Response to U.S. Department of Energy Request for Information: Energy Improvements in Rural or Remote Areas

To: US Department of Energy Office of Clean Energy Demonstrations (ERA@hq.doe.gov)
From: Karen Wayland, CEO, The GridWise Alliance (kwayland@gridwise.org)
Re: Request for Information DE-FOA-0002841_RFI
Date: December 4, 2022

On behalf of the members of the GridWise Alliance, I am pleased to submit the following response to the Department of Energy (DOE) Office of Clean Energy Demonstrations (OCED) Request for Information (RFI) (DE-FOA-0002841) regarding DOE's implementation of Section 40103(c) of the Bipartisan Infrastructure Law, Energy Improvements in Rural or Remote Areas.

The GridWise Alliance is a non-profit organization consisting of leading utilities, rural cooperatives, owners and operators of transmission and distribution grids, manufacturing, engineering companies, and new innovative grid technology companies. This diverse group of industry stakeholders is committed to building a modern 21st century grid that can support decarbonization, empower consumers, reduce costs, and bolster electric reliability and resiliency. GridWise Alliance strongly supported Congress' historic investments in grid modernization under the Infrastructure and Investment and Jobs Act (IIJA).

As the Department of Energy (DOE) implements IIJA programs, it must leverage federal funding to drive additional investment in both the transmission and distribution systems as Congress envisioned. It is worth noting that IIJA funding is an important tool in mitigating the costs on state ratepayers of grid modernization projects, an important priority in providing afforable electricity to US families and businesses. We look forward to working with you and your team as you design these programs and offer the following comments in response to the RFI.

Category 1: Respondent Characteristics

Respondent Characteristics:

1.1 What type of organization do you represent, or are you responding as a private citizen? To help DOE categorize responses, please use one of the following respondent classifications: private citizen, government, community-based organization, labor union, energy provider, American Indian Tribe and Alaska Native Village, or other tribal organization, for-profit company, other type of non-profit entity, or other. If other, please specify.

GRIDWISE RESPONSE: The GridWise Alliance is a non-profit organization consisting of leading utilities, rural cooperatives, owners and operators of transmission and distribution grids, manufacturing, engineering companies, and new innovative grid technology companies. This diverse group of industry stakeholders is committed to building a modern 21st century grid that can support decarbonization, empower consumers, reduce costs, and bolster electric reliability and

resiliency. GridWise Alliance strongly supported Congress' historic investments in grid modernization under the Infrastructure and Investment and Jobs Act (IIJA).

1.2 What role would you or your organization play in an energy project conducted through this Program?

GRIDWISE RESPONSE: GridWise Alliance members could be developers, owners and operators of energy projects or could supply grid technologies (both hardware and software) to enable energy projects, or supply design, engineering or other consulting services to support the development of energy projects.

Category 2: Potential Project Details

Area Definition:
2.1 In Section 40103(c), "rural or remote area'' is defined as a city, town, or unincorporated area that has a population of not more than 10,000 inhabitants. Would you characterize the area you represent or have in mind regarding this program as being rural or remote? If so, why? If you are considering many areas (e.g., as a governmental body or non-profit), what characteristics would be indicative of communities fitting this definition?

GRIDWISE RESPONSE: Utilities serving rural and remote areas may serve a large number of small communities or unincorporated areas with dispersed populations, including Indian Nations. Grid modernization projects that span a large portion of such a utility's service territory may affect a total population that exceeds 10,000 inhabitants. DOE must consider how proposals for grid modernization projects could improve energy delivery for multiple small rural or remote communities.

2.2 Would you characterize this area as underserved, overburdened, disadvantaged, or as having environmental justice concerns? If so, why and with what metrics? In what ways, if any, does being rural or remote shape these challenges?

GRIDWISE RESPONSE: Rural communities include over 90% of persistently impoverished counties in the U.S. [1] These communities may be more vulnerable to tornadoes, hurricanes, floods, wildfires, droughts, and other impacts of climate change. These communities may be disadvantaged by limited emergency and first responder teams. Inhabitants of rural communities may experience higher energy burden given persistent poverty and the relatively higher cost of providing electricity to widely dispersed customers (low population density).

