refuse to do so.

DOE may exercise its march-in rights only if it determines that such action is necessary under any of the four following conditions:

- The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time;
- The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner;
- The owner has not met public use requirements specified by federal statutes in a reasonably satisfied manner; or
- The United States manufacturing requirement has not been met.

Any determination that march-in rights are warranted must follow a fact-finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject inventions.

L. Rights in Technical Data

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

"Limited Rights Data": The U.S. government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Government Rights in Technical Data Produced Under Awards: The U.S. government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards under this FOA may be protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards permitting Protected Data, the protected data must be marked as set forth in the award's intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

M. Copyright

The prime recipient and subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without EERE approval. When copyright is asserted, the government retains a paid-up nonexclusive, irrevocable worldwide license

to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the government.

N. Export Control

The United States government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the United States to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of federal agencies and regulations that govern exports that are collectively referred to as "Export Controls." All recipients and subrecipients are responsible for ensuring compliance with all applicable United States Export Control laws and regulations relating to any work performed under a resulting award.

The recipient must immediately report to DOE any export control investigations, indictments, charges, convictions, and violations, at the recipient or subrecipient level, and provide the corrective action(s) to prevent future violations.

O. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

As set forth in 2 CFR 200.216, recipients and subrecipients are prohibited from obligating or expending project funds (federal funds and recipient cost share) to procure or obtain; extend or renew a contract to procure or obtain; exercise an option to procure, or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use *covered telecommunications equipment or services* as a substantial or essential component of any system, or as critical technology as part of any system. As described in Section 889 of Public Law 115-232, *covered telecommunications equipment* is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

See Public Law 115-232, Section 889, 2 CFR 200.216, and 2 CFR 200.471 for additional information.

P. Personally Identifiable Information (PII)

All information provided by the applicant must to the greatest extent possible exclude PII. The term "PII" refers to information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, alone, or when combined with other personal or identifying information which is linked

or linkable to a specific individual, such as date and place of birth, mother's maiden name. (See OMB Memorandum M-17-12 dated January 3, 2017)

By way of example, applicants must screen resumes to ensure that they do not contain PII such as personal addresses, personal landline/cell phone numbers, and personal emails. **Under no circumstances should Social Security Numbers (SSNs) be included in the application**. Federal agencies are prohibited from the collecting, using, and displaying unnecessary SSNs. (See, the Federal Information Security Modernization Act of 2014 (Pub. L. No. 113-283, Dec 18, 2014; 44 U.S.C. § 3551).

Q. Annual Independent Audits

If a for-profit entity is a prime recipient and has expended $750,000 or more of DOE awards during the entity's fiscal year, an annual compliance audit performed by an independent auditor is required. For additional information, please refer to 2 CFR 910.501 and Subpart F.

If an educational institution, non-profit organization, or state/local government is a prime recipient or subrecipient and has expended $750,000 or more of federal awards during the non-federal entity's fiscal year, a Single or Program-Specific Audit is required. For additional information, please refer to 2 CFR 200.501 and Subpart F.

Applicants and subrecipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

R. Informational Webinar

EERE will conduct one informational webinar during the FOA process. It will be held after the initial FOA release but before the due date for Concept Papers.

Attendance is not mandatory and will not positively or negatively impact the overall review of any applicant submissions. The webinar will be open to all applicants who wish to participate. Applicants should refrain from asking questions or communicating information that would reveal confidential and/or proprietary information specific to their project. The webinar date is listed on the cover page of the FOA.

Registration Link: https://events.gcc.teams.microsoft.com/event/ec88a42e-242e-4c72-8bf8-62f1fad891dd@6b183ecc-4b55-4ed5-b3f8-7f64be1c4138

APPENDIX A – COST SHARE INFORMATION

Cost Sharing or Cost Matching

The terms "cost sharing" and "cost matching" are often used synonymously. Even the DOE Financial Assistance Regulations, 2 CFR 200.306, use both terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses "cost sharing," as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here "cost matching" for the non-federal share is calculated as a percentage of the federal funds only, rather than the Total Project Cost.

How Cost Sharing Is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. FFRDC costs must be included in Total Project Costs. The following is an example of how to calculate cost sharing amounts for a project with $1,000,000 in federal funds with a minimum 20% non-federal cost sharing requirement:

- Formula: Federal share ($) divided by federal share (%) = Total Project Cost
  Example: $1,000,000 divided by 80% = $1,250,000

- Formula: Total Project Cost ($) minus federal share ($) = Non-federal share ($)
  Example: $1,250,000 minus $1,000,000 = $250,000

- Formula: Non-federal share ($) divided by Total Project Cost ($) = Non-federal share (%)
  Example: $250,000 divided by $1,250,000 = 20%

What Qualifies for Cost Sharing

While it is not possible to explain what specifically qualifies for cost sharing in one or two sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the federal government under another award unless authorized by federal statute to be used for cost sharing.

The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entities. The specific rules applicable to:

- FAR Part 31 for For-Profit entities, (48 CFR Part 31); and
- 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

In addition to the above regulations, other factors may also come into play such as timing of donations and length of the project period. For example, the value of 10 years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

General Cost Sharing Rules on a DOE Award

1. **Cash Cost Share** encompasses all contributions to the project made by the recipient or subrecipient(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, or equipment for their company with organizational resources. If the cost of the item or service is reimbursed, it is cash cost share. All cost share items must be necessary to the performance of the project.

2. **In-Kind Cost Share** encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In-Kind cost share items include volunteer personnel hours, donated existing equipment, and donated existing supplies. The cash value and calculations thereof for all In-Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification. All cost share items must be necessary to the performance of the project. Consult your DOE contact if you have questions before filling out the In-Kind cost share section of the Budget Justification.

3. **Funds from other federal sources** may **not** be counted as cost share. This prohibition includes FFRDC subrecipients. Non-federal sources include any source not originally derived from federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.

4. **Fee or profit**, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs

that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

DOE Financial Assistance Rules 2 CFR Part 200 as amended by 2 CFR Part 910

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

(A) Acceptable contributions. All contributions, including cash contributions and third-party in-kind contributions, must be accepted as part of the prime recipient's cost sharing if such contributions meet all of the following criteria:

(1) They are verifiable from the recipient's records.

(2) They are not included as contributions for any other federally assisted project or program.

(3) They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.

(4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:

a. For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the FAR, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations; and

b. Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.

(5) They are not paid by the federal government under another award unless authorized by federal statute to be used for cost sharing or matching.

(6) They are provided for in the approved budget.

(B) Valuing and documenting contributions

(1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:

a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or

b. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.

(2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.

(3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.

(4) Valuing property donated by third parties.

a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.

b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the

performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:

i. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.

ii. The value of loaned equipment must not exceed its fair rental value.

(5) Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties:

a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.

b. The basis for determining the valuation for personal services and property must be documented.

APPENDIX B – SAMPLE COST SHARE CALCULATION FOR BLENDED COST SHARE PERCENTAGE

The following example shows the math for calculating required cost share for a project with $2 million in federal funds with four tasks requiring different non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	$1,000,000	80%	20%
Task 2 (R&D)	$500,000	80%	20%
Task 3 (Demonstration)	$400,000	50%	50%
Task 4 (Outreach)	$100,000	100%	0%

Federal share ($) divided by federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1
$1,000,000 divided by 80% = $1,250,000 (Task 1 Cost)
Task 1 Cost minus federal share = non-federal share
$1,250,000 - $1,000,000 = $250,000 (non-federal share)

Task 2
$500,000 divided 80% = $625,000 (Task 2 Cost)
Task 2 Cost minus federal share = non-federal share
$625,000 - $500,000 = $125,000 (non-federal share)

Task 3
$400,000 / 50% = $800,000 (Task 3 Cost)
Task 3 Cost minus federal share = non-federal share
$800,000 - $400,000 = $400,000 (non-federal share)

Task 4
Federal share = $100,000
Non-federal cost share is not mandated for outreach = $0 (non-federal share)

The calculation may then be completed as follows:

Tasks	$ Federal Share	% Federal Share	$ Non-Federal Share	% Non-Federal Share	Total Project Cost
Task 1	$1,000,000	80%	$250,000	20%	$1,250,000
Task 2	$500,000	80%	$125,000	20%	$625,000
Task 3	$400,000	50%	$400,000	50%	$800,000
Task 4	$100,000	100%	$0	0%	$100,000
Totals	$2,000,000		$775,000		$2,775,000

Blended Cost Share %
Non-federal share ($775,000) divided by Total Project Cost ($2,775,000) = 27.9% (non-federal)
Federal share ($2,000,000) divided by Total Project Cost ($2,775,000) = 72.1% (federal)

APPENDIX C – WAIVER REQUESTS FOR: 1. FOREIGN ENTITY PARTICIPATION; AND 2. FOREIGN WORK

i. Waiver for Foreign Entity Participation

Many of the technology areas DOE funds fall in the category of critical and emerging technologies (CETs). CETs are a subset of advanced technologies that are potentially significant to United States national and economic security.[34] For projects selected under this FOA, all recipients and subrecipients must be organized, chartered, or incorporated (or otherwise formed) under the laws of a state or territory of the United States; have majority domestic ownership and control; and have a physical location for business operations in the United States. To request a waiver of this requirement, an applicant must submit an explicit waiver request in the Full Application.

Waiver Criteria

Foreign entities seeking to participate in a project funded under this FOA must demonstrate to the satisfaction of DOE that:

a. Its participation is in the best interest of the United States industry and United States economic development;
b. The project team has appropriate measures in place to control sensitive information and protect against unauthorized transfer of scientific and technical information;
c. Adequate protocols exist between the United States subsidiary and its foreign parent organization to comply with export control laws and any obligations to protect proprietary information from the foreign parent organization;
d. The work is conducted within the United States and the entity acknowledges and demonstrates that it has the intent and ability to comply with the United States Competitiveness Provision (see Section VI.B.xxi.); and
e. The foreign entity will satisfy other conditions that may be deemed necessary by DOE to protect United States government interests.

Content for Waiver Request

A Foreign Entity waiver request must include the following:

a. Information about the entity: name, point of contact, physical address, and proposed type of involvement in the project;

[34] See Critical and Emerging Technologies List Update (whitehouse.gov).

b. Country of incorporation, the extent of the ownership/level control by foreign entities, whether the entity is state owned or controlled, a summary of the ownership breakdown of the foreign entity, and the percentage of ownership/control by foreign entities, foreign shareholders, foreign state or foreign individuals;
c. The rationale for proposing a foreign entity participate (must address criteria above);
d. A description of the project's anticipated contributions to the United States economy;
    - How the project will benefit the United States, including manufacturing, contributions to employment in the United States and growth in new markets and jobs in the United States;
    - How the project will promote manufacturing of products and/or services in the United States;
e. A description of how the foreign entity's participation is essential to the project;
f. A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and
g. Countries where the work will be performed. (Note: if any work is proposed to be conducted outside the United States, the applicant must also complete a separate request foreign work waiver.)

