

ENHANCING COMMUNITY RESILIENCE WITH THE GREEN POWER ON- DEMAND SYSTEM (GPODS)

A White Paper
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1. Executive Summary

This white paper explores the deployment of the Green Power On-Demand System (GPODS) as a multi-year, multi-state infrastructure initiative aimed at enhancing community resilience during extended electrical power outages. Such outages can result from a variety of causes, including human-made disasters, technological disruptions, and natural hazards, and they have cascading effects on communities, disrupting essential services known as Community Lifelines. Rural, underserved, and disadvantaged communities are particularly vulnerable, often relying heavily on public services and utilities to restore critical infrastructure and Community Lifelines.

In the last decade, the electric industry and the federal government have prioritized energy storage technology (like batteries, cold storage, and more) due to the growing use of electricity. The focus on renewable energy generation and the need to match that generation with customers usage has made energy storage a critical part of their long-term plans. Billions of dollars are being invested in developing and using these energy storage solutions to enhance grid resilience and maintain a dependable power source.

The GPODS (Green Power On-Demand System) project focuses on deploying mobile, rechargeable, energy storage units (battery) connected to the utility distribution grid. These units can support the community's grid resilience year-round and be deployed during disasters to pre-determined critical locations, ensuring uninterrupted power supply. This white paper outlines the problem, describes the GPODS solution, highlights the collaborative effort driving the project, provides a status update, and emphasizes the resources provided by the All Hazards Consortium (AHC), the participating utility, and other project partners.

2. Introduction

In our modern world, prolonged power outages resulting from various crises pose a significant threat to all communities. These outages disrupt essential services vital to response, mitigation, and recovery efforts during and after emergencies. Vulnerable communities, such as those in rural, underserved, or disadvantaged areas, face acute challenges during power outages, often relying heavily on state and local government services, public safety officials, and utilities to restore critical infrastructure and Community Lifelines.

This white paper addresses these critical issues by introducing the Green Power On-Demand System (GPODS) initiative, a comprehensive approach to ensuring uninterrupted power supply to underserved communities and essential infrastructure during emergencies. GPODS leverages energy storage technology to enhance community resilience, with a focus on collaboration, innovation, and long-term sustainability.

3. Problem Statement

Extended electrical power outages caused by human-made disasters, technological disruptions, and natural hazards can have devastating consequences. These outages disrupt essential Community Lifelines and services and have cascading impacts in all areas, including safety and security, health and medical, communications, food, water, shelter, power, and fuel. These services are vital for effective response, mitigation, and recovery efforts during major disasters or emergency incidents that produce significant temporary or long-term disruptions.

Rural, underserved, and disadvantaged communities bear a disproportionate burden during these power outages. They often rely heavily on state and local government services and utilities to restore critical infrastructure and Community Lifelines. However, inadequate critical infrastructure leaves these communities vulnerable, with limited access to health and medical services, transportation, food, water, and shelter. This makes them more susceptible to the impacts of widespread power outages, hindering their self-sufficiency during emergencies and their ability to recover effectively and swiftly.

Furthermore, the lack of power significantly affects the ability of public safety and emergency responders to assist in response and recovery efforts, straining their limited resources and increasing the potential for hardship and suffering among those in the community who most need assistance.

4. The GPODS Project Abstract

In 2020, the All Hazards Consortium's private sector leadership initiated the GPODS project, a multi-year, multi-state infrastructure initiative. This initiative aims to leverage the research and development funding and resources in the energy industry in addition to the federal government's infrastructure funding sources (e.g. FEMA BRIC Infrastructure Grant, Department of Energy grants, or other federal funding sources for infrastructure). Large utilities and energy companies are investing billions in energy storage technology to prepare for a future increasingly dominated by electrification. As the prospects for building new generation plants become less promising, energy storage becomes a vital component of their strategy.

The GPODS project's initial focus is on rural, underserved, or disadvantaged communities, a requirement of the FEMA BRIC (Building Resilient Infrastructure and Communities) grant program. It centers on the development of mobile, rechargeable, commercial-grade energy storage units (e.g. batteries). These units can be connected to utility distribution grids on utility infrastructure, supporting local grid resilience year-round.

