Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)

Connected Communities

Funding Opportunity Announcement (FOA) Number: DE-FOA-0002206
FOA Type: Mod 0002
CFDA Number: 81.086

FOA Issue Date:	10/13/2020
Informational Webinar: Please see FOA posting in Exchange for link	11/10/2020
Submission Deadline for Concept Papers:	5:00pm ET 2/17/2021
Submission Deadline for Full Applications:	5:00pm ET 3/3/2021
Expected Submission Deadline for Replies to Reviewer Comments:	5:00pm ET 5/4/2021
Expected Date for EERE Selection Notifications:	7/1/2021
Expected Timeframe for Award Negotiations:	9/16/2021

- Concept papers will be accepted on a rolling basis until the concept paper due date. Applicants must submit a Concept Paper by 5:00pm ET on the due date listed above to be eligible to submit a Full Application. Concept papers will be accepted starting on the FOA issue date above and encourage/discourage determinations will be sent within seven calendar days of submission. Applicants are encouraged to submit concept papers as early as possible.

- 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.

Modifications

All modifications to the FOA are [HIGHLIGHTED] in the body of the FOA.

Mod. No.	Date	Description of Modification
0001	10/15/2020	Section I.C. Teaming Partner List was added on page 18 to include information about how organizations can submit information to be included on the Teaming Partner List that EERE is compiling to facilitate the widest possible participation for this FOA.
0002	11/6/2020	Section II.A.i. Award Information, Estimated Funding on page 20 was edited to remove sentence about downselects. Section IV.C.xvii. Open Source Software Distribution Plan on page 46 was modified to make it encouraged but not required. Appendix H, Project Evaluation was replaced.

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I. Funding Opportunity Description

A. Background and Context

i. Objective

A Connected Community (CC) is a group of grid-interactive efficient buildings GEB[1] with diverse, flexible end use equipment and other distributed energy resources (DERs) that collectively work to maximize building, community, and grid efficiency. The objective of this FOA is to select projects that will demonstrate how groups of buildings combined with other types of DERs[2], such as electric vehicle (EV) charging and photovoltaic (PV) generation, can reliably and cost-effectively serve as grid assets by strategically deploying efficiency and demand flexibility. By demonstrating the ability of groups of buildings and DERs to modify load, the FOA outcomes will enable increased energy efficiency, reduced energy demand, and reduced environmental impact.[3]

Under this FOA, DOE will select a portfolio of "*Connected Community*" projects totaling up to $65 million in varying climates, geographies, building types, building vintages, DERs utility/grid/regulatory structures and resource bases. Through funding these projects, DOE hopes to find and share technical and market solutions that will increase demand flexibility[4] and energy efficiency.

For the purpose of this FOA, a DER is defined as a resource (community-scale or building-scale) that can provide all or some immediate electric and/or power needs and can also be used by the community to either reduce demand (such as energy efficiency) or supply power to satisfy the energy, capacity, or ancillary service needs of the distribution grid. In addition it should be connected to the distribution system, close to load, and the majority of produced energy should be consumed within the community. Examples of different types of DERs include photovoltaics

[1] Connected communities build on BTO's ongoing Grid-interactive Efficient Buildings (GEB) research: www.energy.gov/eere/buildings/GEB and Zero Energy Ready (ZE/R) strategies

[2] A resource sited close to customers that can provide all or some of their immediate electric and power needs and can also be used by the system to either reduce demand (such as energy efficiency) or provide supply to satisfy the energy, capacity, or ancillary service needs of the distribution grid. The resources, if providing electricity or thermal energy, are small in scale, connected to the distribution system, and close to load. Examples of different types of DERs include solar photovoltaic (PV), wind, combined heat and power (CHP), energy storage, demand response (DR), electric vehicles (EVs), microgrids, and energy efficiency (EE) - N. A. of R. U. C. (NARUC), "Distributed Energy Resources Rate Design and Compensation," 2016

[3] *See* 42 U.S.C. §16291

[4] Capability of DERs to adjust a building's load profile across different timescales; energy flexibility and load flexibility are often used interchangeably with demand flexibility. Unlike EE and DR, however, demand flexibility is not a resource in the traditional sense (e.g., eligible to be bid into wholesale markets), but a potential that the utility or system operator can utilize to provide reliable electricity service.

(PV), energy storage, wind, combined heat and power (CHP), demand response (DR), energy efficiency (EE), microgrids, and electric vehicle charging infrastructure.[5]

Beyond a foundation of demand flexibility and energy efficiency, DOE expects to select a diverse portfolio of individual projects so that the combined insights from the whole portfolio will provide scalable solutions that can be applied throughout the country. Individual projects can include new construction, retrofits of existing building, residential, commercial, mixed use, campuses, and appropriate DERs. It is anticipated, but not required, that proposals will come from multi-disciplinary partnerships between energy utilities/providers, building/home developers/owners/operators, manufacturers, researchers and other key players. For a complete list of desired project elements, see Table 1 below.

ii. Background

Domestic renewable energy production has been increasing, influencing utility electricity supply operations and creating technical challenges to efficient, cost effective, and reliable grid performance. This, and other reasons including deferred infrastructure investment, have led to a number of federal, regional, and local efforts to modernize the electric grid. At the same time, advanced building techonologies utilizing smart controls are becoming more sophisticated and widely available, allowing buildings to become more responsive to occupant and grid needs. Similarly, advances in electric vehicles (EVs) and energy storage technologies are offering pathways to interact with the electric grid in more dynamic ways. EVs are forecasted to be the largest net increase in load to the utility system in the next twenty years. Charging of these vehicles will mostly be attached to buildings. By coordinating the loads of buildings with the loads of EVs, and managing those loads with the grid, it both increases the opportunity to provide grid services and decreases the risk of high costs for building/vehicle owners and for the grid.

At the same time an increasing number of truck fleets are planning to electrify their vehicles not only to address emissions but also to lower operating costs.[6] This FOA recognizes the challenges and opportunities that relate to this changing energy landscape and addresses the role that demand side strategies, including buildings, electric vehicles with smart charge management and other DERs as well as supply side strategies, can offer.

The Building Technologies Office (BTO) has a mission to develop and accelerate the adoption of cost-effective technologies, techniques, tools, and services that enable high-performing, energy-efficient, and demand-flexible residential and commercial buildings in both the new and existing buildings markets. The Office's overall goal is to improve the energy efficiency and productivity of buildings without sacrificing occupant comfort or product performance.

[5] National Association of Regulatory Utility Commissioners (NARUC), "Distributed Energy Resources Rate Design and Compensation," 2016.
[6] https://sustainability.ups.com/media/UPS_GreenBiz_Whitepaper_v2.pdf

Progress towards achieving this goal will make building energy costs more affordable and reduce the environmental impact of energy-related activities to the benefit of American households and businesses.

In support of this goal, BTO has developed a Grid-interactive Efficient Buildings (GEB) strategy which aims to advance the role buildings can play in energy system design, operations and planning. This is achieved by optimizing energy consumption with an integrated approach to energy efficiency and flexibility. The GEB strategy recognizes that:

- Building end uses can be dynamically managed to reduce energy cost, consumption, help meet grid needs, and minimize electricity system costs, while meeting occupants' comfort and productivity requirements;
- Technologies such as PV, storage, CHP, EVs and their charging infrastructure, other DERs, and microgrids can be co-optimized with buildings to provide greater value and resiliency to both utility customers and the electricity system; and
- The value of energy efficiency, demand response, and other services provided by behind-the-meter DERs varies by building type, location, hour, season, and year.

A key part of this strategy includes utilizing efficient building design, operational strategies, and highly efficient, innovative building equipment coupled with smart technologies for building energy management. These are areas of core technological investment for BTO.

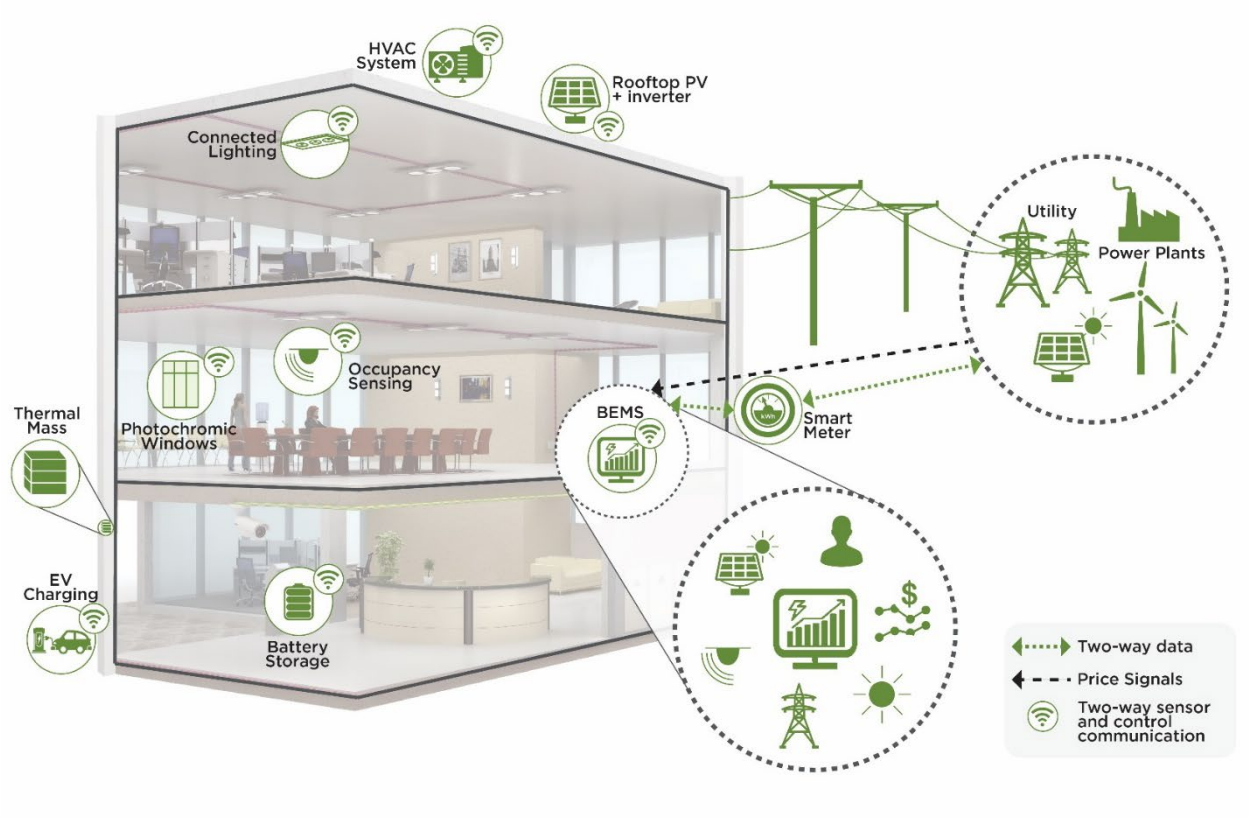

Figure 1: A Grid-interactive Efficient Building: An energy-efficient building that uses smart technologies and on-site DERs to provide demand flexibility while co-optimizing for energy cost, grid services, and occupant needs and preferences, in a continuous and integrated way.

The vision of GEB is the integration and continual optimization of DERs for the benefit of the buildings' owners, occupants, and the electric grid, as shown in Figure 1. Improving the energy efficiency and demand flexibility of buildings alleviates pressure on the electric grid. Given the importance of DER integration in the Connected Communities FOA, BTO is closely collaborating with DOE's Solar Energy Technologies Office (SETO), Vehicle Technologies Office (VTO), and Office of Electricity (OE). Each of these program offices have a unique perspective and expertise that will contribute to the Connected Communities FOA outcomes.

