U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Connected Communities RFI

DOE Investment in Efficient, Smart, Flexible Buildings of the Future

April, 2020

Agenda

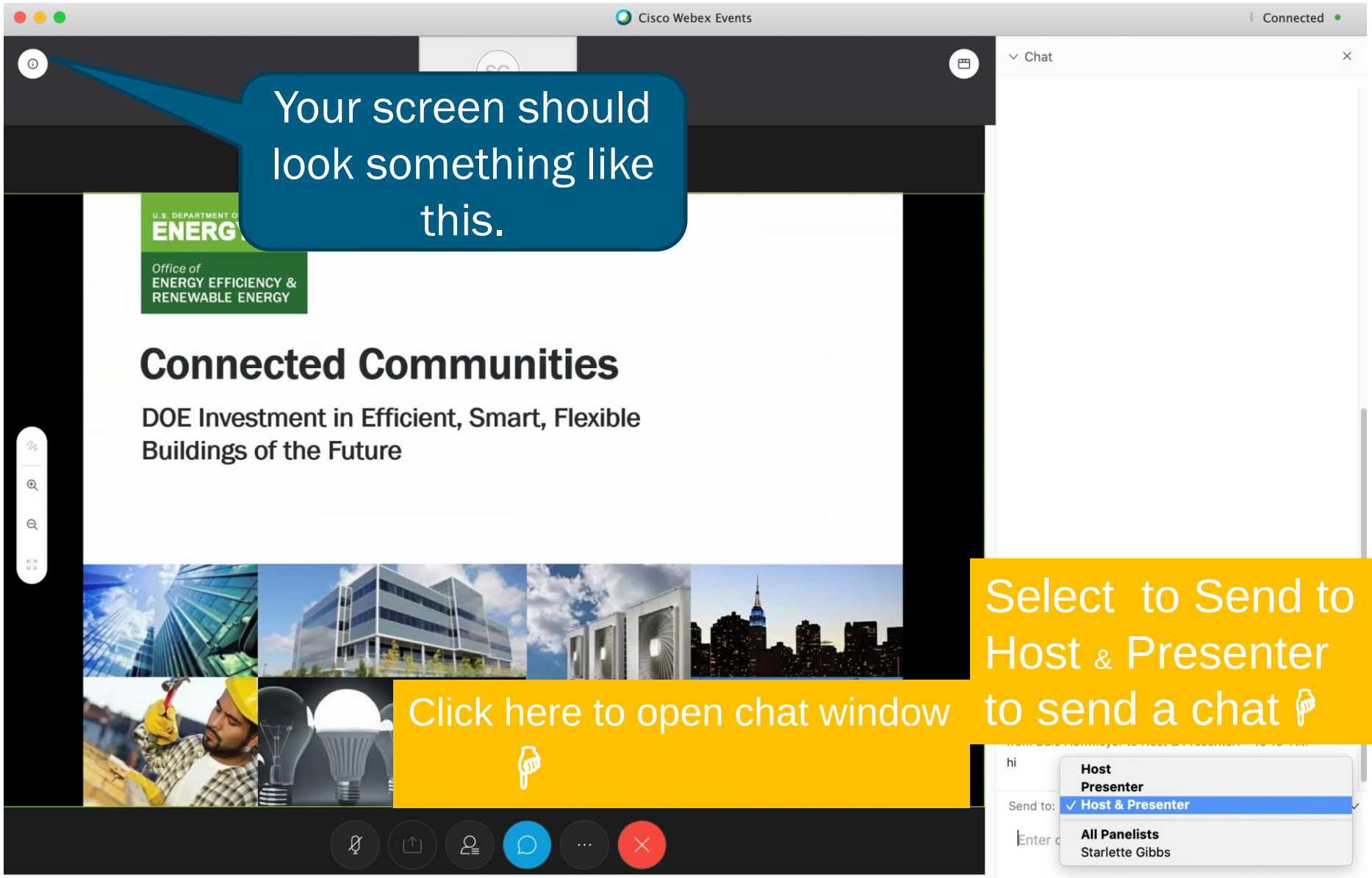
- **Webinar Purpose & Introductions**
- **Summary of Grid-interactive Efficient Buildings**
- **Overview of Funding Opportunity Announcement Timeline**
- **Overview of the Connected Community RFI**
  - Content
  - Submission Process
  - Teaming Information
- **Q&A on the RFI Process**

Purpose

The purpose of this webinar is to:

- Provide background on Building Technologies Office and its Grid-integrated Efficient Buildings work
- Solicit feedback from stakeholders on the draft Connected Communities FOA goals and design.
- Answer questions on the RFI and response process

One note before we get started....



Collaborating DOE Program Offices

David Nemtzow

Building Technologies Office (BTO)

BTO's goal is to develop, demonstrate, 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.

Andrew Dawson

Solar Energy Technologies Office (SETO)

SETO's goal is to of improving the affordability, performance, and value of solar technologies on the grid through research and development in 3 technology areas: photovoltaics, concentrating solar-thermal power, and systems integration.