During disasters, these units can be deployed, at the direction of government, to pre-qualified communities and connected to pre-qualified, "pre-wired" critical infrastructure or facilities. This deployment ensures that electric power remains available at critical facilities, including shelters, dialysis centers, local government buildings, and essential sites of critical infrastructure, such as water, communications, and fuel.

5. Addressing the Critical Community Needs

The GPODS project was conceived to address critical needs stemming from extended power outages in vulnerable communities. By providing backup electric power to underserved communities and critical infrastructure, this project seeks to mitigate the far-reaching impacts of power outages. Key needs include:

- Ensuring the availability of essential Community Lifelines during emergencies.
- Enhancing the resilience of the local distribution grid year-round.
- Supporting vulnerable communities in their quest for self-sufficiency during emergencies.
- Reducing negative health outcomes by ensuring access to critical services.
- Assisting public safety and emergency responders in their response and recovery efforts.

The GPODS project aligns with these needs and aims to create a more resilient and sustainable future for communities facing power outage challenges.



6. GPODS Project Overview

The GPODS project's goal is to create a resilient and reliable power supply that can help communities to better cope with and recover from power outages, by ensuring that essential services such as health care, water, transportation, communication, safety/security, feeding/cooling stations, and shelters can continue to operate. (www.gogpods.org).

The Green Power On-Demand System (GPODS) is a project that uses mobile rechargeable batteries to support the electrical grid in disadvantaged communities. These batteries can detach from the grid and be deployed to specific locations during natural disasters or other emergencies. Here's a simple breakdown of how it works:

GPODS Concept

GPODS will be managed jointly by state and local emergency managers like any other county resources. The utility company will own, operate, and maintain the GPODS system. When a mission is requested by government, the utility will disconnect GPODS units from charging stations, transport them to pre-wired sites, and plug them in. Once the regular power is back, GPODS will be disconnected by the utility and returned to the charging station or go to another pre-wired site.

GPODS Maximized Utilization

GPODS units serve a dual purpose. During normal conditions, they make the community's power grid more efficient by storing and releasing energy 24x7. During emergencies with power outages, utilities can detach GPODS units and use them as backup power for pre-qualified facilities.

GPODS Safety

Safety is a top priority for all utilities and government. The GPODS equipment is charging at the utility's site when not in use, reducing the time it's in the community. Quick-connect devices are installed by the utility on utility infrastructure. NO GPODS equipment is installed in the facilities. This approach makes GPODS operations safer and more efficient. Remote monitoring of GPODS equipment by the utility ensures safety, availability, and reliability.

Post-Grant Maintenance

After the grant period, the utility will continue to own, operate, and maintain the GPODS system as part of their normal infrastructure, relieving the maintenance burden from state and local governments.

Three-Phase Approach: The project has three implementation phases:

1. **Phase 1 - Scoping Project:** Determines feasibility and identifies qualified sites.
2. **Phase 2- Pilot Project:** Deploys GPODS units and quick-connect devices at selected sites.
3. **Phase 3 - Implementation Project:** Expands to more communities with additional units and quick-connect devices.

Long-Term Vision

GPODS aims to expand across counties and states, supported by multiple utilities. This collaborative industry and government approach ensures that more communities can mitigate cascading power outages during disasters, making the power supply more resilient and efficient while coordinating resources in energy storage.

For more details, see Attachment 1 – GPODS Project Overview



7. Collaborative Effort for a Resilient Future

Public-Private Partnership

The GPODS project represents a unique collaboration between the public and private sectors. The All Hazards Consortium (AHC) and its private sector leadership are partnered with investor-owned electric utilities to drive this multi-year initiative.

The GPODS project leverages partnerships with other organizations, such as non-profits, private sector companies, trade associations, academia, and other government agencies that help leverage additional resources, align with other projects and research, develop in-kind match, and attract expertise to implement the GPODS project over multiple years.

8. Current Status of the GPODS Project

Virginia

In 2021, the Virginia Department of Emergency Management (VDEM) partnered with the All Hazards Consortium and Dominion Energy to begin working on the first GPODS project.