[1] Electricity Use in Rural and Islanded Communities A Workshop Supporting the Quadrennial Energy Reviews Public Outreach | National Academies

2.3 What, if any, energy challenges does the rural or remote area have? What are the community's priorities among these challenges? Has the area considered specific solutions and, if so, what progress has been made to implement the solutions? Answers can cover both a specific community you represent as well as broader categories or types of relevant Communities.

GRIDWISE RESPONSE: GridWise Alliance members are actively creating innovative new solutions to optimize operations and benefit customers, while ensuring that the grid continues to provide safe, reliable, and affordable electricity to consumers in communities across the United States. Technological challenges to providing reliable and affordable delivery of electricity to rural customers include:

- Lower power quality at end of distribution networks far from electricity generation;
- Longer and more frequent power outages after grid disruptions; and
- Greater impacts from the effects of climate change, such as wildfires and floods.

Rural and remote areas have unique challenges in financing grid modernization projects that result in higher costs to energy consumers:

- There are fewer customers per mile of electricity lines so the costs of infrastructure improvements per customer can be higher than in more densely populated areas;
- Capital investment costs can be comparatively higher in rural areas because of transportation costs and the need to build redundancy;
- Inadequate workforce with skills in the operational and informational technologies required by utilities can lead to higher technology obsolescence; and
- Rural communities include over 90% of persistently impoverished counties in the U.S. [2]

Project Priorities:

2.4 Given the purposes referenced above (bullets A-F), what types of energy projects would be most impactful?

GRIDWISE RESPONSE: Rural and remote areas must have more resilient infrastructure to reduce power disruptions (upgraded utility poles, raised substations, etc.), but also must develop local generation resources such as distributed energy resources (DER) and microgrids to improve power quality and provide power continuity during widespread disruptions to distribution systems. This will require a portfolio of technology solutions, from Advanced Meter

[2] Electricity Use in Rural and Islanded Communities A Workshop Supporting the Quadrennial Energy Reviews Public Outreach | National Academies

Infrastructure (AMI or smart meters) at the customer interface, grid monitoring sensors and grid edge control devices to supervisory control and data acquisition (SCADA) systems, outage management systems (OMS) and distributed energy resource management systems (DERMS). Energy Storage will also plan an important role in many rural and remote energy projects. For more resilient and local electricity delivery, the grid in rural and remote areas must have an advanced communication network, including grid sensors, grid edge control devices and automation controls, connected by either fiber or wireless broadband, to enable intelligent, interactive, self-healing grid functions.

2.5 Would this type of project(s) address energy burdens, economic burdens, environmental impacts, lack of quality jobs, or other energy equity and environmental justice considerations? If so, how?

GRIDWISE RESPONSE: Local/technical community colleges can generate local talent pools to create local jobs for line workers, commercial truck drivers, grid operations personnel, communication infrastructure, cybersecurity analysts, inspection, installation and maintenance of overhead, underground cables and circuits and associated asset management functions.

2.6 What barriers have been encountered or would be anticipated for these types of projects or relevant analogs? What are potential paths to overcoming them? Provide specific examples of the types of barriers of interest in the categories of permitting, financing, community engagement, materials acquisition and construction, and operations and maintenance.

GRIDWISE RESPONSE: As noted above, rural and remote areas have unique challenges in financing grid modernization projects:

- There are fewer customers per mile of electricity lines so the costs of infrastructure improvements per customer can be higher than in more densely populated areas;
- Capital investment costs can be comparatively higher in rural areas because of transportation costs and the need to build redundancy; and
- Rural communities include over 90% of persistently impoverished counties in the U.S. [3]

In addition, the complex and lengthy process of permitting grid modernization projects delays necessary upgrades that will deliver benefits to rural and remote communities. The inability to hire qualified workers across business functions in rural and remote communities also creates challenges for developing energy projects, procuring required equipment and working stock, project management, cyber protections and other critical functions.

