Hooper Bay on December 16, 1968, more than 150 persons gathered to see the lighting of the village's first community Christmas tree.

Image Credit: Alaska Village Electric Cooperative

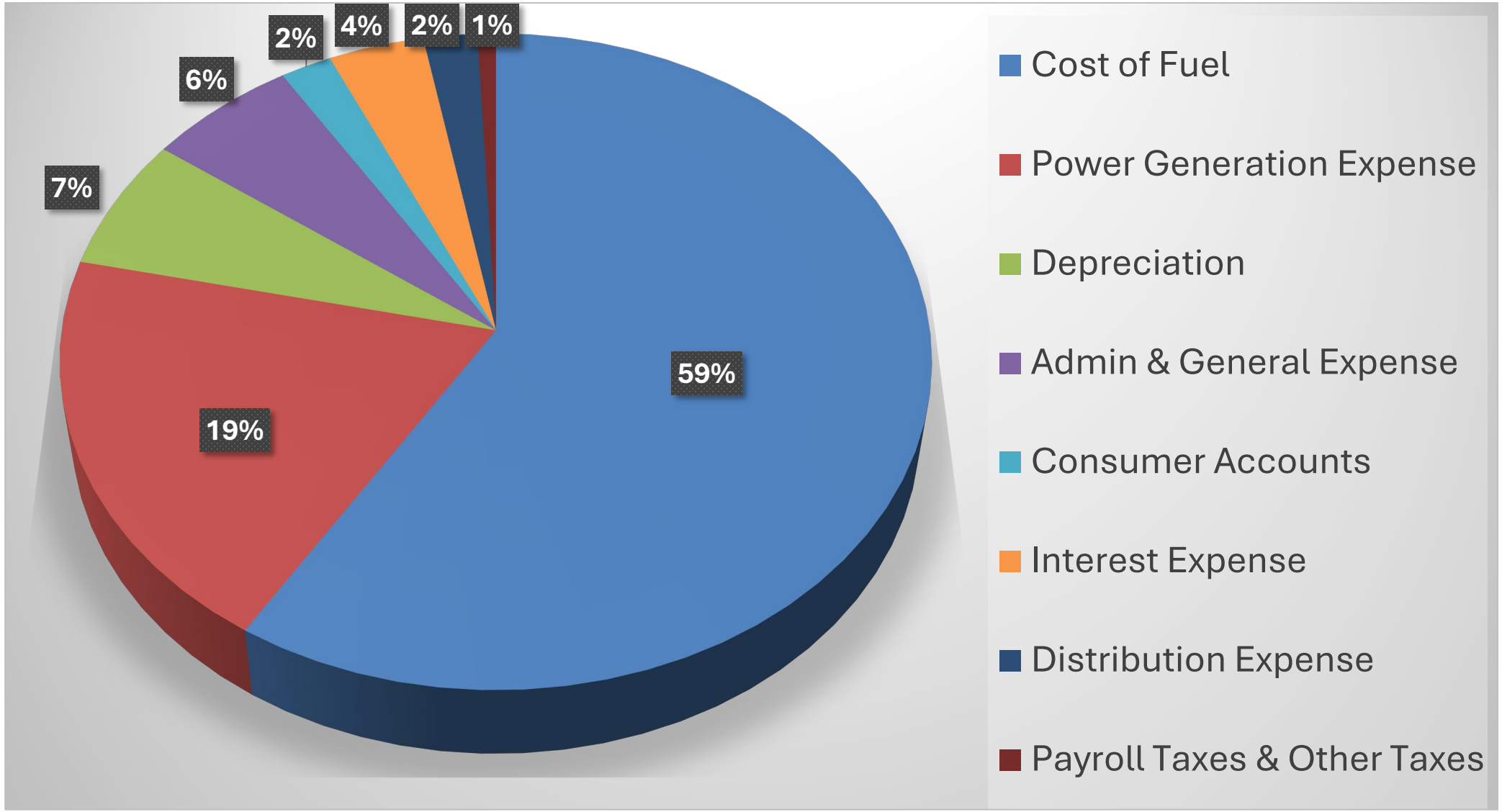
AVEC

Established 1968, Member owned electric utility, Not for profit

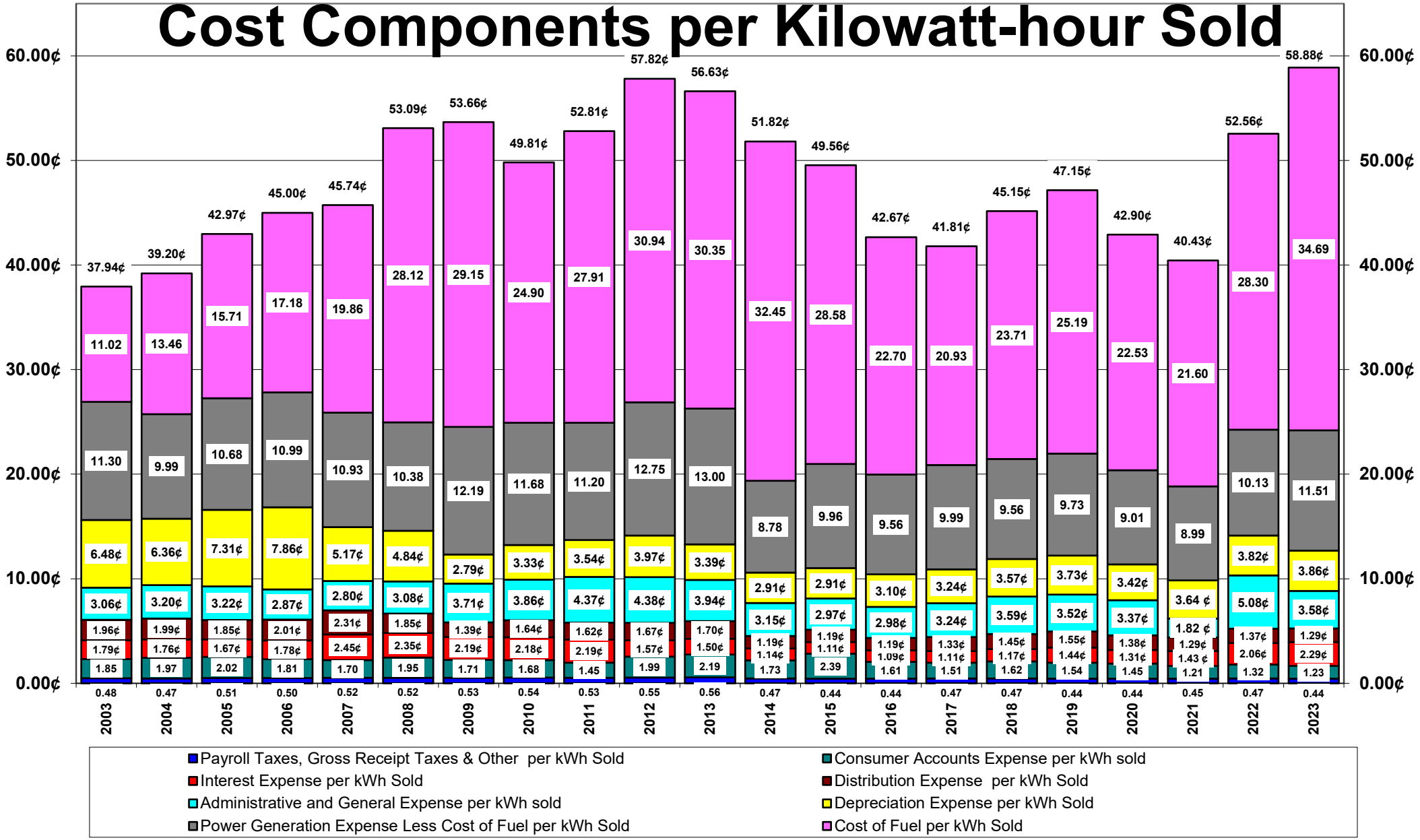
- 60 Rural Communities served, 31,000+ Residents
- 46 Power Plants, 161 Diesel Generators
- 9.3M gallons of diesel in 2023 ($48M)
- 555 miles of Distribution Lines
- 90+% Alaska Native
- Smallest: Anvik 58→ Largest: Bethel 6,154
- 88 FT Employees, 77 PT Employees
- 33 wind turbines serving 23 communities
- Solar (2 AVEC & 2 IPP) serving 5 communities
- Batteries (4 AVEC & 1 IPP) serving 10 communities
- 2023 Total Electricity Sold 126.4 MW