Collaborating DOE Offices

VTO supports a sustainable transportation system through research and technology development to enable a broad range of affordable, efficient and clean transportation choices. Both light and medium/heavy duty vehicle electrification are a significant change not only to the transportation of people and goods, but also to the electric grid and to the consumer experience. Plug-in electric vehicle (EV) charging represents both a potentially large new load but also one that has some level of flexibility. Flexible loads may be key to managing a future grid that is more dynamic and based on more intermittent generation. Almost all EV charging currently happens in, or connected to,

a building complex and is supported by the building's overall electrical delivery system and infrastructure. A key part of any EV smart charging management must therefore be tied to the overall building's energy management strategy. VTO has awarded multiple large-scale "EV Community Partner Projects" in recent years. These projects aim to demonstrate the technology needed for successful EV deployment and charging at a community level, including personally owned vehicles, commercial delivery vehicles and buses. They also bring together a broad group of community members to enable increased vehicle electrification. They have shown that managed charging is a key to delivering low operating cost as well as innovative charging deployment. This Connected Communities FOA will expand these EV Community Partner Projects to recognize the critical role of building load management along with EV load management.

SETO supports research and development to improve the affordability, performance, and value of solar technologies on the grid. A number of SETO programs, including ongoing collaborations with OE, BTO and VTO, explore opportunities to integrate solar generation with other energy technologies to improve total system value and flexibility while maintaining or improving system affordability, reliability and security. Past research includes integrated solar generation and energy storage with technologies such as dynamic load management, advanced forecasting techniques, utility communication and control systems, and smart buildings and smart appliances to meet both consumer needs and the demands of the electricity grid. SETO also supports innovation through a number of networking, technical assistance, and analytical efforts. Programs on community solar, most notably the National Community Solar Partnership, explore new models for ownership in cases where individual, roof-mounted installations may not be feasible or competitive. The Connected Communities FOA is an opportunity to further extend these efforts in system design, operations optimization, and innovation.

DOE's Office of Electricity (OE), collaborating with BTO on this FOA, recognizes a secure and resilient power grid is vital to national security, economic security, and the services Americans rely upon. Among other priorities, OE works closely with the private and public sectors on risk management for critical energy infrastructure interdependencies; the protection and enhancement of defense critical electric infrastructure; and grid reliability, resilience and long-term recovery of damaged energy infrastructure. 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 has a mission to support R&D for a secure, resilient and adaptive power grid. 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. The GEB strategy reflects those shared priorities across OE and EERE and will benefit from this partnership.

iii. Technology Space and Strategic Goals

Desired Outcomes

The overall desired outcome from this FOA is to demonstrate, through a portfolio of diverse projects, the ability of groups of buildings and DERs to provide cost effective grid services through demand flexibility and efficiency that maximize use of renewable resources and reduce emissions, while maintaining (if not enhancing) occupant satisfaction and productivity. Specific outcomes within that are:

1. Data showing if, and how much, diverse groups of buildings can reliably and cost-effectively serve as grid assets by strategically deploying efficiency and demand flexibility in conjunction with DERs, without sacrificing occupant comfort or productivity;
2. Analysis on the interaction between energy efficiency and demand flexibility measures and how GEBs improve energy affordability and grid reliability while offering environmental and community benefits;
3. Demonstration of how DERs, such as managed charging of electric vehicles, can contribute to overall building load management, grid services and reduced cost of DER ownership and operation;
4. Demonstration of proven pathways to install the hardware, software and communications necessary to make buildings grid interactive that decrease cost, set up time for installers and potential disruption to occupants;
5. Insights on occupant impact, including benefits, resulting from equipment with advanced sensing, controls and capabilities to modify and optimize operational sequencing to balance comfort and grid needs;
6. Perspective into the willingness and ability of the occupants to change the timing and/or duration of their energy use, and any necessary level of compensation to meet grid needs;
7. Demonstrate the value of how demand flexibility and DER integration across buildings will attract customers, utilities, and other key stakeholders; and
8. Public dissemination of case studies of each project, including technical requirements and specifications, synthesized best practices, businesses models, partnership approaches, lessons learned, required analyses (including the results of those analyses) and analytical tools used to conduct the design, operation and evaluation of successful connected communities.

DOE will be taking a coordinated research approach in which selected projects will serve as a cohort to share challenges and best practices between each other and publicly. This will allow DOE to synthesize information across many projects that include multiple building types, applications, vintages and sectors, climates, DERs, electricity regulatory and market environments, occupancy/programmatic approaches, business models and occupant impact in an effort to scale innovation.

Examples of the Connected Communities Projects

Current connected communities projects, sometimes referred to as pilots, take advantage of highly efficient homes and commercial buildings and multi-disciplinary partnerships between utilities (or other energy service providers), building developers/owners/operators, manufacturers and researchers. These communities leverage high performance building design, operation and technology (e.g. dynamic windows, heat pump water heaters, and smart thermostats). A growing number of smart devices and advanced data-analytics can provide the ability to optimize energy-related operations at the building zone, by system, for the whole building and possibly between buildings in a community.

A few early pilots of connected communities illustrate some of these concepts. For example, through work funded by the Building Technologies Office and OE, Oak Ridge National Laboratory researchers have found that, after one year of occupancy, the actual energy consumption of the homes in the Reynolds Landing Smart Neighborhood™ consumed 44% less energy (kWh) as compared to similar homes built to minimum code requirements in Alabama and reduced their peak winter heating demand (kW) by ~34% from what a traditional, all-electric community would have otherwise needed because of the highly efficient envelope and the capability to shift heating and cooling loads.[7]

In another example, the AI-driven Smart Community in Basalt, CO[8] is an affordable housing development providing very energy efficient homes with rooftop solar and backup battery storage. 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.

VTO also has example community projects such as the Smart Charging pilots that include Southern California Edison, which as part of their Charge Ready pilot program, deployed nearly 400 networked stations in multi-unit dwellings, workplace, and public locations. One goal of the pilot was to demonstrate demand response (DR) capabilities by reducing the rate of charge 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 a residential or commercial customer premises.

[7] Oak Ridge National Laboratory, "Smart Technologies Enable Homes to Be Efficient and Interactive with the Grid" https://info.ornl.gov/sites/publications/Files/Pub139277.pdf

[8] https://www.nrel.gov/news/features/2019/small-colorado-utility-sets-national-renewable-electricity-example-using-nrel-algorithms.html, https://www.swenergy.org/colorado's-basalt-vista-neighborhood-"a-net-zero-affordable-housing-community"-1

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 are going to develop smart charging at intermodal transit hubs for buses, rail, public charging and other EV users so they can prioritize and stack charging in such a way that increases efficiencies and spreads the demand charges among different users (rail, transit bus and public charging). Other projects will be exploring smart charging solutions at local business with workplace charging. The intent is to align charging times so they coincide with times that maximize solar energy using a staggered charging system.[9]

Connected communities can include new construction or existing building retrofits, or a mix. In addition to residential neighborhoods, other examples of building combinations that could make up a connected community include:

- A university, medical or corporate campus[10]
- A downtown district of commercial and/or mixed use buildings
- A mixed use development or neighborhood[11]
- A non-geographically contiguous collection of buildings within a utility or energy service territory[12]
- A U.S. national defense or security campus/installation such as a military base, and/or its surrounding community
- Commercial Industrial Parks including Shipping/Parcel Distribution Facilities, Freight Logistics Centers

[9] 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

[10] For example, Pacific Northwest National Lab Transactive Campus in WA state https://bgintegration.pnnl.gov/connectedcampus.asp

[11] For example: CenterPoint Energy's Post House project in Evansville, IN (https://www.courierpress.com/story/news/2018/08/13/post-house-bring-change-innovation-downtown-evansville/979982002/ or https://aimindiana.org/terminal/post-house-bringing-smart-energy-technology-downtown-evansville/)

[12] For example: Fleet operation of heat-pump water heaters in the Pacific Northwest (https://www.energy.gov/eere/buildings/articles/heat-pump-water-heaters-achieve-significant-peak-reduction-and-energy)

- A mix of any of the above

In addition to coordination of diverse, flexible building loads, connected communities can potentially share infrastructure and energy assets to achieve economies of scale, improve system efficiency, reduce operations, maintenance and capital costs, and to island as part of a microgrid that manages loads to safely provide reliable power during grid outages. Shared resources may include (but are not limited to) community solar, EV charging infrastructure, battery storage, or thermal storage, or individual building level resources that are pooled to provide a summed performance that is greater than the parts.

By leveraging load diversity, storage and/or generation across a group of buildings, connected communities can offer more cost-effective solutions to energy goals.[13] For example, if a group of buildings each use large amounts of electricity, paying associated high peak load charges at different times, they could co-invest in battery or other storage devices to share management of peaking loads for both buildings and shave non-coincident peak load at the respective times. This investment may not be financially possible for one building owner, but sharing the cost across multiple buildings reduces the cost per owner, a benefit that could multiply with additional willing building representatives. Another example is a multi-building complex with a shared central thermal plant that may be able to serve the non-coincident heating loads of multiple buildings with a lower plant capacity than the sum of the capacities if each building were to install its own thermal plant.

Grid Issues Addressed by the Connected Communities FOA

As stated earlier, a key goal of this FOA is to select projects that will demonstrate how groups of buildings can reliably and cost-effectively serve as grid assets by strategically deploying efficiency and demand flexibility in conjunction with DERs. The ***grid issues*** addressed by Connected Communities FOA should include:

- Aiding variable renewable energy integration;

And may include, among others:

- Providing resource adequacy;
- Improve resilience, allowing systems to withstand or recover rapidly from disturbances;
- 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

[13] Olgyay, Victor, Seth Coan, Brett Webster, and William Livingood. 2020. *Connected Communities: A Multi-Building Energy Management Approach*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5500-75528. https://www.nrel.gov/docs/fy20osti/75528.pdf

- Extending the reliability and resilience of the surrounding electric system through coordinated islanding or the provision of blackstart or other recovery related services.

The issues can be addressed at either the bulk power system or distribution system. Numerous grid services are required to support reliable grid operations and respond to the inherent variability and uncertainty of electricity supply and demand. Figure 2 identifies key grid services for the bulk power system. While not a requirement of CC FOA proposed projects, we note that 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[14].

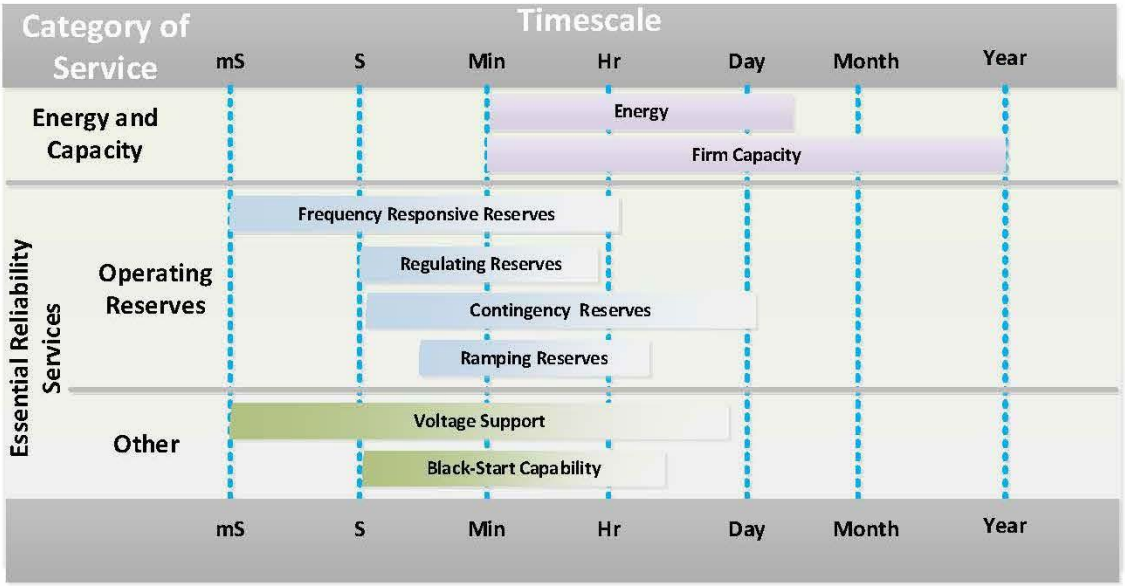

Figure 2 - Bulk Power System Services[15]

At the distribution system, connected communities can provide additional grid services (see Figure 3), some of which have been represented as non-wire alternatives (NWAs)[16]. For more detail on grid services please refer to Appendix J.

