

Tribal Energy Conference

Denver, Colorado

November 2019

Alaska Village Electric Cooperative, Inc./
Bethel Native Corporation
Renewable Energy Joint Venture
Bethel Wind Energy Construction Project

Forest Button
Manager, Project Development
& Key Accounts





Toksook Bay

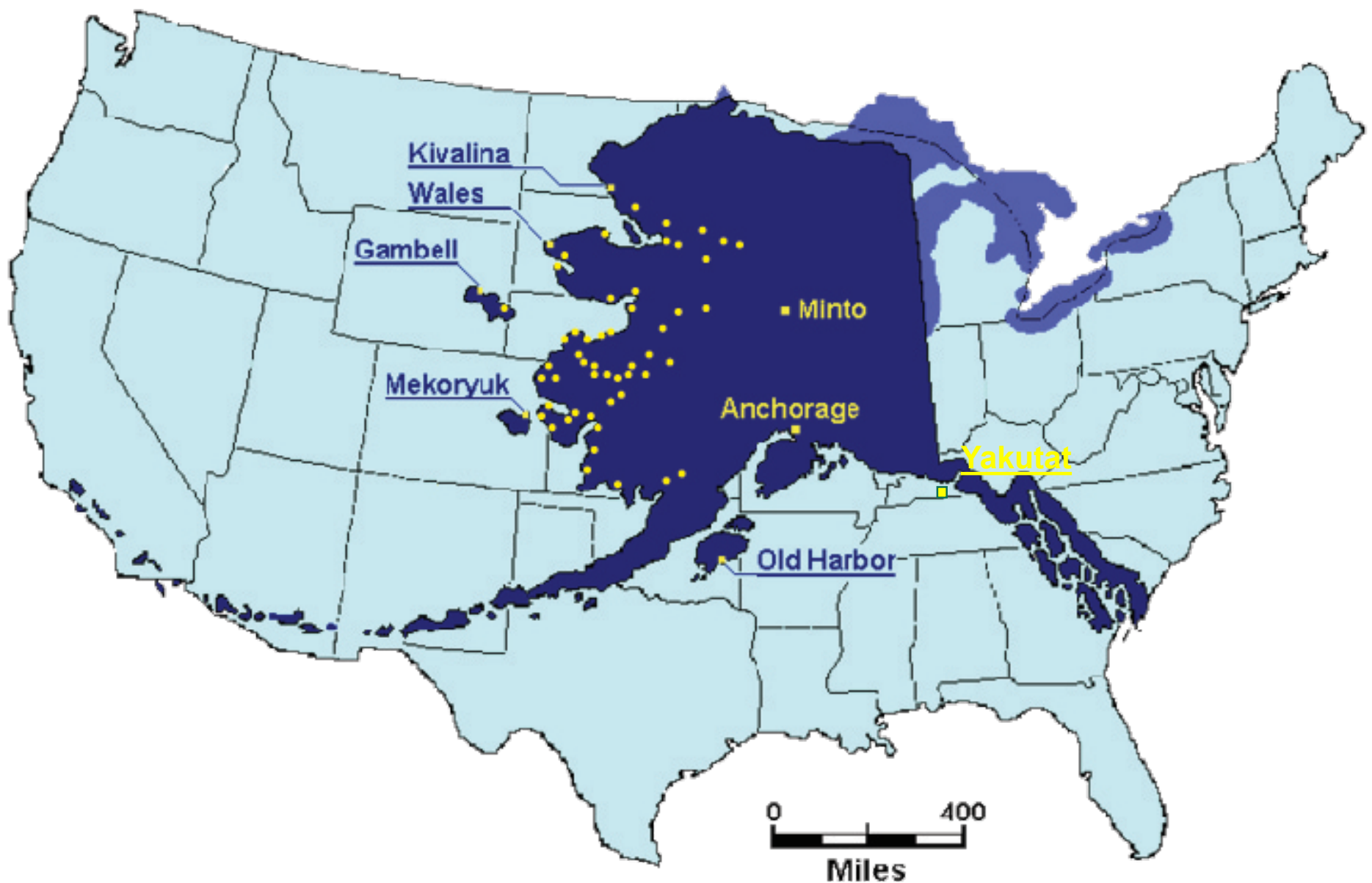
Alaska Village Electric Cooperative

Member owned, not-for-profit

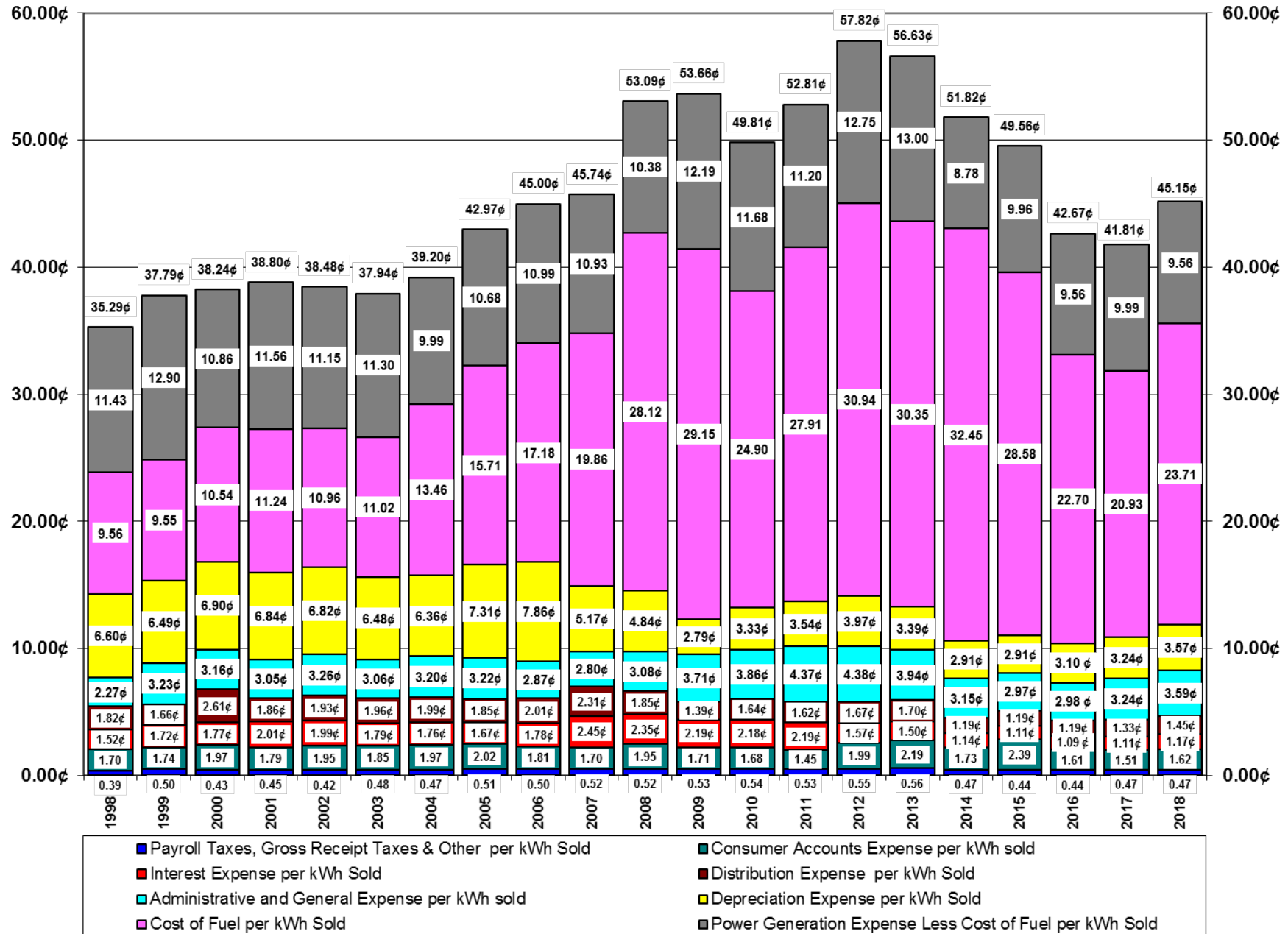
Energizing Rural Alaska since 1968

- 58 Member Communities
- 11,500 Services
- Population Served: 30,194
- 94% Alaska Native
- Smallest: Shageluk 71 → Largest: Bethel 6,205
- 9.3 million gallons of diesel / \$32 million (\$3.46)
- 90 FT / 95 PT Employees
- 48 Power Plants & 10 Standby
- 32 Wind turbines serving 19 communities
- 2 Solar arrays serving 2 communities
- Two tug and barge sets