DOE may also require:

- A risk assessment with respect to IP and data protection protocols that includes the export control risk based on the data protection protocols, the technology being developed, and the foreign entity and country. These submissions could be prepared by the project lead (if not the prime recipient), but the prime recipient must make a representation to DOE as to whether it believes the data protection protocols are adequate and make a representation of the risk assessment – high, medium, or low risk of data leakage to a foreign entity.
- Additional language be added to any agreement or subagreement to protect IP, mitigate risk, or other related purposes.

DOE may require additional information before considering the waiver request.

DOE's decision concerning a waiver request is not appealable.

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

As set forth in Section IV.I.iii., all work funded under this FOA must be performed in 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 DOE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request for a foreign work waiver must include the following:

1. The rationale for performing the work outside the United States ("foreign work");
2. A description of the work proposed to be performed outside the United States;
3. An explanation as to how the foreign work is essential to the project;
4. A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the U.S. economy;
5. The associated benefits to be realized and the contribution to the project from the foreign work;
6. How the foreign work will benefit the United States, including manufacturing, contributions to employment in the United States and growth in new markets and jobs in the United States;
7. How the foreign work will promote manufacturing of products and/or services in the United States;
8. A description of the likelihood of IP being created from the foreign work and the treatment of any such IP;
9. The total estimated cost (DOE and recipient cost share) of the proposed foreign work;
10. The countries in which the foreign work is proposed to be performed; and
11. The name of the entity that would perform the foreign work. Information about the entity(ies) involved in the work proposed to be conducted outside the United States. (i.e., entity seeking a waiver and the entity(ies) that will conduct the work).

DOE may require additional information before considering the waiver request.

DOE's decision concerning a waiver request is not appealable.

APPENDIX D – BUY AMERICA REQUIREMENTS FOR INFRASTRUCTURE PROJECTS
Required Use of American Iron, Steel, Manufactured Products, and Construction Materials

A. Definitions
For purposes of the Buy America Requirement, the following definitions apply:

Components See 2 CFR 184.3 Definitions

Construction Materials See 2 CFR 184.3 Definitions

"Buy America Preference," "Buy America Requirement," or "domestic content procurement preference" means the requirements set forth in section 70914 of the Build America, Buy America Act, which requires the head of each Federal agency to ensure that none of the funds subject to the requirements are made available for a Federal award for an infrastructure project may be obligated unless all of the iron, steel, manufactured products, and construction materials incorporated into the project are produced in the United States.

Infrastructure See 2 CFR 184.4(c) and (d).

Manufactured Products See 2 CFR 184.3 Definitions

Predominantly of iron or steel See 2 CFR 184.3 Definitions.

Infrastructure project See 2 CFR 184.3 Definitions

B. Buy America Requirements for Infrastructure Projects (Buy America Requirement)
None of the award funds (includes federal share and recipient cost share) may be used for a project for infrastructure unless:

(1) all iron and steel used in the project is produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all

components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation. See 2 CFR 184.5 for determining the cost of components for manufactured products; and

(3) all construction materials[35] are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. See 2 CFR 184.6 for construction material standards.

The Buy America Requirement only applies to those articles, materials, and supplies that are consumed in, incorporated into, or affixed to the infrastructure in the project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does the Buy America Requirement apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

The Buy America Requirement only applies to an article, material, or supply classified into one of the following categories* based on its status at the time it is brought to the work site for incorporation into an infrastructure project:

(i) Iron or steel products;
(ii) Manufactured products; or
(iii) Construction materials;

The Buy America Requirement only applies to the iron or steel products, manufactured products, and construction materials used for the construction, alteration, maintenance, or repair of public infrastructure in the United States when those items are consumed in, incorporated into, or permanently affixed to the infrastructure. An article, material, or supply incorporated into an infrastructure project should not be considered to fall into multiple categories, but rather must meet the Buy America Preference Requirement for only the single category in which it is classified.

The Buy America Requirement applies to public infrastructure projects in the United States. For purposes of this guidance, applicants should consider whether the infrastructure project will serve a public function. Infrastructure projects should generally be considered "public" if the infrastructure is: publicly owned, privately owned but operated on behalf of the public, or is a place of public accommodation. Review the implementation guidance in OMB Memorandum

[35] Excludes cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

OMB Memorandum M-24-02 and consult with DOE if you are unsure if your project is subject to Buy America requirements.

All iron and steel, manufactured products, and construction materials used in the infrastructure project must be produced in the United States.

** Section 70917(c) Materials* are cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives as provided in section 70917(c) of BABA. Section 70917 (c) materials are excluded from Construction materials. Asphalt concrete pavement mixes are typically composed of asphalt cement (a binding agent) and aggregates such as stone, sand, and gravel. Accordingly, asphalt is also excluded from the definition of Construction materials.

Section 70917(c) materials, on their own, are not manufactured products. Further, Section 70917(c) materials should not be considered manufactured products when they are used at or combined proximate to the work site—such as is the case with wet concrete or hot mix asphalt brought to the work site for incorporation. However, certain Section 70917(c) materials (such as stone, sand, and gravel) may be used to produce a manufactured product, such as is precast concrete. Precast concrete is made of components, is processed into a specific shape or form, and is in such state when brought to the work site. Furthermore, wet concrete should not be considered a manufactured product if not dried or set prior to reaching the work site.

Further clarification is provided in 2 CFR Part 184 on the circumstances under which a determination is made that Section 70917(c) materials should be treated as components of a manufactured product. That determination is based on consideration of: (i) the revised definition of the "manufactured products" at 2 CFR 184.3; (ii) a new definition of "section 70917(c) materials" at 2 CFR 184.3; (iii) new instructions at 2 CFR 184.4(e) on how and when to categorize articles, materials, and supplies; and (iv) new instructions at 2 CFR 184.4(f) on how to apply the Buy America preference by category.

The recipient is responsible for flowing the Buy America Requirement down to all sub-awards, contracts, subcontracts, and purchase orders for work performed under the proposed infrastructure project, including to For-Profit Entities when the for-profit entity is a subrecipient or subawardee.

Recipients must certify or provide equivalent documentation for proof of compliance that a good faith effort was made to solicit bids for domestic products used in the infrastructure project under this award.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by an approved waiver

or an exemption provided in 2 CFR 184.8, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all subawardees, contractors and vendors to the recipient. Recipients must keep these certifications with the award/project files and be able to produce them upon request from DOE, auditors or Office of Inspector General.

C. DOE Submission Requirements for Full Application

Within the first two pages of the workplan or project description, applicants must provide a short statement on whether the project will involve the construction, alteration, maintenance and/or repair of infrastructure in the United States. The ultimate determination about whether a project includes infrastructure remains with DOE, but the applicant's statement will assist project planning and integration of the Buy America Requirement, which may impact the project's proposed budget and/or schedule.

D. Waivers

In limited circumstances, DOE may waive the application of the Buy America Requirement in an award where DOE determines that:

(1) Applying the Buy America requirements would be inconsistent with the public interest (Public Interest);

(2) The types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (Non-Availability); or

(3) The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25% (Unreasonable Cost).

DOE will only process waiver requests after an award has been made but prior to any purchase of items the recipient is seeking to waive, and for which the requests have been submitted in accordance with the term and conditions of the award. Waiver requests must be reviewed by DOE and the Office of Management and Budget's Made in America Office and are subject to a public comment period of no less than 15 calendar days.

DOE or OMB may request additional information for consideration of the wavier. DOE may reject or grant waivers in whole or in part depending on its review, analysis, and/or feedback from OMB or the public. DOEs final determination regarding approval or rejection of the waiver request may not be appealed by a recipient.

Requests to waive the Buy America Requirement must include the following:

- Waiver type (Public Interest, Non-Availability, or Unreasonable Cost);
- Recipient name and Unique Entity Identifier (UEI);
- Award information (Federal Award Identification Number, Assistance Listing number);
- A brief description of the project, its location, and the specific infrastructure involved;
- Total estimated project cost, with estimated federal share and recipient cost share breakdowns;
- Total estimated infrastructure costs, with estimated federal share and recipient cost share breakdowns;
- List and description of iron or steel item(s), manufactured goods, and/or construction material(s) the recipient seeks to waive from the Buy America Requirement, including name, cost, quantity(ies), country(ies) of origin, and relevant Product Service Codes (PSC) and North American Industry Classification System (NAICS) codes for each;
- A detailed justification as to how the non-domestic item(s) is/are essential the project;
- A certification that the recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and non-proprietary communications with potential suppliers;
- A justification statement—based on one of the applicable justifications outlined above—as to why the listed items cannot be procured domestically, including the due diligence performed (e.g., market research, industry outreach, cost analysis, cost-benefit analysis) by the recipient to attempt to avoid the need for a waiver. This justification may cite, if applicable, the absence of any Buy America-compliant bids received for domestic products in response to a solicitation;
- A description of the market research conducted that includes who conducted the market research, when it was conducted, sources that were used, and the methods used to conduct the research; and Anticipated impact to the project if no waiver is issued.

APPENDIX E – OPEN-SOURCE SOFTWARE

Open-Source Software Distribution Plan.

Applicants that are applying to one or more Topic Areas for which open-source software distribution is required must submit a plan describing how software produced under this FOA will be distributed. For a DOE National Laboratory or a FFRDC, the data rights clause, including rights and requirements pertaining to computer software, in its M&O Contract shall apply and shall take precedence over any requirement set forth in this Appendix. The plan must include the following elements:

1. A complete description of any existing software that will be modified or incorporated into software produced under this FOA, including a description of the license rights. The license rights must allow the modified or incorporated software to be distributed as open-source.

2. A discussion of the open-source license that the applicant plans to use for the software it plans to produce under the FOA, and how that choice furthers the goals of this FOA. The discussion must also address how the license conforms to the conditions listed below.

3. A method for depositing the software in a source code repository.

4. A method for sharing and disseminating the software and other information to team members or others when multiple parties will contribute to the development of the software or the FOA requires that the software or other information be shared or disseminated to others.

Open-Source Definition: Open-source licenses must conform to all of the following conditions:

Free Redistribution
The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale. The rights attached to the software must apply to all to whom the software is redistributed without the need for execution of an additional license by those parties.