Mark Smith

Vehicle Technologies Office (VTO)

VTO supports research, development, and deployment of efficient and sustainable transportation technologies that will improve energy efficiency, fuel economy, and increase America's energy security, economic vitality, and quality of life.

Christopher Irwin

Office of Electricity (OE)

OE's goal is to ensure the nation's security and prosperity by driving grid modernization and resiliency through research, partnerships, demonstration, modeling and analytics, developing technologies to improve the infrastructure that brings electricity into our homes, offices, and factories.

Building Technologies Office Approach

BTO invests in energy efficiency & related technologies that make homes and buildings more affordable and comfortable, and make the US more sustainable, secure and prosperous. Budget ~US$285M/year; activities include:

R&D

Pre-competitive, early-stage investment in next-generation technologies

Integration

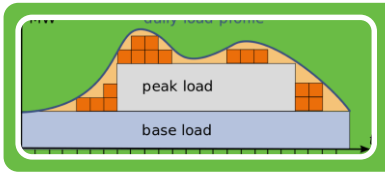
Technology validation, field & lab testing, metrics, market integration

Codes & Standards

Whole building & equipment standards technical analysis, test procedures, regulations

Potential Benefits of Flexible Building Loads

✓ Energy Affordability



✓ Improved reliability

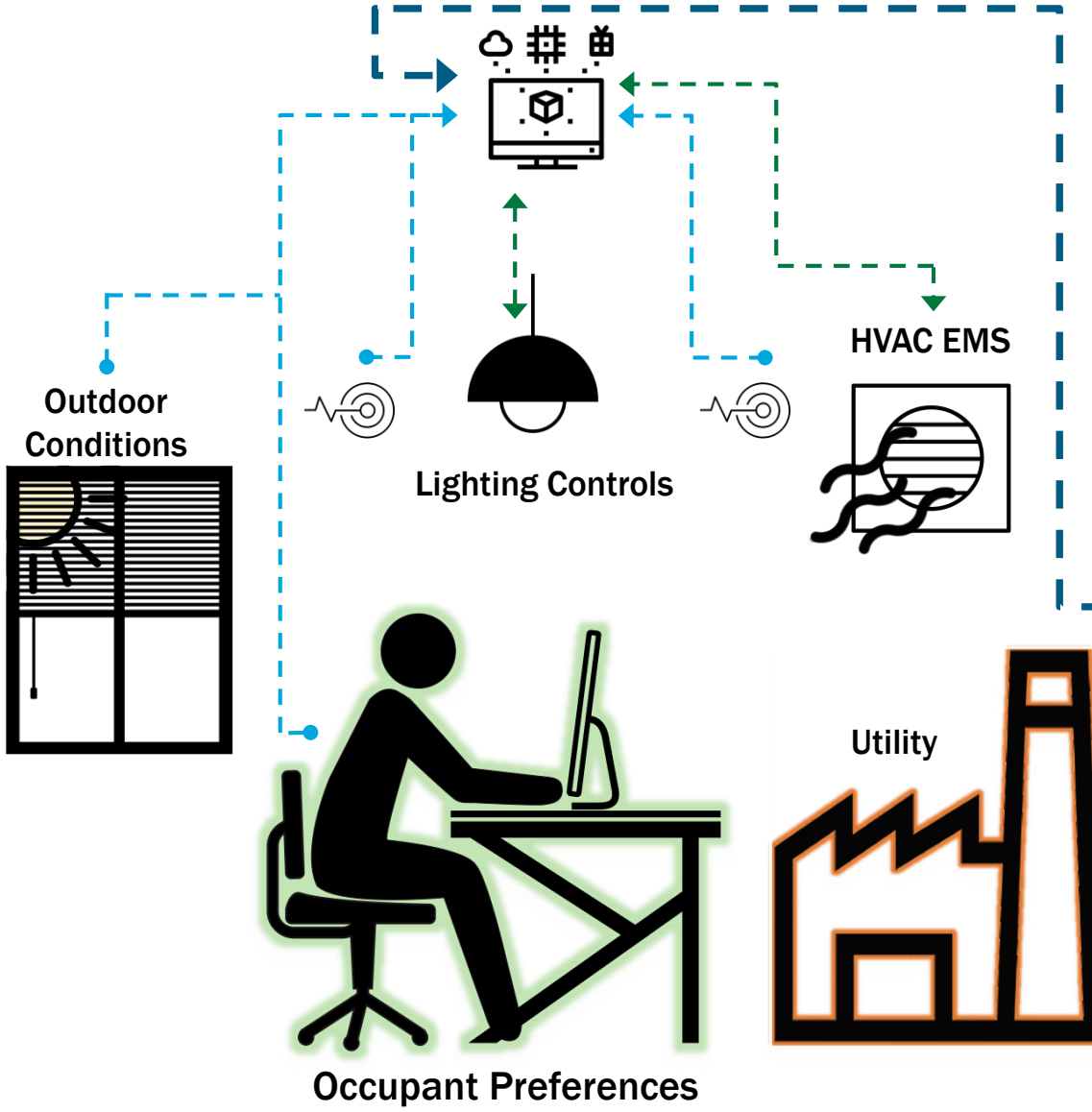
✓ Reduced grid congestion

✓ Enhanced services

✓ Environmental benefits

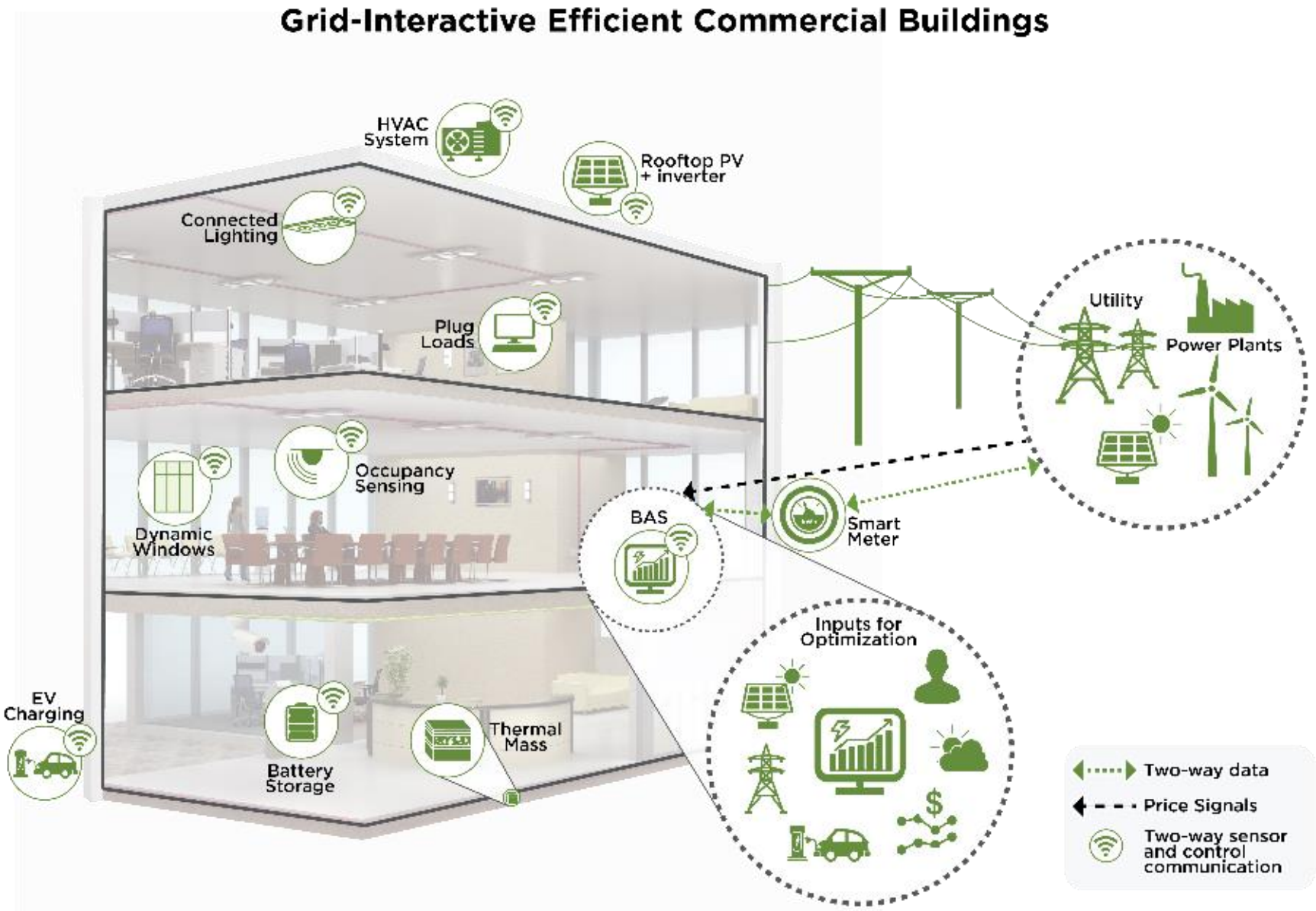
✓ Customer choice

Interactions with Building Occupants



- Interoperable, integrated systems
- Continuously optimized operation for maximum comfort and efficiency
- Grid-responsive

