

Kipnuk Light Plant



A tribally owned utility

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Kipnuk Battery Energy Storage Project



Department of Energy
Office of Indian Energy Energy
Infrastructure Deployment on Tribal
Lands

Kipnuk Light Plant:
a tribally owned utility of the Native
Village of Kipnuk

Period of Performance:
10/01/2021 to 3/31/2024

About Kipnuk Light Plant



Kipnuk Light Plant (KLP) is the **Native Village of Kipnuk's** tribally owned utility. We are a federally recognized tribe in Western Alaska in the Yukon-Kuskokwim Delta.

- Governed by a Board of Directors
- Managed on a daily basis by a General Manager
- Employs up to nine people in the community (depending on the time of year)
- Operates on revenues from electricity sales and PCE subsidy payments from the State of Alaska



About Kipnuk



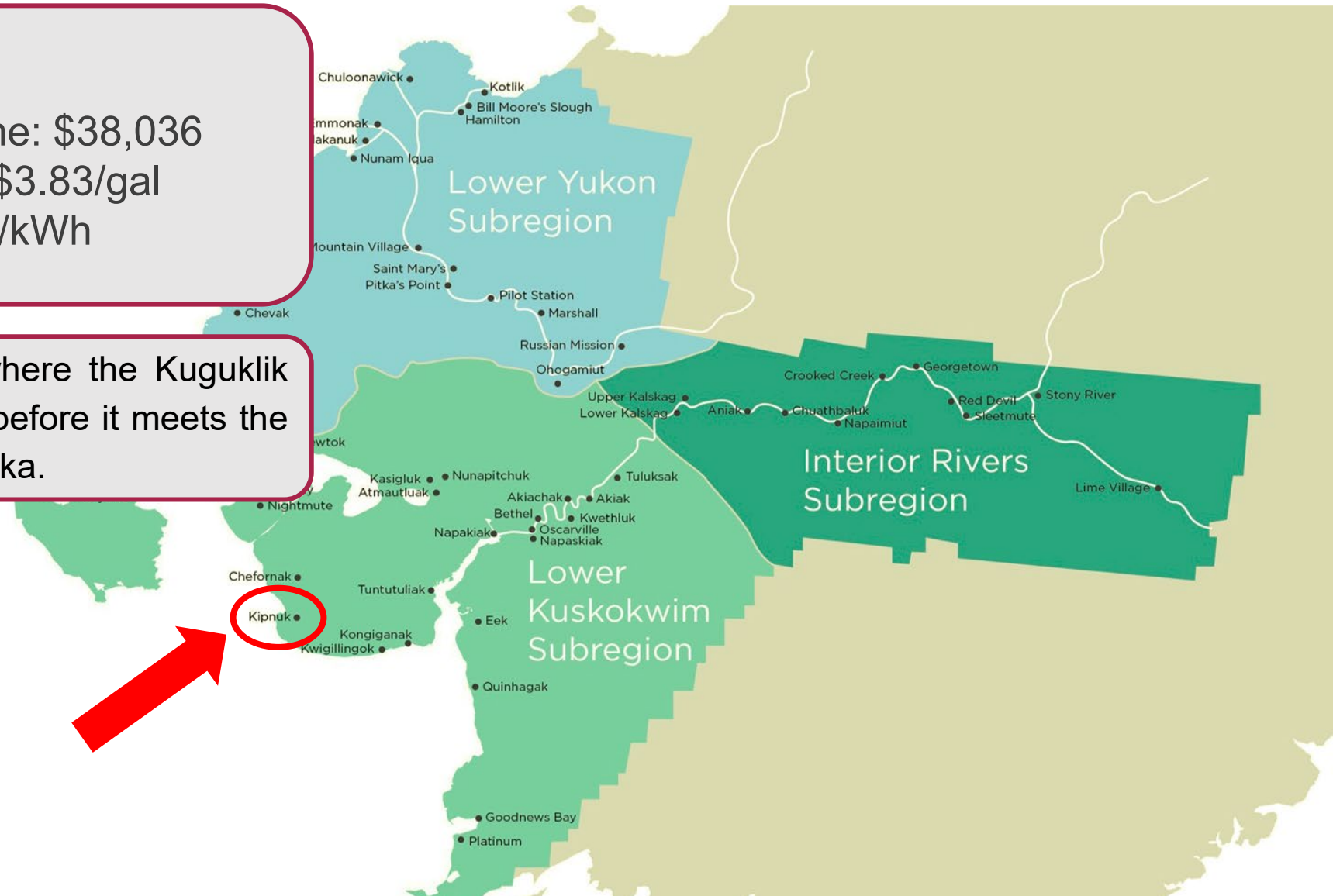
Population: 669

Median household income: \$38,036

Average price of diesel: \$3.83/gal

Price of electricity: \$0.69/kWh

The village of Kipnuk sits where the Kuguklik River makes a hairpin bend before it meets the Bering Sea in southwest Alaska.





About the Native Village of Kipnuk

The Native Village of Kipnuk is the federally recognized tribe and is the only local government for the community.

The Native Village of Kipnuk owns and operates Kipnuk Light Plant through the Light Plant's Board of Directors.

About the Chaninik Wind Group



As an **islanded utility**, KLP began our journey to become a more reliable and resilient utility system in 2005 by working with other neighboring Yup'ik communities as part of the **Chininik Wind Group**. First, we learned about renewable options, and then we developed wind power and integrated it into our power generation.

CWG Accomplishments

All have built small wind farms and have installed ETS units for heat. Except for Kipnuk, all have integrated battery/energy storage into their systems.

*This funding from the **DOE Tribal Program** allows Kipnuk to benefit from energy storage in its community too.*



Kipnuk's Current Energy System

- Kipnuk's stand-alone Wind-Heat System has a diesel-generator powerplant and 6 (six)-95 KW turbines capturing energy from the wind that rolls over the flat, coastal landscape.
- Wind power is used for both lights and heat due to the 40 electric thermal storage (ETS) units installed.
- A heat recovery loop also heats the power plant and Qanganak Tribal Council building.

- KLP is governed by a Board of Directors and is managed on a daily basis by its Utility Manager and up to 18 employees who live in the Village.
- Revenues come from electricity sales for lights, PCE subsidy payments from the State of Alaska, and electricity sales for heat.
- Peak load is 420 kW.
- Kipnuk has an average of 6 outages each year.



Project Overview

Install/Integrate *ABB 500/670 kW E-Mesh PowerStore* battery energy storage system (BESS) into Kipnuk's stand-alone community wind-diesel grid.

Outcomes

- *Improve* Kipnuk's energy resilience and security by increasing local, renewable energy use and reducing diesel consumption.
 - HOMER Analysis: Increase to 5,500 hours wind only generation (diesel off). *Displace a total of 76,000 gallons of diesel* up from the current ~42,000 gallons.
 - The BESS can immediately react to power interruptions, providing sub-second frequency response, and *stabilize the grid*.



Project Objectives & Outcomes of BESS Installations



- BESS installation will provide renewable, rechargeable non-fossil fuel emergency power backup for community facilities.
- When an outage occurs, the BESS will provide emergency power to:
 - Clinic (1200 sq ft)
 - Washeteria (2,500 sq ft)
 - Kipnuk Light Plant (powerplant 2,500 sq ft) to complete necessary repairs
 - Tribal Offices/Community Center (2,000 sq ft)
- Sufficient power to homes, to prevent subsistence foods stored in freezer(s) from thawing.
- BESS will provide power for an estimated 3 hours for essential services, or 1 hour at the average load.