[3] Electricity Use in Rural and Islanded Communities A Workshop Supporting the Quadrennial Energy Reviews Public Outreach | National Academies

DOE should consider how other IIJA funding streams, especially the Commerce Department's broadband funding for states and the middle-mile broadband program, can be leveraged to support rural and remote communities' energy projects that would be funded by the ERA program. Modern utility communication networks are essential for even the smallest utilities to improve reliability and resilience and to integrate DERs to provide essential grid functions. These communication networks may also provide rural communities with high speed internet access that is essential for these communities to participate in the 21st century digital economy and create new economic opportunities.

DOE could fund projects that help the utilities serving rural and remote communities and provide technical assistance to enable the deployment of modern grid technologies, especially digital solutions that integrate both software and hardware solutions. These solutions may require new ways of storing, managing and analyzing utility data. Changes to business and operational processes at these small utilities may include:

- The need to use cloud solutions rather than on-premises systems for back-office functions and even OT grid management systems;
- Adoption of artificial intelligence/machine learning-based software/analytics platforms that force process redesign and create new work processes replacing old processes;
- Changes in financing to allow capital recovery for SaaS/service offerings, which are typically recurring monthly/annual operational items;
- Potential need to redesign internal processes for Requests for Proposals;
- Working with vendors as partners to realize value creation savings over time rather than savings at the time of purchase alone;
- Pooling purchase orders across a number of smaller public power combine reduce market fragmentation and therefore attract top industry vendors to the public power marketplace; and
- Possible expanded use of third parties to manage some infrastructure and grid operations to overcome OT/IT talent shortages.

DOE may also consider how to incentivize the use of templated solutions that offer faster time-to-value rather than highly engineered custom solutions, which are always likely to be higher cost and behind schedule. DOE's technical assistance should also seek to address the shortage of regulatory, technical and legal staff necessary to complete grant applications.

2.7 What would equitable and meaningful community involvement look like for this type of energy project(s)? How can you incorporate perspectives from groups within the community who experience disproportionate socio-economic, environmental, political, or energy burdens? What support is needed to build equitable community engagement?

GRIDWISE RESPONSE: Energy projects funded through the ERA program should prioritize those that incorporate local workforce development and local economic development, for example, securing a commitment from local universities/technical colleges to train local workers who want to remain in the community and contribute to the local economy growth rather than moving to big cities. Local entrepreneurship could be nurtured with targeted seed funds/loans to start minority/diversity companies that are focused on creating local jobs. Economic development may be enhanced by energy projects that bring in local commercial or industrial customers who are on a path for energy independence together to evaluate new business models.

Large public power banks like CoBank, NRUCFC, etc should be encouraged to step in with pre-approvals so that the "cost share" or matching funds does not become a reason not to apply for the IIJA grants. Grid equipment manufacturers and vendors (both hardware and software) should be invited to partner with eligible entities at the concept paper phase rather than just be invited to bid for the RFP; this allows for exploration of the long-term value of integrating new grid technologies rather than just an evaluation based on cost once the project funding has been awarded.

What looks transformational for one utility will look different for other utilities, even in the same region. An innovative approach is not always just deploying new technology, rather simplification and shrink-wrapping solutions so the scale down and scale up costs are dramatically lowered. Replicability of project successes may be enhanced if the project is modular in nature, rather than custom-designed.

Project Size:

2.8 For projects conducted within the community area in the past or that are being planned, what is the approximate size (e.g., measured in dollars, power rating, geographic benefit)? What size projects could this rural or remote area support in the future? Are there approaches to make projects scalable for future community needs?

GRIDWISE RESPONSE: DOE should consider both small-scale projects that benefit localized neighborhoods, like microgrids, and larger-scale projects that benefit multiple rural and remote communities, like grid modernization. Given the resource requirements necessary to construct a successful grant application, as well as the resources necessary to develop, construct and manage energy projects, some level of consolidation of smaller grid projects into a single application could deliver greater benefits across a geographical region. For this reason, DOE should consider that some awards in any given year should be in excess of $30 million. Preference for these larger projects could include consideration of how a transmission/G&T utility partners with (multiple) distribution co-ops, or how a large utility partners with individual communities to address system-wide upgrades.