Grid-interactive Efficient Buildings Initiative



Key Characteristics of GEBs

EFFICIENT

Persistent low energy use minimizes demand on grid resources and infrastructure

CONNECTED

Two-way communication with flexible technologies, the grid, and occupants

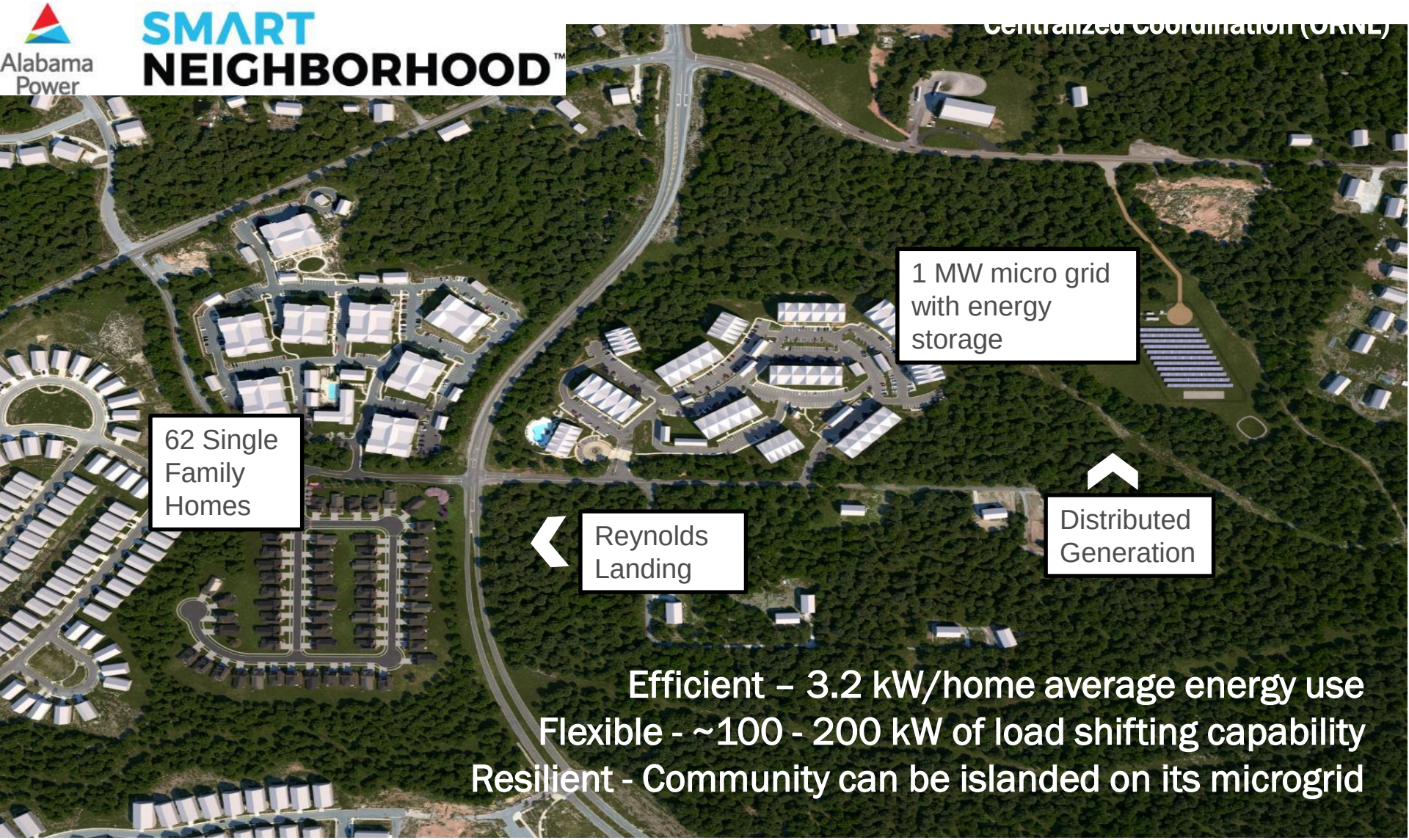
SMART

Analytics supported by sensors and controls co-optimize efficiency, flexibility, and occupant preferences