[14] 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.

[15] 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.

[16] 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.

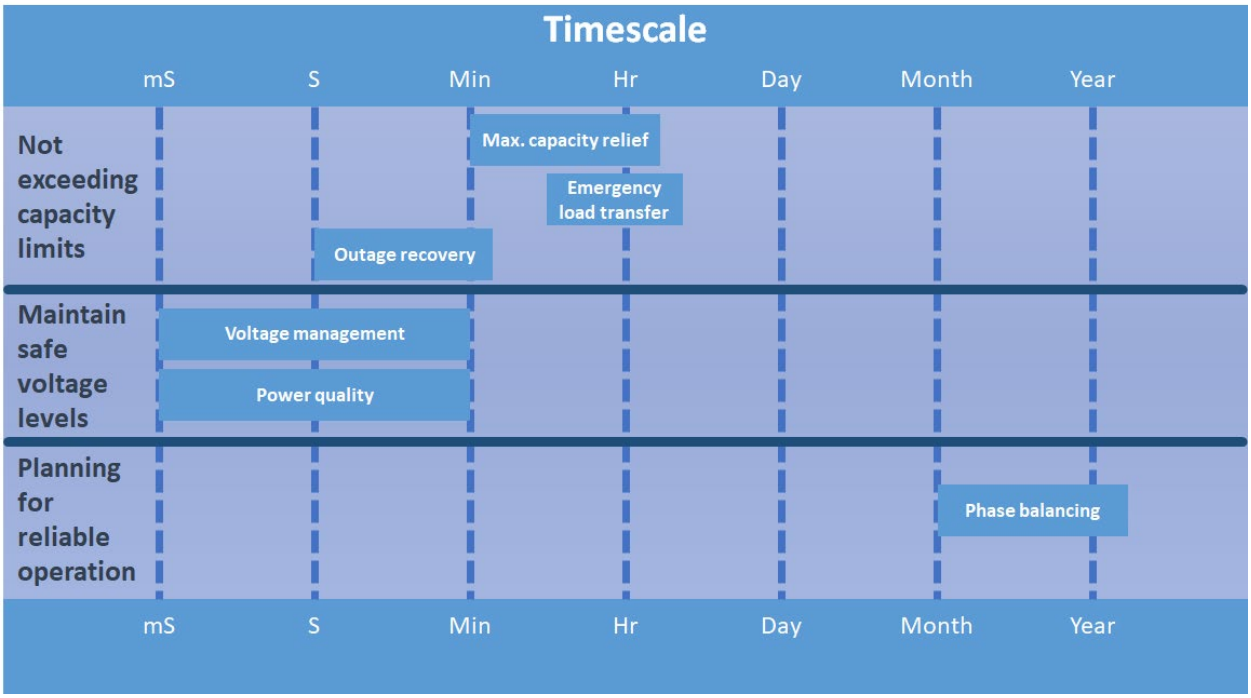

Figure 3: Distribution System Services[17]

B. Topic Description

This FOA calls for projects that seek an integration of the technological, operational, environmental, and economic aspects to create value for occupants and other participants. Using technology, software, and business models that can integrate DERs across buildings and with the grid should create a bidirectional flow of benefits. Non-electric fuel sources may be applicable, for both distributed generation and building equipment, provided they meet the objectives of the FOA and are allowed by appropriate regulatory agencies to provide grid services (if being used for that purpose).

Energy efficient buildings should be used as a foundational resource and utilized to the greatest extent reasonable in project communities. Applicants are strongly encouraged to apply high performance building principles to build and/or retrofit new and existing buildings. Several examples of cost-effective deep efficiency improvements have been documented in the Better Buildings Solution Center and the Building America Solution Center. For projects including

[17] 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.

smart EV charging[18] applicants are encouraged to reference the "Summary Report On EVs at Scale and the U.S. Electric Power System"

Critical Aspects for Proposed Projects

Table 1 lists all of the required categories and identifies the aspects that are required and the ones that are encouraged of the connected community projects proposed in response to this FOA.

Table 1 – Connected Community Aspects

Category	Description
Grid Issues and Services to Address	Each project must: • Address increased integration of renewable energy resources and at least one more electric grid issue relevant to transmission and/or distribution as shown in Figures 2 and 3. • Provide at least two defined and quantifiable grid services that reliably and cost effectively address targeted grid issues. • Incorporate resilience at a defined scale (e.g. Building, Campus, Community, Feeder, Substation etc.) enhancing the ability to withstand or recover from disruptions. • Include the amount of load flexibility needed to provide a viable demonstration of the provision of grid services at a scale meaningful to participate in wholesale markets and/or at the distribution grid level over multiple seasons. See Appendix J for more detail. Projects are encouraged to: • Address more than two grid issues. • Provide more than two grid services to address the targeted grid issues. • 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.
Energy Efficiency	Each project must: • Significantly improve the energy efficiency performance of buildings in the community over an appropriate baseline.

[18] Smart EV Charging refers to controls beyond simple time of day pricing, but includes the ability communicate and control loads for either individual vehicles or charging locations as the utility level. This requires bi-directional communication from the vehicle (including a process for the vehicle operator to indicate their charging needs) to the charging equipment to the aggregator and ultimately the utility.

	Projects are encouraged to: • Improve energy efficiency by more than 30% over the baseline while meeting objectives and maintaining occupant comfort, building performance, and economic viability.
Building Load Flexibility Provision and Metrics	Each project must: • Provide a significant and quantifiable amount of building load flexibility that provides shed, shift, and/or modulation grid services while maintaining comfort and performance. • Use specific performance metrics to quantify the services provided, such as maximum, average, and minimum time dependent flexibility (e.g. kW and % of the applicable electricity network system).
DER Types, Capacities (as applicable) and Quantities	Each project must: • Include, in addition to demand response and energy efficiency, at least two other types of DERs (such as PV, electric vehicles, electrical or thermal energy storage[19], etc.) that support emissions reduction, demand flexibility, affordability, and resiliency. These may be building level installations or community scale installations. Projects may also consider: • If applicable, demonstrating smart managed charging of large scale EVs (either 1000'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).
Coordinated Controls for Energy Efficient and Flexible Load Operations	Each project must: • Have a coordinated control and integration approach, to be used for energy efficiency and load flexibility to provide coordinated management both within individual buildings and across multiple buildings and/or DERs. • Focus on groups of buildings with integrated DERs that when aggregated demonstrate measurable added value to both the 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 energy management.

[19] 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.

	• Consider how the community will support ongoing operations and maintenance to ensure sustainability of the flexibility strategies.
Implementation Pathways	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 to make buildings grid interactive. • Integrate technologies, building infrastructure, and/or contractual arrangements that are broadly replicable across the U.S. building stock and electricity business and regulatory environments. Projects are encouraged to: • Systemically address interoperability throughout their project, and use appropriate open standards for the grid or utility signal connection for their application. Examples of open standards include IEEE 2030.5, OpenADR, OpenFMB,DNP3, and The Open Charge Point Protocol(OCPP) .
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)
Business Model Innovation	Each project must: • Include a business model that can be used to achieve economic viability at scale. It should recognize the technological, business and contractual approaches that will be potentially attractive to customers, utilities, builders 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 and grid needs. Projects are encouraged to: • Include representation of grid resources/assets (e.g. electric utility, efficiency utility, 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), and researchers (e.g. national lab, university, consulting firm).
Project 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 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. Projects are encouraged to: • Directly support corporate, utility, state, or local emission reduction goals where applicable. • Ensure equitable access to community energy resources, affordable housing, and other community improvements. • Provide increased community resilience to grid outages and other extreme events.
Data and Analysis Methods	Each project must: • Implement a well-thought out data collection and analysis plan, working with the Connected Communities National Coordinator (described following), that includes sensing and software/analytical platforms, 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. • Include the data types identified in Table 2: Data Requirements
Occupant Experience	Each project must: • Collect data to understand the availability of building services (e.g. hot water, lighting) on the occupant experience and comfort 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.
Cybersecurity and Privacy	Each project must: • Include measures that will be utilized in the defense, detection, and mitigation of cyber security threats covering both the application of 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.
Scalability and Replication	Projects are encouraged to: • Use approaches that can be easily applied and scaled to other communities and distribution networks. • Include a plan for replication in other communities • Identify the challenges and needs to scale the connected community.
Outreach	Each project must: • Include a communication plan to educate relevant industries, public officials, professionals, the public and stakeholders regarding the project's approach, implementation and value.

Data Requirements

All projects are required to produce and collect data to demonstrate the ability of the project to provide the efficiency, load flexibility, and the grid services targeted. This will be quantified through a measurement and verification process utilizing an evaluation protocol as provided by the National Coordinator. In order to measure quantity and "quality" of actual load change and or energy services, it is anticipated that all buildings will be equipped with interval metering infrastructure and analytics, and analogous infrastructure on the grid side. Each project should produce the types of data listed in Table 2.

Table 2: Data Requirements

Data Types
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;
Building occupant / vehicle operator benefits;
Financial costs and benefits (e.g. capital costs, energy costs, disruption, etc.) for both building/vehicle owners 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. 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.

Cohort Approach and National Coordinator

Selected projects will serve as a cohort to share challenges and best practices between each other and publicly. Lawrence Berkeley National Laboratory (LBNL) will serve as the Connected Communities National Coordinator to support planning, implementation, communications, stakeholder engagement, project evaluations and publishing of research findings. In this role LBNL 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) and provide technical assistance to awardees with common challenges. The primary role will be to support the projects, and synthesize project results to identify lessons learned and best practices critical for replicability including technologies, policies, business models, incentives, and regulatory issues. The National Coordinator will also play a key role in helping to develop the overall research and evaluation plan, including data collection process, methods to evaluate project performance, analysis to answer research questions, and detailed case studies of all projects. As the National Coordinator, LBNL will not be eligible to apply for this FOA.

The National Coordinator will provide standardized analysis methods across the projects selected for awards, and limited technical assistance to each project through Cooperative Research and Development Agreements (CRADA) or similar LBNL partnering agreements with recipients funded directly from DOE (and not through the project's awarded funds) on activities such as the following items. Full scope to be finalized post award, and is pending available funds.

- Development of, and assistance with, standardized data management approaches for ease of analysis.
- Development of standardized summary metrics to characterize energy performance data, provide benchmarking, and measure peak demand, load shapes, grid services, baselines, thermal comfort, and IAQ.
- Creation and application of a standardized cost data framework – to enable consistent data collection of equipment, hardware, software, labor, maintenance, and other costs.
- Development of standardized surveys - standardized content for surveys, such as customer experience of technologies and services.
- Technical & program sound boarding - facilitated discussions to assist ideation and resolution of project challenges, focused on aspects such as key considerations, success factors, etc.

- Review of applicant's plans and reports - design and controls strategies, measurement plans, interim and final reports.

