Maryland Energy Administration

U.S. DOE RFI - Connected Communities FOA
Formal Response

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Category 1: Technical Requirements

1.1 Response

Yes, these solutions should be encouraged before looking at any DER solutions. Energy best practices warrant EE investment and building performance optimization technologies before DER capacity is considered and modeled. Maryland is already encouraging this strategy in its various incentive programs and policy recommendations in both governmental and utility capacity. MEA encourages Applicants to first pursue efficiency measures, which it also helps incent through programs such as its Commercial, Industrial, and Agricultural Energy Efficiency Grant Program and Jane E. Lawton Conservation Loan Program. After efficiency measures are considered, MEA welcomes application to its various DER incentives, such as its Commercial Clean Energy Rebate Program, various solar PV incentive programs, and Combined Heat and Power Program. This is also an opportunity for the FOA to serve as a market driver on EE and IoT/controls technologies (foster innovation and forward economies of scale by introducing replicable models which include it as part of the overall solution package).

1.2 Response

This is where creating replicable models and economies of scale (EOS) becomes key. The purpose of the FOA is to achieve a model that can be used across the U.S. but driving the market to sustainable, affordable solutions is what will allow future program iterations to stretch their dollars, leverage outside financing (such as utility incentives for energy upgrades, private financing such as that provided through C-PACE, and others), and even achieve cost share from recipients themselves. The focus should stress not only finding projects but bringing them to a meaningful scale that can attract sustainable sources of capital as well as capacity growth within energy sector providers.

Many times demonstration projects work only because of one-time funding associated with the project. These projects are not necessarily scalable because they are not economic on their own. As the purpose of this FOA will be to identify replicable connected buildings models, including microgrids, that will lead to grid-interactive energy efficient facilities that can be scaled and widely deployed, DOE funding would best be utilized in determining whether or not various technology mixes are commercially-viable. The risk with providing the bulk of DOE funds to R&D of innovative technologies not yet to market is that it shifts the purpose of the DOE investment away from encouraging scalable projects into testing commercially unviable solutions.

Funding should be encouraged for, and to some degree actually limited to, costs that would not be borne by a commercial installation or to test a new technology or the integration of existing technologies in new ways. However, new technological pilots should only be allowable if the technology itself has been made for the most part commercially-available. That will allow market penetration of the technology to me more easily and economically realized in a scalable program.

1.3 Response

Generally, setting a standard of efficiency expectations for proposed projects is a responsible program design consideration. However, there should be some level of flexibility in what constitutes this standard due to the varying degrees of adoption of energy codes across jurisdictions in the United States. Some jurisdictions have adopted newer codes than others, and some simply do not have energy efficiency codes required outside of what building codes mandate. However, setting the precedent that efficiency is important for these projects on a national scale, as efficiency contributes to the economic viability of a project due to its improvements to the ROI for project investors. Wide-scale commercial adoption and marketability can only be achieved on these projects if they can, long-term, be self-sustaining and attract private investment. The DOE should therefore arrive at a consensus on what efficiency standards must be, at minimum, adopted should a jurisdictional mandate not already be in place which supersedes that minimum. Efficiency erosions must also never, under any circumstances, be allowed.

1.4 Response

Generally, specific minimum requirements should not be employed in a pilot project as they may restrict proposals which are of conceptually good quality but are not at the required quantified thresholds (such as square footage, number of buildings, etc.). The purpose of the FOA will be to identify and develop solutions opportunities in the market and help develop them into replicable, scalable models for other communities and organizations.

This is where the Resilient Maryland model can provide some insight. The driver on scope is based upon two factors: complexity of project implementation and scope of beneficial impact (i.e. who and how many benefits, what are those benefits, and what are the value drivers?). After answering these questions, a successful FOA might include areas of interest. For example, implementing a resilient facility power system at a small town hospital may have a substantial community benefit in that it adds clean, renewable, resilient energy to a community pillar (i.e. everyone benefits, and in great magnitude, when the resiliency is improved). With more room to install technologies, engineering and technical challenges may not be as complex as the same project implemented in a hospital in an urban area. Conversely, whereas necessary utility infrastructure may be readily available in a city, it may be sparser in a more rural community where technological innovation may be more needed. All of these factors should be considered before setting any quantitative tier.

The New Jersey Board of Public Utilities provided a similar microgrid feasibility pilot in 2016-2017, under which it evaluated proposals for community-benefit microgrids and issued 13 awards. The program allowed flexibility in allowable building stock, and all of the projects awarded did because of their scale have more than two (2) facilities which were included. There was also a lot of flexibility in the DERs which were allowed, as the optimal mix of technologies are ultimately dependent upon what the end-use requirements of off takers are and the associated sustainability and economic requirements of each project.