Phase 1 - Scoping Project in Virginia (Awarded by FEMA March 2023)

In January 2022, the All Hazards Consortium (AHC) collaborated with the Commonwealth of Virginia's Department of Emergency Management's (VDEM) Mitigation Grants teams and Dominion Energy to submit and secure a FEMA BRIC grant award for a Phase 1 Scoping Project. The objectives of this phase include:

1. Identifying underserved communities in Virginia, collaborating with VDEM and local, regional mitigation coordinators.
2. Identifying potential facilities within these communities that meet the technical criteria for participation in the GPODS program.
3. Developing initial frameworks, processes, and mechanisms for program governance, management, operations, and maintenance.

Phase 2 - Pilot Project in Virginia (Selected by FEMA August 2023)

The Phase 2 - Pilot Project was submitted in January 2023 for a budget exceeding \$20+ million. This phase aims to deploy several GPODS trailers and multiple pre-wired locations in various Virginia locations, including Richmond, Colonial Heights, Petersburg, and Prince William County. These locations encompass critical infrastructure such as water pumping stations, dialysis centers, shelters, and city halls. The Phase 2 application was selected for further review by FEMA in August 2023. Award is expected in early 2024.

Phase 3 - Implementation Project in Virginia (To be Submitted Jan 2024)

The Phase 3 - Implementation Project is already underway and is expected to be a more extensive endeavor, with an estimated budget of \$45 million. This phase will cover multiple sites in Virginia's Region 5 (Tidewater region) and Region 3 (Charlottesville area), with the application scheduled for submission in January 2024.



9. Resources Provided by AHC & Partners

The All Hazards Consortium (AHC), a Maryland-based nonprofit, has a 15-year history of fostering public-private partnerships and successfully securing and managing federal grants in collaboration with states. This includes the FEMA BRIC grant, a long-term infrastructure initiative.

Recognizing that energy infrastructure projects are complex, have long development cycles, and often require resources and expertise that is far beyond the technical and financial capabilities of rural and underserved communities, the AHC's leadership has partnered with utilities and other stakeholders to underwrite the initial two years of work required to develop a winning, multi-phased project. Once implemented, the GPODS initiative will benefit participating communities for up to two decades.

Under the GPODS project, AHC, alongside its private sector partners and participating utilities, offers a range of resources and staff at no cost to state and local governments during the first two grant application cycles (e.g., in January 2024 and January 2025). These resources include experts in research, grant application writing, acquisition of support letters, business cost analysis, technical and engineering support, communications and marketing, community outreach, partner management, and grant match development. This comprehensive support aims to facilitate the successful implementation of the GPODS project and ensure its long-term sustainability.

The GPODS project does NOT require any funding from state and local governments. Instead, only some time to participate in the planning process and guidance during the application development process.

For more details, see Attachment 2 - Resources Provided by AHC & Partners.

10. Roles & Responsibilities

- **All Hazards Consortium (AHC) / Participating Utility**
 - Assemble and manage partnerships.
 - Provided initial outreach, gain agreements with state and utility to proceed on joint BRIC project application work for two (2) years.
 - Facilitation of project with state and utility, operate governance structure, meeting administration, notes, program management, outreach to partners, provide FOIA protection.
 - Provide all technical design, engineering, surveys, procurement, installation, operation, and ongoing maintenance of all GPODS related equipment.
 - Help generate, produce and track the “in-kind match” for the state.
- **Participating Utility**
 - Provide design, engineering, technical, installation, operations, and maintenance support for GPODS system.
 - Conduct assessments of the GPODS operating capabilities.
 - Conduct technical reviews and survey to qualify pre-wired locations.
 - Conduct ongoing research and development of renewable energy technologies/solutions to support project.
- **State / County**
 - Participate in project status meetings (as needed).
 - Provide guidance and advise the AHC in the grant application submittal process and governance framework.
 - Submit the grant applications/proposals to FEMA in January 2024 & 2025.
 - Support process to help select the communities/facilities to focus the project upon.
 - Support AHC's partner development process via introductions to relevant organizations.



11. Conclusion

The Green Power On-Demand System (GPODS) represents a pioneering initiative to enhance community and infrastructure resilience during extended electrical power outages. The project acknowledges the far-reaching consequences of such outages on critical services and vulnerable communities. By developing mobile, rechargeable energy storage units, the GPODS project aims to address these challenges and contribute to a more resilient future.