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. The selectees will be expected to collaborate with LBNL on the evaluation scope, working with LBNL's standardized evaluation protocol as a starting point. Refer to Appendix H for details, including further definition of the division of labor between the applicant and the National Coordinator. LBNL will not provide detailed technical designs, plans, specifications or reports, and will not participate in audits, onsite assessments, data collection, technology selection, service provider selection, or related activities.

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

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. Funding Restrictions for information about allowable costs.

C. Teaming Partner List

EERE 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.

EERE is compiling a Teaming Partner List to facilitate the widest possible participation for this FOA. The list allows organizations with expertise in the topic and wish to participate in an application, but may not wish to apply as the Prime applicant to the FOA, to express their interest to potential applicants and to explore potential partnerships.

The Teaming Partner List will be available on https://eere-Exchange.energy.gov under the Connected Communities FOA (DE-FOA-0002206). The Teaming Partner List will be updated at least weekly until the close of the Full Application period, to reflect new Teaming Partners who have

provided their information. **Any organization that would like to be included on this list should submit the following information to the Teaming List email CCPilotsTeamingList@hq.doe.gov with the subject line "Teaming Partner Information":**

- **Organization Name;**
- **Generic Organization Contact Email;**
- **One of the following: Generic Organization Contact Email, Web Site Contact-Us URL, or social media URL (Facebook, LinkedIn, Twitter, etc.);**
- **Organization Type;**
- **Area of Technical Expertise (bulleted list less than 25 words); and**
- **Brief Description of Capabilities (less than 100 words).**

By submitting a request to be included on the Teaming Partner List, the requesting organization consents to the publication of the above-referenced information. **Each organization should provide a generic point of contact e-mail address to receive queries. Direct personal e-mail addresses will not be posted.** By facilitating this Teaming Partner List, EERE does not endorse or otherwise evaluate the qualifications of the entities that self-identify themselves for placement on the Teaming Partner List. EERE will not pay for the provision of any information, nor will it compensate any applicants or requesting organizations for the development of such information.

D. 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 Section 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 multiple buildings;
- Applications that do not use building energy efficiency to achieve the objectives of the FOA;
- Applications proposing only the construction of new buildings or major grid upgrades.

E. Authorizing Statutes

The programmatic authorizing statute is EPAct 2005 911(a)(2)(B).

Awards made under this announcement will fall under the purview of 2 Code of Federal Regulation (CFR) Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

EERE and OE expect to make a total of approximately $65 million of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 6-8 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between $3 million and $7 million, but DOE reserves the right to adjust these amounts depending on the applications submitted.

There is only one topic for this FOA and EERE may issue one, multiple, or no awards.

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 up to 36-60 months in length, comprised of one or more budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and Go/No-Go decision review. For a complete list, see Section VI.B.xiv. At the Go/No-Go decision points, EERE will evaluate project performance, project schedule adherence, the extent milestone objectives are met, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE 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 project because of insufficient progress, change in strategic direction, or lack of funding.

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 United States 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.ix of the FOA for more information on what substantial involvement may involve.

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

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.

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. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient or subrecipient.

ii. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States and have a physical location for business operations in the United States are eligible to apply for funding as a prime recipient or subrecipient. 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.

State, local, and tribal government entities are eligible to apply for funding as a prime recipient or subrecipient.

For purposes of this FOA, an eligible tribal government means an indian tribe, band, nation or other organized group or community (including Alaska Native villages), and must be federally recognized as listed in Indian Entities Recognized and Eligible to Receive Services from the United States Bureau of Indian Affairs, published by the Department of Interior's Bureau of Indian Affairs in the Federal Register on January 30, 2020, 85 FR 20.

DOE/NNSA FFRDCs, with the exception of Lawrence Berkeley National Laboratory, are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient. Lawrence Berkeley National Laboratory is not eligible to apply as a prime or subrecipient under this FOA.

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

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

iii. Foreign Entities

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this FOA. Other than as provided in the "Individuals" or "Domestic Entities" sections above, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of the United States and have a physical location for business operations in the United States. If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a state or territory of the United States to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the prime recipient in the Full Application (i.e., a foreign entity may request that it remains the prime recipient on an award). To do so, the applicant must submit an explicit written waiver request in the Full Application. Appendix C lists the necessary information that must be included in a request to waive this requirement. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

In the waiver request, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the prime recipient. EERE may require additional information before considering the waiver request.

A foreign entity may receive funding as a subrecipient.

iv. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a prime recipient or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a state or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

v. Unincorporated Consortia

Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative. The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a state or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the prime recipient/consortium representative under Section III.A. of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. Cost Sharing

Cost Share Percentage

The cost share must be at least 30% of the total allowable costs for demonstration projects (i.e., the sum of the government share, including FFRDC costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)

To assist applicants in calculating 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 project as a whole, 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.

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 project as a whole 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.

Project teams may provide cost share in the form of cash or in-kind contributions. 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 funding was not provided to the state or local government by the federal government.

The prime recipient may not use the following sources to meet its cost share obligations including, but not limited to:

- 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

EERE 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 EERE 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

Concept Papers, Full Applications and Replies to Reviewer Comments must meet all compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions, including Concept Papers, Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

i. Compliance Criteria

1. *Concept Papers*
Concept Papers are deemed compliant if:

- The Concept Paper complies with the content and form requirements in Section IV.B. of the FOA; and
- The applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in this FOA.

2. *Full Applications*
Full Applications are deemed compliant if:

- The applicant submitted a compliant Concept Paper;
- The Full Application complies with the content and form requirements in Section IV.C. of the FOA; and
- The applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in the FOA.

3. *Replies to Reviewer Comments*
Replies to Reviewer Comments are deemed compliant if:

- The Reply to Reviewer Comments complies with the content and form requirements in Section IV.D. of the FOA; and
- The applicant successfully uploaded all required documents to EERE Exchange by the deadline stated in the FOA.

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 Federally Funded Research and Development Centers 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:

1. *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.

2. *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.

3. *Value/Funding*
The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal (WP) system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

4. *Cost Share*
Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, 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.

5. *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 contractor.

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, distinct project and provided that 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 submit an application in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

The application process will include two phases: a Concept Paper phase and a Full Application phase. At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Exchange at https://eere-exchange.energy.gov/, unless specifically stated otherwise. **EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, or incomplete submissions**. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion.

A **Control Number** will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all application documents, as described below.

The Concept Paper, Full Application, and Reply to Reviewer Comments must conform to the following requirements:

- 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 inch paper with margins not less than one inch on every side. Use Times New Roman 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;
- The Control Number must be prominently displayed on the upper right corner of the header of every page. 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.

Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their Concept Papers and Full Applications at least 48 hours in advance of the submission deadline**. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 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 urges applicants to carefully review their Concept Papers and Full Applications and to allow sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.ii. of the FOA.

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. Should applicants experience problems with EERE Exchange, the following information may be helpful.

Applicants that experience issues with submission PRIOR to the FOA deadline: In the event that an applicant experiences technical difficulties with a submission, the applicant should contact the EERE Exchange helpdesk for assistance (EERE-ExchangeSupport@hq.doe.gov). The EERE Exchange helpdesk and/or the EERE Exchange system administrators will assist applicants in resolving issues.

A. Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, 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 20MB. Files in excess of 20MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 20MB 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:
ControlNumber_LeadOrganization_Project_Part_1
ControlNumber_LeadOrganization_Project_Part_2

B. Content and Form of the Concept Paper

To be eligible to submit a Full Application, applicants must submit a Concept Paper by the specified due date and time. Applicants are encouraged to submit a concept paper as soon as possible.

i. Concept Paper Content Requirements

EERE will not review or consider ineligible Concept Papers (see Section III of the FOA).

Each Concept Paper must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Concept Paper.

The Concept Paper must conform to the following content requirements:

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, and any statements regarding confidentiality.
Technical Description and Impacts	4 pages maximum	Applicants are required to succinctly describe: • A detailed description of the project, including a description of the electric grid infrastructure (e.g. distribution grid), building descriptions (e.g. types, sizes and quantities), DERs (e.g. types, sizes and quantities), location(s), efficiency improvements, total load size and estimated load flexibility that will participate in the demonstration;

		• Identify the grid issues being addressed and the grid services that are to be provided; • The potential impact that the proposed project would have in terms of energy savings, grid services provided, emissions reduction, and value to the occupants and the grid operators or other entities; and • The impact that EERE funding would have on the proposed project.
Addendum	2 pages maximum	Applicants are required to succinctly describe 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 and its teaming partners have prior experience which demonstrates an ability to carry out projects of similar risk and complexity; • Whether the applicant has worked together with its teaming partners on prior projects or programs; and • Whether the applicant has adequate access to resources and facilities necessary to accomplish the effort and/or clearly explain how it intends to obtain access to the necessary equipment and facilities. 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. An applicant who receives a "discouraged" notification may still submit a Full Application. EERE will review all eligible Full Applications. However, by discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project in an effort to save the applicant the time and expense of preparing an application that is unlikely to be selected for award negotiations. For this to be effective applicants are encouraged to submit their concept papers as early as possible.

EERE may include general comments provided from reviewers on an applicant's Concept Paper in the encourage/discourage notification posted on EERE Exchange at the close of that phase.

C. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following

application forms found on the EERE Exchange website at https://eere-Exchange.energy.gov/, in accordance with the instructions.

The amount of time Applicants will have from receipt of the Concept Paper Encourage/Discourage notification on EERE Exchange to prepare and submit a Full Application is dependent on when the concept paper is submitted. 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. Applicants will receive a control number upon clicking the "Create Concept Paper" button in EERE Exchange, and should include that control number in the file name of their Full Application submission (i.e., *Control number_Applicant Name_Full Application*).

i. Full Application Content Requirements

EERE will not review or consider ineligible Full Applications (see Section III. of the FOA).

Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application. Full Applications must conform to the following requirements:

Submission	Components	File Name
Full Application (PDF, unless stated otherwise)	Technical Volume (PDF format. See Chart in Section IV.D.ii.)	ControlNumber_LeadOrganization_TechnicalVolume
	Resumes (PDF format. 1 page maximum per person)	ControlNumber_LeadOrganization_Resumes
	Letters of Commitment, if applicable (PDF format. 1 page maximum per letter)	ControlNumber_LeadOrganization_LOCs
	Statement of Project Objectives (SOPO) (Microsoft Word format. 10 page limit)	ControlNumber_LeadOrganization_SOPO
	SF-424 Application for Federal Assistance (PDF format)	ControlNumber_LeadOrganization_App424
	Budget Justification (Microsoft Excel format. Applicants must use the template available in EERE Exchange)	ControlNumber_LeadOrganization_Budget_Justification
	Summary for Public Release (PDF format. 1 page limit)	ControlNumber_LeadOrganization_Summary
	Summary Slide (Microsoft PowerPoint format. 1 page limit)	ControlNumber_LeadOrganization_Slide

	Subrecipient Budget Justification, if applicable (Microsoft Excel format. Applicants must use the template available in EERE Exchange)	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
	DOE WP for FFRDC, if applicable (PDF format. See DOE O 412.1A, Attachment 3)	ControlNumber_LeadOrganization_WP
	Authorization from cognizant Contracting Officer for FFRDC, if applicable (PDF format)	ControlNumber_LeadOrganization_FFRDCAuth
	SF-LLL Disclosure of Lobbying Activities (PDF format)	ControlNumber_LeadOrganization_SF-LLL
	Foreign Entity and Foreign Work waiver requests, if applicable (PDF format)	ControlNumber_LeadOrganization_Waiver
	U.S. Manufacturing Plan (PDF format)	ControlNumber_LeadOrganization_USMP
	Open Source Software Distribution Plan (PDF format)	ControlNumber_LeadOrganization_OSSDP

Note: The maximum file size that can be uploaded to the EERE Exchange website is 20MB. Files in excess of 20MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 20MB 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:
ControlNumber_LeadOrganization_TechnicalVolume_Part_1
ControlNumber_LeadOrganization_TechnicalVolume_Part_2

EERE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 20MB.