The Connecticut Department of Energy and Environmental Protection (DEEP) also ran a Microgrid incentive program which targeted projects that produced a community benefit. While it did not set a minimum threshold on the number of buildings, it did show favorability to projects which incorporated building stock from both the public and private sectors.

All three of these Programs share one common goal of employing microgrids as a service that provide community benefit in the form of resilient, efficient energy available to the facilities they serve while affording the maximum flexibility in building stock.

Where a minimum requirement may be beneficial is on load size. The goal of the FOA is to create a notable positive benefit to the macrogrid, and that cannot be achieved if a load is not significant enough to have a noticeable impact.

1.5 Response

Setting a minimum requirement on the number of DERs could limit the number of applicants, namely those which are smaller-scale but produce a model that works for a small community. A successful FOA might consider projects that involve multiple DERs will be considered first, but those with only one will still be evaluated.

A broad definition of DER should be adopted (e.g. consider not only battery storage but other viable storage options such as thermal, EV charger integration, compressed air (especially in industrial environments), etc.). Intermittent DERs should be used for load following and peak shaving when economic and/or technical integration of storage technology to achieve baseload is not possible. Fossil-based combustion technologies should be limited, as much as possible, to satisfying baseload, and cogen capabilities should always be employed where the technical and economic conditions are favorable to do so (and thus minimize the amount of traditional combustion-based thermal generation and curtail environmental impact). Without a broad definition of DER, a prohibition on certain projects could result. Energy efficiency and demand response measures should be hard requirements but additional measures such as renewables, storage, or EVs, etc. should be more flexible as a result of site specifics that prohibit certain types of DER installation.

1.6 Response

These definitions are satisfactory from the grid perspective but the FOA should also include the building perspective and allow flexibility in what specific DERs and other EE technology solutions meet them. We suggest expanding the definition to include rapid recovery from stresses and outages as part of preservation of services at the building and grid level. For example, a facility/campus with an advanced building automation system that increases or curtails load in preparation for and/or during grid stress events can be thought of as a “grid service” under the proposed definition.

1.7 Response

These are the correct parties. Consideration should also be given to offtaker and affected sector advocacy organizations (for example, MEA consults frequently with the Maryland Regional Manufacturing Institute on energy matters affecting our State’s manufacturers and industrial businesses). These organizations provide subject-matter experts who can weigh in on critical project components: technical, financial, and regulatory alike. The applicable regulatory bodies are critical stakeholders as they have the authority to significantly impact the pace at which a project may be deployed, based on the timing of regulatory approvals. A member of public utilities/service commission staff would be an appropriate team member. A State Energy Office (or other state entity involved in or responsible for planning state energy usage) would also be an appropriate choice.

In order to meet applicable environmental goals as part of the project, other potentially beneficial stakeholders which could contribute meaningful input to project design include locally-recognized environmental groups and affiliated organizations. Flexibility on local involvement is critical to ensure that the relevant mix of industry expertise which will lend itself to an effective, replicable model that meets local sustainability and environmental goals while balancing the long-term economic needs of the project offtakers.

1.8 Response

Yes, they should. Jurisdictional laws and regulations governing the use of fossil fuel combustion assets will heavily drive facility design considerations, as will individual organization sustainability initiatives and project economics. Maryland has achieved widespread adoption of combined heat and power (CHP, or “cogeneration”) technologies as part of its grid modernization efforts. These assets not only provide reliable and affordable power to their offtakers but also result in substantial reduction of grid-sourced power from traditional fuel sources and thus achieve greenhouse gas reductions. Renewable energy should always be at the forefront in the decision-making process, but the technical limitations and energy demands of facilities may warrant combustion DERs to meet continuous demand where renewable plus storage DERs are not technically or financially feasible. Additional incentive dollars could be offered if the combustion asset proposes to incorporate carbon sequestration technologies or use renewable natural gas sources.

Biogas options should be considered where they are technically feasible and make the most strategic and economic sense. For example, wastewater treatment facilities present optimal cases for CHP adoption in that they have high electricity demand as well as thermal for the processing of organic waste solids. There exists opportunity to derive biogas from the anaerobic digestion of solid waste from this process, thereby making the technology renewable and environmentally beneficial while retaining the benefits afforded by a combustion asset to meet constant high baseload demand. Other entities that may fit this solution are agricultural operations with high organic waste output, such as dairy farms. As an example, MEA has incented a CHP project at a dairy farm operation in Cecil County which utilizes biogas generated from the anaerobic digestion of cattle manure and food waste from a nearby school.

1.9 Response

Technologies which allow the dynamic interaction of supervisory controls, building automation systems (BAS), connected EE technologies, DERs, real-time and forecasted weather data, grid behaviors, and energy pricing should be considered. An ideal system will be able to diagnose system inefficiencies, dispatch corrections, and react in real time to the present conditions so that building loads, generation, storage, occupant comfort and desires, and grid operations can be optimized. Optimization in this context should mean maximizing the use of clean and renewable energy at the lowest cost to satisfy occupant needs and effectively respond to grid demands to avoid costly peaker generation (for supply shortfalls) or negative energy prices (for oversupply).