Source Code
The program must include source code and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable

reproduction cost preferably, i.e., downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code and intermediate forms such as the output of a preprocessor or translator are not allowed.

Derived Works
The license must allow modifications and derived works and permit the option of distributing the modifications and derived works under the same terms as the license of the original software.

Integrity of the Author's Source Code
The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

No Restriction Against Fields of Endeavor
The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

License Must Not Be Specific to a Product or Technology
The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution. No provision of the license may be predicated on any individual technology or style of interface.

License Must Not Restrict Other Software
The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

Examples of Acceptable Licenses
Apache License, 2.0
http://www.apache.org/licenses

The 2.0 version of the Apache License was approved by the Apache Software Foundation (ASF) in 2004. The goals of this license revision were to reduce the number of frequently asked questions, to allow the license to be reusable without modification by any project (including

non-ASF projects), to allow the license to be included by reference instead of listed in every file, to clarify the license on submission of contributions, to require a patent license on contributions that necessarily infringe the contributor's own patents, and to move comments regarding Apache and other inherited attribution notices to a location outside the license terms

The result is a license that is compatible with other open-source licenses, while remaining true to and supportive of collaborative development across both nonprofit and commercial organizations.

All packages produced by the ASF are implicitly licensed under the Apache License, Version 2.0, unless otherwise explicitly stated.

GNU General or Public License (GPLv3)
http://www.gnu.org/licenses/gpl.html

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The LGPL places copyleft restrictions on the program governed under it but does not apply these restrictions to other software that merely link with the program. There are, however, certain other restrictions on this software.

The LGPL is primarily used for software libraries, although it is also used by some stand-alone applications, most notably Mozilla and OpenOffice.org.

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Software packages that use one of the versions of the MIT License include Expat, PuTTY, the Mono development platform class libraries, Ruby on Rails, Lua (from version 5.0 onwards), and the X Window System, for which the license was written.

Mozilla Public License 2.0 (MPL-2.0)
http://www.mozilla.org/MPL/2.0/

The Mozilla Public License (MPL) is a free and open-source software license. Version 1.0 was developed by Mitchell Baker when she worked as a lawyer at Netscape Communications Corporation and version 1.1 at the Mozilla Foundation. Version 2.0 was developed in the open, overseen by Baker and led by Louis Villa. The MPL is characterized as a hybridization of the modified BSD license and GNU General Public License.

The MPL is the license for the Mozilla Application Suite, Mozilla Firefox, Mozilla Thunderbird, and other Mozilla software. The MPL has been adapted by others as a license for their software, most notably Sun Microsystems, as the Common Development and Distribution License for OpenSolaris, the open-source version of the Solaris 10 operating system, and by Adobe, as the license for its Flex product line.

APPENDIX F – DEFINITION OF TECHNOLOGY READINESS LEVELS

TRL 1:	Basic principles observed and reported
TRL 2:	Technology concept and/or application formulated
TRL 3:	Analytical and experimental critical function and/or characteristic proof of concept
TRL 4:	Component and/or breadboard validation in a laboratory environment
TRL 5:	Component and/or breadboard validation in a relevant environment
TRL 6:	System/subsystem model or prototype demonstration in a relevant environment
TRL 7:	System prototype demonstration in an operational environment
TRL 8:	Actual system completed and qualified through test and demonstrated
TRL 9:	Actual system proven through successful mission operations

APPENDIX G – LIST OF ACRONYMS

ADMS	Advanced Distribution Management System
AMI	Advanced Metering Infrastructure
ANC	Alaska Native Corporation
ASF	Apache Software Foundation
BABA	Build America Buy America
BIL	Bipartisan Infrastructure Law
BTO	Building Technologies Office
BTUs	British Thermal Units
CC	Connected Communities
CETs	Critical and Emerging Technologies
CDFIs	Community Development Financial Institutions
CFR	Code of Federal Regulations
COI	Conflict of Interest
Co-PI	Co-Principal Investigator
CRADA	Cooperative Research and Development Agreement
CSP	Cybersecurity Plan
DC	Direct Current
DEC	Determination of Exceptional Circumstances
DEI	Diversity, Equity, and Inclusion
DERs	Distributed Energy Resources
DMP	Data Management Plan
DOE	Department of Energy
DOI	Digital Object Identifier
DOL	Department of Labor
DR	Demand Response
EBiz POC	Electronic Business Point of Contact
EE	Energy Efficiency
EERE	Office of Energy Efficiency and Renewable Energy
ESMP	Electric Sector Modernization Plan
EVs	Electric Vehicles
EVSE	Electric Vehicle Supply Equipment
FAR	Federal Acquisition Regulation
FCOI	Financial Conflicts of Interest
FFATA	Federal Funding and Transparency Act of 2006
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FFRDC	Federally Funded Research and Development Center
FSF	Free Software Foundation
GAAP	Generally Accepted Accounting Principles
GEB	Grid-Interactive Efficient Building
GHG	Greenhouse Gas

GMLC	Grid Modernization Laboratory Consortium
GPL	GNU General Public License
GTO	Geothermal Technologies Office
GW	Gigawatt
HBCUs	Historically Black Colleges and Universities
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
HBCUs	Historically Black Colleges and Universities
IEDO	Industrial Efficiency and Decarbonization Office
IP	Intellectual Property
IPMP	Intellectual Property Management Plan
IRB	Institutional Review Board
IRS	Internal Revenue Service
kW	Kilowatt
kWh	Kilowatt-hour
LBNL	Lawrence Berkely National Lab
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, and Queer
LGPL	GNU Lesser General Public License
M&O	Management and Operating
MFA	Multi-Factor Authentication
MIT	Massachusetts Institute of Technology
MPIN	Marketing Partner ID Number
MPL	Mozilla Public License
MPUC	Minnesota Public Utilities Commission
MSI	Minority-Serving institution
MW	Megawatt
MYPP	Multi-Year Program Plan
NAICS	North American Industry Classification System
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNSA	National Nuclear Security Agency
NREL	National Renewable Energy Laboratory
NSF	National Science Foundation
NSPM	National Security Presidential Memorandum
NWAs	Non-Wire Alternatives
OE	Office of Electricity
OCR	Office of Civil Rights
OCPP	Open Charge Point Protocol
OEMs	Original Equipment Manufacturers
OFCCP	Office of Federal Contractor Compliance Programs
OIG	Office of Inspector General
OMB	Office of Management and Budget
OMIs	Other Minority Institutions

O&M	Operations and Maintenance
ORNL	Oak Ridge National Laboratory
OSSDP	Open-Source Software Distribution Plan
OSTI	Office of Scientific and Technical Information
OT	Other Transaction
OTA	Other Transactions Authority
PI	Principal Investigator
PII	Personal Identifiable Information
PNNL	Pacific Northwest National Laboratory
POC	Point of Contact
PUCs	Public Utility Commissions
PSC	Product Service Codes
PV	Photovoltaics
R&D	Research and Development
RD&D	Research, Development, and Demonstration
RDD&D	Research, Development, Demonstration, and Deployment
RFI	Request for Information
RFP	Request for Proposal
SAM	System for Award Management
SCM	Smart Charge Management
SciENcv	Science Experts Network Curriculum Vita
SETO	Solar Energy Technologies Office
SMART	Specific, Measurable, Attainable, Realistic, and Timely
SOPO	Statement of Project Objectives
SPOC	Single Point of Contact
SSNs	Social Security Numbers
STEM	Science, Technology, Engineering, and Mathematics
TA	Technical Assistance
TAA	Technical Assistance Agreement
T&D	Transmission and Distribution
TENs	Thermal Energy Networks
TIA	Technology Investment Agreement
TRL	Technology Readiness Level
U.S.C.	United States Code
UCC	Uniform Commercial Code
UEI	Unique Entity Identifier
V	Volt
VPPs	Virtual Power Plants
VTO	Vehicle Technologies Office
V2B	Vehicle-to-Building
V2G	Vehicle-to-Grid
WBS	Work Breakdown Structure
WP	Work Proposal
ZERH	Zero Energy Ready Home

APPENDIX H – PROJECT EVALUATION METHODS AND DATA STANDARDS

As a first budget period deliverable, an Evaluation Plan must be produced. The Evaluation Plan should address the six common evaluation criteria developed in collaboration with the Connected Communities National Coordinator and outlined in this appendix. The criteria and data standards outlined herein were developed over the course of work with the first Connected Communities cohort and are subject to change pending the scope of the second Connected Communities 2.0 cohort.

The scope of the Evaluation Plan is beyond that of traditional M&V plans. Awardees will be asked to collaborate with the Connected Communities National Coordinator and follow standardized data collection and reporting (as appropriate). This requirement is in place to facilitate consistent and comparable lessons learned across the cohort, and also allow the National Coordinator to perform cross-cohort analysis towards the end of the projects. As such, data sharing agreements should be considered and planned for.

The **six common evaluation criteria** and proposed subcategories are:

1) **Stakeholder Benefits and Experience**
   a) Occupant experience - Describe survey use, how implemented and by whom, intended frequency, question topics if any added to core module, approximate dates of baseline and post surveys.
      i) Human Subjects
         (1) Description of what general scope the IRB approved human subjects protocol will cover (e.g., surveys, recruiting and consent to collect data, which evaluation methods involve human subjects data and what data is involved, removal of personal identifiable information, etc.).
         (2) Incentives for participation
   b) Other stakeholder surveys/interviews - Describe implementation plan, including timing and anticipated sample size/characteristics (key stakeholder groups and roles of persons from whom you intend to gather data); question topics if any added to core module.
2) **Grid Services and Energy Impacts of Relevant Grid Edge Technical Measures**
   a) Overview of services and markets - Describe the markets or programs the Connected Community will participate in and the services provided. Specify the interconnection, metering, and communications requirements with references to program manuals, tariffs, and/or business practice manuals.
   b) Physical and financial magnitude of grid services
   c) Consistency of grid service provision
   d) Individual DER contribution to grid service magnitude

e) Energy impacts - describe what technologies/approaches used to achieve energy efficiency goal. Include baselining approach. Describe metering approach to capture savings estimates.

