



CONNECTED COMMUNITIES

The ARCHER Project, Resiliency Planning Framework

Pilot Project Case Study

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LOCATION

Nashville, TN

PROJECT COSTS

\$1.25M

Total Funding

\$1M

DOE Project Funds to EPRI

\$250,000

TVA Connected Communities

FOCUS AREAS



Enhanced
Community
Resiliency

Project Summary

This Department of Energy (DOE)-funded project developed a planning and operations framework with a community focus that uses distributed energy resources (DER) to provide more energy resilience in the face of power outages caused by extreme weather events.

TOPICS

- ✓ Community Resilience
- ✓ Resource Planning
- ✓ Disaster Recovery

TECHNOLOGY

- ✓ Resilience Planning Framework
- ✓ Community Stakeholder Dashboard

KEY PARTNERS

- Federal Energy Agency
- Nonprofit Research Institution
- Local Power Company
- University Partner
- Project Advisor



Challenge and Solution



Challenge

Nashville, like many other communities, has faced several severe weather events that have caused outages over the last decade. Power outages are more than just an inconvenience - they can be life-threatening for some groups of people. There are opportunities for communities and utilities to collaborate to use distributed energy resources (DER) to limit outages and rapidly restore electricity should there be a power disruption.



Solution

Through Accelerating Resilience of the Community through Holistic Engagement and use of Renewables (ARCHER), Electric Power Research Institute (EPRI) along with its partners—Nashville Electric Service (NES), City of Nashville, Tennessee State University (TSU), Tennessee Valley Authority (TVA) and Larsen & Toubro (L&T)—developed a planning and operations framework with a community focus that uses DER to provide more energy resilience in the face of power outages caused by extreme weather events.

Focus Areas Supported



Enhanced Community Resiliency

The development of community-based plans and guides to increase resilience across communities provides benefits to residents, businesses, local government agencies and local power companies.

Goals, Approach and Results

Project Goals

ARCHER provides a methodology to understand risks – social, energy, environmental and grid – that can minimize the burden of power outages on residents, especially those in disadvantaged communities. This project aims to inform investments in community resilience by accounting for energy and social burden discrepancies, varying access to services and disparate living conditions. By developing and testing a framework with planning guidelines, practices and activities that enhance community resilience, the project can help the city ensure future events are met with appropriate responses.



PILOT PROJECT GOAL

Develop a community-centric resiliency approach to minimize the burden of power outages on local residents, especially disadvantaged populations.

“ By infusing this community resilience piece, we have to think about it in the context of the needs of the community beyond just the critical customers, beyond the hospitals and water treatment facilities. This is another way of thinking about how to keep power on to those essential services, the grocery stores, the community centers, the shelters and the places that support the community during these major events. That has been the focus of the project since the very beginning. Thinking about this not from necessarily a grid perspective, but from a community perspective.

JARED GREEN | principal technical leader, EPRI

Goals, Approach and Results

Project Approach

As part of a [greater Department of Energy \(DOE\) initiative](#), the Nashville ARCHER project benefits from an existing resilience framework and an industry advisory board composed of utilities, including investor-owned utilities, municipalities and co-ops, providing critical feedback. Building on existing DOE findings and insights ensures that the additional solutions developed can be replicated across various utilities and community structures, allowing scalability and applicability of the project results. A unique aspect of this project is the community engagement component, as the project team is composed of stakeholders from multiple community functions.

In Nashville, community engagement was approached from multiple angles. During the first phase of the project, a community resilience advisory board (CRAB) was created to gather insights on community needs during extreme weather events, focusing on

essential services and critical infrastructure like water treatment and hospitals. Conversations with CRAB members revealed the importance of essential services like grocery stores, pharmacies and banks during power outages, aligning with the Federal Emergency Management Agency's (FEMA) community lifelines. These discussions highlighted that beyond restoring electricity, ensuring access to basic services is critical for community resilience.

Nashville was already aiming to establish resilience hubs in disadvantaged communities before this project commenced and identified the greater North Nashville area as a key target in need of support. This historically underserved area presents unique challenges from an electric system perspective due to different primary distribution voltages that limit the number of grid connections across the river.

“ We always talk about grid resilience as keeping the lights on and restoring power as quickly as possible. But when you look at it through the lens of community resilience, there are different actions that a utility would take to provide resilience to the community.

JARED GREEN | principal technical leader, EPRI

Goals, Approach and Results

Project Approach (CONTINUED)

With a campus in the North Nashville neighborhood, TSU proposed an expanded community education and engagement component, involving promoting science, technology, engineering and math (STEM) programs at local schools to raise awareness and participation in a sustainable energy future. With extensive connections in the community, TSU played and continues to play a crucial role in community engagement, education and the technical aspects of the project.

A goal of the project was to create a dashboard that embodies the resilience framework and facilitates real-time communication between the utility and the community during major events, allowing all event responders to receive and act on information about community needs efficiently. When discussing potential use cases and features for the dashboard, the project team found that additional time was needed to educate community members about the electric distribution system to provide informed feedback and guidance.

When beginning to design the dashboard, the project team considered how to make the dashboard useful for various types of utilities and communities, ensuring city officials and NES partners were confident in its application. This involved developing a user-friendly interface that communicates complex information in an accessible way. While development is still in progress, the final dashboard aims to facilitate real-time communication between the utility and the community during major events, allowing all event responders to receive and act on information about community needs efficiently.