This white paper has outlined the problem, described the GPODS solution, highlighted the collaborative effort driving the project, provided a status update, and emphasized the valuable resources provided by the All Hazards Consortium (AHC) and its partners. As the project progresses through its phases and expands beyond its initial scope, it exemplifies the potential of public-private partnerships to create innovative solutions that benefit communities and enhance their capacity to withstand and recover from disasters. In GPODS, we find a shining example of resilience in action.

Attachment 1 – GPODS Project Overview

The project—Green Power On-Demand System (GPODS)—will leverage a mobile rechargeable battery system that will support the disadvantaged community’s electric grid during normal conditions but will detach and be deployed to predetermined and pre-wired rural, underserved, or disadvantaged community facilities or critical infrastructure locations throughout the state to ensure continuous power or provide immediate backup power during a natural disaster or other catastrophic incidents. **See Figure 1.**

GPODS vs. Diesel Generators

The GPODS system approach offers several differences from traditional solutions like stationary large diesel generators. GPODS reduce pollution, whereas diesel generators do not, as GPODS uses battery as power storage, which does not emit pollutants. GPODS also provide support to renewable sources of energy, as it allows to store surplus energy generated from renewable sources like wind and solar, which can be used during peak demand or power outages, diesel generators cannot.



Figure 1 – GPODS Mobile Unit Concept

Mobile GPODS units can be shared across communities when needed and provide the ability to scale the project to reach more locations in the future without having an expensive generator(s) at every site. Instead of installing a stationary large diesel generator and interfaces at each location, the GPODS approach involves installing quick-connect devices at multiple sites, which allows for more facilities and communities to participate in the GPODS program in the future.

Additionally, GPODS units can also be used day-to-day storing and discharging energy, making the community's electrical grid more reliable and resilient during peak demand periods, which diesel generators cannot do. By using GPODS, communities can better manage their energy consumption and reduce dependence on fossil fuels (a grant requirement) and provide a cleaner solution for back-up power during a crisis.

GPODS Concept of Operation

The GPODS system will be governed by a joint governance process (to be developed) including state and local emergency managers. The GPODS system will be owned, operated, and maintained by the utility who will execute approved GPODS missions from the governance process.

Once a mission is requested, the utility will disconnect the GPODS unit(s) from the distribution grid charging stations, transport the unit(s) to the pre-wired site(s) and plug them into the GPODS quick-connect device(s). Once the grid power comes back on, the GPODS power source will automatically be disconnected from the facility via the quick-connect units technology. The utility

will either return the GPODS unit to the charging station or transport it to another pre-wired location based on pre-arranged parameters (to be developed). **See Figure 2 below.**