A project that can demonstrate delivered economic development in addition to enhanced reliability, resilience and clean energy will have the greatest chance of being scalable and/or replicable.

2.9 How long would an envisioned project take to go from concept to operation?

GRIDWISE RESPONSE: Certain modular time-to-value solutions like Grid Monitoring Systems and GridEdge Control systems can be 100% live in 3-5 business days with the first layer of situational awareness and reliability/resilience improvements while still being future-compatible with more sophisticated SCADA/ADMS/DERMS Grid mod projects that take 3-5 years to complete.

2.10 Is this project in the review or design stage, or is it ready to build? How do you assess readiness of the project?

GRIDWISE RESPONSE: Many of the solutions from Gridwise members are generally available today, proven and "shovel-ready". The focus on innovation alone should not have to wait for the innovations of tomorrow like Vehicle-to-X, bi-directional power flow analytics and the emergence of a transactive energy marketplace. Modularity today that helps accommodate tomorrow's cutting edge innovation to demonstrate good, smart use of funds quickly to improve reliability, resilience and flexibility while the emergent solutions of tomorrow unfold in the next 3-5 years.

2.11 Demonstration projects through DOE typically require a 50% cost share, in other words a minimum 1:1 match of private sector to federal funds. Do you anticipate challenges for a 50% cost share requirement?

GRIDWISE RESPONSE: The 50% match for energy projects in rural and remote areas is likely too high for the rural/public power market, particularly given the higher costs to develop energy projects in these communities.

2.14 Would you anticipate any challenges in operating or maintaining the energy project? These challenges could include factors such as hiring and retaining staff and long-term business models to ensure funding is available for operations and maintenance.

GRIDWISE RESPONSE: As previously noted, the shortage of trained workforce with skills to build and operate a modern and secure grid is particularly acute in rural and remote communities.

Yet a modern grid offers potential work-arounds to help deliver solutions, for example the ability to use cloud SaaS offerings where grid data can be stored and analyzed, and where utilities can access a growing library of proven, vetted solutions.

Community Benefits Planning

2.16 Which entities would need to be involved in these energy projects for them to be successful? Please describe the roles of these entities.

GRIDWISE RESPONSE: A range of stakeholders must be consulted to successfully deploy new energy projects. Given the deep expertise in planning, constructing, operating and maintaining energy projects, utilities are a critical partner for communities seeking ERA funding. Rural co-ops are obvious partners, but some rural customers are served by multi-state investor-owned utilities. And even where co-ops are the distribution utility, an IOU or Power Marketing Administration (PMA) may provide transmission services. These larger entities may have economies of scale, technical expertise or workforce capacity that can be leveraged by communities and their local utilities for grid modernization projects. This is particularly important for projects designed to integrate DERs, so that rural customers can be assured of the opportunity to participate in the wholesale aggregated DER markets envisioned by FERC Order 2222, which will require coordination between the distribution system and bulk power markets.

Outcomes and Replicability:

2.20 What outcomes would the organization you represent prioritize for an energy project? What metrics would be appropriate to convey these outcomes?

GRIDWISE RESPONSE: ERA funding should enable more reliable, resilient, affordable and clean electricity for rural and remote communities. The metrics that would convey these outcomes include:

Reliability metrics: Customer Minute Interrupted (CMI) saved average and focus on CMI reduction; IEEE 1366 metrics like SAIDI, SAIFI, MAIFI, ASAI etc.

Resilience Metrics There is no current industry accepted standard metric for Grid Resilience. One metric used by innovative utilities like FPL is “economic value of each day that the grid is 100% restored”. FPL investments made their grid resilience such that they came back 3 days faster on 2017 after Hurricane Irma compared to Hurricane Wilma in 2005. The economic value was measured by FPL at $1B a day across 25 million citizens.