The final dashboard will also support future response efforts, helping utilities prioritize essential services during outages. Continuous feedback from CRAB ensures that the dashboard remains relevant and useful for all community members. The project exemplifies how eliminating silos and fostering collaboration among stakeholders can lead to innovative solutions for community resilience.

Goals, Approach and Results

Project Results

Having completed the first year of its two-year project lifecycle, the ARCHER project has completed the following activities, as outlined in the initial scope.

YEAR 1 (STARTING MARCH 2023)

Community Energy Resilience Planning

- Community engagement strategy
- Identification of essential needs
- Evaluation of existing energy resources
- Combine social, energy and grid vulnerabilities into common energy resilience metric
- Preliminary community resilience data exchange platform work
- Testing, validating and adjusting the community energy resilience framework

Goals, Approach and Results

Key Partners

- **City of Nashville**
 - **Kendra Abkowitz**, chief sustainability & resilience officer
- **Department of Energy (DOE)**
- **Electric Power Research Institute**
 - **Brenda Brickhouse**, senior technical executive
 - **Jared Green**, principal technical leader
 - **Sarmad Hanif**, technical leader
 - **Ram Ravikumar**, technical leader
- **Larsen & Toubro**
 - **Dr. Mayur Basu**, senior electrical engineer
 - **Dr. Arindam Maitra**, associate vice president
- **Nashville Electric Service**
 - **Antonio Carroll**, attorney
 - **Carla Nelson**, energy services engineering/technical engineering supervisor
 - **Chris Newman**, engineering supervisor – distribution planning
 - **Kat Pohlman**, sustainability manager
 - **Tony Richman**, energy services engineering manager
 - **Leah Taylor**, communications specialist
- **Recurve**
 - **Tony Shay**, vice president market development
- **Tennessee State University**
 - **Dr. Sagnika Ghosh**, associate professor
 - **Dr. Charles McCurry**, associate professor
 - **Dr. Saleh Zein-Sabatto**, professor and department chair
- **Tennessee Valley Authority**
 - **Lisa Akins**, senior program manager
 - **Georgia Caruthers**, senior project lead



This project benefitted from the creation of a CRAB comprised of individuals representing the following organizations:

- Corner to Corner
- FiftyForward Bordeaux
- Gideons Army
- Masjid Al-Islam Nashville
- Mount Bethel Baptist Church
- Muslim American Cultural Association
- Price Plaza
- Rachel + Winfree Data Analytics Consulting
- Saint James Missionary Baptist Church

Lessons Learned

1

Prepare to Educate Community Members

When engaging the community, it is crucial to include an education component in the planning process. Initially, the project team assumed that community members would have a basic understanding of the electric grid but found that this was not the case. As a result, additional efforts were needed to educate CRAB members on how the grid operates, its unique characteristics within their community and the potential impact of proposed changes, such as the potential introduction of a microgrid. This education allowed the community to provide more informed feedback, greatly enhancing the planning and operational processes. For other communities undertaking projects involving heavy community feedback, consider integrating educational sessions early in the project to ensure that all participants are well-informed and can contribute effectively.

“ I was amazed just how interested they were and how much of that information they were soaking up. You could almost see the light bulbs going off. That was the biggest thing I wish we had done differently as we were planning. Build in that education piece. That is one of the key things that we’re promoting—the education of the community groups formed to advise on these projects.

JARED GREEN | principal technical leader, EPRI

2

Consider Funding Requirements and Compliance

The project team experienced delays due to the complexities of contract negotiations, especially given the additional considerations for a DOE-funded project. Despite these setbacks, all entities continued to contribute, keeping the project on track. While this issue may be specific to projects involving governmental agencies, it highlights the importance of understanding and planning for funding requirements and compliance from the outset. For other communities, ensuring clear communication and prompt action on compliance matters can prevent delays and maintain project momentum.

Lessons Learned

3

Approach Potential Solutions with an Open Mind

Open and transparent conversations between utilities and the community are essential for developing effective resiliency strategies. Traditionally, community engagement might be limited to attending events and recruitment efforts, but deeper discussions about grid reliability and community needs are necessary for comprehensive resilience. These conversations should cover not just how to keep the lights on, but how to prioritize restoration efforts to best support the holistic community during outages. For example, utilities may initially be concerned with restoring power to as many residents as possible, but community-wide resilience may mean prioritizing getting essential services like grocery stores and pharmacies back online first. This approach may require a shift in thinking and a willingness to adapt strategies based on community feedback. Other communities should set this expectation and foster this open dialogue to identify and implement the most beneficial solutions for all stakeholders.

Looking Ahead

With a two-year lifecycle, the ARCHER project will be moving into the second year of the timeline, with the following activities to be completed by June 1, 2025:

YEAR 2 (ENDING JUNE 2025)

Fusion of Planning and Power Company System Resilience and Operationalization

- Develop procedures to link community needs to types of extreme weather events
- Prioritize energy and grid resilience projects
- Conduct an economic analysis of DER options
- Develop and teach STEM course for local schools
- Final version of community resilience data exchange platform
- Testing, validating and adjusting the community energy resilience framework

The project team will continue to seek community feedback to ensure usability and clarity. Once all stakeholders are familiar with the final dashboard, the project team will initiate a demonstration in which the impacts of the 2020 tornado and derecho will be recreated, triggering response protocol and resource deployment activities. To ensure an accurate demonstration, input is being gathered from NES and TVA based on past storm events and community impacts. Through this demonstration, project teams seek to understand how the grid's performance could have been different with the proposed changes outlined in the resilience framework.

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