Alaska Microgrid Partnership

CHALLENGE

Alaska—perhaps more than any other region in the country—faces unprecedented challenges in modernizing its rural energy infrastructure. Across the state, approximately 200 isolated microgrid systems are not connected to larger grids, and most of these systems rely almost exclusively on imported fuel (primarily diesel) to meet electrical, space/water heating, and transportation requirements. These communities have populations ranging from 50 to 6,000 people, are composed primarily of native Alaskans, and have some of the highest energy costs in the nation (up to ~10 times the national average).

Two of three wind turbines can be seen over the bulk fuel tanks of the Kasigluk Power Station, a vision of what could be possible in the future.

Alaska has extensive renewable energy resources, access to advanced diesel and load control technologies, and significant opportunities to improve energy efficiency. Despite this potential, relatively few energy projects have been completed with most of these projects being funded by grants. Rural Alaska likely has the lowest reliability and least resilient power systems in the country.

APPROACH

This project involves creating a development pathway for islanded microgrids that emphasizes leading by example, then testing the pathway using two pilot projects, and making the pathway data and other useful information available for other communities to follow. Key project activities include the following:

- developing a consistent assessment pathway to reduce total imported energy usage in a holistic way, working to address electrical, heating, and transportation energy needs;
- pulling together largely existing analytical tools to coordinate technical and financial methods that support full development assessments, allowing expanded public and private sector engagement;
- integrating more robust financial pro-forma assessment into the analysis of energy options, facilitating private sector investment in energy system improvements;
- implementing the pathway with two pilot communities, providing a workable example for other, non-pilot communities; and

At-A-Glance

PROJECT LEADS

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PARTNERS

- Renewable Energy Alaska Project
- University of Alaska Center for Energy and Power
- Intelligent Energy Systems
- University of Alaska Institute of Social and Economic Research

BUDGET

$1.18 million

DURATION

March 2016 – September 2017

TECHNICAL AREA

Design and Planning

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- developing new data sources and sharing information with project developers—via the Alaska Energy Data Gateway—that details the human, financial, and technical capacity of communities across Alaska to undertake new energy infrastructure projects.

EXPECTED OUTCOMES

The over-arching goal of the Alaska Microgrid Partnership is to significantly reduce the use of imported energy sources in Alaska's remote microgrids without increasing system lifecycle costs, while improving overall system reliability, security, and resilience. Expected outcomes from this project include the following:

- documenting the full techno-economic development process for reducing imported energy consumption by at least 50% in remote microgrids in Alaska, using a combination of energy efficiency, building energy improvements, power system upgrades, and transportation options analysis;
- identifying investment opportunities (i.e., the business case) to attract the funding needed to implement these types of projects on a wide scale;
- creating an implementation methodology for other communities to follow by documenting and publicizing the community assessment, data collection, project analysis, and development process; and
- implementing the methodology in two pilot communities to serve as models to position the communities to seek private and public funding to implement project recommendations.
- making Alaska Mircrogrid Partnership project and community information and data more readily available through an expansion of the Alaska Energy Data Gateway: https://akenergygateway.alaska.edu/

The potential worldwide market and impact are significant: 400 diesel microgrids in Canada, 70 in Greenland, and more than 1,000 in Indonesia. The International Energy Agency estimates that more than 700 million people currently without electricity access could be most cost-effectively served by mini-grids or microgrids.

Pathway for Holistic Community Microgrid Development

LAB TEAM

BERKELEY LAB · NREL National Renewable Energy Laboratory · Pacific Northwest National Laboratory · Sandia National Laboratories

Launched in November 2014 under the U.S. Department of Energy's Grid Modernization Initiative, the GMLC is a strategic partnership between DOE Headquarters and the national laboratories, bringing together leading experts and resources to collaborate on national grid modernization goals. The GMLC's work is focused in **six technical areas** viewed as essential to modernization efforts:

Devices and Testing | Sensing and Measurements | Systems Operations and Control
Design and Planning | Security and Resilience | Institutional Support