3) Benefit-Cost Analysis
   a) Approach [For each stakeholder type, describe the specific participants, what costs and benefits will be tracked, and how, and at what scale]

4) Business Model
   a) Project offerings and value streams
   b) Customer satisfaction
   c) Business model strengths and weaknesses

5) Greenhouse Gas Benefit
   a) Approach

6) Resilience Benefit
   a) Scale [building/community, etc.]
   b) Nature of resilience
   c) Approach

The Evaluation Plan is expected to encompass 5 primary analysis methods:

1. *Meter-based (existing buildings) and/or versus-code (new construction) analysis* of, e.g., energy savings, demand impacts, and customer bill impacts at the building and community aggregate level.
2. *Survey-based assessment* of, e.g., occupant/customer experience, performers' regulatory and policy barriers and enablers. Standardized surveys, developed in collaboration with the National Coordinator, will be implemented by all awardees. The standardized questions must be included, however, teams may include additional questions relevant to their project. Teams will be presented with the survey questions and may choose the most appropriate delivery method.
3. *Measurement-based assessment* of, e.g., indoor environmental conditions (temperature, humidity, illuminance) relevant to the load flexibility strategies implemented.
4. *Descriptive characterizations* of e.g., connected community business/delivery models, resilience benefits, and cybersecurity implications based on a common template.
5. *Techno-economic assessments* of, e.g., cost effectiveness and complementary calculations as available to awardees.

It is expected that some evaluation efforts may involve a hybrid of methods, while other cases may require methods that are not enumerated in the above. Similarly, there may be methods and data needs (see below), that are specific to, or not relevant to a particular project. Nonetheless, this information is provided to support applicants in determining the resources required for project evaluation and documentation activities.

Data Collection Needs:

The anticipated data collection needs include one-time information as well as data that will be continuously acquired throughout the project performance period. To understand how data types correspond to the evaluation methods, reference Table H-2. We anticipate each project will produce the following types of data:

a) Quantity (e.g. kW, kWh) and quality (e.g. duration, response time, power quality/tolerance, persistence) of actual energy load and/or generation during periods of interest;
b) Voltage and reactive power measurements and others, as required to support proposed grid services value streams;
c) Building occupant benefits (e.g. cost savings, asset value increases, comfort and convenience improvements);
d) Financial costs (e.g. capital costs, energy costs, disruption, etc.) and benefits (e.g., avoided costs) for both building owners or occupants and the grid; and
e) Case studies that will include data trends, research questions and findings, and promising operational practices.

The continuous data needs are expected to encompass:

- Sub-hourly power quality data (voltage, reactive power, etc.) at the point in the power system where grid services are provided;
- Sub/hourly weather, building electric load (including main meter power quality), DER loads/production/charge;
- Sub/hourly demand for loads utilizing DER+GEB control strategies;
- Dates and times of any grid service events (vs. every-day or price-response control policies) and associated control actions;
- Building-level measurements of indoor temperature, humidity, light (if part of demand flexibility strategies implemented);
- Customer opt-outs of grid service requests and/or overrides of DER+GEB control strategies (as applicable to project design); and
- Ongoing costs, including O&M and post-commissioning.

One-time data needs may encompass, for example:

- 12-24 month historic utility billing data, and tariff, at highest resolution possible, and associated weather data;
- 12-24 month load and power quality data (voltage, reactive power, etc.) at the point in the power system where grid services are being provided(e.g., distribution feeder, coordination area, system);
- Customer/occupant satisfaction and experience surveys;
- Awardee surveys and documentation of regulatory barriers and enabling policies, resilience-enabling community characteristics, cyber security benefits/vulnerabilities, and project lessons learned;
- Characteristics of equipment, building, and community: floor area, sector/sub-sector, services provided, DER capacity, installed equipment and controls costs, etc.;

- Presumed utility tariff for the project, the utility's avoided cost of energy and emissions of the grid supply;
- Description of control strategies for all assets in their EE only mode and in their EE+DER+GEB mode;
- Description of strategies for coordinating control of multiple buildings and shared DERs at a community or sub-community scale, particularly with different owners and operators.
- Documentation of the business model used in the project, projected full scale costs of delivery, revenue, profit including;
    - Information on incentives provided, type and level/magnitude
    - Participation statistics - e.g., enrollment rates, opt outs, recruitment costs/labor effort
    - Labor hours, rates, and calendar time to install and commission all EE, DER, and controls
- Data on historic and post-project outages.

APPENDIX I – CYBER SECURITY PLAN

A Cybersecurity Plan explains how the award recipient will demonstrate their awareness of cybersecurity in the context of the project and establish a plan for ensuring and maintaining cybersecurity throughout the life of the proposed solution. It should demonstrate the Recipient's understanding of cybersecurity issues within the proposed solution, as well as what issues exist at the external interfaces at the solution boundaries. This plan is subject to DOE review and acceptance, and the recipient is expected to comply with this plan throughout the life of the project.

A Cybersecurity Plan (CSP) must address not only deliberate attacks launched by disgruntled employees, agents of industrial espionage, terrorists, and other adversaries, but also inadvertent compromises of the information infrastructure due to user errors, equipment failures, and natural disasters. Security must be included in all phases of the system development life cycle, from design phase through implementation, maintenance, and disposition. Systems for critical applications need to withstand cybersecurity events with no loss of critical function.

The CSP will be developed with the support of technical assistance provided by the National Coordinator CSP Review team at PNNL. The plan development will follow a phased approach to account for evolution of the plan through each phase of the project, described in Figure 1. Phases and requirements for each phase are subject to change pending the scope of the selected projects.

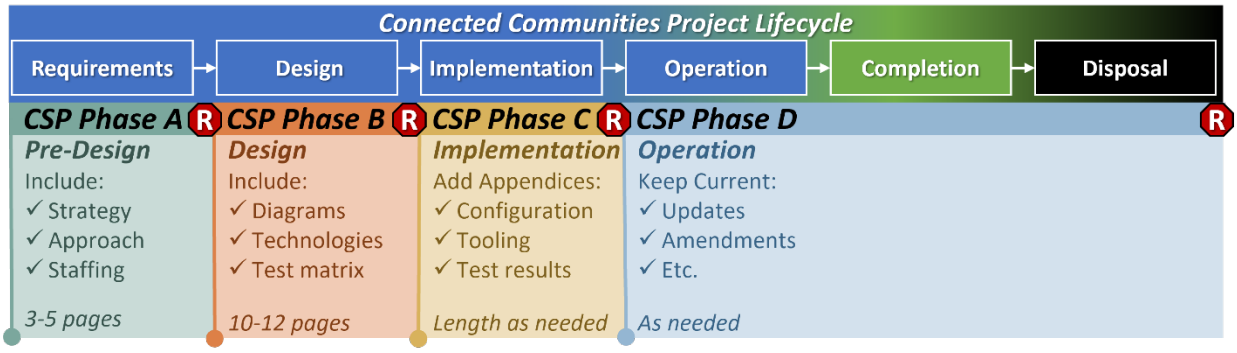

Figure 1. Typical project lifecycle and corresponding CSP Phases

Cybersecurity Plan (CSP) Phases that corresponds to the typical project development lifecycle. This is shown in the bottom portion of Figure 1. The CSP phases correspond to the lifecycle as follow:

Requirements. In this phase the CC project establishes the requirements and the operational flow of the project. Phase A (Pre-Design) is the corresponding CSP phase.

Design. The design phase identifies the CC project components and the interactions between these components. Phase B (Design) is the corresponding CSP phase.

Implementation. In this phase, the CC project is completed according to the design. At the end of this phase, the details of the CC project are captured in the as-built documentation. Any deviation from the original design is called out in the as-built documents. Phase C (Implementation) is the corresponding CSP phase.

Operation. Operation phase starts after the project is successfully built. During the operation phase, routine monitoring is performed. Depending on local conditions further maintenance, and equipment replacements may be needed. Phase D (Operation) is the corresponding CSP phase.

The cybersecurity plan for a CC project will mature as the CC project continues through the different phases of the project lifecycle. One of the main goals of the cybersecurity plan is to manage risk through the life of the project. During each successive phase, either more details are added to the cybersecurity plan or existing details are updated to better reflect the as-built state of the project. This makes the cybersecurity plan a living document that is continuously updated until the end of the project. Additional resources will be made available to Recipients, including a checklist of contents for each CSP phase with the goal of providing clear guidance and reducing ambiguity. Figure 1 illustrates the requirements for each of the CSP phases. Note that the PNNL CSP Review team works with the CC project team throughout each phase, with a more structured review occurring at each red stop sign. Figure 2 shows the steps that occur during the PNNL CSP Review process, including a submission of the CSP to DOE following the PNNL CSP Team review.

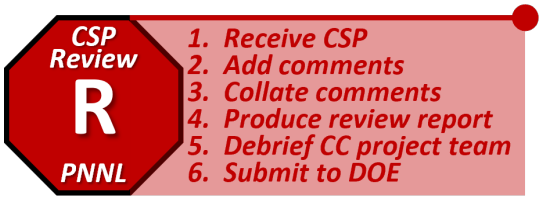

Figure 2. The PNNL CSP Review Process

APPENDIX J – GRID ISSUES TO BE ADDRESSED

DOE is making a significant investment in Connected Communities because of the potential for grid edge technical measures to cost effectively improve grid issues such as reliability and resilience[36] when smart technology to manage building loads, EV charging, and DERs are leveraged. The *grid issues* addressed by Connected Communities should include:

- Managing variable renewable energy integration issues (e.g. steep ramp rates);
- Improving resilience at the building, campus, community, feeder, or substation scale, allowing systems to withstand or recover rapidly from disruptions;

And may include, among others:

- Ensuring resource adequacy;
- Deferring or avoiding major capital investments in generation, transmission, or distribution grid infrastructure;
- Maintaining voltage limits on the transmission and distribution (T&D) system; and
- Extending the reliability and resilience of the surrounding electric system through coordinated islanding or the provision of black start or other recovery related services.

At the bulk power system, the benefits inure from the provision of grid services procured by utilities, reliability organizations, and/or organized wholesale markets as shown in Figure 1. In most organized wholesale markets, 100 kW of load flexibility is the typical minimum threshold for participation of individual or aggregations of demand-side resources in Demand Response (DR) programs.[37]

In the distribution system, grid edge technical measures can produce benefits by providing grid services (Figure 2) via utility incentive-based programs, some of which have been represented as non-wire alternatives (NWAs).[38] Given that a typical distribution feeder serves 5-6 MW of peak load, and distribution grid services would generally need to affect 10% of the feeder capacity to be meaningful, then the total GEB/DER would need to be at least 500 kW. Note that these resource levels are the amount of load or DER flexibility available to the grid, meaning that the peak load of the buildings supplying that resource would be several times larger than this threshold (possibly peak load or DER capacity on the order of 1MW or more).

[36] For the purposes of this FOA, grid resilience is defined as "The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions, including the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents." Kintner-Meyer et al. (2017) Grid Modernization: Metrics Analysis (GMLC 1.1) Reference Document, Version 2.1. May. PNNL-26541. Pacific Northwest National Laboratory.