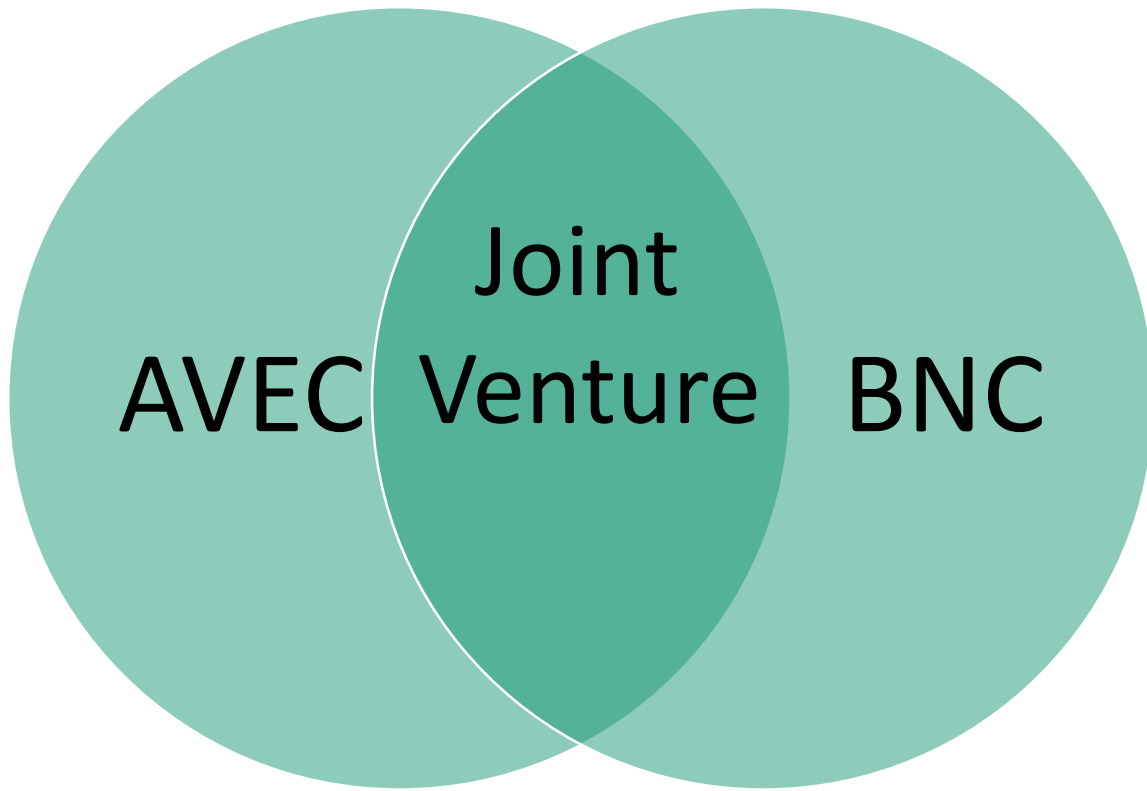




Alaska Village Electric Cost Components per Kilowatt-hour Sold



- Partnership between AVEC and BNC - ABRE
 - To benefit the communities of Bethel and Oscarville

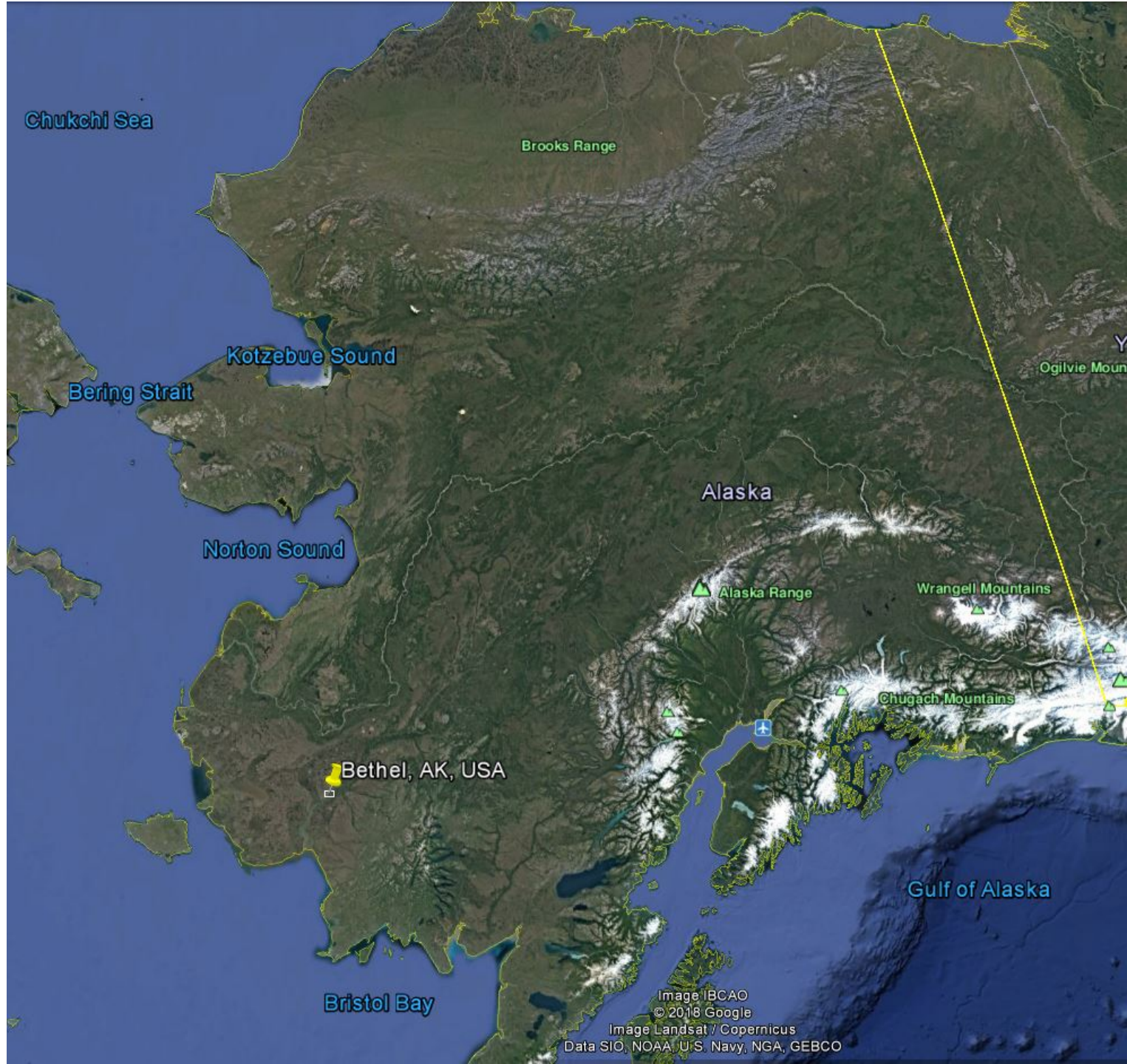


Project Partners:

- Bethel Native Corp
- Alaska Energy Authority
- DOE Office of Indian Energy
- Denali Commission

Bethel Native Corp

- ANCSA village corporation
- Construction, Environmental, Logistics
- Alaska, Washington, California
- Serves 1,800 shareholders
- Mostly Yup'ik Eskimo