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

ii. Technical Volume

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.ii. 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 of the information in the table below. The applicant should consider the weighting of each of the evaluation 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. The Technical Volume must conform to the following content requirements:

SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the project title, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.

Project Overview (This section should constitute approximately 10% of the Technical Volume)	The Project Overview should contain the following information:
	• Background: The applicant should discuss the background of their organization, including the history, successes, and current projects relevant to the technical topic being addressed in the Full Application.
	• Project Description: The application should:
	  ○ Provide a detailed description of the project, including a description of:
	  ▪ the electric grid infrastructure (e.g. distribution grid),
	  ▪ building descriptions (e.g. types, sizes and quantities),
	  ▪ DERs (e.g. types, sizes and quantities),
	  ▪ location(s),
	  ▪ the building design strategies, technologies and operations that will both improve energy efficiency and demand flexibility,
	  ▪ total load size and estimated load flexibility that will participate in the demonstration.
	  ○ Identify and describe two or more electric grid (transmission and/or distribution) issues addressed by the project (as shown in Figures 2 and 3)
	  ○ Provide two or more defined and quantifiable grid services that are reliable and cost effective to address the grid issues identified.

	• Project Goal: The applicant should explicitly identify the baseline they will be comparing to and the targeted improvements over that baseline for energy efficiency and demand flexibility as well as 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 (This section should constitute approximately 30% of the Technical Volume)	The Technical Description should contain the following information: • Relevance and Outcomes: 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 clearly specify the expected outcomes of the project. The applicant should provide a detailed description of the connected community project including: ○ How the connected community 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 in wholesale markets and/or at the distribution grid level over multiple seasons. See Appendix J for more detail. ○ The planned level of energy efficiency performance of the buildings 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. ○ The total load flexibility to be provided by the connected community (buildings and 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 (wholesale or 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, 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 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 and/or DERs. ○ 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 to make buildings grid interactive. ○ The strategies for recruitment and retention of connected community participants, including elements of customer segmentation and how technologies will be adopted and energy use patterns changed. ○ The business models to be used for demand flexibility and DER coordination, aggregation and optimization across buildings that can be scaled, recognizing technological, business and contractual approaches that will be potentially attractive to customers, utilities, builders and other key stakeholders. ○ 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. The applicant should describe the current state-of-the-art in the applicable field, the specific advancements of the proposed project community, and the overall impact on advancing the state-of-the-art if the project is successful. • Ensure sufficiency of detail in the application to assess whether the proposed project is viable.
Workplan and Market Transformation Plan (This section should constitute approximately 40% 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 SMART technical milestone. SMART

	milestones should be **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**imely, 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: The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. A Go/No-Go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See Section VI.B.xiv. The applicant should also provide the specific technical criteria to be used to evaluate the project at the Go/No-Go decision point. The summary provided should be consistent with the SOPO. Go/No-Go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone.
	• End of Project Goal: The applicant should provide a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO.
	• Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points.
	• Project Management: The applicant should discuss the team's proposed management plan, including the following:
	  ○ The overall approach to and organization for managing the work
	  ○ The roles of each project team member
	  ○ Any critical handoffs/interdependencies among project team members
	  ○ The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices
	  ○ The approach to project risk management
	  ○ A description of how project changes will be handled
	  ○ If applicable, the approach to Quality Assurance/Control
	  ○ How communications will be maintained among project team members

	• Market Transformation Plan: The Market Transformation plan should address how the project community can be replicated and scaled up. The applicant should provide a market transformation plan, including the following components: ○ Value Proposition and Market Opportunity: quantify the market opportunity and value proposition for replication of the community in other locations and describe how additional locations for replication and scale will be identified. Include discussion of customer segmentation and how technologies will be adopted and energy use patterns changed. ○ Risk and Mitigation Strategy: Identify the relevant challenges to replication 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. ○ Scalability Analysis: Discuss the challenges to scaling up the project community to larger communities and markets and identify the necessary steps required to scale up.
Technical Qualifications and Resources (Approximately 20% of the Technical Volume)	The Technical Qualifications and Resources should contain the following information: • Describe how the proposed team includes all of the critical partners and stakeholders needed to successfully implement the project. • Describe the project team's unique qualifications and expertise, including those of key subrecipients. • Describe the project team's existing resources and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. • This section should also include relevant, previous work efforts including large-scale demonstration projects, demonstrated innovations, and how these enable the applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. • For multi-organizational or multi-investigator projects, succinctly describe: ○ The roles and the work to be performed by each PI and Key Participant ○ Business agreements between the applicant and each PI and Key Participant ○ How the various efforts will be integrated and managed

	○ Process for making decisions on scientific/technical direction ○ Publication arrangements ○ Intellectual Property issues ○ Communication plans

iii. Resumes

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

iv. Letters of Commitment

Submit letters of commitment from all subrecipient and third party cost share providers. If applicable, also include any letters of commitment from partners/end users (1 page maximum per letter). Save the letters of commitment in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_LOCs".

v. Statement of Project Objectives (SOPO)

Applicants are required to complete a SOPO. A SOPO template is available 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. Save the SOPO in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_SOPO".

vi. SF-424: Application for Federal Assistance

Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms, under Certifications and Assurances. Note: The dates and dollar amounts 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_App424".

vii. Budget Justification Workbook

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at https://eere-Exchange.energy.gov/. Prime recipients must complete each tab of the Budget Justification Workbook for the project as a whole, 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".

viii. Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 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".

ix. Summary Slide

Applicants are required to provide a single PowerPoint slide summarizing the proposed project. The slide must be submitted in Microsoft PowerPoint format. This slide is used during the evaluation process. Save the Summary Slide in a single file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

The Summary Slide template requires the following information:

- A project summary;
- A description of the project's impact;
- Proposed project baseline and improvement goals for energy efficiency and energy flexibility;
- Any key graphics (illustrations, charts and/or tables);
- The project's key idea/takeaway;

- Project title, prime recipient, Principal Investigator, and Key Participant information; and
- Requested EERE funds and proposed applicant cost share.

x. 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 percent of the total work effort (whichever is less). The budget justification must include the same justification information described in the "Budget Justification" section above. Save each subrecipient budget justification in a Microsoft Excel file using the following convention for the title "ControlNumber_LeadOrganization_Subrecipient_Budget_Justification".

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

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

xii. Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs (if applicable)

The cognizant Contracting Officer for 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".

xiii. SF-LLL: Disclosure of Lobbying Activities (required)

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

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

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

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

xiv. Waiver Requests: Foreign Entities and Foreign Work (if applicable)

1. **Foreign Entity Participation:**
   As set forth in Section III.A.iii., all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of 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 necessary information that must be included in a request to waive this requirement.

2. **Performance of Work in the United States (Foreign Work Waiver)**
   As set forth in Section IV.J.iii., all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. Appendix C lists the necessary information that must be included in a foreign work waiver request.

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

xv. U.S. Manufacturing Commitments

Pursuant to the DOE Determination of Exceptional Circumstances (DEC) dated September 9, 2013, each applicant is required to submit a U.S. Manufacturing Plan as part of its application. The U.S. Manufacturing Plan represents the applicant's measurable commitment to support U.S. manufacturing as a result of its award.

Each U.S. Manufacturing Plan must include a commitment 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 can show to the satisfaction of DOE that it is not commercially feasible to do so (referred to hereinafter as "the U.S. Competitiveness Provision"). The

applicant further agrees to make the U.S. Competitiveness Provision binding on any subawardee and any assignee or licensee or any entity otherwise acquiring rights to any subject invention, including subsequent assignees or licensees. A subject invention is any invention conceived of or first actually reduced to practice under an award.

Due to the lower technology readiness levels of this FOA, DOE does not expect the U.S. Manufacturing Plans to be tied to a specific product or technology. However, in lieu of the U.S. Competitiveness Provision, an applicant may propose a U.S. Manufacturing Plan with more specific commitments that would be beneficial to the U.S. economy and competitiveness. For example, an applicant may commit specific products to be manufactured in the U.S., commit to a specific investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. or support a certain number of jobs in the U.S. related to the technology. An applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. Manufacturing Plan may indicate the applicant's plan and commitment to use a specific licensing strategy that would likely support U.S. manufacturing.

If DOE determines, at its sole discretion, that the more specific commitments would provide a sufficient benefit to the U.S. economy and industrial competitiveness, the specific commitments will be part of the terms and conditions of the award. For all other awards, the U.S. Competitiveness Provision shall be incorporated as part of the terms and conditions of the award as the U.S. Manufacturing Plan for that award.

The U.S. Competitiveness Provision is also a requirement for the Class Patent Waiver that applies to domestic large business under this FOA (see Section VIII.K. Title to Subject Inventions).

Save the U.S. Manufacturing Plan in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_USMP”.

xvi. Data Management Plan (DMP)

Applicants whose Full Applications are selected for award negotiations will be required to submit a DMP during the award negotiations phase. The DMP shall meet the data requirements described in Table 2 and include a measurement and verification plan.

The Data Management Plan (DMP) submitted by the applicant must at a minimum, (1) describe how data sharing and preservation will enable validation of the results from the proposed work, how the results could be validated if data

are not shared or preserved and (2) have a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications. DOE Public Access Plan dated July 24, 2014 provides additional guidance and information on DMPs.

For any publication that includes results of the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, the recipient must indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

xvii. Open Source Software Distribution Plan

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 is required for those applicants who choose to make any portion, or all of their software open source as part of their Full Application. This plan describes how software produced under this FOA will be distributed.. Guidance for preparing an Open Source Software Distribution Plan is included in Appendix D of the FOA.

D. Content and Form of Replies to Reviewer Comments

EERE will provide applicants with reviewer comments following the evaluation of all eligible Full Applications. Applicants will have a brief opportunity to review the comments and to prepare a short Reply to Reviewer Comments responding to the comments however they desire or supplementing their Full Application. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in EERE Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor EERE Exchange in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their reply due to failure to check EERE Exchange or relying on the expected date alone. Applicants should anticipate having approximately three (3) business days to submit Replies to Reviewer Comments.

EERE will not review or consider ineligible Replies to Reviewer Comments (see Section III.C of the FOA). EERE will review and consider each eligible Full Application, even if no Reply is submitted or if the Reply is found to be ineligible.

Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three (3) pages in length, EERE will review only the first three (3) pages and disregard any additional pages.

SECTION	PAGE LIMIT	DESCRIPTION
Text	2 pages max	Applicants may respond to one or more reviewer comments or supplement their Full Application.
Optional	1 page max	Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable.

E. Post Selection Information Requests

If selected for award, EERE reserves the right to request additional or clarifying information regarding the following (non-exhaustive list):

- Indirect cost information;
- Other budget information;
- Commitment Letters 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);
- Representation of Limited Rights Data and Restricted Software, if applicable; and
- Environmental Questionnaire.

F. Dun and Bradstreet Universal Numbering System (DUNS) Number 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) Be registered in the SAM at https://www.sam.gov before submitting its application; (2) provide a valid DUNS number in its application; and (3) continue to 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 DUNS 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, the 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.

G. Submission Dates and Times

Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted in EERE Exchange no later than 5 p.m. Eastern Time 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.

Refer to the following applicable federal cost principles for more information:

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

ii. Pre-Award Costs

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 assigned to the award.