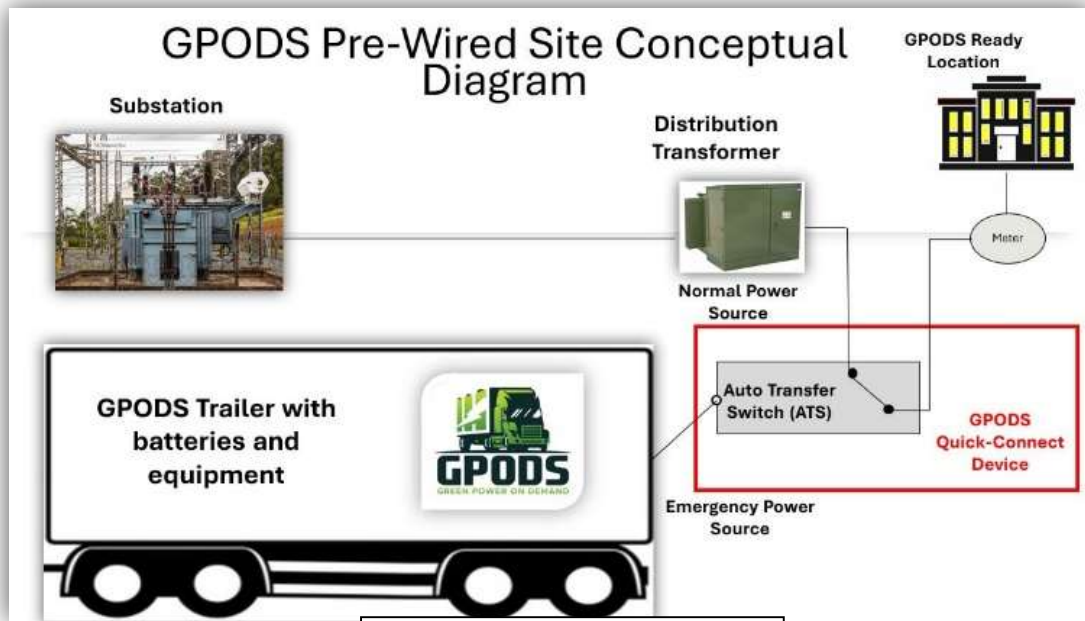


Figure 2 – Pre-Wired Site Diagram

Flexibility & Scalability

The GPODS project uses an innovative "distributed quick-connect approach" that involves installing quick-connect devices with standardized interfaces at multiple pre-qualified sites to create a

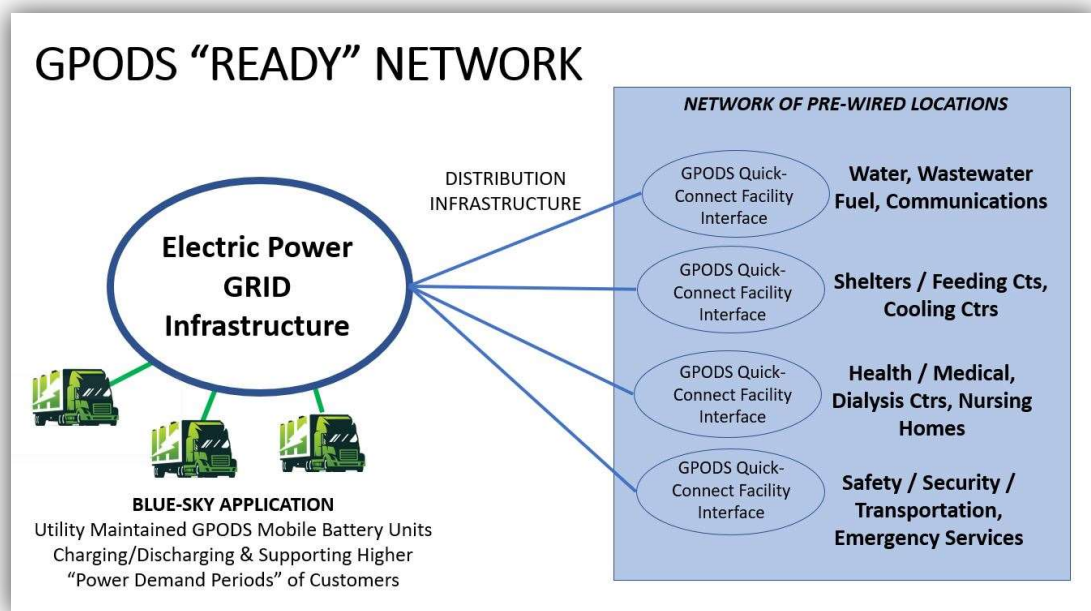


Figure 3 – GPODS "Ready" Network of Pre-Wired Sites

network of "GPODS ready" locations. This approach allows for more facilities, communities, utilities, and states to participate in the GPODS program in the future. **See Figure 3 below.**

GPODS Maximized Utilization

The innovative mobile GPODS energy storage approach will allow dual utilization of the GPODS units that will maximize the project's risk reduction and resilience benefits to the communities. Instead of a fixed asset (e.g. large-scale diesel generator) that may only provide benefits a limited number of times, the GPODS mobile units will be in use every day, serving a dual purpose:

- 1) During normal conditions, the GPODS system helps the community's power grid work better by storing excess generation during non-peak hours and releasing that energy when demand exceeds normal availability. This makes the grid stronger and ensures that existing and renewable energy sources can be used effectively all year long.
- 2) During emergency conditions with power outages, the utility, at the direction of the governance process, will detach the GPODS unit(s) from the grid and transport it to a pre-wired location(s) to provide back-up power.