Project Overview

Upgrade power plant to accept wind energy

- Automated governors -actuators
- Voltage Regulators



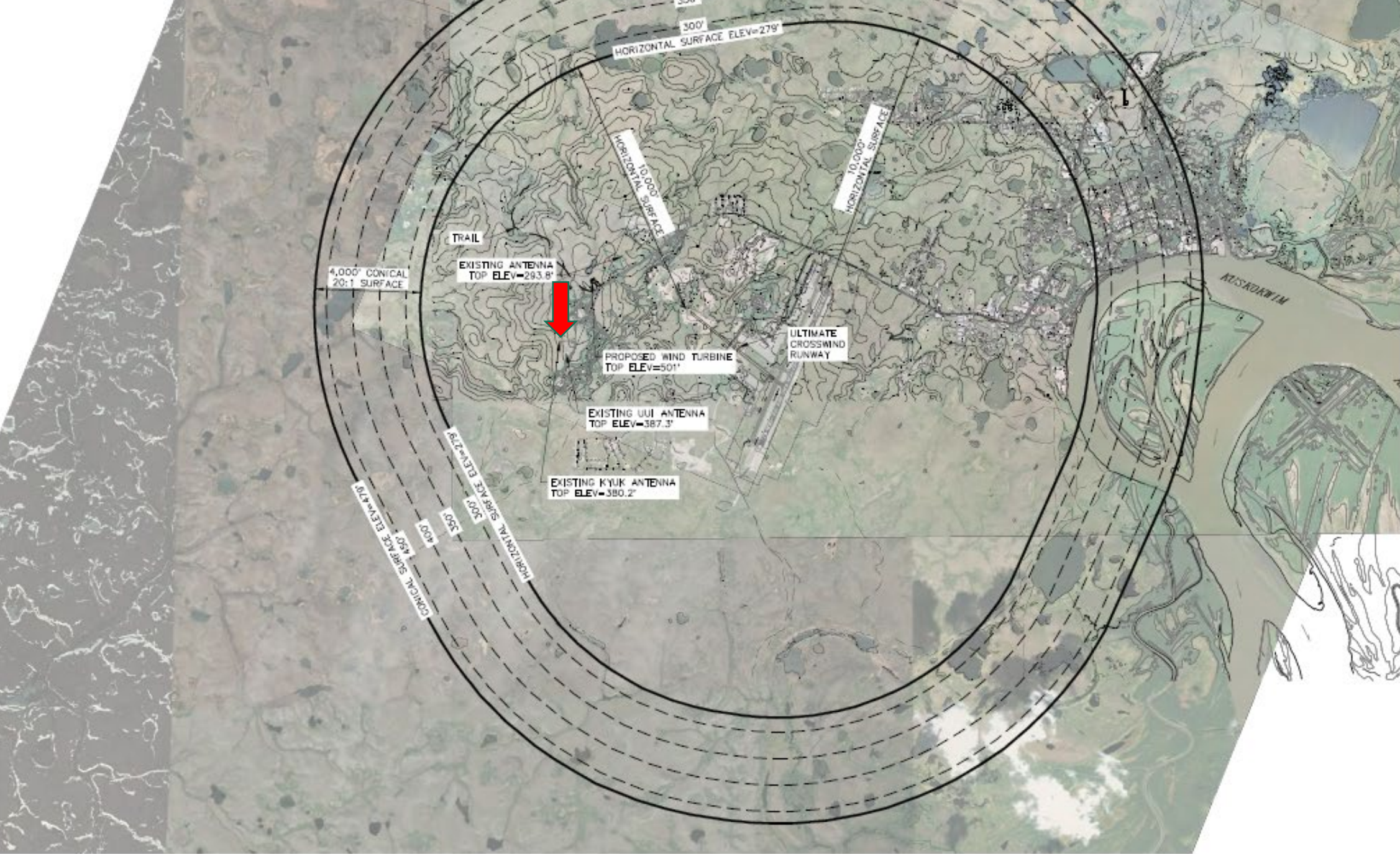
Installation of one Emergya Wind Technologies (EWT) 900 kW direct drive wind turbine.

- 52 meter diameter rotor
- 50 meter high tower



Project Location





1 PART 77 AIRSPACE
SCALE: GRAPHIC



BETHEL, ALASKA
WIND TURBINE PROJECT
PART 77 AIRSPACE

NO.	REVISION	BY	DATE

Plot Date	4/21/17
Designed	KSH
Drawn	CB
Approved	JVS

2017-2018 Construction

Road, pad, and pile foundation winter 2017/2018

Turbine ship to Alaska May 2018

Concrete foundation June / July 2018

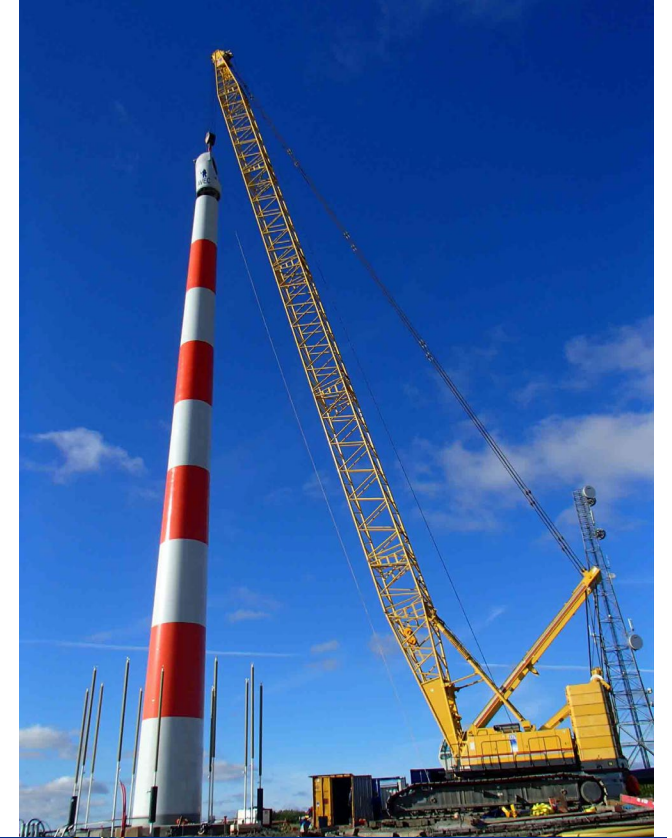
Erect turbine, install transformers connect to grid
August - September 2018