Due to the complexity and volume of data exchange to facilitate these actions, cybersecurity should be a primary component of any devised solution. This is especially true for DER systems which are grid-interactive, as it will require the presence of a data stream that connects the system's assets to the data networks of the macrogrid and therefore creates an avenue for malware. Therefore, the FOA should require that cybersecurity and privacy solutions be implemented as part of the system design in such a way that maximum security against threats which could disrupt optimal system performance or threaten the offtakers is afforded but system value is not significantly eroded as a result. It may be worthwhile to ask that proposals attempt to quantify the impact of the avoided losses that would result from information compromise and system disruption as a means to evaluate the benefit provided by security measures.

There also exists a personal privacy concern for projects that involve residential meters and customer account information. PII can be extracted from residential utility accounts if the proper security measures are not employed when meters talk to DERs, for example. Careful consideration should be given to this area.

1.10 Response

Increased incentives in microgrid development will increase associated emerging business model development. However, the ultimate buy-in from private investors and capital providers will be key to identifying commercially-viable project models. GEB development carries some ROI uncertainty which can only be mitigated from increased adoption of standard solution packages which prove the ROI they purport from initial modeling. Thus, engagement from not only capital providers themselves, but the stakeholder organizations which represent them is necessary for long-term success for the FOA's ultimate, long-term goals. This component should be a key FOA design consideration. Successful proposals will include an element of ROI measurement & verification that can be subsequently logged and reported to inform project attributes that are ultimately successful, those which need improvement, and those which should not be considered again.

Another area that could be addressed, however, is workforce development. A well-educated workforce familiar with the technical acumen and operational/managerial skill sets to effectively design, implement, and operate microgrid technologies is critical for their long-term success. MEA has a detailed lens on this issue through its interactions with stakeholders in the CHP and facilities energy management industries: there is high demand for these workforces and actual projects have suffered due to the lack thereof. However, there also exists a recruitment issue for these industries. Individuals with the necessary skill sets are in the U.S. workforce now, but effective recruitment could be improved to make such positions more attractive to viable candidates. This is another solution that may be explored in either this or future FOAs.

1.11 Response
Smart systems that interact with surrounding weather stations to procure environmental/weather forecasting data should also be considered in system design. This allows for pretreatment of buildings, yielding operational savings and helping to mitigate grid stress.

Packaged CHP technologies are a rapidly-growing solution for organizations that do not have sufficient free capital to put toward custom-engineered systems that require substantial lead times and design. These systems have been designed in a manner that make them easy to install, generate the desired facility capacity, and easily-integrated with existing facility infrastructure.

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

2.1 Response
Cost share should be broadly defined. Resilient Maryland, for example, considers all meaningful contributions from Applicants, including but not limited to: donated work hours, in-kind capital contribution, third-party funding sources, incentives (such as those from utilities and other State agencies). Systemic economic barriers, such as those imposed by economies in contraction and recession, may hinder the ability for organizations to mobilize on projects that would otherwise move forward under healthy economic conditions. Other examples of organizations that may be very willing to pursue a project (and which would ultimately achieve long-term operational benefits from installation) are those with little available free capital, such as those which primarily serve low-to-moderate income communities.

2.2 Response
MEA believes that 5-7 years is a more reasonable performance period. MEA's incented CHP projects take, on average, 1-3 years to fully design and get to shovel-ready status, and then can take up to 1-2 years longer to achieve installation and operational status. Common barriers include organization RFP solicitation, review, and final selection; utility interconnection barriers, delays, and implementation timeframes; capital sourcing; and unforeseen construction and system integration issues that arise throughout installation.

Microgrids include planning for multiple DERs and ancillary technologies with control systems, which adds to the complexity. This further justifies the 5-7 year estimate.

Category 3: Data Sharing/Measurement and Verification

3.1 Response

Given that organizations will likely desire to keep operational information proprietary to guard against competitive advantage concerns, the DOE should factor this into the type and level of data that is requested. However, it should not erode the quality of data needed from the pilot projects to meet the goals of the FOA; that is, identify replicable and cost-effective microgrid models. There can be a fair compromise between identifying information and providing the level of quality needed for DOE purposes.

Since there is no “control group”, the best way to measure impact is to compare total energy use over an extended period of time against the prediction of a model. A baseline of performance should first be established, perhaps over the three most recent years. Then, a model can be constructed based upon the ultimate goals of the microgrid’s implementation and the mix of benefits desired for the offtakers. Actual performance can then be compared against modeled performance, which will inform the accuracy of the initial model and identify areas of improvement in future replications.