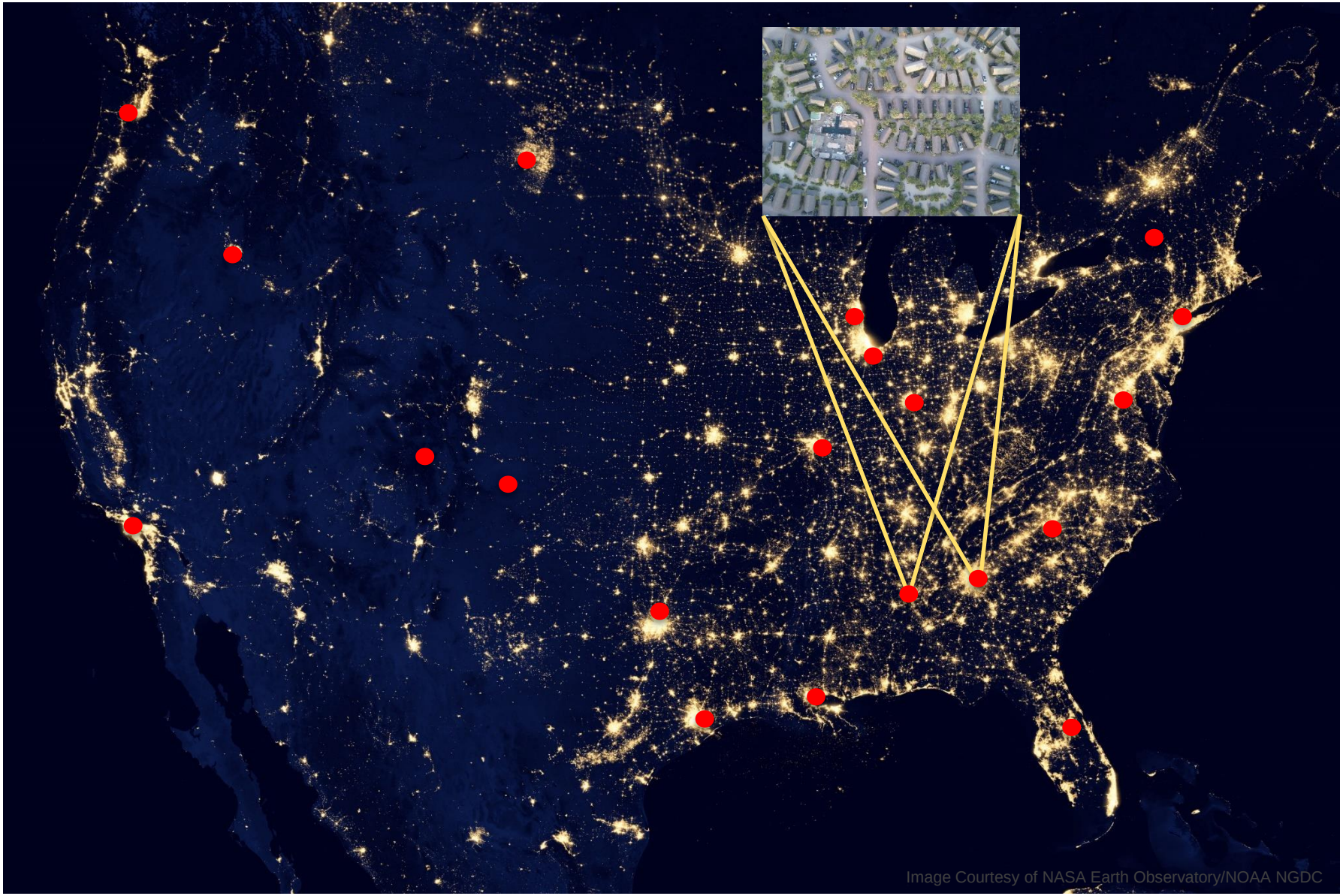
FLEXIBLE

Flexible loads and distributed generation/storage can be used to reduce, shift, or modulate energy use

Where We Are Today…Example Demonstration Project



This is Where We're Going



DOE Intends to Invest $42 Million into "Connected Communities"

Connected Community:

A group of grid-interactive efficient buildings (GEBs) with diverse, flexible end use equipment that collectively work to maximize building and grid efficiency without compromising occupant needs and comfort

Funding opportunity would enable regional GEB communities to share research results and lessons learned on projects that increase grid reliability, resilience, security and energy integration well into the future.

Demonstrate and evaluate the capacity of buildings as grid assets by **flexing load** in both **new developments and existing communities** across diverse climates, geography, building types and grid/regulatory structures

Share research results and lessons-learned on projects that improve energy affordability, increase grid reliability, resilience, security and energy integration

What We're Looking For When the FOA is Released

- ✓ Teams of strategic stakeholders
- ✓ Sets of multiple buildings
- ✓ Multiple DER integration
- ✓ Ability and willingness to share data
- ✓ Diversity of projects (geography, building type, climate, vintage, regulatory)

What We Hope to Achieve

- Measured impact of building as grid assets
- Solutions that address diverse grid needs that can be scaled in size and in other communities
- Input from occupants on impact and comfort level
- Demonstrated new business models for demand flexibility and DER coordination and optimization
- Online solutions center on best practices