Commission bring on line September 2018

Construction



Construction



Project Objectives

GOAL

ACTUAL

- | | |
|---|------------------------|
| ❖ Generate 2,100 MWh / Year | 2,088 MWh / Year |
| ❖ Offset 156,250 gallons fuel consumption per year | Offset 155,355 Gallons |
| ❖ Save approx. \$571,500 per year on fuel (\$3.658) | \$590,817 (\$3.803) |
| ❖ Eliminate 1,587 tons of CO ₂ / year | 1,578 tons eliminated |

Alaska Village Electric Cooperative, Inc./
Pitka's Point Native Corporation Renewable
Energy Joint Venture

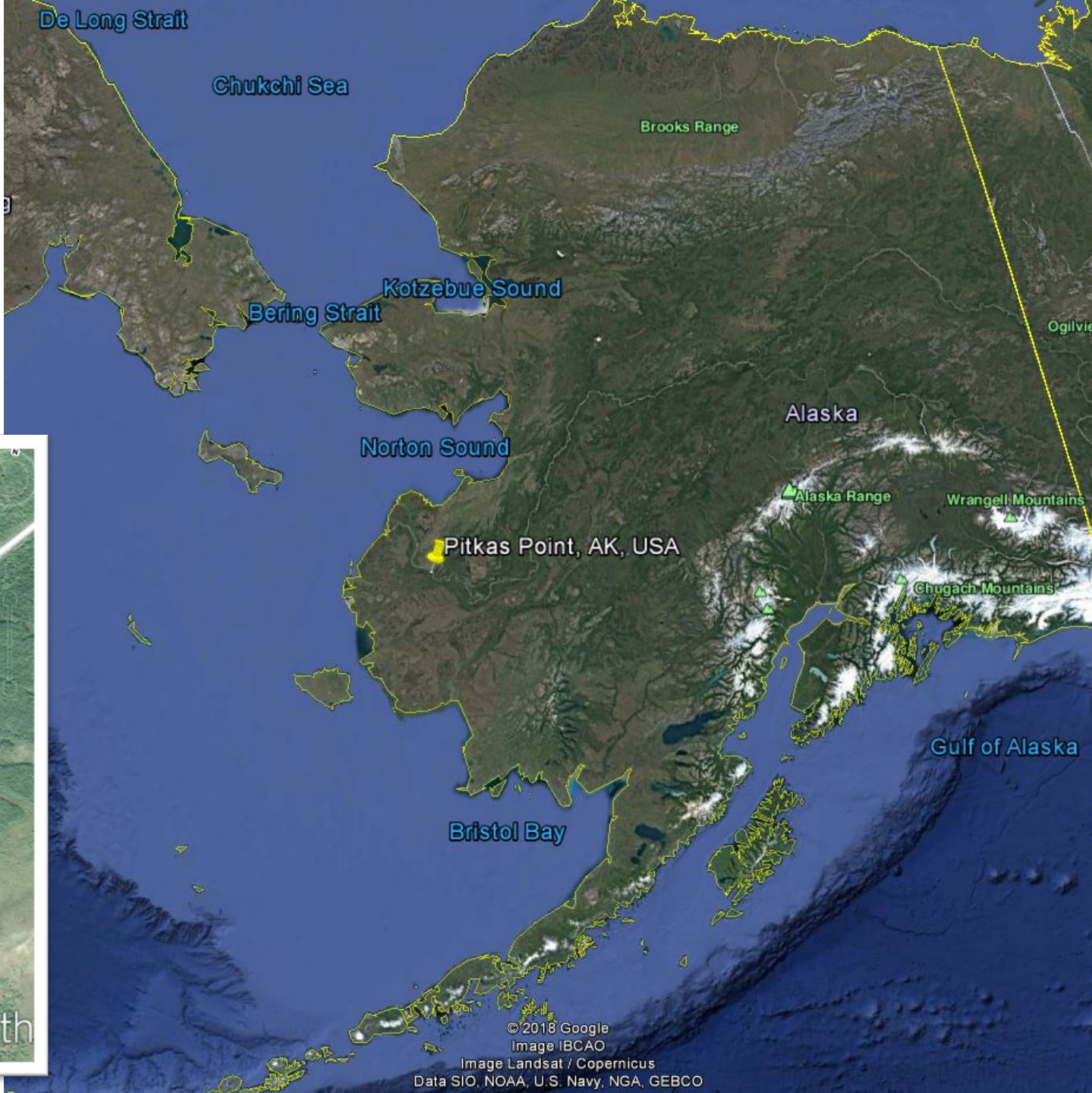
(APRE)