3.2 Response

Yes, this is typically what all of MEA’s hard asset incentive programs require. Either a baseline or a modeled industry-minimum technology baseline (for new construction projects) and subsequent EM&V to measure realization rate. Many incentive programs operate on this basis to find failure points and address solutions.

3.3 Response

Any project funded by federal dollars should employ some requirement on a minimum generally-accepted level of data transparency. Data sharing between different project parties is essential for an effective, scalable project which maximizes efficiency. To determine whether or not data can be proprietary, affected parties should gauge when the absence of a level of data negatively impacts the quality of the project. Protecting trade secrets should be respected, but within the realm of reasonability. It’s also necessary to make data available to the public out of these studies so that scalable, replicable models can be created and industry standards can be set. Care should be taken to ensure that compromising identifying attributes of the data are stripped out so that entities sensitive to public disclosure are not threatened.

3.4 Response

Multiple DERs will require supervisory control and building management systems to ensure that the presence of reactive power from being out of sync is minimized (especially when integrating with grid power, as that can cause functional issues on the grid and result in costly reactive power penalties to the implementing organization(s)). Additionally, in regard to renewable intermittent DERs, weather data and pricing data are critical to any management system so that dispatch does not result in power more costly than alternatives (i.e. utility power or combustion DERs).

Resilience is also something to focus on. Multiple coordinated DERs can be designed to provide black start and islanding capabilities that a single DER might not be able to achieve alone. Logic control systems should be able to restart DERs when grid power is lost and continue to manage them in the most economically, technically-responsible way.

Security and reliability are also two important issues for multiple DER integration and interaction through data transfer and collection. Compromised datastreams can lead to sub-optimal system operation, or worse, malicious instructions that could threaten the DERs and potentially cause physical damage and harm.

Category 4: Other

4.1 Response

The FOA needs to clearly define what proposals should detail. For example, Resilient Maryland requires the definition of a value proposition, anticipated costs associated with the study itself, what issues the proposed project hopes to address (i.e. improving resiliency, energy affordability, a cleaner fuel profile, a combination thereof, etc.). The FOA should also specify what specific entities are required to support a successful proposal (your facility representatives, contractors/developers, utility reps, PSC/State reps, local reps, advocacy orgs, etc.). The FOA must clearly explain how each proposal will be evaluated and how favorability under each review criteria can be achieved. The DOE should also stress that it retains the ability to adjust award amounts based upon external factors like overall demand, funding availability, etc.

Flexibility should be employed in what types of proposals are allowed. Resilient Maryland, for example, understands that being a pilot in a new area will require an element of active market research through solicitations in multiple industries and for multiple types of energy solutions. The FOA should adopt the same mentality - be flexible in the pillot, learn where your market lies, and hone future offerings based on lessons learned.

Strong proposals require dedicated personnel and resources; and therefore the FOA might consider a portion of a grant award apportioned for upfront administrative expenses.

4.2 Response

Page 6 of the RFI indicates that "Preferred applications will: ... Demonstrate EVs and managed charging as part of the overall building system load;" MEA recommends that the RFP build on this by requiring that the building energy management system manage the charging of multiple vehicles in such a manner as to ensure each vehicle is charged by the time specified by the vehicle.The energy management system should also coordinate the charging to minimize the effect on demand. Simply stated, the energy management system must know when the vehicle needs to be charged (time), how much energy is needed (kWh), and the system charging rate (kW). This will require communication between the vehicle and the energy management system.

Page 7 of the RFI indicates that "We anticipate each project will produce the following types of data: …. c) Building occupant benefits (e.g. comfort, productivity, health, convenience);" These metrics are highly subjective. The FOA will likely need to provide detailed guidance concerning what specific data is to be collected and how it is to be analyzed to quantify these benefits.

Page 8 of the RFI indicates "Perspective into the amount and duration that occupants are willing to change the timing of their energy use, and any necessary level of compensation". Opinions on comfort are highly subjective. Relying on the opportunity cost structure of a behavioral reward system is an excellent way to address the issue without introducing unnecessary levels of corporate/managerial authority that erode morale. Long-term workplace modifications in the wake of the current global COVID-19 pandemic should also be considered. There is high likelihood that more telework will be encouraged, and thus less use of traditional office space. While this means a reduction in energy consumption for office facilities, it also means that this energy use is shifted to residential communities where employees reside and work throughout the day. Therefore, preference should be given to projects which include residential communities as that is where the energy use will be found.

The FOA should make clear that American households and businesses will benefit from more affordable energy costs because of incented projects and that the incentive itself is an investment by the American taxpayer primarily for their benefit. The value proposition to U.S. taxpayers should not be overlooked/left unaddressed. Systemic national support is needed for future program continuity.