Request for Information on Connected Communities

We Look Forward to Your Feedback

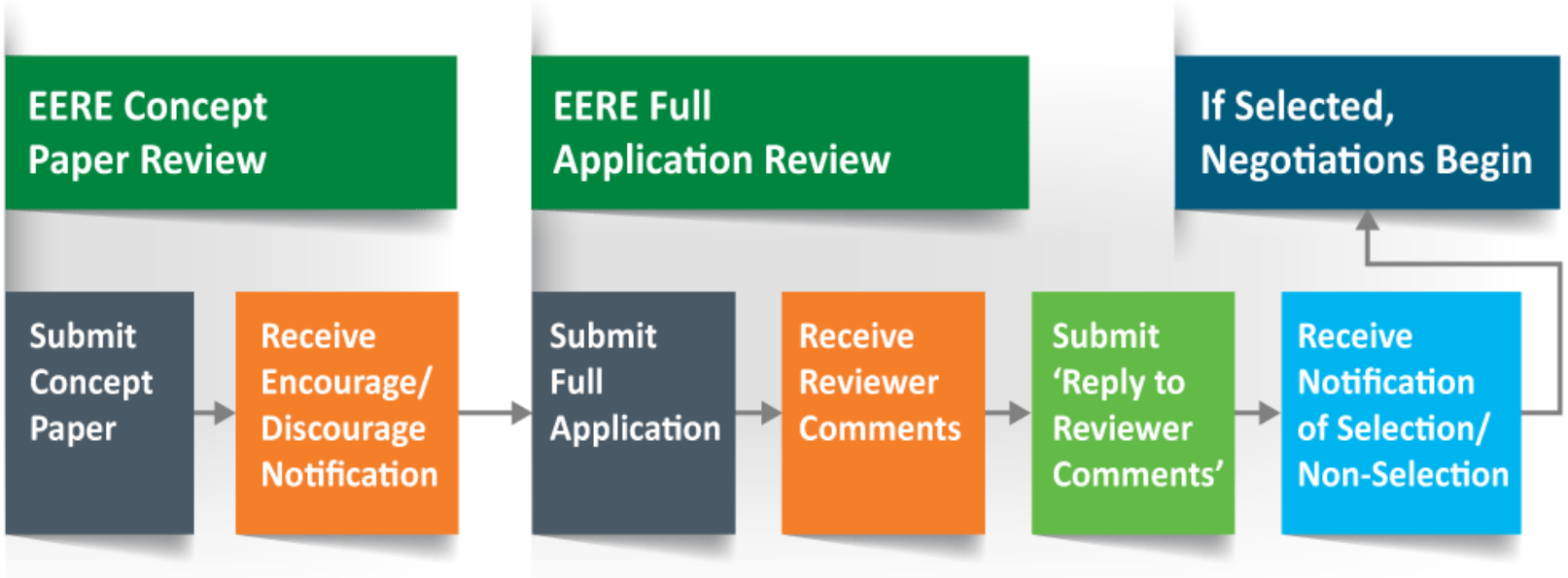
Visit eere-exchange.energy.gov or Scan the QR Code for the Request for Information:

"DE-FOA-0002291: **Request for Information**: Funding Opportunity Announcement 2206: "Connected Communities"

Funding Opportunity Announcements (FOAs)

EERE uses **FOAs to solicit applications in specific program areas and selects projects based on a merit review process that includes industry and technology** experts. When you apply for funding, the application process may include multiple phases:

- Letter of intent
- Concept paper
- Full application phase
- Replies to reviewer comments



Pre-FOA Phase

A Notice of Intent (NOI) notifies public/stakeholders of EERE's intention to publish a new FOA. It alerts the public of a potential upcoming FOA, and allowing potential applicants additional time to assemble project teams and prepare for applying.

- The Connected Communities NOI was released on February 13, 2020

A Request for Information (RFI)—is used when more information is needed to develop a FOA or FOA concept.

- The Connected Communities RFI was released on March 27, 2020

The NOI and RFI are available on EERE-Exchange.Energy.Gov

DE-FOA-0002291
Request for Information: Funding Opportunity Announcement 2206 "Connected Communities"

This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time.

Download a copy of the RFI

https://EERE-Exchange.Energy.Gov

The Subject of the RFI

This RFI pertains to a draft FOA planned to be issued by EERE.

- The information we receive will be used to help develop the FOA.
- We are specifically interested in information on the draft Connected Communities FOA goals and design.

This is solely a Request for Information and not a FOA.

EERE is not accepting proposals, concept papers or applications for this topic at this time.

RFI Questions

Category 1: Technical Requirements

- e.g. will the proposed requirements of the draft FOA support demonstrations that explore the smart load controls and building design load reduction strategies in combination with other DERs that provide the best options for demand flexibility to meet specific grid needs?

Category 2: Funding, Cost share, and Period of Performance

- e.g. is the proposed funding per project reasonable to achieve the drafted FOA objectives?

Category 3: Data Sharing/Measurement and Verification

- e.g. how can these pilots best consider, measure, and document energy, building occupant/tenant, and financial impacts?

Category 4: Other

- e.g. is there any other feedback on the FOA goals, design, requirements, etc. you would like to provide?

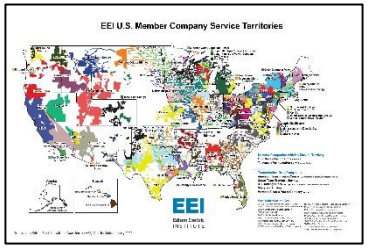
Introduction to the RFI Content

“Communities” Could Take Many Forms

Residential neighborhood

Geographically-dispersed building portfolio

Mixed-use development



Utility territory

Downtown commercial district

New construction

University, or corporate campus

Existing building retrofits

Coordination across a Diverse set of Pilots

Planned FOA Desired Outcomes (1 of 2)

