C2C: Clean Energy *to* Communities
U.S. DEPARTMENT OF ENERGY

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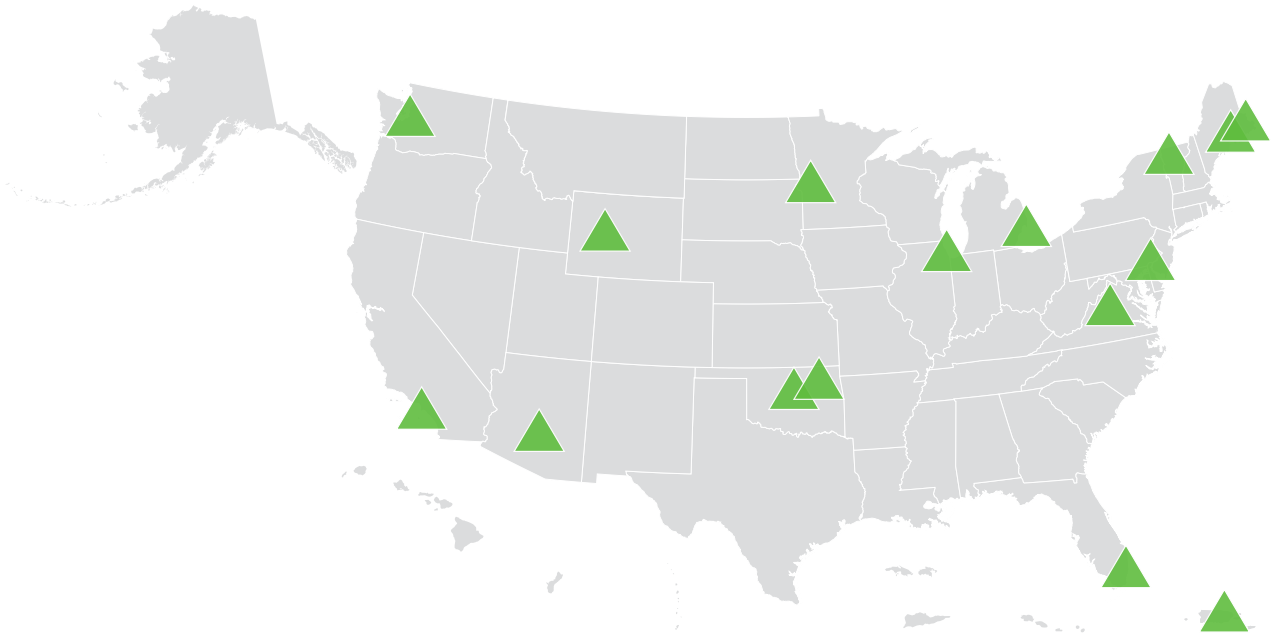
LESSONS LEARNED *from*

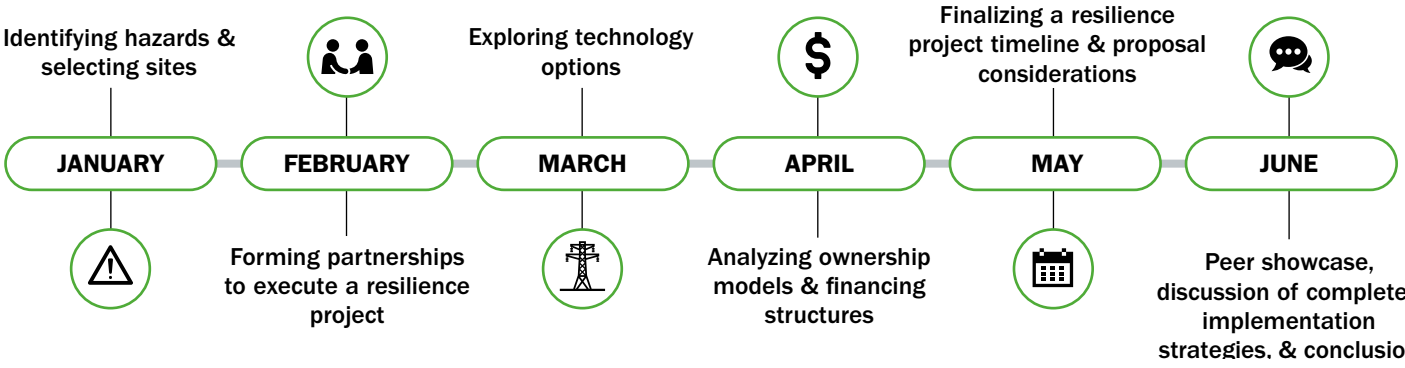
THE CLEAN ENERGY TO COMMUNITIES PEER-LEARNING COHORT ON

Enhancing Resilience at Critical Facilities through Solar, Storage, and Microgrids



The National Renewable Energy Laboratory (NREL), with support from World Resources Institute (WRI), designed and led a six-month peer-learning cohort from January through July 2024 on "Enhancing Resilience at Critical Facilities through Solar, Storage, and Microgrids" as part of the U.S Department of Energy's ***Clean Energy to Communities*** *(nrel.gov/c2c) (C2C) program.*

Representatives from 15 municipalities, municipal utilities, colleges, and Tribes from across the United States participated in monthly workshops covering best practices for planning and deploying local resilience projects. This document shares key takeaways, lessons learned, and resources from the cohort.