[37] IRC (2018). North American Wholesale Electricity Demand Response Program Comparison, 2018 Edition. ISO/RTO Council. https://isorto.org/wp-content/uploads/2018/12/2018-Demand-Response-Program-Comparison.xlsx These programs include those provided by PJM, ERCOT, NYISO and CAISO's energy market. CAISO's threshold for DR to participate in ancillary services is higher at 500 kW.

[38] Homer, J., Cooke, A., Schwartz, L., Leventis, G., Flores-Espino, F. and Coddington, M. (2017) State Engagement in Electric Distribution Planning. National Renewable Energy Laboratory. December. PNNL-27066.

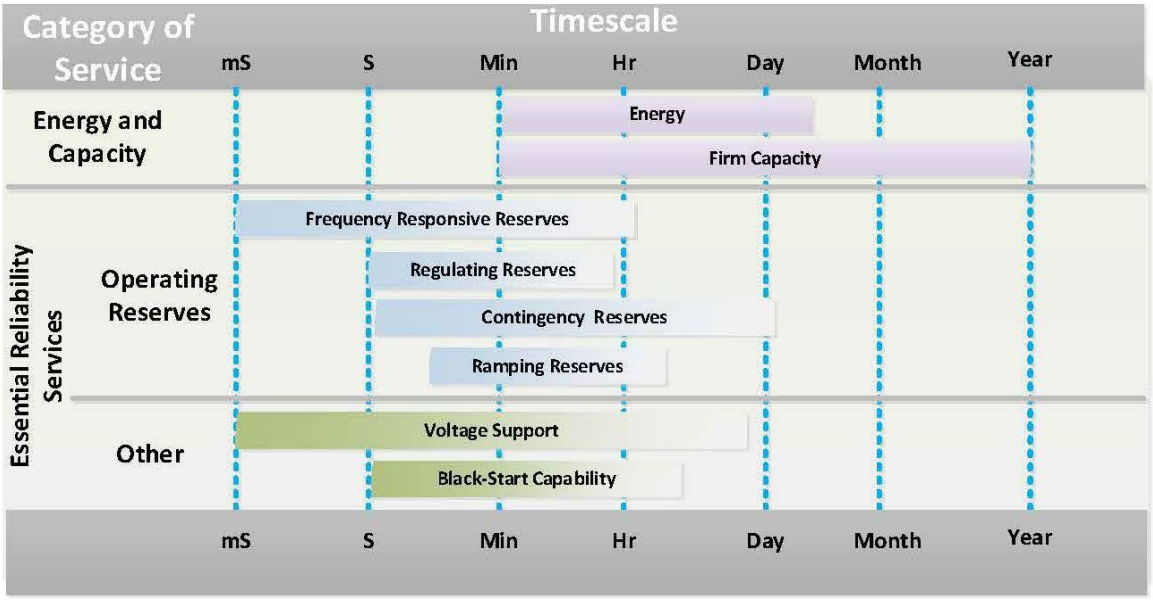

Figure 1 - Bulk Power System Services[39]

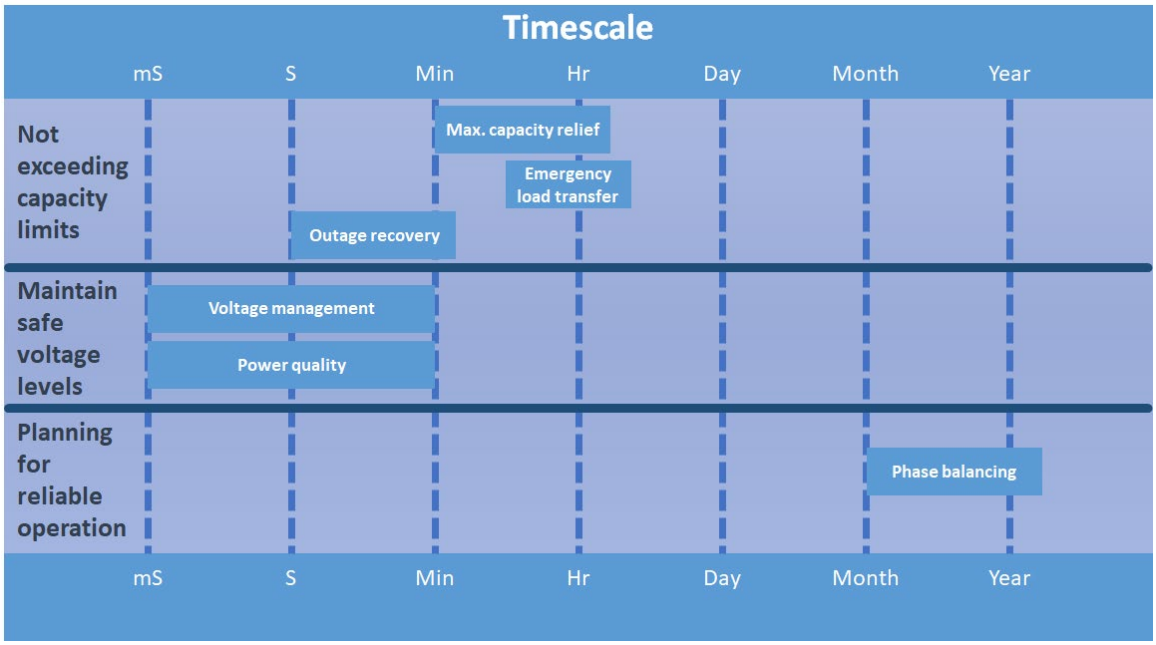

Figure 3. Distribution System Services[40]

[39] Denholm, P., Sun, Y., Mai, T. 2019. An Introduction to Grid Services: Concepts, Technical Requirements and Provision from Wind. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-72578.

[40] Cappers, P., MacDonald, J., Page, J., Potter, J. and Stewart, E. (2016) Future Opportunities and Challenges with Using Demand Response as a Resource in Distribution System Operation and Planning Activities. Lawrence Berkeley National Laboratory, Berkeley, CA. January 2016. LBNL-1003951.

APPENDIX K – OPEN STANDARDS AND PROTOCOLS

Communications and systems interoperability are common technology challenges, but they are particularly important at the grid edge, where many different management and control systems, distributed energy resources, grid operators, and other service providers interact in new, automated ways. To address these challenges, DOE supports the implementation of open standards, protocols and platforms. Provided in this Appendix are examples of open communication protocols, their applications, and examples of DOE-supported platforms that support them. Although projects are not required to use these platforms, proposals are expected to describe how they will employ relevant standards in their proposed solutions. Technical assistance in these areas will be available through the Connected Communities National Coordinator. Additional assistance may be available for projects to leverage DOE-developed grid-integrated building control hardware/software testbeds to prototype and verify building-grid-DER systems integration and control strategies.

Protocol	Application / End Use
BACnet	Building Automation
Modbus	Building Automation
LonTalk	Building Automation
KNX	Building Automation
Dali	Building Lighting
M-bus	Building Metering
OPC	Building and Electrical System Automation
OpenADR	Building Automation - Demand Response
CTA2045-A	Heat Pump Water Heater Communications
Matter	Home Automation
Thread	Wireless IoT
ZigBee	Wireless IoT
EnOcean	Wireless IoT
Z-Wave	Wireless IoT
ISO 15118	Electric Vehicles
Open Charge Point Protocols	Electric Vehicles
Modbus	Distributed Energy Resources
DNP3	Distributed Energy Resources
SEP2	Distributed Energy Resources
IEEE 2030.5	Smart grid interactions and integration of DERs

Examples of DOE-Supported Platforms:

VOLTTRON™:

VOLTTRON™, developed at Pacific Northwest National Laboratory and available as an open-source tool, provides an environment where data and devices connect seamlessly and securely to make decisions based on user needs and preferences.

The VOLTTRON™ distributed sensing and control software platform is a flexible, scalable, economic, and secure solution to operate the Internet of Things. The technology and its applications, deployable from low-cost computing resources, readily communicate with and gather data from a wide range of building and home systems, as well as from physical devices such as heat pumps. VOLTTRON™ rapidly analyzes the data and makes decisions to control device operations and maximize energy, cost, and comfort benefits. The technology also can coordinate its actions with the power grid.

VOLTTRON™ is a platform for solutions that independently manage heating, ventilation, and air conditioning systems, electric vehicles, distributed energy, entire building loads, and more. The technology has been successfully deployed in multiple projects and products, and efforts continue to further develop, test, and advance its capabilities. The U.S. Department of Energy's Building Technologies Office was an early advocate of the technology and continues to support its development.

VOLTTRON™ is open source and publicly available from GitHub, and its ongoing development benefits from a highly collaborative approach. The U.S. Department of Energy views the technology as a central component of buildings-grid integration, and provides funding support. Updates and other advances are carried out by a PNNL research team working in concert with an active nationwide community of users.

More information is available on the VOLTTRON™ website.

FAST-DERMS:

A Federated Architecture for Secure and Transactive Distributed Energy Resource Management Solutions (FAST-DERMS) is being developed to enable the provision of reliable, resilient, and secure distribution and transmission grid services through scalable aggregation and near-real-time management of utility-scale and small-scale DERs.

A flexible resource scheduler at the distribution utility level, which could be implemented on an Advanced Distribution Management System (ADMS), performs reliability-constrained economic dispatch of DERs, either directly or through a transactive market or DER aggregator. FAST-DERMS also allows for the seamless integration of any centralized distribution utility management system and a transmission energy management system at the independent system operator level.

The project will end with a laboratory demonstration at NREL's ESIF using its ADMS test bed.

FAST-DERMS is being developed through funding provided by the Building Technologies Office and Office of Electricity's Advanced Grid Research program through the Grid Modernization Laboratory Consortium. The project is led by NREL and supported by multiple partners, including Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, San Diego Gas & Electric, Southern, ComEd, Centrica, and Oracle.