- Desired outcomes from the portfolio of pilots and other activities conducted under this planned FOA are as follows:
- Data from projects in several regions showing if/how groups of buildings, both new and existing, can reliably and cost-effectively serve as significant grid assets by strategically deploying efficiency and demand flexibility in conjunction with DERs; Q1.1
- Analysis on the interaction between energy efficiency and demand flexibility measures and how grid-interactive efficient buildings improve energy affordability, grid reliability and congestion, offer environmental benefits and enhanced grid services;
- Proven pathways that decrease the set up time and potential disruption to occupants of installing hardware, software and communications to make buildings grid interactive;

Planned FOA Desired Outcomes (2 of 2)

- Insights on occupant impact and comfort levels resulting from equipment with advanced controls and changing operation of equipment to meet grid needs;
- Perspective into the amount and duration that occupants are willing to change the timing of their energy use, and any necessary level of compensation;
- Demonstrate new business models for demand flexibility and DER coordination, aggregation and optimization across buildings that can be scaled throughout a region, and beyond, recognizing technological, business and contractual approaches that will be potentially attractive to customers, utilities, builders and other key stakeholders; and

Q1.2

- Provide an online solutions portal with case studies of each pilot project, synthesized best practices, successful approaches and lessons learned, analysis and associated analytical tools.

RFI Questions Related to FOA Outcomes

1.1) Will the proposed FOA requirements support demonstrations that explore the smart load controls and building design load reduction strategies (e.g. high performance envelope, shading, etc.) in combination with other DERs that provide the best options for demand flexibility to meet specific grid needs?

1.2) How can the FOA be designed to enable future scaling of connected communities beyond pilots?

Planned FOA Draft Requirements (1 of 3)

- Include both demand flexibility and energy efficiency, with a to-be-determined minimum level of energy efficiency; Q1.3
- Include at least a to-be-determined total square footage of building space and a to-be-determined number of buildings; Q1.4
- Include at least two DERs (such as solar PV, electric vehicles, thermal energy storage, microgrid, etc.), in addition to flexible/efficient building load, that support demand flexibility, affordability, and resiliency; Q1.5 Q1.6
- Focus proposed pilots on groups of buildings that when aggregated demonstrate measurable added value to both the occupants and the grid beyond what can be achieved on an individual building basis;
- Articulate pilot's value to the power grid in terms of defined and quantifiable grid services, considering both transmission and distribution operational domains;

Planned FOA Draft Requirements (2 of 3)

- Form teams composed of critical stakeholders representing, at a minimum, grid resources/assets (e.g. utility), buildings owners/assets (e.g. home builder, building owner, developer, building manager), and researchers (e.g. national lab, university);Additional collaborators may include relevant technology manufacturers, regional, state and local governments, and others; Q1.7
- Include demonstration of innovative technology or approaches; Q1.8 Q1.11
- Demonstrate pathways that 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;
- Collect data supporting occupant interactions with smart technologies and improved comfort levels; Q1.9
- Include a plan to address cybersecurity and privacy challenges both in demonstration and at scale;

Planned FOA Draft Requirements (3 of 3)

- Pilot new business models 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; and

Q1.10

- Communicate to and educate relevant industries, public officials, professionals, the public and stakeholders regarding the pilot's value in terms of the goals described earlier.

Planned FOA draft preferences

In addition to the draft requirements, preferred applications will:

- Integrate technologies, building infrastructure, and/or contractual arrangements that are broadly replicable across the U.S. building stock and electricity business and regulatory environments;
- Demonstrate EVs and managed charging as part of the overall building system load'
- Scale or stage energy supply and consumption using load control, storage and generation in order to operate the community at varied levels of service during multi-day power outages;
- Include a greater number of buildings and additional behind the meter DER assets;
- Consider building- as well as community-based assets to maximize system value to community members, asset owners and grid operators; and
- Provide a plan for replication in other communities.

RFI Questions on FOA Technical Requirements

1.3) What should be the required **minimum energy efficiency level** or efficiency improvement? How should minimum requirements differ for new versus existing commercial and residential buildings?

1.4) What should be the **minimum square feet or number of buildings requirement** for each project to demonstrate buildings can contribute as reliable grid resources? Is there a different way to require a minimum project size (e.g. load size)?

1.5) Is the requirement of including **at least two DERs** in addition to energy efficiency the right approach to exploring demand flexibility solutions to support grid needs, customer service, environmental and resiliency goals or other considerations and priorities? Should there be a minimum amount of demand flexibility resulting from the combined DERs?
If yes what should it be and why? Should it be different for new and existing commercial and residential buildings;
if yes how?

RFI Questions on FOA Technical Requirements

1.6) For the proposed FOA **"grid resilience"** is defined as *the functional preservation of the electric grid operations in the face of natural and man-made threats and hazards* and **"grid services"** is defined as *services that support the generation, transmission, and distribution of electricity and provide value through avoided electricity system costs (generation and/or delivery costs)*.

Are these definitions appropriate for this FOA or should FOA applicants define grid resilience or grid services in a manner that addresses both building and grid perspectives?

If so, how?