Communities across the United States seek to bolster their resilience in the face of severe heat, flooding, and grid outages. The development of solar and storage microgrids and other onsite generation at critical facilities or community centers—especially in disadvantaged communities or regions with higher rates of severe events and outages—can enhance resilience and provide additional benefits for residents. The C2C cohort on "Enhancing Resilience at Critical Facilities through Solar, Storage, and Microgrids" convened participants in six monthly workshops to discuss best practices and tools to help them deploy a resilience hub or onsite resilience system. These types of critical facility resilience projects are often defined differently by unique stakeholders and in differing contexts. Some participants prioritized solar plus storage projects throughout the cohort, while others were focused on planning fully islandable microgrids with control systems. The following lessons may be valuable to a broad spectrum of related energy resilience infrastructure projects.

> *Being part of this C2C cohort was an invaluable experience as the Office of Sustainability navigates cross departmental coordination for renewable and energy resilience systems. The technical information and resources shared have been key in the development of our project scopes.*
>
> – Maria Galarza, City of Detroit

The following lessons and best practices arose from six sessions of expert presentations, discussions between cohort participants, and direct technical assistance sessions that took place during the cohort.

Considerations for Planning and Proposing Microgrid Projects for Resilience

1. **Governments and other entities may benefit from strategic integration of resilience projects into a larger clean energy and resilience vision.**

   Entities exploring a potential resilience project should consider how it aligns with the objectives laid out in a broader Climate Action Plan or resilience plan. For example, the City of St. Paul, Minnesota, has a combined **Climate Action and Resilience Plan** (www.stpaul.gov/sites/default/files/Media Root/Mayor's Office/Saint Paul Climate Action & Resilience Plan.pdf) that outlines community vulnerabilities and cites strategies to support people, natural infrastructure, and build infrastructure.

   Projects are more likely to gain buy-in from internal decisionmakers if their broader plans identify the value of and need for the suggested measures. Further, if a plan analyzes the frequency of severe heat, flooding events, and/or grid outages—and which communities will be most impacted by such events—it can help clarify the need for a project or set of projects to address those problems and support siting considerations. Overall, a strategic vision can smooth the project development process for costly systems and better ensure community benefit.

2. **The goals and benefits of the proposed project must be clearly defined from the beginning.**

   "Resilience" can refer to a variety of things: residents' ability to access shelter or resources during or after severe weather events, the functioning of critical facilities during energy disruptions, overall grid function, the ability to rebuild quickly after a disaster, and more. A clear definition of a project's resilience goals can help encourage stakeholder buy-in and alignment, both internally and externally.

3. **Quantify the benefits of resilience for internal leadership and the public.**

   Resilience projects may be expensive, especially when deployed as microgrids, and may never recoup the full costs associated with their installation (particularly in locations with lower electricity rates). When the net present value of the system (obtained through a tool like **REopt®** (reopt.nrel.gov/tool)) is negative, an entity may need to provide project funders, partners, stakeholders, and decision makers with alternative supporting justification (other than a financial justification). Tools such as NREL's **Customer Damage Function Calculator** (cdfc.nrel.gov) can help entities characterize the ancillary benefits of increased resilience in the event of severe weather events or grid outages that might be hard to otherwise quantify. Additionally, it's valuable to provide a human-centered perspective by sharing qualitative

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> *I found the Enhancing Resilience at Critical Facilities through Solar, Storage, and Microgrids cohort valuable to improve my understanding of the topic area, to learn about resiliency planning at critical facilities, and I was able to learn from people and communities that I otherwise would not have the opportunity to meet.*
>
> – Elias Platte-Bormeo, City of Santa Monica, California

data on how certain hazards have affected (or may affect) residents and how these residents can benefit from a proposed project.

4 **Indices and metrics are useful to inform siting of resilience systems, and community engagement is essential to project success.**

Local governments can use a variety of metrics to inform the siting of a resilience project. These include datasets that identify areas most susceptible to climate hazards (e.g., the **FEMA National Risk Index** (hazards.fema.gov/nri); areas that deal with persistent and lengthy power outages (e.g., the System Average Interruption Duration Index [SAIDI], the System Average Interruption Frequency Index [SAIFI], and the Customer Average Interruption Duration Index [CAIDI]); and areas that experience disadvantages associated with historic and ongoing injustices **Climate and Economic Justice Screening Tool** (screeningtool.geoplatform.gov/en/#8/33.469/-97.502). However, none of these tools, metrics, and indices are a substitute for the expertise and lived experience of residents. Engaging residents in the design and site selection process ensures a project is sited in an accessible location, that necessary services are provided, and that residents are aware of the resource for future usage.