Pitka's Point/Saint Mary's Wind Energy
Construction Project

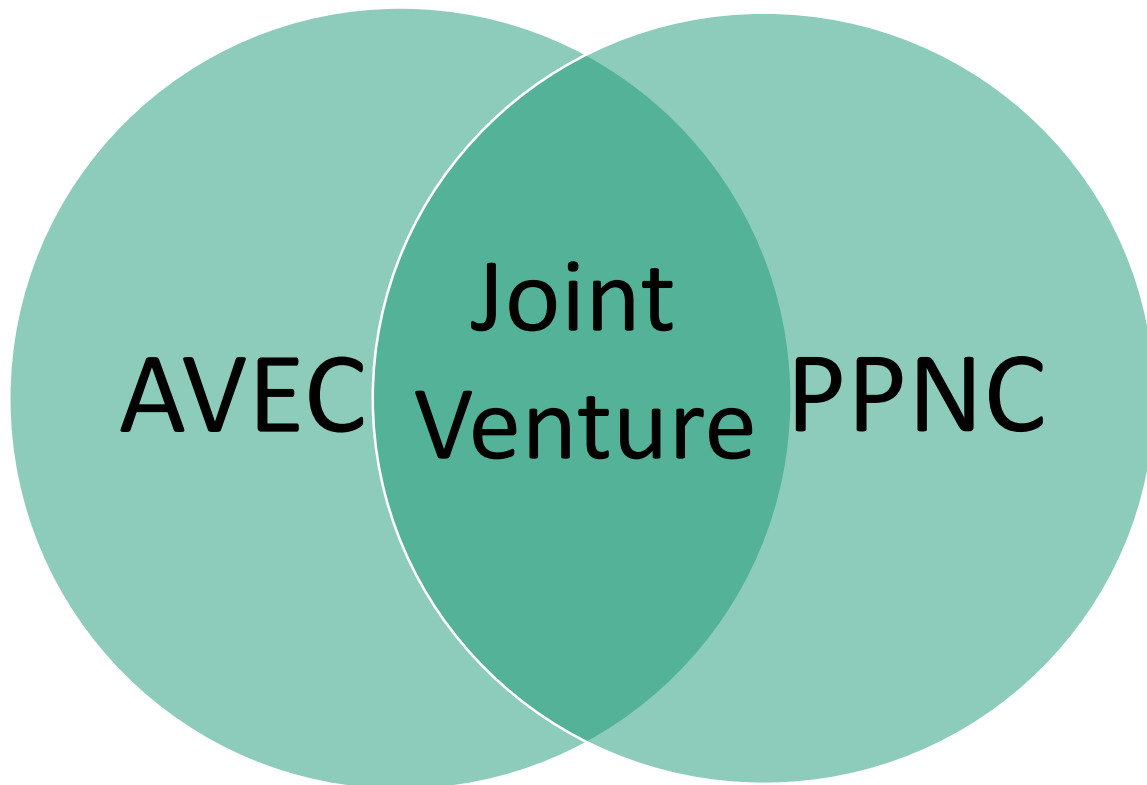


Pitka's Point Native Cooperation

- ANCSA village corporation
- Serves 426 shareholders



- Partnership between AVEC and PPNC
 - To benefit the communities of Pitka's Point, Saint Mary's, and Mountain Village



Project Partners:

- Native Village of Pitka's Point
- Algaaciq Tribal Council
- Yupiit of Andreafski
- Asa'carsarmiut Tribal Council
- Azachorok, Inc.
- Nerklikmute Native Corporation
- Saint Mary's Native Corporation
- City of Saint Mary's
- City of Mountain Village
- Alaska Energy Authority
- DOE Office of Indian Energy

Project Overview

- Installation of one Emergya Wind Technologies (EWT) 900 kW direct drive wind turbine.
 - 52 meter diameter rotor
 - 50 meter high tower
- Upgrade electrical distribution line to three-phase between St. Mary's and Pitka's Point
- Upgrades at the Saint Mary's power plant to effectively utilize wind
- Wind-to-heat component



Project Location



Progress

- **Road, pad, and foundation complete in 2017**
- **Electrical upgrade complete 2018**
- **Turbine installed 2018**
- **Turbine Commissioned and brought on line
January 2019**

Next steps...

- **Intertie Mt. Village with St. Mary's – Winter
2020**



Foundation Construction 2017



Turbine Construction 2018



Turbine Construction 2018



Turbine Construction 2018



Project Objectives

(10.5 Months)