More information is available on NREL's Advanced Distribution Management Systems website, and in the following resources:

- This document provides grid architecture guidance to support the Grid Modernization Laboratory Consortium (GMLC) Federated Architecture for Secure and Transactive Distributed Energy Resource Management Solution (FAST-DERMS) project: TECHNICAL REPORT
- Presentation at the AES Workshop, July 2022: HERE

APPENDIX L – COMMUNITY BENEFITS, EQUITY ELIGIBLE BUILDINGS, AND DEI DEFINITIONS AND EXAMPLES

This section details examples and definitions of "equity eligible" buildings and community benefits.

i. Equity Eligible Buildings:

For the purpose of this FOA, the following building types are considered "equity eligible." Applicants should justify how the building(s) in their project that are included due to their community benefits are "equity eligible." Examples of equity-eligible buildings include but are not limited to:

- **Buildings located within Climate and Environmental Justice Screening Tool (CEJST)-designated and/or** DOE-designated **Justice40 census tracts, federally recognized tribal lands, and U.S. territories.** Applicants that use this approach to defining their equity-eligible buildings should reference the specific census tracts they plan to focus on for building upgrades as part of their project. Teams should also explain which building types (low-income housing, underserved commercial, schools, etc.) they plan to upgrade within the specific DOE-designated Justice40 census tracts.
- **Affordable housing (subsidized, naturally occurring, or buildings occupied by low-income residents).** Low-income households face a disproportionately higher energy burden, defined as the percentage of gross household income spent on energy costs. According to DOE's Low-Income Energy Affordability Data (LEAD) Tool, the national average energy burden for low-income households is 8.6%, nearly three times higher than for non-low-income households, which is estimated at 3%. The following building types fit within this category:
    - **Subsidized affordable housing**, such as public housing, Project-Based Section 8 housing, housing subsidized by the Low-Income Housing Tax Credit, rural housing subsidized by U.S. Department of Agriculture programs, and affordable housing subsidized by other federal, state, or local funding.
    - **Naturally occurring affordable rental housing**, or non-subsidized housing that provide affordable rents for households at the 80% level of area median income. Teams can consider any multifamily building located in a U.S. Department of Housing and Urban Development (HUD)-designated low-income housing tax credit "qualified census tract" as meeting these criteria.
    - **Homes occupied by low-income households**, or households whose total income falls below a certain threshold. These homes can include all housing types, including single family, multifamily, and manufactured housing. For this prize, teams may use the Weatherization Assistance Program eligibility definition of low income, which is 200% of the poverty level or 60% of state median income.

Teams may also choose to use the definition of 80% of area median income, the income level that qualifies households for full low-income rebates through the Inflation Reduction Act Home Rebate program.

- **Underserved commercial, nonprofit, and public buildings**. The underserved commercial and nonprofit sector includes many organizations and building types that provide vital services to communities and can experience high energy and building maintenance costs. These high costs can inhibit wealth-building and economic development on the commercial side and direct crucial resources away from services to the community on the nonprofit side. The following building types provide a framework for possible types of commercial buildings that could fit within this equity-eligible buildings category:
    - **Buildings used by small, disadvantaged businesses**, which include small businesses that are majority minority-owned, women-owned, or veteran-owned. These businesses can own or lease their operating space.
    - **Buildings used by businesses that serve disadvantaged communities**, especially businesses whose benefits or service offerings remain within the community.
    - **Title I schools**, or schools with high percentages of students qualifying for free and reduced-cost lunch, high percentages of students from low-income families, or located in rural or remote areas. Applicants can use this DOE mapping tool to identify Title I schools: https://energyjustice-schools.egs.anl.gov/.
    - **Buildings used by nonprofit organizations that provide localized community services**, such as emergency shelters, meal service centers, arts and culture organizations, and environmental, economic, and housing justice organizations. These nonprofits can own or lease their operating space.
    - **Buildings that provide critical community services**, such as public community centers, libraries, emergency service providers, and childcare centers.
    - **Buildings designated or planned to be designated for use as resilience hubs or disaster shelters.** These buildings are community-serving facilities augmented to support residents, coordinate communication, distribute resources, and provide temporary shelter during emergency and disaster relief situations. Resilient hubs aim to provide healthy buildings and energy security through efficient building design and operation, integration of renewables, and low-carbon backup power (such as batteries).
    - **Other commercial or nonprofit buildings defined as equity-eligible through community input**. See details below on how a team can make this determination.

- **Locally defined equity-eligible buildings as defined or identified by the local community of the prize applicant team.** DOE recognizes that community-based organizations, local governments, community leaders, and other local stakeholders have on-the-ground knowledge of underserved communities and disadvantaged areas not necessarily captured by national datasets or the categories above. The Office of Management and Budget Memo M-21-28: Interim Implementation Guidance for the Justice40 Initiative includes factors that can help a team to create its own local definition of equity-eligible buildings. The memo lists the following variables for consideration:
    - Low income, high and/or persistent poverty
    - High unemployment and underemployment
    - Racial and ethnic residential segregation, particularly where the segregation stems from discrimination by government entities
    - Linguistic isolation
    - High housing cost burden and substandard housing
    - Distressed neighborhoods
    - High transportation cost burden and/or low transportation access
    - Disproportionate environmental stressor burden and high cumulative impacts
    - Limited water and sanitation access and affordability
    - Disproportionate impacts from climate change

ii. **Community Benefits:**

For the purpose of this FOA, qualifying benefits must be (1) measurable, (2) direct, and (3) serve qualified underserved communities.
Qualifying benefits may include but are not limited to:

- A decrease in energy burden for building occupants, building owners, etc.
- A decrease in environmental exposure and burdens
    - Examples may include effects of heat waves or other extreme weather events (floods, wildfires, cyclones, etc.).
- An increase in access to low-cost capital
    - Examples may include collaborations with community development financial institutions (CDFIs), development of innovative financing models, use of revolving loan funds specifically to target projects/implementation in underserved communities, or any other methods of increasing access to affordable capital for energy upgrades
- An increase in high-quality job creation
    - Examples may include job training opportunities, certification programs, integration of apprenticeship programs into project implementation, and

workforce development programs, including partnerships with trade schools and/or community colleges

- An increase in the clean energy pipeline
  - Examples may include labor union engagement, outreach initiatives to engage underrepresented communities in clean energy projects, supporting small businesses and entrepreneurs in clean energy who are from underserved backgrounds
- An increase in community resilience
  - Examples may include ensuring the ability to withstand and recover from disruptions, emergencies, and challenges while concurrently incorporating clean energy solutions
- Increased parity in clean energy technology access and adoption
  - Examples may include offering special pricing structures, group purchasing initiatives, subsidies to reduce upfront costs, making these technologies financially viable for communities with limited resources, or tailoring clean energy solutions to the specific needs and preferences of underserved communities
- Opportunities for educational institutions, especially Community Colleges or K-12 schools
  - Examples include campuses as sites for demonstration projects, inclusion of project operations as part of courses delivered by associated faculty, and opportunities for students to design capstone or other work around the project's objectives
- Opportunities for engagement with state and local governments, both during application periods and via technical assistance offered by the coordinator, during the project execution
  - Opportunities for ongoing community engagement, both in collaboration with the National Coordinator and independently

iii. **Common Diversity, Equity, and Inclusion Terms and Definitions:**

- **Underserved Communities**: 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 of in the definition of "equity." E.O. 13985. For purposes of this FOA, 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.

- **Minority Serving Institutions (MSIs)**: 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.
- **DEI in STEM**: According to the National Science Foundation's 2019 report titled, "Women, Minorities and Persons with Disabilities in Science and Engineering", women, persons with disabilities, and underrepresented minority groups—blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives—are vastly underrepresented in the STEM (science, technology, engineering and math) fields that drive the energy sector. That is, their representation in STEM education and STEM employment is smaller than their representation in the U.S. population. https://ncses.nsf.gov/pubs/nsf19304/digest/about-this-report For example, in the U.S., Hispanics, African Americans and American Indians or Alaska Natives make up 24 percent of the overall workforce, yet only account for 9 percent of the country's science and engineering workforce. DOE seeks to inspire underrepresented Americans to pursue careers in energy and support their advancement into leadership positions. https://www.energy.gov/articles/introducing-minorities-energy-initiative
  See also. 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.

APPENDIX M – COLLABORATING DOE OFFICES

Connected Communities is a collaborative program across many offices within DOE and is led out of the **Building Technologies Office (BTO)**, a technology office within the **Office of Energy Efficiency and Renewable Energy (EERE)**. The paragraphs below describe each of the collaborating DOE offices. Each office has a unique perspective and expertise that will contribute to the Connected Communities FOA outcomes.

EERE's mission is to Accelerate the research, development, demonstration, and deployment (RDD&D) of innovative technologies that will transition Americans to a 100% clean energy economy no later than 2050 and ensure the clean energy economy benefits all Americans. EERE RDD&D ensures an energy system that is affordable, reliable, resilient, secure, and clean. These RDD&D activities are organized among three pillars: Buildings and Industry, Sustainable Transportation and Fuels, and Renewable Energy. The following five offices represent a collaboration of RDD&D activities across the three pillars.

BTO's overall goal is to improve the energy efficiency, resiliency and productivity of buildings without sacrificing occupant comfort or health. Progress towards achieving this goal will make building energy costs more affordable and reduce the environmental impact of energy-related activities, benefitting American households and businesses. Given the importance of system-level technology and stakeholder integration in the Connected Communities FOA, BTO is closely collaborating with other DOE program offices that are described below further.

The **Solar Energy Technology Office (SETO)** supports research, development, demonstration, and deployment of technologies and solutions that enable rapid solar deployments and the smooth transition to a reliable, secure, resilient, and decarbonized grid of the future. SETO has an interest in the ability of connected communities to demonstrate system-level value and flexibility when integrating distributed solar with other energy technologies; new business models by considering connected communities' potential participation to electricity market; allowing connected communities being an integral part of distribution and operational planning processes; and detection and remediation of cyber threats for connected communities.

The **Vehicle Technology Office (VTO)** supports a sustainable transportation system through research and technology development to enable a broad range of affordable, efficient, and clean transportation choices. Plug-in electric vehicle (EV) charging represents both a potentially large new load that is also flexible. VTO has awarded multiple large-scale "EV Community Partner Projects" in recent years that aim to demonstrate the technology needed for successful EV deployment and charging. This Connected Communities FOA could expand these EV Community Partner Projects to recognize the critical role of building load management along with EV load management. A key item for VTO research is investigation of impact of various tariffs, controls, and communications to reduce the cost of EV charging.

The **Industrial Efficiency and Decarbonization Office (IEDO)** focuses on accelerating the innovation and adoption of cost-effective technologies that eliminate industrial GHG emissions through research, development, and deployment. IEDO's new Onsite Energy program provides technical assistance for industrial facilities and other large energy users to increase the adoption of onsite clean energy technologies, providing the opportunity for incorporation into a Connected Community. The role of industrial firms as major employers and oftentimes hosts of electric vehicle fleets can allow them to provide anchor loads in a connected community setting.