This innovative "dual use" approach leverages energy storage technology and maximizes the investment and utilization of the GPODS mobile generators all year round. **See Figure 4 below.**

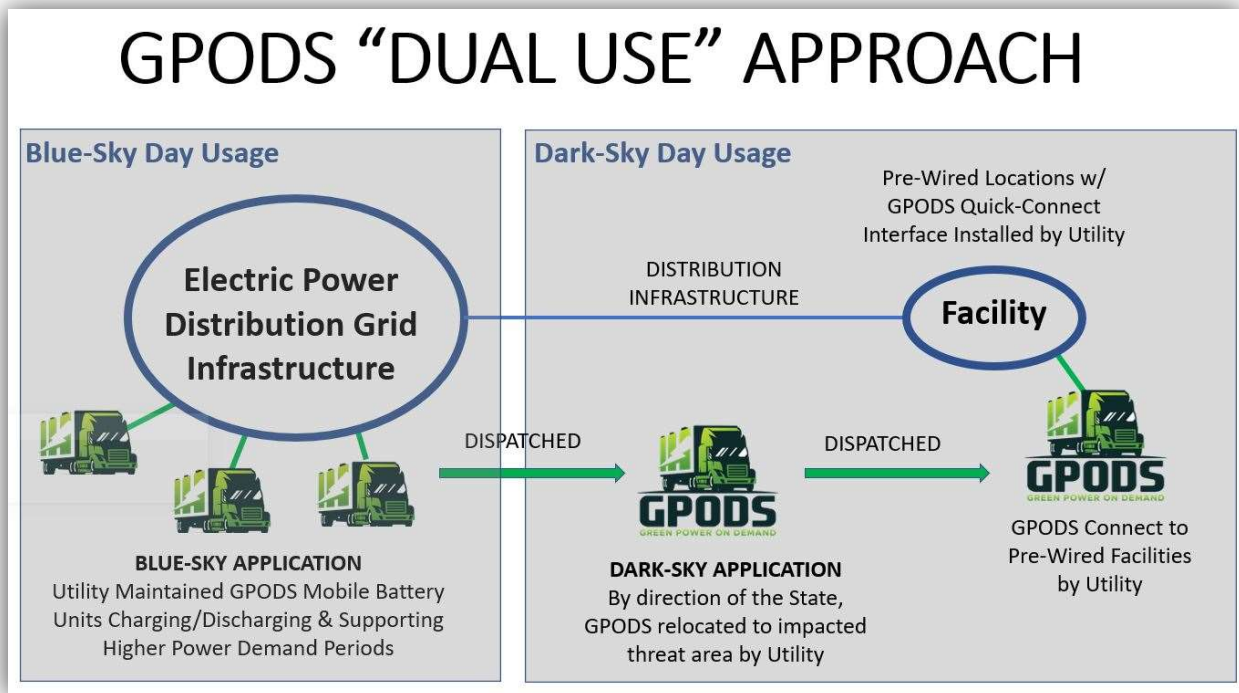


Figure 4 – GPODS Dual Use Approach

GPODS Safety

Safety is a primary focus for all utilities. The GPODS system has been designed to maximize safety and reduce any risks associated with the GPODS energy storage units, charging stations, and quick-connect devices.

1. All GPODS equipment is kept at the utility's site when things are normal, not at customer sites. When they're needed somewhere, utility workers transport them and set them up to provide power. Once the regular power is back, the GPODS unit is moved to a new location or returned to the utility's GPODS charging station. This keeps the community safer by reducing the time GPODS battery units are in the area.



2. Quick-connect devices are installed by the utility outside a qualified facility on utility infrastructure which is on the utility side of the power meter. These quick-connect devices are not active unless the main power goes out **and** a GPODS unit is attached to them. There's no need to install GPODS equipment inside buildings. This design makes everything easier, involves fewer people in GPODS work, makes it safer to operate GPODS, and reduces the risks of injury and/or delays during GPODS deployments.
3. The GPODS and quick-connect devices will be continuously monitored remotely via the utility's operations centers to ensure operational safety, reliability, and reduces the risk of equipment not working as designed when needed for power back-up missions.

Post Grant GPODS Project Maintenance

The utility will own, operate, and maintain the GPODS system as part of their infrastructure support costs following the grant period. This eliminates the long-term support burden on state and local government.

