ENERGY TRANSITIONS INITIATIVE
U.S. Department of Energy

# Energy Transitions Initiative Partnership Project: Resilient Energy Planning for Ouzinkie, Alaska

The U.S. Department of Energy (DOE) Energy Transitions Initiative Partnership Project (ETIPP) works with remote and island communities seeking to transform their energy systems and increase energy resilience. Through ETIPP, DOE national laboratories partner with regional organizations to provide technical assistance to address selected communities' energy needs.

A view from Spruce Island. *Photo by Thushara Gunda, Sandia National Laboratories*

## Ouzinkie, Alaska

Ouzinkie is located on Spruce Island, Alaska, in the Kodiak Archipelago. The community is remote, located 245 miles from Anchorage. It is only accessible by water or air. Ouzinkie has a year-round population of approximately 200 people.

The community is served by a local electrical system powered by a combination of diesel generators and a hydroelectric turbine. Power system reliability has declined in recent years. The hydroelectric system has experienced issues since December 2021, awaiting studies and parts to make repairs. The three electric diesel generators are all aging and will need replacement in the near future. In 2021, Ouzinkie spent more than $17,000 a month on imported diesel fuel. To address these problems, Ouzinkie applied to ETIPP for technical assistance. The application noted that the main challenge for the community's energy system was to determine the next steps necessary to reduce reliance on expensive imported diesel fuel and pursue renewable energy technologies.

### Energy Resilience

The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from energy disruptions.

## Project Overview

The goal of this ETIPP technical assistance project was to update plans for improvements to the Ouzinkie power system, to support the transition to a more renewably powered, reliable, and resilient system. The analysis was intended to help the community prioritize renewable energy investment projects, and provide the documentation needed for future grant or loan applications.

The national laboratory researchers on the ETIPP team (from Lawrence Berkeley National Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratories) considered three new energy technologies for addition to the Ouzinkie

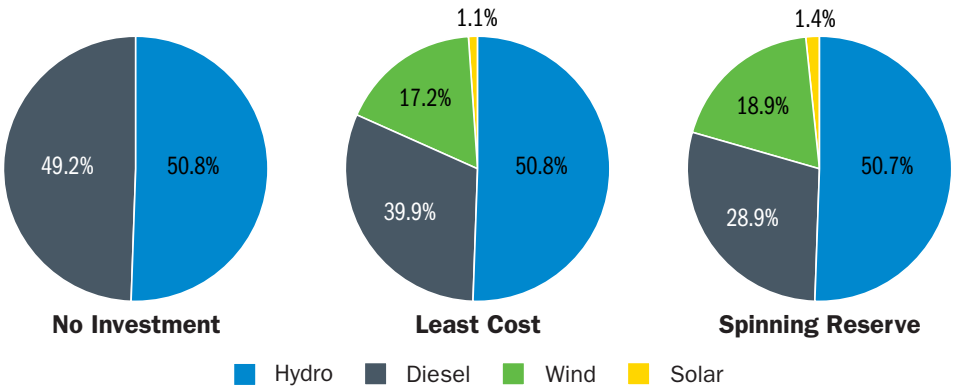


Figure 1. The optimal generation mixes for each of the goals scenarios: no investment, least cost, and enhanced reliability. Each scenario illustrated assumes that the hydropower control system is upgraded according to community plans. *Illustration by Nicole Leon, National Renewable Energy Laboratory*

system—wind, solar, and battery storage—as well as upgrades to the hydropower system. The team compiled data on each technology from a variety of data sources and used these data as inputs to an optimization model that determined the optimal size and location of resources needed to meet electricity needs in Ouzinkie.

## Findings

An "optimal" mix of energy resources ultimately depends on the goals and values of the community, as well as access to funding to invest in new generating resources. The optimization model used in this technical assistance considered three different goals for upgrading the power system: no investment, least cost, and enhanced reliability. Figure 1 shows the optimal generation mixes for these three goal scenarios. All goals assume that the existing hydroelectric system is repaired and operating.

In the **No Investment scenario**, Ouzinkie would make the planned improvements and repairs to the hydroelectric system and then continue to operate its electricity system as it currently does. In the **Least Cost scenario**, the addition of a wind turbine and some solar photovoltaic (PV) panels would greatly reduce the community's use of the diesel generators and thus reduce fuel costs. In the **Enhanced Reliability scenario**, adding a battery to provide energy storage on the electricity system would allow for more wind and solar PV generation to be used, further decreasing the use of diesel fuel. The battery would also improve system reliability by providing short-term, back-up energy in the event an energy generation source has an outage.

Ouzinkie kids learn about wind energy by creating paper turbines. *Photo by Alice Orrell, Pacific Northwest National Laboratory*

## Next Steps for Ouzinkie

The findings from this analysis, and Ouzinkie's preference for pursuing lower-cost options first, suggest the following implementation steps:

1. Complete the repairs and upgrades to the hydropower system to get it back online.
2. Design and install the enhanced controls for the hydropower generator.
3. Collect detailed wind meteorological (met) tower data for a minimum of one year.
4. Obtain funding and install a 25-kW wind turbine.
5. If additional power reliability is desired, fund and install the battery system and add either a PV array or a second wind turbine.

Ouzinkie is one of many communities using ETIPP to make energy more resilient and affordable. To learn how you can join ETIPP, visit the About ETIPP page. https://www.energy.gov/eere/about-energy-transitions-initiative-partnership-project ■

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