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 override these NEPA requirements 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. This requirement does not apply to the purchase of supplies and equipment; however, the prime recipient should make every effort to purchase supplies and equipment within 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**
There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a foreign work waiver, the applicant must submit a written waiver request to EERE. Appendix C lists the necessary information that must be included in a request for a foreign work waiver.

The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional information before considering a waiver request. Save the waiver request(s) in a single PDF file titled "ControlNumber_LeadOrganization_Waiver". 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.

Property disposition will be required at the end of a project if the current fair market value of property exceeds $5,000. For-profit entity disposition requirements are set forth at 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 – 200.316.

vii. Domestic Preference – Infrastructure Projects

As appropriate and to the extent consistent with law, Applicants shall ensure that, to the greatest extent practicable, iron and aluminum as well as steel, cement, and other manufactured products (items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics

and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber) used in the proposed project shall be produced in the United States. This requirement shall flow down to all sub-awards including all contracts, subcontracts and purchase orders for work performed under the proposed project.

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/web/grants/forms/sf-424-individual-family.html) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

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

ix. Risk Assessment

Prior to making a federal award, the DOE is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any Office of Management and Budget (OMB)-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and "Do Not Pay."

In addition, DOE evaluates the risk(s) posed by applicants before they receive federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-federal entities.

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.

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.

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 sub-criteria:

- The applicant clearly presents the proposed connected community project, the technology and approach being demonstrated, the locations, building types/systems, business models and all other salient information;
- The project's potential to replicate, scale, validate, advance and deploy the current state-of-the-art;
- The applicant has identified risks and challenges, including possible mitigation strategies, and has shown the impact that EERE funding and the proposed project would have;

- The applicant has the qualifications, experience, capabilities and other resources necessary to complete (incl. measurement and evaluation, communications and outreach, etc.) 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 merit 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 sub-criteria:

Technical Merit and Innovation

- Degree to which the proposed energy efficiency and demand flexibility improvements and the integration of additional DERs included in the project are clearly described and impactful for the grid issues addressed;
- Extent to which the application includes multiple grid services, addressing multiple grid issues;
- Extent to which the technical solution includes coordinated controls across the connected community to provide enhanced energy efficient and flexible load operations;
- Extent to which the technical solution achieves load flexibility and maintains or enhances building (end use) services to occupants (e.g. occupant comfort and productivity), protect data privacy, and provide cybersecurity in the project demonstration and in a scalable implementation of the technology solution, and
- Extent to which the application describes a viable technical solution.

Impact of Technology Advancement

- How the project supports the topic area objectives and target specifications and metrics;
- Extent to which the application specifically and convincingly demonstrates at a sufficient scale how the connected community project will provide grid services to enable maximized use of renewable generation and minimized emissions; and
- Extent to which the proposed connected community solution has the potential to be replicable, scalable and advance the state-of-the-art.

Criterion 2: Project Research and Market Transformation Plan (30%)
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 ; and
- Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan and SOPO will succeed in meeting the project goals.

Identification of Risks

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

Baseline, Metrics, and Deliverables

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

Market Transformation Plan

- Degree to which the plan identifies a reasonable path toward commercial viability and success 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.

Criterion 3: Team and Resources (20%)
This criterion involves consideration of the following factors:

- The capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposed work with a high probability of success. The qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- The degree to which the proposed team demonstrates the ability to facilitate and expedite further development and commercial deployment of the proposed technologies or approaches;

- The level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
- The reasonableness of the budget and spend plan for the proposed project and objectives.

iii. Criteria for Replies to Reviewer Comments

EERE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

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 April 14, 2017, which is available at: https://energy.gov/management/downloads/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 unweighted program policy factors in determining which Full Applications to select for award negotiations:

- The degree to which the project's solution or strategy will maximize deployment or replication;
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers;
- 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 supports complementary efforts or projects, which, when taken together, will best achieve the research goals and objectives;
- 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 degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States;
- 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 avoids duplication/overlap with other publicly or privately funded work;
- 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[20]. 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, in determining which applications to select.

ii. Pre-Selection Interviews

As part of the evaluation and selection process, EERE may invite one or more applicants to participate in Pre-Selection Interviews. Pre-Selection Interviews are distinct from and more formal than pre-selection clarifications (See Section V.D.iii of the FOA). The invited applicant(s) will meet with EERE representatives to provide clarification on the contents of the Full Applications and to provide EERE an opportunity to ask questions regarding the proposed project. The information provided by applicants to EERE through Pre-Selection Interviews contributes to EERE's selection decisions.

[20] 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.

EERE will arrange to meet with the invited applicants in person at EERE's offices or a mutually agreed upon location. EERE may also arrange site visits at certain applicants' facilities. In the alternative, EERE may invite certain applicants to participate in a one-on-one conference with EERE via webinar, videoconference, or conference call.

EERE will not reimburse applicants for travel and other expenses relating to the Pre-Selection Interviews, nor will these costs be eligible for reimbursement as pre-award costs.

EERE may obtain additional information through Pre-Selection Interviews that will be used to make a final selection determination. EERE may select applications for funding and make awards without Pre-Selection Interviews. Participation in Pre-Selection Interviews with EERE does not signify that applicants have been selected for award negotiations.

iii. 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, and will be limited to information already provided in the application documentation. 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.

iv. Recipient Integrity and Performance Matters

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 information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, 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 C.F.R. § 200.205.

v. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, 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 within seven days of concept paper submission. EERE will post these notifications to EERE Exchange.

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. Applicants are encouraged to submit their concept paper early to ensure timely feedback.

A notification encouraging the submission of a Full Application does not authorize the applicant to commence performance of the project. Please refer to Section IV.I.ii. of the FOA for guidance on pre-award costs.

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. Successful Applicants

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. Applicants do not receive an award 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 before submitting an application in response to this FOA, and it is vital that applicants address these items as soon as possible. Some may take several weeks, and failure to complete them could interfere with an applicant's ability to apply to this FOA, or to meet the negotiation deadlines and receive an award if the application is selected. These requirements are as follows:

1. **EERE Exchange**
   Register and create an account on EERE Exchange at https://eere-Exchange.energy.gov.
   This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. **This step is required to apply to this FOA.**

   The EERE 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. **DUNS Number**
   Obtain a DUNS number (including the plus 4 extension, if applicable) at http://fedgov.dnb.com/webform.

3. **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.

4. **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.

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

6. **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 Access Under DOE Order 142.3A, "Unclassified Foreign Visits and Assignments Program"

All applicants selected for an award under this FOA may be required to provide information to DOE in order to satisfy requirements for foreign nationals' access to DOE sites, information, technologies, equipment, programs or personnel. A foreign national is defined as any person who is not a U.S. citizen by birth or naturalization. If a selected applicant (including any of its subrecipients, contractors or vendors) anticipates involving foreign nationals in the performance of its award, the selected applicant may be required to provide DOE with specific information about each foreign national to ensure compliance with the requirements for access approval. National laboratory personnel already cleared for site access may be excluded. Access approval for foreign nationals from countries identified on the U.S. Department of State's list of State Sponsors of Terrorism must receive final approval authority from the Secretary of Energy or the Secretary's assignee before they commence any work under the award.

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 recipients selected for 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 records must be prepared to complete the NEPA review process (e.g., biological evaluations or environmental assessments), the recipient may be required to prepare the records and the costs to prepare the necessary records may be included as part of the project costs.

vii. 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 in response 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 the following definitions apply:

   A Corporation includes any 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]. It includes both for-profit and non-profit organizations.

3. **Nondisclosure and Confidentiality Agreements Representations**
   In submitting an application in response 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 particular 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 Department of Justice, that are essential to reporting a substantial violation of law.

viii. 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.

ix. 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 as a whole. 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.

x. Intellectual Property Management Plan (IPMP)

As a quarter 1 milestone if selected for award, applicants must submit an executed IPMP between the members of the consortia or team.

The award will set forth the treatment of and obligations related to intellectual property rights between EERE and the individual members. The IPMP should describe how the members will handle intellectual property rights and issues between themselves while ensuring compliance with federal intellectual property laws, regulations, and policies (see Sections VIII.K.-VIII.N. of this FOA for more details on applicable federal intellectual property laws and regulations). Guidance regarding the contents of IPMP is available from EERE upon request.

The following is a non-exhaustive list of examples of items that the IPMP may cover:

- The treatment of confidential information between members (e.g., the use of NDAs);
- The treatment of background intellectual property (e.g., any requirements for identifying it or making it available);
- The treatment of inventions made under the award (e.g., any requirements for disclosing to the other members on an application, filing patent applications, paying for patent prosecution, and cross-licensing or other licensing arrangements between the members);
- The treatment of data produced, including software, under the award (e.g., any publication process or other dissemination strategies, copyrighting strategy or arrangement between members);
- Any technology transfer and commercialization requirements or arrangements between the members;
- The treatment of any intellectual property issues that may arise due to a change in membership of the consortia or team; and
- The handling of disputes related to intellectual property between the members.

xi. Subject Invention Utilization Reporting

In order to ensure that prime recipients and subrecipients 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. This helpful EERE checklist can be accessed at https://www.energy.gov/eere/funding/eere-funding-application-and-management-forms. See Attachment 2 Federal Assistance Reporting

Checklist, after clicking on “Model Cooperative Agreement" under the Award Package section.

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. 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 EERE 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; 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 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 United States 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 $1,000,000, 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.

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 as described below. Specifically, questions regarding the content of this FOA must be submitted to: CCPilotsFOA@ee.doe.gov. Questions must be submitted not 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. **Please note that you must first select this specific FOA Number in order 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 the EERE Exchange website 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 commercial or financial information that is privileged or confidential 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 information that is commercial or financial, or information that is confidential or privileged, it is furnished to the 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 Government's right to use the information if it is obtained from another source.

Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions containing confidential, proprietary, or privileged information 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 U.S. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

The cover sheet of the Concept Paper, Full Application, Reply to Reviewer Comments, or other submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

> **Notice of Restriction on Disclosure and Use of Data:**
> Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged 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 or loan 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]

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure." In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

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 termination 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 Concept Papers, Full Applications, Replies to Reviewer Comments, 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. In order 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, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

- Advance and Identified Waivers: Applicants 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; and
- DEC: Each applicant is required to submit a U.S. Manufacturing Plan as part of its application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations. DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. Any Bayh-Dole entity (domestic small business or nonprofit organization) affected by this DEC has the right to appeal it.

K. Government Rights in Subject Inventions

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

1. 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 contractors doing work on behalf of the government.

2. 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 U.S. 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 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 awards 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. In addition, for those awards requiring distribution of software as Open-Source Software (OSS), the additional information in Appendix D must be addressed in the application.

N. Export Control

The U.S. government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the U.S. 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”. To ensure compliance with Export Controls, it is the prime recipient’s responsibility to determine when its project activities trigger Export Controls and to ensure compliance.

Export Controls may apply to individual projects, depending on the nature of the tasks. When Export Controls apply, the recipient must take the appropriate steps to obtain any required governmental licenses, monitor and control access to restricted information, and safeguard all controlled materials. Under no circumstances may foreign entities (organizations, companies or persons) receive access to export controlled information unless proper export procedures have been satisfied and such access is authorized pursuant to law or regulation.

Applicants are advised that some of the results of the research conducted under this FOA are expected to be restricted for proprietary reasons and not published or shared broadly within the scientific community.

O. 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-07-16 dated May 22, 2007, found at: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/m07-16.pdf

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).

P. 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 C.F.R. § 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, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 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.

Q. 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. As 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. Specific dates for the webinar can be found on the cover page of the FOA.