The Three-Phase Approach

The GPODS project is a comprehensive initiative designed to enhance community resilience during extended power outages. It consists of three distinct phases, each contributing to the overall success of the project:

Phase 1 - Scoping Project:

The first phase focuses on determining the feasibility of communities and potential facilities. It involves identifying qualified sites that can participate in the pilot project. It provides the people to perform the initial research, outreach, partner development, technical research, policy research, communications, match development, and ongoing weekly project/program management activities to prepare for Phase 2 – Pilot Project. This phase serves as the foundation for subsequent project activities.

Phase 2 - Pilot Project:

This Phase 2 – Pilot Project continues the ongoing Phase 1 activities and will deploy two (2) to three (3) GPODS units along with seven (7) to ten (10) GPODS “quick-connect” devices.

The quick-connect devices will be installed outside of the qualified facilities on the utility's infrastructure. NO GPODS equipment will be installed in the participating facilities.

The pilot site locations will be jointly selected by the County and the All Hazards Consortium Team in coordination with regional and local emergency managers. The utility will provide the final technical approvals for each pilot site to ensure technical compliance with the GPODS system and long-term maintenance.

Phase 3 - Implementation Project:

The final phase of the GPODS project involves the full-scale implementation of the initiative. It includes deploying additional GPODS units to additional quick-connect devices within multiple communities, potentially ranging from 50 to 100 sites.

Long-Term GPODS Project Vision

The future vision for GPODS is inspired by the way many utilities currently help each other during big power outages by sharing their personnel and resources across different regions, states, and counties.



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The GPODS project is designed to utilize standards and processes that can easily expand across county or state lines with participating utilities and states.

By coordinating funds from utility and federal investments in infrastructure and energy storage, GPODS units could be moved by multiple utilities into the County by participating utilities. This would help more communities during disasters, making the GPODS power supply more resilient and capable. It also spreads the costs, reduces the effects of climate change-related outages, and gives local emergency managers extra resources to keep power running at important locations without straining their limited resources.



ATTACHMENT 2 - Resources Provided by AHC & Partners

The All Hazards Consortium, a Maryland 501c3, has over 15 years of facilitating public/private partnerships and winning and executing federal grants with states. The FEMA BRIC grant is no exception.

Knowing that infrastructure projects have long-lead times, require technical, legal and regulatory resources that rural, disadvantaged, and underserved communities simply do not have access to, the AHC's leadership formed partnerships with utilities and its partners to underwrite the first two years of work required to produce a winning, multi-phased project that will bring benefits to communities for 20 years.

As part of the GPODS project, the All Hazards Consortium (AHC) team, in collaboration with its private sector partners and participating utilities, will provide a range of resources and staff at no cost to state and local government for the first two (2) grant application periods (e.g, Jan 2024 and Jan 2025). After the first two years, the grant award will provide the funding for the implementation of the pilot project and beyond.

These resources include:

- **Researchers:** Experts who compile legal, regulatory, and technical requirements to establish the GPODS system in Maryland with Exelon/PEPCO.
- **Grant Application Writers/Editors/Validators:** The AHC offers a team of 8 to 10 grant writers, editors, and reviewers to support the County in the grant application process.
- **Acquisition of all Support Letters:** The AHC ensures the production and submission of FEMA Support letters with grant applications, where applicable.
- **Performing a Business Cost Analysis (BCA):** The AHC offers support for the BCA work, either directly or in collaboration with the County and State. For instance, the AHC conducted the BCA for the Virginia project.
- **Providing Technical/Engineering Support:** Resources are provided for technical engineering, design, site surveys, and other critical activities to support grant applications and project implementations.
- **Providing Communications and Marketing Support:** Resources are dedicated to developing an integrated project messaging strategy in coordination with state, county government, and utility representatives. Notably, the joint development of the www.gogpods.org website serves as a platform for unified messaging.
- **Providing Community & Partner Outreach:** Efforts are made to engage local communities and partners to provide education at the appropriate times, enhancing awareness and understanding of the GPODS project.
- **Project and Partner Management:** facilitation of weekly status meeting and provide the central coordination staff and systems for all project related costs, timelines, implementation issues, work/labor issues, contractor, management, coordination with DEV, outreach and communications, and other project related tasks.
- **Match Development Services:** As the project management lead, the AHC provides the support needed for developing the 25% grant match required by the FEMA BRIC grant, ensuring that federal costs share requirements are met.