Project Name:

SHUNGNAK-KOBUK COMMUNITY SOLAR INDEPENDENT POWER PRODUCER (IPP)

Two native communities form an independent power producer and operate an innovative microgrid above the Arctic Circle

Size: 168 KW_{AC}

Energy Storage: 384 KWh

Location:
6 W River Road, Shungnak, AK 99773

# of LMI customers:
96

Project Website:
https://avec.org/2021/05/11/shungnak-power-plant-upgrades-benefit-the-community-and-the-solar-project/

BEST PRACTICES

- State or Federal Grants
- No-cost Site Lease

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Overview

The Shungnak-Kobuk Community Solar Independent Power Producer (IPP) project serves the remote Iñupiat villages of Shungnak and Kobuk, located in the Northwest Arctic Borough (NWAB) – a government entity that oversees twelve remote villages in Alaska. Considered as the first of its kind, the solar-battery microgrid project operates above the Arctic Circle, and provides access to renewable power and clean energy solutions for tribal communities. The project was installed in cooperation with the local co-op, Alaska Village Electric Cooperative (AVEC), which operates mostly diesel-powered plants in 58 Alaskan communities. Shungnak has no road access, meaning diesel fuel to power the generator must be delivered via barge. In the summer, when water levels are too low for barges, fuel must be transported via air, resulting in very high costs.

Energized in late 2021, the installation adds solar power generation and energy storage to an existing, off-grid AVEC diesel power plant. The energy storage and diesel generator – with a generating capacity of 1,573 KW – comprise a microgrid that serves the villages via a ten mile tie line. The microgrid seamlessly switches between resources as needed. The 168 KWAC solar array (consisting of 552 LG bifacial solar modules) offsets much of the villages' energy needs in the summer season, allowing the diesel generators to turn off for roughly 700 hours. These solar offsets result in around $200,000 of savings on diesel fuel annually, and provide welcome relief from the constant drone of generators. The energy storage can power the communities for up to two hours.

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Excess summertime power production from the solar array would be wasted without the accompanying energy storage. In the summer months, parts of the array would have to be turned off when the batteries do not need to be charged, and energy production exceeds the load. The energy storage portion of the microgrid consists of Blue Planet Energy's Blue Ion LXHV commercial energy storage system. This system uses low fire-risk lithium ferro-phosphate (LFP) batteries. Although LFP batteries provide a slightly lower energy density, they last longer and are less likely to experience thermal runaway events.

The project is a Department of Energy (DOE) Sunny Awards for Equitable Community Solar winner.

The Shungnak and Kobuk communities joined to form an (IPP) that sells the solar power produced by the array back to AVEC at an "avoided fuel cost rate", which is the same, or less than, the actual cost of diesel. The payments of roughly $200,000 / year to the IPP are used to maintain the microgrid, and to create an energy fund for households to draw upon. The value of energy production is not allocated as bill credits to households.


Photo Credit: Blue Planet Energy

The Power Cost Equalization Program (PCE Program, administered by the Alaska Energy Authority) plays a pivotal role in reducing electricity costs for Alaskan households. The program aims to align the cost of electricity in rural communities with electricity costs in major Alaska cities. The PCE Program provides a hefty discount ranging from $0.20 to $0.50 per KWh (See AVEC residential rate table). The Shungnak-Kobuk Community Solar IPP receives remuneration via this process: AVEC requests reimbursement for their avoided fuel cost from the PCE Program, which, once received, is then funded back to the IPP.

Alaskan residents have other state and federal programs to assist with energy costs:

- The Electric Utility Relief Program provides households up to $1,300 annually.
- The Heating Assistance Program (HAP).

The Shungnak-Kobuk Community Solar IPP project is owned by the IPP, and AVEC retains ownership of the diesel power generators. NWAB played a major role in promoting, designing and soliciting funds for the project. Alaska Native Renewable Industries (ANRI), based in Huslia, Alaska, was contracted to install the solar array and energy storage system. ANRI hired Ageto Energy, based in Fort Collins, Colorado, to provide the controller to integrate the solar panels. The microgrid is controlled using Ageto Energy's software.

NWAB funded the $2.1million project cost with a grant from the Department of Agriculture's High Energy Cost Grant program, and a local grant from a NWAB Village Improvement Fund. One qualification criterion for the High Energy Cost Grant – met by the project – was that the energy cost for households in the area must be equal to or higher than 275%of the national average. The Village Improvement Fund is supported by a payment-in-lieu-of-taxes arrangement with a local zinc mine.

Innovative Approaches

- A microgrid operating above the Arctic Circle.
- AVEC deploying energy storage.
- Heat recovery system: Due to a necessary upgrade to the diesel generator, the heat from the exhaust and engine block is recovered and transferred to other power plant buildings and community buildings.

Lessons Learned

- AVEC was initially unsure of using energy storage in tandem with their mostly autonomous diesel plant at Shungnak. It was determined that the effective use of energy storage above the Arctic Circle is possible by using the appropriate battery chemistry.

- Ingemar Matthiason, NWAB Energy Coordinator noted that when NWAB approached the USDA about solar in the arctic, the USDA felt that there was not enough sunlight to make an installation worthwhile. However, as the first of its kind, the Shungnak-Kobuk Community Solar IPP demonstrated that solar power generation can be deployed successfully in the arctic.

This case study is a part of the LIFT Toolkit initiative. To explore more case studies and best practices visit LIFT.Groundswell.org
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