Another aspect of Grid Resilence is improved load management to better maintain grid stability. and therefore maintaining grid stability. Rapid and unplanned deployment of

DER/Microgrids/EV on the distribution grid also impacts grid stability and performance. Voltage drops at grid edge and associated poor power quality in distribution circuits create inefficiency as well. Improving Grid Edge Volt/VAR metrics like Conservation Voltage Reduction (CVR) is a key innovation needed. Improving feeder end voltage profiles by 1-5% using CVR devices has been demonstrated by Xcel Energy to reduce energy supplied at a substation level by as much as 1.5MW. This is another measure of Grid Resilience. Its ability to manage large DER/EV loads and the emergence of microgrids.

Grid Flexibility: There is no current industry accepted standard for Grid Flexibility metrics. However, the vision of Grid Flexibiity is to reduce spot purchases of energy during times of extreme weather events so "normal" purchase prices like $25-$35/Mwh rather than $9000 per Mwh in the state of TX in the midst of the Feb 2021 ice storm. Alternate measurements include "negawatts" saving energy consumed during times of high demand. Creating Virtual power plants (VPP) using DERMS is all about energy self-reliance and reducing dependency on external energy sources.

2.21 What attributes of the project(s) need to be demonstrated to support their replication for follow-on deployments? Example factors affecting replication could include attributes such as geographic context, business model, regulatory or permitting, community or ownership structure, or other contextual factors.

GRIDWISE RESPONSE: No two geographical locations are the same, nor are any two circuits. So value metrics are the best way to demonstrate high ROI on tax-payer funded IIJA/IRA funds to assure the American taxpayer that their money is preparing a better 21st century grid and that too quickly and cost-effectively. New business model demonstrations for IOUs and public power are critical to assure them of successful transition to energy service providers rather than the current business model of energy providers. This is critical since many commercial and industrial customers are well on their path to energy self-sufficiency without any need for IIJA money already. So there is a fierce urgency of now to deploy proven solutions first and then invest in innovation prototypes.

Category 3: Program Structure

In addition to seeking information on the types of projects and attributes of communities that may seek assistance through this provision, OCED is seeking feedback and additional information on the structure of the Program, including the role of partners, states, and other organizations in supporting improvements in rural and remote areas.

3.8 How can OCED design the ERA Program to unlock other, non-Federal sources of capital for rural and remote energy projects?

GRIDWISE RESPONSE: The historic funding for grid modernization in IIJA will leverage private capital by offering federal cost share for project expenses. Small communities and their correspondingly small utilities may find that their capacity to marshall their percentage of the cost share is limited, even if at a reduced rate compared to other grid grant funding. Allowing partnerships with larger utilities in the region may address this limited local capacity for matching the cost share.

Competitive Solicitations:
OCED may use several potential financial mechanisms and support programs to provide assistance to applicants and stakeholders.

Prize Competitions: As mechanism to reach new people, audiences, and communities, OCED is considering the use of prize competitions. This could include activities to build capacity and relationships between entities required for successful demonstration projects in rural or remote areas, including communities, utilities, private capital, project developers, and DOE; providing seed funding for new investment models or companies; or identifying and developing solutions to help address other challenges.

3.12 Are there any key considerations OCED should keep in mind while shaping prize competitions?
3.13 Are there areas that you believe would be well suited for a prize competition?

GRIDWISE RESPONSE: GridWise Alliance recognizes that rural communities and their local utilities may have limited capacity to track all grid-related funding announcements across DOE's grid portfolio, identify appropriate funding streams and complete (potentially multiple) applications, and manage project procurement, construction, and operations, while also meeting reporting requirements. GridWise also notes that the energy needs in rural and remote communities are significant, and are likely to exceed the annual $200 million allocated for this program. Therefore, GridWise recommends that DOE use grants and cooperative agreements as the primary mechanism for distributing ERA funding.

Should DOE develop a prize competition, GridWise Alliance recommends that DOE prioritize projects that demonstration innovations in project development that reduce the time to deployment of energy projects that deliver community benefits.