RFI Questions on FOA Technical Requirements

1.7) Are the required teams "composed of **critical stakeholders** representing grid resources/assets (e.g. utility), buildings owners/assets (e.g. home builder, building owner, developer, building manager), and researchers (e.g. national lab, university)" and suggested additional collaborators such as "relevant technology manufacturers and local governments" appropriate to meeting outcomes of the anticipated FOA?

If not, are there other important partners that should be included?

1.8) Should **natural gas technologies** be considered in the pilots?

If yes, how should they be included?

RFI Questions on FOA Technical Requirements

1.9) What **technical communication** (e.g. data access, data transport, network technologies, interoperability) requirements should be included for maximum project effectiveness and future scaling of the technologies? What cybersecurity and privacy requirements should be included?

1.10) Do any of the outlined criteria present limitations to emerging **business models**?

Should other criteria be considered?

1.11) Are there **new or emerging technologies or strategies** that support DER optimization that could leapfrog the outcomes of the anticipated FOA that should be incorporated into pilot design and implementation?

Planned FOA Draft Data Requirements

We anticipate each project will produce the following types of data: Q3.1-4

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. comfort, productivity, health, convenience);

d) Financial costs and benefits (e.g. capital costs, energy costs, disruption, etc.) for both building owners or occupants and the grid; and

e) Case studies that will include data trends, research questions and findings, and operational promising practices.

Applicants should explain their planned approach to measure, collect, and analyze data to demonstrate the ability of the pilot to reduce load as well as shift load, modulate load, or generate energy.

RFI Questions on Data Sharing/M&V

3.1) How can these pilots best **consider, measure, and document** energy, building occupant/tenant, and financial impacts?

3.2) Are the proposed **types of data for measurement and verification** consistent with current industry practice and supportive of utility, customer, and other relevant stakeholder decision making?

If not, what additional data should be required?

RFI Questions on Data Sharing/M&V

3.3) How feasible is it for potential applicant teams to **collect the required types of data** and share at an aggregated level between project teams and publicly?

What **privacy policies and cybersecurity standards**, guidelines, and practices are applicable to the proposed data collection and sharing requirements? What data sharing platforms or mechanisms would be appropriate for sharing data among project teams and with the public?

3.4) What are the critical issues that need to be addressed to successfully evaluate, measure and verify impact of multiples DERs?

Planned FOA Draft Award Information

i. Estimated Funding

Under this FOA, EERE envisions awarding 4-6 financial assistance awards of up to $7M each in the form of cooperative agreements. Individual awards may vary between $3 million and $7 million. DOE may issue one, multiple, or no awards.

Q2.1

ii. Period of Performance

DOE anticipates making awards that will run from 3-5 years, comprised of 2-5 budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and Go/No-Go decision review.

Q2.2

iii. Cost Share

The cost share must be at least 50% 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.

RFI Questions on FOA Award Information

2.1) Is the proposed DOE **funding level** per project (i.e. up to $7 million) reasonable to achieve the drafted FOA objectives?

If not what would be more appropriate and why?

Note that all demonstration projects must meet a minimum **cost share requirement** of 50%.

2.2) Is a **period of performance** of 3-5 years reasonable? If not what is appropriate and why?

RFI Questions: Other

4.1) How can DOE best design the FOA to allow applicant teams to form and provide strong proposals?

What additional aspects should be considered for successful pilot design and implementation?

4.2) Is there any other feedback on the FOA goals, design, requirements, etc. you would like to provide?

How to Respond to this RFI

Responses must be submitted electronically to:

CCPilotsRFI@ee.doe.gov

no later than 5:00pm (ET) on May 12, 2020

Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 10 pages in length, 12 point font, 1 inch margins.

- Please identify your answers by responding to a specific question (e.g. Q2.1) or topic if applicable. You may answer as many or as few questions as appropriate.
- Please provide the following information at the start of your response to this RFI:
  - Company / institution name;
  - Company / institution contact;
  - Contact's address, phone number, and e-mail address.

Teaming Partner List

EERE is compiling a Teaming Partner List to facilitate the widest possible participation for this anticipated 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.

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,
- Generic Contact Phone,
- Organization Type,
- Area of Technical Expertise (bulleted list less than 25 words), and
- Brief Description of Capabilities (less than 100 words).

Questions?

Lets pause to ask if you have questions about this **RFI** or **RFI process. You** can enter your question in the chat window or email them to CCPilotsRFI@ee.doe.gov.

We will post a Q&A document on the RFI process on EERE-Exchange along with the RFI.

Ways to Engage

Recognizing the large scale and complexity of projects targeted for this opportunity, we have built in time for thoughtful feedback and team formation.

Team Stakeholders

- Grid resources/assets
- Building/home owners
- Researchers
- Technology manufacturers
- Regional, state, or local governments
- Other types of stakeholders

Teaming List Email
CCPilotsTeamingList@hq.doe.gov

RFI Opened on March 27, 2020
Provide feedback and responses to key questions around FOA development by **May 12, 2020**.

FOA Planned for Summer 2020 Release
Start forming a team of strategic stakeholders for submission

Email your responses to:

CCPilotsRFI@ee.doe.gov

Thank you!