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

Recipients and subrecipients are prohibited from obligating or expending federal funds to procure or obtain; extend or renew a contract to procure or obtain; 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 Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

Recipients, and subrecipients also may not use Federal funds to purchase:

a. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
b. Telecommunications or video surveillance services provided by such entities or using such equipment.
c. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Certain prohibited equipment, systems, or services, including equipment, systems, or services produced or provided by entities identified in Public Law 115-232, section 889, are recorded in the System for Award Management exclusion list.

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 of the terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses the term "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 even a couple of 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, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then 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 regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten 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, equipment for their own company with organizational resources. If the item or service is reimbursed for, 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, 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. If questions exist, consult your DOE contact 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.

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 $2,000,000 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 AND APPROVAL PROCESSES: 1. FOREIGN ENTITY PARTICIPATION AS THE PRIME RECIPIENT; AND 2. PERFORMANCE OF WORK IN THE UNITED STATES (FOREIGN WORK WAIVER)

1. Waiver for Foreign Entity Participation as the Prime Recipient

As set forth in Section III.A.iii., all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of the United States 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.

Overall, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the prime recipient. A request to waive the *Foreign Entity Participation as the prime recipient* requirement must include the following:

- Entity name;
- The rationale for proposing a foreign entity to serve as the prime recipient;
- Country of incorporation and the extent, if any, the entity is state owned or controlled;
- A description of the project's anticipated contributions to the US economy;
- How the project will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
- How the project will promote domestic American manufacturing of products and/or services;
- A description of how the foreign entity's participation as the prime recipient is essential to the project;
- A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and
- Countries where the work will be performed (Note: if any work is proposed to be conducted outside the U.S., the applicant must also complete a separate request for waiver of the Performance of Work in the United States requirement).

EERE may require additional information before considering the waiver request.

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

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

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

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

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

EERE may require additional information before considering the waiver request.

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

APPENDIX D – 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

The GNU General Public License (GNU GPL or simply GPL) is the most widely used free software license, originally written by Richard Stallman for the GNU Project.

The GPL is the first copyleft license for general use, which means that derived works must be distributed under the same license terms. Under this philosophy, the GPL grants the recipients of a computer program the rights of the free software definition and uses copyleft to ensure the freedoms are preserved, even when the work is changed or additions are made. This aspect distinguishes the GPL from permissive free software licenses, including the BSD licenses.
The license's copyright disallows modification of the license. Copying and distributing the license is allowed because the GPL requires recipients to get "a copy of this License along with the Program". According to the GPL FAQ, anyone can make a new license using a modified version of the GPL as long as he or she uses a different name for the license, does not mention "GNU", and removes the preamble, though the preamble can be used in a modified license if permission to use it is obtained from the Free Software Foundation (FSF).

GNU Library or “Lesser” General Public License (LGPLv3) http://www.gnu.org/licenses/lgpl.html

The GNU Lesser General Public License (formerly the GNU Library General Public License) or LGPL is a free software license published by the Free Software Foundation (FSF). It was designed as a compromise between the strong-copyleft GNU General Public License or GPL and permissive licenses such as the BSD licenses and the MIT License. The GNU Library General Public License (as the LGPL was originally named) was published in 1991, and adopted the version number 2 for parity with GPL version 2. The LGPL was revised in minor ways in the 2.1 point release, published in 1999, when it was renamed the GNU Lesser General Public License to reflect the FSF's position that not all libraries should use it. Version 3 of the LGPL was published in 2007 as a list of additional permissions applied to GPL version 3.

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.

The MIT License (MIT)
http://opensource.org/licenses/MIT

The MIT License is a free software license originating at the Massachusetts Institute of Technology (MIT). It is a permissive license, meaning that it permits reuse within proprietary software provided all copies of the licensed software include a copy of the MIT License terms. Such proprietary software retains its proprietary nature even though it incorporates software under the MIT License. The license is also GPL-compatible, meaning that the GPL permits combination and redistribution with software that uses the MIT License.

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 E – GLOSSARY

Applicant – The lead organization submitting an application under the FOA.

Continuation application – 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 to EERE its continuation application, which includes the following information:

i. A report on the Recipient's progress towards meeting the objectives of the project, including any 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 negotiated Statement of Project Objectives and/or Milestone Summary Table.

Cooperative Research and Development Agreement (CRADA) – 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

Federally Funded Research and Development Centers (FFRDC) - FFRDCs are public-private partnerships which conduct research for the United States government. A listing of FFRDCs can be found at http://www.nsf.gov/statistics/ffrdclist/.

Go/No-Go Decision Points – A decision point at the end of a budget period that defines the overall objectives, milestones and deliverables to be achieved by the recipient in that budget period. As of a result of EERE's review, EERE may take one of the following actions: 1) authorize federal funding for the next budget period; 2) recommend redirection of work; 3) discontinue providing federal funding beyond the current budget period; or 4) place a hold on federal funding pending further supporting data.

Project – The entire scope of the cooperative agreement which is contained in the recipient's Statement of Project Objectives.

Recipient or "Prime Recipient" – A non-federal entity that receives a federal award directly from a federal awarding agency to carry out an activity under a federal program. The term recipient does not include subrecipients.

Subrecipient – A non-federal entity that receives a subaward from a pass-through entity to carry out part of a federal program; but does not include an individual that is a beneficiary of such program. A subrecipient may also be a recipient of other federal awards directly from a federal awarding agency. Also, a DOE/NNSA and non-DOE/NNSA FFRDC may be proposed as a subrecipient on another entity's application. See section III.E.ii.

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

COI	Conflict of Interest
DEC	Determination of Exceptional Circumstances
DMP	Data Management Plan
DOE	Department of Energy
DOI	Digital Object Identifier
EERE	Energy Efficiency and Renewable Energy
FAR	Federal Acquisition Regulation
FFATA	Federal Funding and Transparency Act of 2006
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FFRDC	Federally Funded Research and Development Center
GAAP	Generally Accepted Accounting Principles
IPMP	Intellectual Property Management Plan
M&O	Management and Operating
MPIN	Marketing Partner ID Number
MYPP	Multi-Year Program Plan
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Agency
OMB	Office of Management and Budget
OSTI	Office of Scientific and Technical Information
PII	Personal Identifiable Information
R&D	Research and Development
RFI	Request for Information
RFP	Request for Proposal
SAM	System for Award Management
SOPO	Statement of Project Objectives
SPOC	Single Point of Contact
TIA	Technology Investment Agreement
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
WBS	Work Breakdown Structure
WP	Work Proposal

APPENDIX H – PROJECT EVALUATION

The purpose of this appendix is two-fold: 1) to provide applicants sufficient information so that they can appropriately budget and plan for project evaluation in their proposals; 2) to highlight for applicants that they will need to consider multiple stakeholder perspectives, including the customers, the service provider(s), the utility/independent system operator (ISO), and the environment.

The primary objective of the evaluation is to inspire confidence to adopt, replicate, and scale the types of solutions demonstrated in succesful FOA projects; and to understand any aspects of solutions that underperformed.

Awardees will be expected to evaluate their project's performance and its effectiveness in meeting the stated goals of the FOA. This Appendix describes: 1) the roles of the National Coordinator and awardees in conducting common and project-specific analyses; 2) expected scope of common evaluation analyses and associated metrics; 3) the anticipated analysis methods, and; 4) data collection needs.

1) A common, base set of analyses will be conducted by every project awardee. The National Coordinator will provide a standardized evaluation protocol, which awardees are required to follow to evaluate their project. The National Coordinator will provide oversight to ensure consistent application of the protocol. The evaluation protocol will define required M&V methods, evaluation parameters and associated calculations, data needs, and reporting standards; it will be aligned with the specific GEB and DER strategies employed across the portfolio of awarded projects.

In addition to the base set of analyses, each awardee will define and evaluate numerous other aspects of performance based on the unique needs and characteristics of their specific project. Awardees will document the results of both the common and project-specific analyses in interim and final reports. The National Coordinator will synthesize findings from the common analyses across the cohort of all awarded projects.

Applicants' project budgets should reflect the resources necessary to conduct the common analyses as well as project-specific analyses. The work of the National Coordinator will be separately funded, and should not be included in applicants' project budgets.

2) The performance period for the evaluation is expected to cover a 12-18 month time duration. The duration of the evaluation must be included in the overall period of performance of the proposed project. The principal categories of evaluation common to each project will include customer experience and benefits, grid benefits, costs of implementation and delivery, viability of the business model, emissions benefits, and resilience benefits. Within each of these categories, several specific evaluation questions will be addressed. Anticipated evaluation questions and a description of associated metrics are provided in Table H-1.

Table H-1. Anticipated common evaluation questions and associated metrics

Evaluation Question	Sub Questions	Description of Associated Metrics
1. What was the benefit of the demonstrated solution to the customer? [owner/occupants]	1a. What was the customer's motivation, and perception of value (was/is it worth it) for participating? 1b. What was the customer's experience, including comfort and productivity etc., including specific DERs - EVs, solar, etc.? 1c. What would be the financial impacts to the customer?	1a. Metrics will be determined to understand what it took for customer to participate in project. For example, this could include quantitative metrics associated with opt-outs or overrides, and/or qualitative metrics associated with self-reported willingness. 1b. Metrics will be determined by the type and format of data collection used to elicit many dimensions of experience, comfort, productivity, etc. 1c. Metrics will quantify the various elements of financial impacts including changes in utility volumetric energy and demand charges and/or any incentive payments.
2. What was the benefit of the demonstrated community scale solution to the grid? [provider, utility/ISO]	2a. What was the physical and financial magnitude of the grid service? 2b. How consistently was the grid service provided? 2c. How much did the individual DERs contribute to the magnitude of the grid service?	2a. Metrics will quantify the average physical measure of performance (e.g., kWh, kW) and financial benefit ($) provided by the community, for each grid service provided during the project. These metrics will be provided in absolute and/or relative/normalized terms. 2b. Metrics will quantify the variability over time in the physical measure of performance (e.g., kWh, kW) and financial benefit ($) provided by the community, for each

Evaluation Question	Sub Questions	Description of Associated Metrics
	2d. How much did the community's energy (electricity and other sources) change over time as a result of providing the grid service?	grid service provided during the project. These metrics will be provided in absolute and/or relative/normalized terms. 2c. Metrics will quantify the share of the average physical measure of performance (e.g., kWh, kW) provided by each DER for each grid service provided during the project. These metrics will be provided in absolute and/or relative/normalized terms. 2d. Metrics will quantify the change in energy consumption (e.g., kWh) monthly, seasonally and/or annually attributable to providing grid services, either individually or collectively. These metrics will be provided in absolute and/or relative/normalized terms.
3. Was the grid benefit obtained cost effectively? [provider, utility/ISO]	3a. What was the cost of implementation and delivery of the solution (vs. traditional approach)? 3b. How were these costs apportioned between equipment, installation and commissioning, and ongoing licensing, service, and other operational costs?	3a. Metrics will quantify the total cost ($) of implementing and delivering the GEB solution vs. a traditional non-GEB solution. These metrics will be provided in absolute and/or relative/normalized terms. 3b. Metrics will quantify the various fixed (e.g., equipment, installation and commissioning) and variable (e.g., incentive payments to customers for grid services, ongoing licensing, maintenance) cost elements ($). These metrics will be provided in absolute and/or relative/normalized terms.
4. Is the business model for the demonstrated solution viable? [provider]	4a. What is the needed scale of the grid services being offered, and	4a. Metrics will quantify the total regional need for each grid service provided, and the project's relative share of that need. They will also quantify the size of the target

Evaluation Question	Sub Questions	Description of Associated Metrics
	what is the customer target market size? 4b. Would the provider(s) replicate delivery of the demonstrated solution in future projects/offerings? Why or why not? 4c. What additional factors might prohibit replication?	market for the technologies and load flexibility strategies demonstrated, based on characteristics such as building type, size, equipment, etc. 4b. Metrics will identify the provider's reasons for continuing and expanding the demonstrated GEB solution or not continuing with it. 4c. Metrics will collect provider's assessment of other major hurdles not previously identified that might limit their interest in continuing and expanding the demonstrated solution. For example, are there federal, state, or local policies or contractual arrangements that could negatively affect the participating customer's or providers financial benefits?
5. What was the GHG benefit of the demonstrated solution? [general]	5a. What were the GHG savings associated with the demonstrated solution?	5a. Metrics that measure scope 1 and 2 GHG emissions reduced due to the grid services and efficiency provided by the demonstrated solution.
6. How did the demonstrated solution afford resilience?	6a. At what scale was resilience incorporated? 6b. What was the nature of the resilience that was provided? 6c. How was the resilience provided?	6a. Scale will be characterized at the physical level, according to the where the resilience was provided, e.g., at the building, campus, community, feeder, or substation level. Associated metrics will quantify characteristics such as square feet, load, # of customers, # of buildings, etc. 6b. The nature of the provided resilience will be characterized qualitatively to describe whether the focus was for example, black-start recovery, coordinated islanding, short term provision of critical services during

Evaluation Question	Sub Questions	Description of Associated Metrics
	6d. What quantity of resilience was provided?	outages, or other means of enhancing the ability to withstand or recover from disruptions. 6c. The evaluation will document what combination of technologies, DERs, load management strategies and operational policies was used, with associated metrics to quantify each. 6d. Metrics to quantify resilience will be determined based on 6a-6c.