5 **Resilience projects are more successful when lead organizations outline a timeline and strategically establish partnerships early in the process, and then thoughtfully engage with those partners across the project timeline.**

Planning ahead for each phase of a resilience project can help ensure long-term success of a project and enable an entity to address barriers before they arise. Further, resilience projects will likely rely on a variety of partnerships, such as with a utility, community-based organization, and developers. Partners' roles will evolve over the project timeline, so it is helpful to develop an engagement strategy in early planning phases and consider how it can be managed and communicated strategically. Engaging all relevant partners, especially residents, at the earliest stages of a project can build support, inform technical and program design, and simplify communications across the project timeline.

Considerations for Designing, Procuring, and Funding Microgrid Projects for Resilience

1 **Tools and resources are available to support entities in determining optimal project design.**

A resilience project can include one or multiple types of energy technologies, including solar, storage, and electric vehicle charging stations.

The types of technologies used, as well as the scale of their deployment, is dependent on factors such as the project's goals and budget. **NREL's REopt® tool** (reopt.nrel.gov/tool) can help entities optimize a project and make well-informed energy investment decisions. With a basic working knowledge of REopt® or another system optimization tool, local governments and other entities can analyze the details and costs of various energy generation and backup power technologies. Including system sizing and configuration in requests for proposals (RFPs) can lead to better responses from developers and end-products that are aligned with established project goals.

Some entities may perform this type of high-level feasibility analysis internally, while others may include feasibility and system sizing services in their RFP. Technical assistance programs like **C2C Expert Match** (**nrel.gov/c2c/expertmatch**) can reduce project soft costs (such as considerations around technology choices, ownership decisions, and RFP development) and help resilience projects move past specific barriers and challenges as projects are underway. Expert Match can provide REopt® analyses or training if staff do not have the capacity or capability to use REopt® themselves.

2 Entities procuring a microgrid project should provide as much context as possible in an RFP to receive the strongest responses.

Entities that release an RFP for any portion of their resilience project should provide a detailed account of the project's critical components. These components may include preferences around (or restrictions on) certain technologies, desired system size, associated co-benefits such as workforce development, and more. Entities issuing an RFP can include relevant contracting language during the RFP phase to reduce complications during the negotiation phase of procurement. Overall, the more detail an entity can provide in an RFP, the more likely developers will provide responses that align with the desired project goals.

Additionally, some entities may find it helpful to seek out RFP templates or examples of successful RFPs from peer organizations to better understand where to begin, what language to include, and how others have included project goals in the RFP. If insufficient information is available at the start of the procurement process, procuring entities may also choose to issue a request for information (RFI) to inform a future RFP.

3 All ownership models have pros and cons, and the best ownership model for each project will depend on a variety of factors.

When determining system ownership options, entities should consider certain issues—such as previous procurement experience, financial status, and organizational capacity. The functionality and performance of the microgrid project will require trained staff with adequate time to monitor and maintain the site. If an entity wants to own a system, the procuring entity should determine facility staff's interest and ability to take on system operations and maintenance responsibilities. In all circumstances, interdepartmental coordination with financial staff and legal counsel can help streamline the procurement process and ensure there is clarity around viable ownership models.

4 Blend, braid, and stack funding sources to maximize cost coverage of a project.

The Inflation Reduction Act and Bipartisan Infrastructure Law have created numerous federal funding opportunities for clean energy resilience projects at the local level. This federal legislation extends access to tax credits that will reduce the capital cost and overall cost of clean energy technologies, and it also supports project financing through programs like the U.S. Environmental Protection Agency's Greenhouse Gas Reduction Fund. The Inflation Reduction Act also established "elective pay" for clean energy and storage systems that makes direct ownership an additional option for nonprofit organizations and local governments.

Local governments and nonprofits may also have access to private grants and/or state and utility incentives for their resilience projects. Funding streams can often be combined to reduce the overall system cost and result in greater likelihood of cost savings over the system's life.

Clean Energy to Communities (C2C) is a U.S. Department of Energy-funded program that aims to significantly accelerate the speed and scale of commitments, plans, and actions to increase clean energy, resiliency, and environmental justice by providing direct support to local communities to achieve their own goals. C2C provides three types of technical assistance to communities across the country: in-depth partnerships, expert match, and peer-learning cohorts.

Peer-learning cohorts are multi-community engagements that convene regularly for approximately six months to exchange strategies and best practices, learn in a collaborative environment, and workshop policy or program proposals, action plans, or strategies to overcome challenges around a common clean energy transition topic.

Three new peer-learning cohorts run every six months and are managed by NREL with support from WRI. For more information on upcoming topics and how to apply, please visit **nrel.gov/c2c/cohorts**.

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For more information, visit: nrel.gov/c2c

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