GOAL

ACTUAL

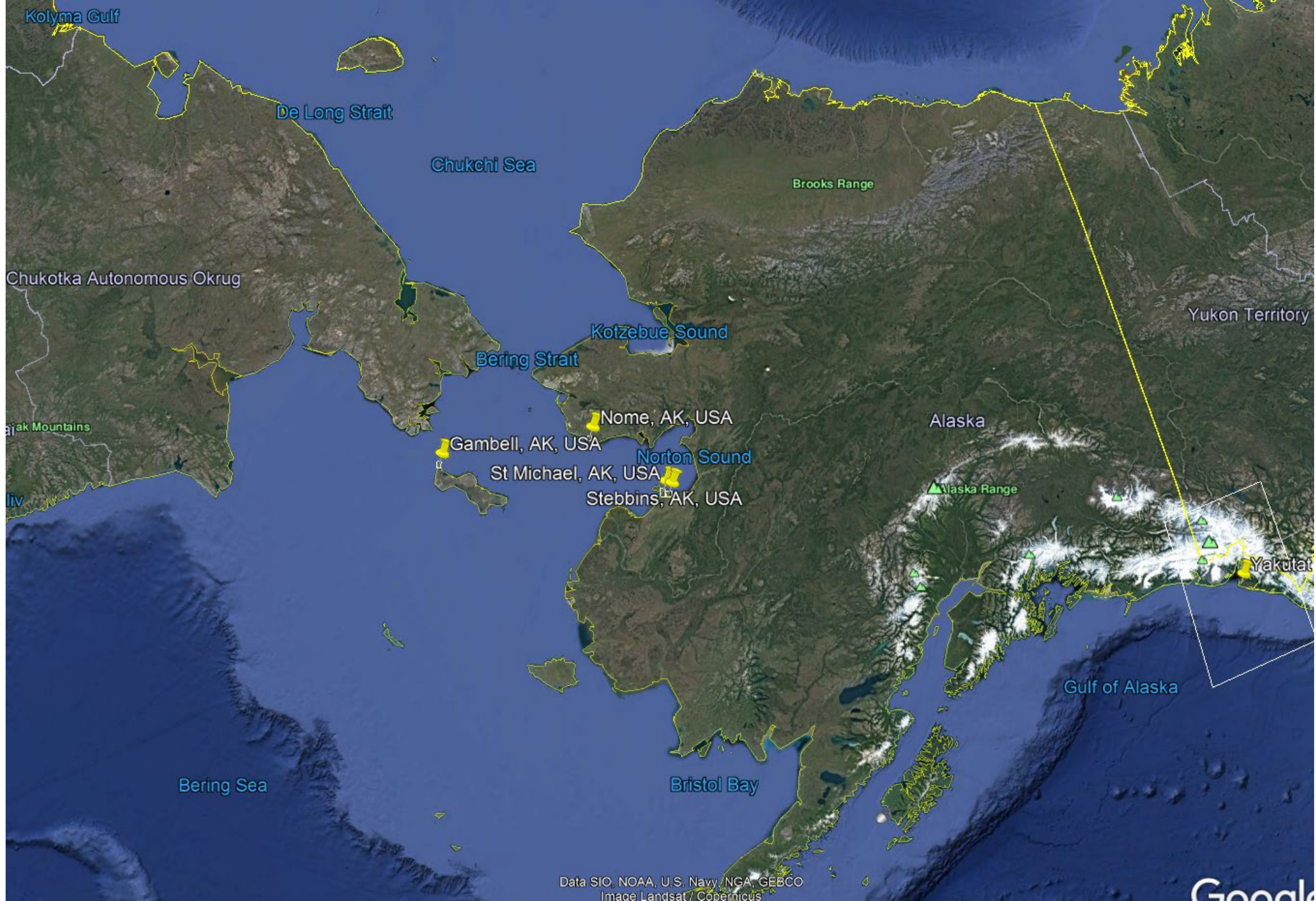
- | | |
|---|-------------------------|
| ❖ Generate 2,525 MWh / Year | 1,043 MWh / Year |
| ❖ Offset 202,000 gallons fuel consumption per year | Offset 84,104 Gallons |
| ❖ Save approx. \$874,000 per year on fuel (\$4.327 -2014) | \$239,859 (\$2.852) |
| ❖ Eliminate 2,100 tons of CO2 / year | 854,216 tons eliminated |

Alaska Village Electric Cooperative, Inc./
Stebbins Native Corporation Renewable
Energy Joint Venture

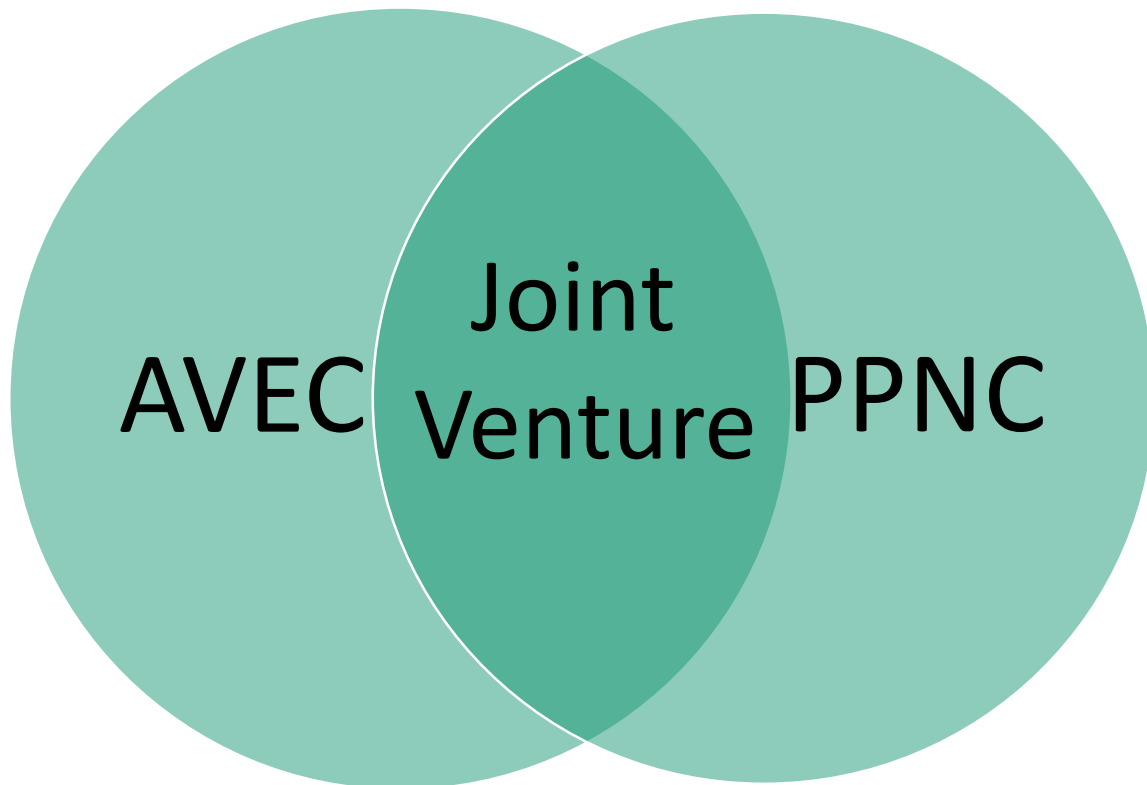
(ASRE)