The **Geothermal Technologies Office (GTO)** supports research, development, and demonstration efforts for residential, commercial, district- and community-scale geothermal heating and cooling systems and geothermal heat pumps. Geothermal heat pumps could be an integral part of community scale decarbonization. One example area of research interest is the successful demonstration of Thermal Energy Networks (TENs) in community, commercial, and multifamily decarbonization to reduce peak load on the grid and fully utilize thermal, ground-source assets.

The **Office of Electricity (OE)** is outside of EERE but is closely collaborating with BTO on this FOA. OE recognizes a secure and resilient power grid is vital to national security, economic security, and the services Americans rely upon. OE has an interest in the ability of Connected Communities to demonstrate how next-generation technologies, policy tools, and technical assistance partnerships with the private sector and at all levels of government can improve the security, reliability, resilience and blackstart capability of the grid and in particular the nation's critical energy infrastructure. OE is actively collaborating with BTO on Connected Communities, recognizing that building optimization is improved by extending into the grid, and grid optimization is improved by extending into buildings.

APPENDIX N – EXAMPLES OF PAST CONNECTED COMMUNITIES PROJECTS

The awardees from 2020 Connected Communities FOA are a cohort of 10 projects that were selected to demonstrate how decarbonization of buildings can be achieved at community scale while also enabling the future low carbon grid. Projects consist of diverse DERs, building types, and regional representation. The desired outcomes of the first Connected Communities FOA are consistent with those of the present FOA.

A few early pilots of connected communities laid the foundation for this cohort. For example, through work funded by the Building Technologies Office and OE, Oak Ridge National Laboratory researchers found significant energy savings in two all-electric, energy-efficient Smart Neighborhoods. Relative to a baseline all-electric community, these Smart Neighborhoods, one in Alabama and one in Georgia and both integrating a variety of DERs and demand flexible controls, showed 44% less electricity used and 42% less electricity purchased respectively.[41]

In another example of BTO funded work, the AI-driven Smart Community in Basalt, CO is an affordable housing development providing energy efficient homes with rooftop solar and backup battery storage.[42] The energy system is managed to minimize utility bills for the residents, maximize local solar consumption, support the needs of the local utility grid, and provide resilience in case of power outage. The control system was developed by the National Renewable Energy Laboratory with funding from DOE's ARPA-E agency and tested under funding from the Solar Energy Technologies Office. The goal of the demonstration is to reduce the adverse impact of solar variability on distribution grid voltage by at least 20% and support critical loads for up to 5 days with DERs in the community.

Another example is the networked community microgrids in Adjuntas (20,000 Population), Puerto Rico, which was severely impacted by long-term (~6 months) power outage caused by Hurricane Maria in 2017. This microgrid operated by the local community is based on 100% solar and battery storage; and aims to serve as a resiliency hub in the event of natural disaster. A microgrid control system is designed to coordinate for optimal operations of multiple local microgrids as a cluster to enhance systems resiliency and reliability while ensuring a cost-effective operation. The networked microgrid cluster also features as self-healing with dynamic boundaries, and supports intelligent, secure load shedding of prioritized critical infrastructure nodes through load and generation forecasting. The control system is developed by the Oak Ridge National Laboratory (ORNL) and will be tested at Adjuntas with funding from DOE's Solar

[41] Buckberry, Heather, Kuruganti, Teja, Winstead, Christopher, Munk, Jeffrey, Zandi, Helia, and Hill, Justin M. *Impact of Connected Communities*. 2021. Pub161222.pdf (ornl.gov)

[42] Jin, X. (2022). AI-Driven Smart Community Control for Accelerating PV Adoption and Enhancing Grid Resilience. https://www.nrel.gov/docs/fy23osti/85283.pdf

Energy Technologies Office.[43] The goal of the demonstration is to support critical facilities in the community with reduced dependency of diesel generation during long-term outages; as well as to reduce electricity cost during both normal operation and power outages.

GTO also recently awarded projects in 11 communities across 10 states to design community geothermal heating and/or cooling systems. Using clean geothermal energy for heating and cooling can help American cities across the country meet their energy needs, drive down costs, create jobs, and reduce greenhouse gas emissions. Community geothermal systems tap the earth's subsurface to provide heating and cooling to multiple residences and businesses through an underground distribution network. They help to decarbonize buildings by providing low-carbon heating and cooling, while supporting decarbonization of the electricity sector by providing a pathway for clean heating and cooling that does not substantially increase electricity demand. The projects feature urban, suburban, rural, and remote communities and a range of system sizes, technologies, and geographies—offering diverse case studies that will help other communities see how they can also implement community geothermal. The 11 projects, which include more than 60 partners across the United States, will be executed by community coalitions offering skills and expertise in community needs, workforce, design and analysis, and deployment.

VTO also has example community projects such as the Smart Charging pilots, including Southern California Edison, which deployed nearly 400 networked stations in multi-unit dwellings, workplaces, and public locations as part of their Charge Ready pilot program. One goal of the pilot was to demonstrate demand response (DR) capabilities by reducing the charge rate by 50%. This was successfully demonstrated using two methods: 1) stations with throttling capabilities were reduced to half charging rates, and 2) stations without adjustable charging speeds used a duty-cycling technique, which stopped charging in 15-minute increments for half of the locations' chargers. In a second example, Avista Utilities ran a managed charging pilot program to own, maintain, and install EVSE on residential or commercial customer premises. To participate in the project, the customers allowed Avista to collect charging data and perform DR experiments. The customers had the option to be notified about upcoming DR events the day before and to opt-out of that event. The project was able to curtail load up to 75% with about a 10% opt out rate overall for the program for residential sessions.

In addition, the recently announced WestSmart EV@Scale project, an Electric Vehicle Community Partner Project award, is a comprehensive and ambitious community partnership that includes more than 25 strategic partners, with PacifiCorp divisions Pacific Power, Rocky Mountain Power, and sister company NV Energy all playing major roles. The project spans seven states and will address regional challenges in critical EV application focus areas, including destination highways, underserved regions, urban mobility, freight and port electrification, along with community and workplace charging. These projects will develop smart charging at

[43] SETO 2020 – Systems Integration | Department of Energy.

intermodal transit hubs for buses, rail, public charging, and other EV users so they can prioritize and stack charging to increase efficiencies and spread the demand charges among different users (rail, transit bus, and public charging). Other projects will be exploring smart charging solutions at local businesses with workplace charging. The intent is to align charging times to coincide with times that maximize solar energy using a staggered charging system.[44]

[44] More information about these, and other vehicle electrification projects, can be found at the VTO Annual Merit Review site: https://www.energy.gov/eere/vehicles/annual-merit-review-presentations

APPENDIX O – SPECIFIC EXAMPLES OF ELECTRICITY SYSTEM CHALLENGES

The electric grid is rapidly changing and will change more in coming years. Key questions need to be answered about how the electric grid will interact with heterogeneous users in diverse regions. Prospective solutions will need to be interoperable with existing and future technologies, and transferred between different utilities, regions, and states to achieve growth and acceptance. Many technical solutions already exist to meet many of our future grid challenges, but possible solutions need to be integrated and deployed at scale. This section describes the technology space, but also why field validation is an essential step in identifying solutions and proving to many diverse stakeholders the value of grid edge technical solutions to avoid, defer and/or reduce future infrastructure investments and to improve customer resilience.

Electrification is expected to result in higher electricity use and peak demands in the nation's electric grid. In 2023, the existing capacity of the grid was approximately 740 GW. By the end of this decade, this grid was expected to have approximately 140 GW or 19% of its capacity retired and forecasts that another 200 GW to meet future demand needs.[45] In the long term and at the national level, a comprehensive study finds that adoption of renewable resources such as solar and wind on the grid depends largely on the speed and extent of the transition to electrified transportation, buildings, and vehicles. Connecting these new loads with renewable resources is forecast to require a doubling of transmission capacity in all regions by 2050.[46]

Many utilities and public utility commissions are engaged in studies, plans, and proceedings to understand the costs and benefits to ratepayers and the public of expanding the distribution system's capacity.[47] Initial estimates of the costs of distribution upgrades are surprisingly high. Hawaii, the first state in the nation to set the goal of 100% of its electricity from renewables, recently accepted an integrated grid plan that calls for capital spending of $1.4 billion for 1.3 million customers, over $1,000 per customer. In California, separate researchers from UC Berkeley and a consulting firm (Kevala) commissioned by the California Public Utilities Commission for 5 and 13 million customers respectively found that distribution upgrades of approximately $5 to $55 billion will be required to handle future expected loads from electric

[45] U.S. Department of Energy. (2023). Pathways to Commercial Liftoff: Virtual Power Plants. https://liftoff.energy.gov/vpp/

[46] Murphy, Caitlin, et al. Electrification Futures Study: Scenarios of Power System Evolution and Infrastructure Development for the United States. NREL/TP--6A20-72330, 1762438, MainId:6548, 1 Jan. 2021, p. NREL/TP--6A20-72330, 1762438, MainId:6548, https://doi.org/10.2172/1762438.

[47] Frick, N. M., & Schwartz, L. (n.d.). State Requirements for Electric Distribution System Planning. Energy Markets & Policy, Berkeley Lab. Retrieved May 7, 2024, from https://emp.lbl.gov/state-distribution-planning-requirements

vehicles, residential electrification, and DERs.[48] The LA100 plan is perhaps the most aggressive electrification plan that calls for spending $30 billion for 1.4 million customers to achieve 100% renewable energy.[49] Cost estimates spanning $1,000-21,500 per customer indicates significant uncertainty in the future costs required for electrification.

In Massachusetts, two major electric utilities have submitted electricity sector modernization plans as required by recent legislation. These plans ask the state's regulators to authorize spending of $2.8 and $6.1 billion over the next five years, or approximately $2,100 and $4,100 per customer, to pursue the state's aggressive climate goals.[50] In Minnesota, Xcel has submitted an integrated distribution plan that calls for $4.4 billion in spending or roughly $3200 per customer.[51]

[48] Elmallah, Salma, Anna M. Brockway, and Duncan Callaway. "Can Distribution Grid Infrastructure Accommodate Residential Electrification and Electric Vehicle Adoption in Northern California?" Environmental Research: Infrastructure and Sustainability 2, no. 4 (November 2022): 045005. https://doi.org/10.1088/2634-4505/ac949c. Kevala: "Electrification Impacts Study (EIS), Part 1; High Distributed Energy Resources (DER) Grid Planning Proceeding." California Public Utilities Commission, May 17, 2023. https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/infrastructure/distribution-planning/2023-0517-eis-part-1-workshop_combined-slides.pdf.