Some metrics will be quantified at both the community level as well as the individual building level. Additionally, some metrics will require disaggregation temporally (e.g., by season, by time of day). To distinguish the independent as well as combined effect of the efficiency strategies and the DER+GEB control strategies, awardees may be asked to work with the National Coordinator to determine appropriate approaches, data collection methods, and evaluation techniques. For example, it may be useful to toggle on and off the operation of the GEB control measures during the performance evaluation period. **Given the broad scope of the evaluation, applicants are encouraged to budget more resources for assessment of project benefits than would be typical for a single-site, energy efficiency-only field demonstration.**

3) The evaluation protocol 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.
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.

4) The anticipated data collection needs include one-time information as well as data that will be continuously acquired throughout the project performance period. 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;
- 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 – CYBERSECURITY PLAN

A Cybersecurity Plan (due within 90 days after award issue) 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 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.

Cybersecurity Plan Requirements

In order for the plan to be considered acceptable, it must address the following:
At a minimum, the Cybersecurity Plan must describe how the award Recipient plans to establish cybersecurity between networks, systems, devices, applications or components within the proposed solution, and at the necessary external interfaces at the solution boundaries. Recipients are directed to maximize the use of open standards wherever possible and adhere to the hierarchy of desirable cybersecurity techniques listed above, and document deviation from open standards and the utilization of proprietary standards where the Recipient deems necessary.

The approach to cybersecurity should include:

- A summary of the cybersecurity risks and how they will be mitigated at each stage of the lifecycle (focusing on vulnerabilities and impact).
- A summary of the cybersecurity criteria utilized for vendor and device selection.
- A summary of the relevant cybersecurity standards and/or best practices that will be followed.
- A summary of how the project will support emerging smart grid cybersecurity standards.
- Plans should also address the adequacy of their approach for addressing
- Ensuring confidentiality, integrity, availability
- Secure logging, monitoring, alarming, and notification

Suggested Elements for a Cybersecurity Plan
The following list of elements for a Cybersecurity Plan provides suggestions regarding the cybersecurity assessment process and the structure of the plan:

Assessment of Scope: A discussion of the scope of the solution should be made, as well as the anticipated challenges (such as confidentiality, integrity or availability is high, but systems or component resources are low). Recipients should document all the interfaces (where information is exchanged between networks, systems, devices, applications or components) in their proposed solution as a method for assessing the full scope of the plan. It should be noted that an assessment of all interfaces is also required for an Interoperability Plan, and both plans can utilize the same assessment.

Content and Format: A statement of plan for designing in cybersecurity, including a defense in depth approach, and plans for sustaining cybersecurity for the life of the solution. Where existing practice or standards seem inadequate, Recipients should propose remedies through open public mechanisms to alleviate them over time. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the plan could propose alternate strategies, and should advise the sponsoring program.

Additional Guidance

The DOE, NIST and other organizations have worked with both public and private sector organizations to advance the state of the art of cybersecurity in energy delivery systems. Recipients are encouraged to seek out resources appropriate to their solution space, but should also consider the following:

- DOE - *Energy Sector Cybersecurity Framework Implementation Guidance*
- NIST - *Framework for Improving Critical Infrastructure Cybersecurity*
- NIST - *NISTIR 7628, Rev1 Guidelines for Smart Grid Cybersecurity*
- NIST - *SP 800-53 Security and Privacy Controls for Information Systems and Organizations*
- *NIST – SP 1500-201 Framework for Cyber-Physical Systems*
- EPRI - *Cyber Security Strategy Guidance for the Electric Sector*
- NRECA – *Guide to Developing a Cyber Security and Risk Mitigation Plan*
- NRECA – *Interoperability and Cyber Security Plan*
- ISA – *ISA/IEC 62443 Series of Standards on Industrial Automation and Control Systems (IACS)*
- *DOE/OE – Data Privacy and the Smart Grid: A Voluntary Code of Conduct (2015) (https://www.energy.gov/oe/downloads/data-privacy-and-smart-grid-voluntary-code-conduct)*

Plans should address or discuss how compliance with the various standards and community best practices will be achieved and make use of community accepted resources whenever practicable.

Costs associated with the scope of work and resources articulated in a Cybersecurity Plan may be included in the proposed research budget as permitted by the applicable cost principles.

APPENDIX J – GRID ISSUES TO BE ADDRESSED

DOE is making a significant investment in Connected Communities because of the potential for GEBs to cost effectively improve grid issues such as reliability and resilience[21] 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 blackstart 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[22].

[21] 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. https://gmlc.doe.gov/sites/default/files/resources/GMLC1%201_Reference_Manual_2%201_final_2017_06_01_v4_wPNNLNo_1.pdf

[22] 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.

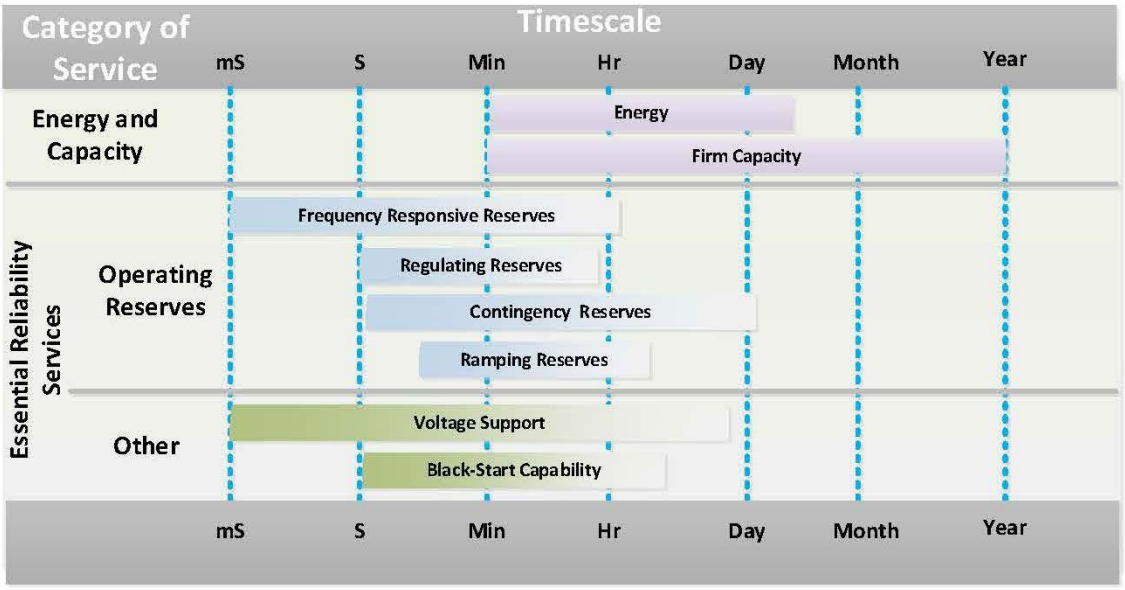

Figure 1 - Bulk Power System Services[23]

In the distribution system, GEBs and DER can produce benefits by providing grid services (see Figure 2) via utility incentive-based programs, some of which have been represented as non-wire alternatives (NWAs)[24]. 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).

[23] 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.

[24] 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.

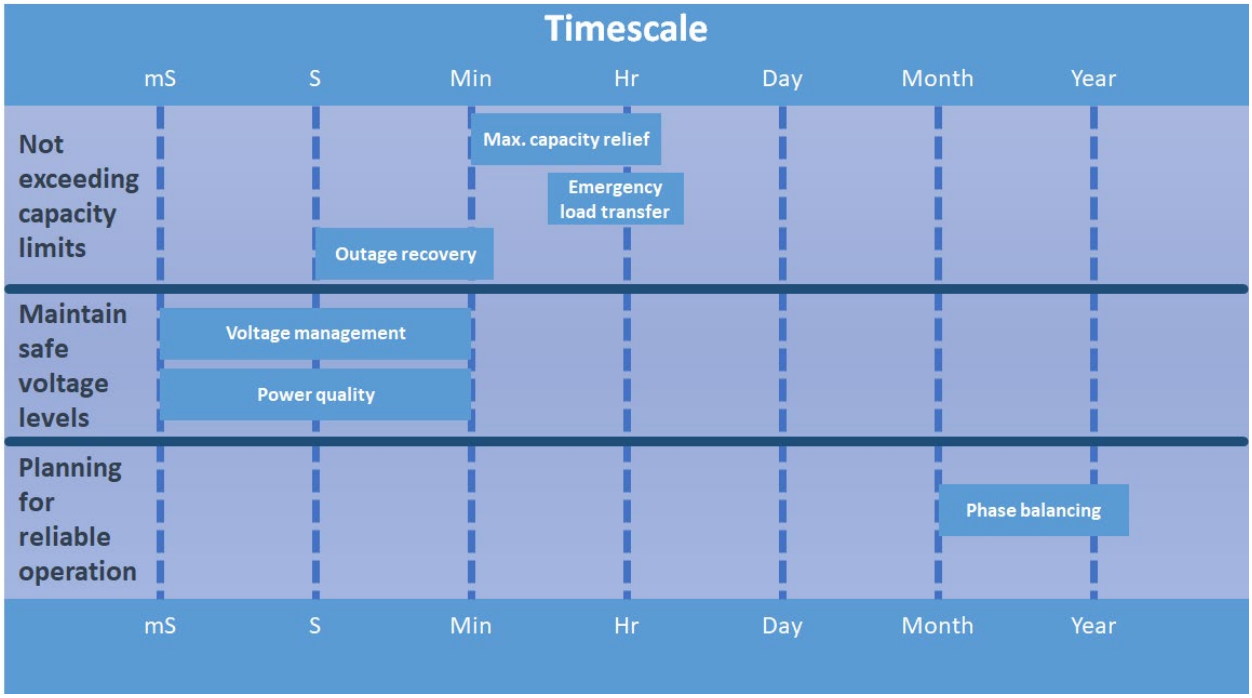

Figure 2: Distribution System Services[25]

These typical thresholds, adjusted for the applicable local conditions, should serve as a guide to FOA applicants proposing how services offered by the project will have a meaningful impact on either the bulk power or distribution grid or both.

[25] 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.