Stebbins / St. Michael Renewable Energy
Project





- Partnership between AVEC and SNC
 - To benefit the communities of Stebbins and Saint Michaels



Project Partners:

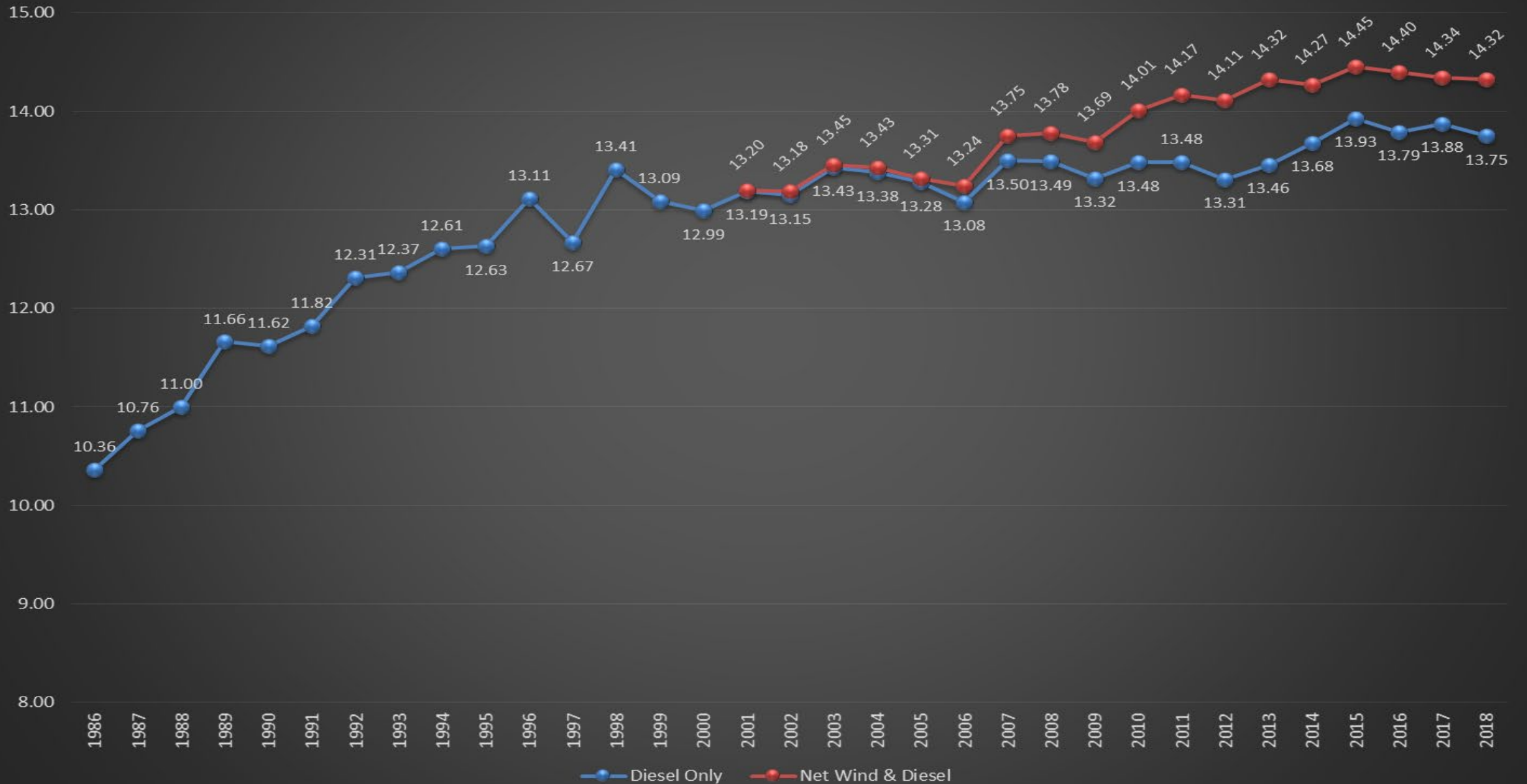
- City of Stebbins
- Native Village of Stebbins
- City of St. Michael
- Native Village of Saint Michael
- Stebbins Native Corporation
- Stebbins Community Association
- St. Michael Native Corporation.
- Denali Commission
- DOE Office of Indian Energy

Install EWT 900kW Turbine

- Offset 104,700 of diesel
- Savings in first year \$365,403
- Life time savings \$11.4 million
- Project life 25 years
- NPV benefit \$6.694 million
- Provide wind to heat



Alaska Village Electric Cooperative Overall Adjusted Generating System Efficiency Diesel Only vs. Wind & Diesel







Thank You