[49] NREL. (2021). Los Angeles 100% Renewable Energy Study. https://maps.nrel.gov/la100

[50] Future Grid Plan: Empowering Massachusetts by Building a Smarter, Stronger, Cleaner and More Equitable Energy Future (January 2024). https://www.nationalgridus.com/media/pdfs/our-company/massachusetts-grid-modernization/future-grid-full-plan.pdf. Eversource. (2024). Electric Sector Modernization Plan (ESMP) for Massachusetts. https://www.eversource.com/content/residential/about/sustainability/renewable-generation/electric-sector-modernization-plan.

[51] Xcel Energy. (2023). Integrated Distribution Plan (No. MPUC Docket No. E002/M-23-452). Minnesota Public Utilities Commission. https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/202311-200132-09.pdf

APPENDIX P – FULL TABLE OF REQUIRED AND ENCOURAGED PROJECT ASPECTS

Table 1 – Connected Community Aspects

Category	Description
Category 1 - Grid Planning and Resilience	
A - Grid Issues and Services to Address	Each project must: • Address one or more electric grid issue(s) relevant to the distribution grid, accounting for the increased integration of renewable energy resources and local projected load growth due to electrification. • Propose a method for evaluating and incorporating the demonstrated grid edge technical measures into long term distribution system planning. • Include the amount of load reduction, flexibility, and/or local generation needed to provide a viable demonstration of the provision of grid services at a scale meaningful to participate at the distribution grid level over multiple seasons. See Appendix J for more detail. Projects are encouraged to: • Address more than two grid issues, which may include issues relevant to distribution and/or transmission as shown in Figures 2 and 3. • Provide two or more defined and quantifiable grid services as shown in Figures 2 and 3 that reliably and cost effectively address targeted grid issues, particularly for the distribution grid. Projects may: • Address bulk and transmission grid issues, alongside distribution grid issues, as shown in Figures 2.
B - Resilience	Each project must: • Incorporate resilience at a defined scale (e.g. Building, Campus, Community, Feeder, Substation, etc.) enhancing the ability to withstand or recover from disruptions. Projects are encouraged to: • Address the need for consistent and robust metrics and data streams for the valuation of resilience. • Scale or stage community energy supply and consumption using load control, storage and generation in order to operate

	the community at varied levels of service during multi-day power outages. • Include measures such as improved envelope or thermal energy storage to improve passive survivability.
Category 2 – Grid-Edge Technical Measures	
Overall Grid-Edge Technical Measures	Each project must: • Include two or more of the measures listed below to demonstrate system level integration to optimize distribution system planning and/or offer improved resilience Each project is encouraged to: • Include energy efficiency alongside two or more other of the grid-edge technical measures listed below.
A – Energy Efficiency	Each project is encouraged to: • Significantly improve the energy efficiency performance of buildings/plants in the community over appropriate baselines, such as local building energy codes for new construction and baseline performance for existing buildings. • Achieve highest federal voluntary efficiency standards for new construction, e.g., certified Zero Energy Ready Homes. • Improve energy efficiency of existing buildings by more than 30% over the baseline while meeting objectives and maintaining occupant comfort, building performance, and economic viability.
B - Building/Plant Load Flexibility Provision and Metrics	Each project is encouraged to: • Provide a significant and quantifiable amount of building/plant load flexibility that provides shed, shift, and/or modulation grid services while maintaining comfort and performance. • Use specific performance metrics (Appendix H) to quantify the services provided, such as maximum, average, and minimum time dependent flexibility (e.g. kW and % of the applicable neighborhood's power system).
C - DER Types, Capacities (as applicable) and Quantities	Each project is encouraged to: • Include at least one other type of DER (such as PV, electric vehicles and charging infrastructure, electrical or thermal energy storage[52], geothermal heating and/or cooling,

[52] For the purpose of this FOA, water heaters will be considered as a building technology contributing to flexible building loads and not as thermal energy storage. Thermal storage systems that would not otherwise be present in the building such as ice storage will be considered as an additional DER.

	hydrogen fuel cells, etc.) that support emissions reduction, demand flexibility, affordability, and resiliency. These may be building level installations or community scale installations. Projects may also consider: • Including two or more types of DERs, with the goal of more robust system-level integration and demonstration for distribution grid planning. • If applicable, demonstrating smart managed charging of large scale EVs (either 100's of vehicles or high power charging at depots) as part of the coordinated community controls approach. • Include innovative ways to deliver charging for individuals without personal parking (i.e. park on the street or live in a multi-unit dwelling).
D - Coordinated Controls for Energy Efficient and Flexible Demand Management	Each project is encouraged to: • Demonstrate a coordinated control and integration approach, to be used for energy efficiency and demand flexibility to provide coordinated management of building/plant loads and various types of DERs both within individual buildings/plants and across multiple buildings/plants. • Focus on groups of grid-edge assets that when aggregated demonstrate measurable added value to both the community members, building occupants and the grid beyond what can be achieved on an individual building basis. • Identify what skills and training requirements are associated with multi-building and/or grid-edge energy management. • Consider how the community will support ongoing operations and maintenance to ensure sustainability of the flexibility strategies. • Develop and demonstrate innovative business models and/or contractual relationships between different stakeholders within the connected community to facilitate coordinated control and aggregated impacts.
E – Local energy systems	Each project may: • Include microgrids • Include integrated energy planning of electricity and thermal networks
Category 3 – Project Stakeholder Benefits and Experience	

A – Utility, grid operator, state/local, and technology stakeholder benefits	Each project must: • Provide benefits to the power grid, building and DER owners, and building occupants both in terms of resource and fuel cost savings Projects are encouraged to: • Directly support corporate, utility, state, or local emission reduction goals where applicable.
B – Occupant and Community Benefits	Each project must: • Provide non-energy benefits such as comfort improvements, productivity enhancements, health and safety improvements, asset value increases, etc. and the benefits to the broader society (e.g. public health, environment, economic development, and job impacts, etc.) provided by the proposed community project. Projects are encouraged to: • Ensure equitable access to community energy resources, affordable housing, and other community improvements. • Provide increased community resilience to grid outages and other extreme events. • Establish a clear community engagement plan for guidance on community benefit needs and priorities. • (maintenance of DERs and community resources)
C – Occupant Experience	Each project must: • Collect data to understand the availability of building, plant, and vehicle services (e.g. hot water, lighting, ventilation, sufficient charge for transportation) and subsequent impacts to occupant experience and comfort, indoor air quality and productivity levels should be documented. • Work to ensure the occupant experience is maintained or improved, including during times that grid services are being provided.
Category 4 – Implementation, Scaling, and Replicability	

A - Systems Integration	Each project must: • Demonstrate a pathway to quantifiably decrease the set up time and challenges associated with the design, installation, and integration and commissioning of hardware, software, controls and communications of grid-edge technical measures. • Integrate technologies, building infrastructure, and/or contractual arrangements that are broadly replicable across the U.S. building stock and electricity business and regulatory environments. • Systemically address interoperability throughout their project, as present. Selected projects must propose scalable, interoperable solutions, and DOE views the implementation of open standards, communication protocols, and interconnection requirements as a strong enabler for achieving scale (Appendix K). Use of appropriate open standards, communication protocols, and interconnection requirements are encouraged, but if not used then an explanation is required. Projects are encouraged to: • Use appropriate open standards, communication protocols, and interconnection requirements for the grid or utility signal connection for their application. Specifically, there is an expectation that any proposal for which utility management of the end user energy environment would propose solutions compatible with OpenADR, IEEE 2030.5, IEEE 1547, OpenFMB, DNP3, The Open Charge Point Protocol(OCPP), and others described in full in Appendix K. • Use open-source tools and other resources supported by DOE to develop compliant solutions quickly, on the time scales of the proposed work.
B - Recruitment	Each project must: • Include strategies for recruitment and retention of connected community participants. Projects are encouraged to (if applicable): • Partner with Clean Cities coalitions (cleancities.energy.gov)
C - Business Model Innovation	Each project must: • Include business models that can be used to achieve economic viability at scale. Each business model should recognize the technological, financial, and contractual approaches that will

	be potentially attractive to customers, utilities, energy service providers, builders and other key stakeholders.
D - Project Partners & Stakeholders	Each project must: • Include teams composed of critical partners needed to successfully implement the project. It is recognized that teams will differ depending on regional, grid, and community needs. • Include a utility must be a project partner. • Include a team member with a strong understanding of the regional regulatory landscape to support the scalability of the results. Projects are encouraged to: • Include representation of grid resources/assets (e.g. electric utility, efficiency utility, energy service providers, community choice aggregator), building owners or related market actors (e.g. home builder, building owner, developer, building manager, engineering firm), technology manufacturers and vendors, state or local governments, Clean Cities coalitions (if applicable), community team member(s) who understand(s) and can communicate the energy, environmental, economic, social, and/or other relevant needs that the proposed system would address, as well as local development and regulatory requirements (examples include local community leadership groups; local planning, zoning, and code officials; community-based organizations; local environmental justice organizations; state, local, and Tribal governments), and researchers (e.g. national lab, university, consulting firm). • Collaborate with other DOE program participants in the community, such as Building Upgrade Prize recipients, Building America teams, and Weatherization Assistance Program recipients.
E – Data and Analysis Methods	Each project must: • Implement a well-thought out data collection and analysis plan, within this FOA referred to as the Evaluation Plan. Projects will work with the Connected Communities National Coordinator (described following) to establish an evaluation plan that has consistent criteria and metrics across the cohort. The data collection and analysis plan (or evaluation plan) includes sensing and software/analytical platforms, to measure, collect, and analyze data to demonstrate the ability of the project to meaningful address grid issues specific to distribution system planning and improved resilience.

	• The Evaluation Plan must be addressed in applications, fully developed in the first budget period of awarded projects, and used to monitor progress through project management. Each plan must address all six evaluation methods and associated data standards (see Appendix H). Include the data types identified in Table 2: Data Requirements • Call out cost-benefit analysis specifically Projects are encouraged to: • Resolve data collected following the guidance in Table 2 and Appendix H at the highest locational/geographic resolution possible
F - Scalability and Replication	Each project must: • Use approaches that can be easily applied and scaled to other communities and distribution networks. • Identify challenges and solutions to further scaling the connected community demonstration project. • Include planning guidance (e.g., implementation playbook) for replication and scaling in other communities.
G - Cybersecurity and Privacy	Each project must: • Include measures that will be utilized in the defense, detection, and mitigation of cybersecurity threats covering both through application in the project, and as scaled to future communities. • Identify privacy provisions for the project and how they would be scaled. Projects are encouraged to: • Reduce the need for collected data to preserve privacy and increase cybersecurity.