Kivalina
Wales
Gambell
Minto
Mekoryuk
Anchorage
Yakutat
Old Harbor
0
400
Miles

2023 Costs per Kilowatt-hour Sold



Cost Components per Kilowatt-hour Sold



Stebbins and St. Michael Renewable Energy Project

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

2024 Program Review

Denver, Colorado

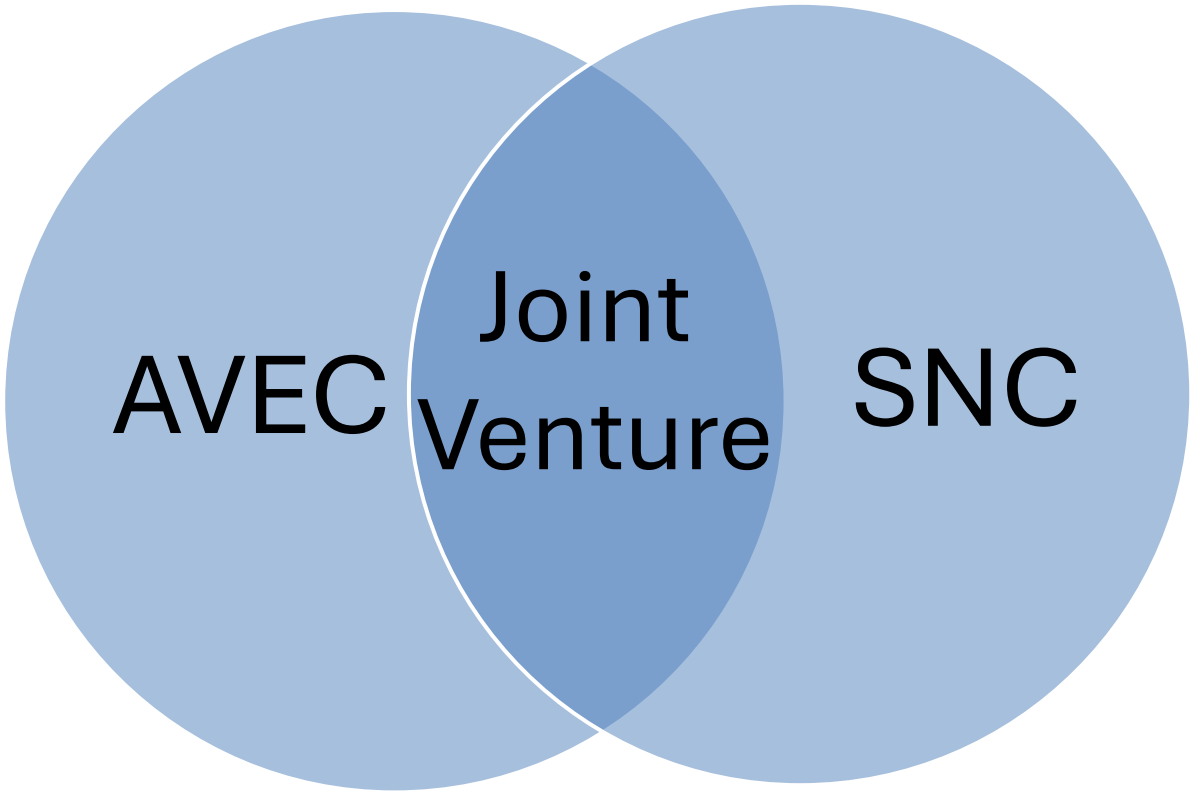
November 20, 2024

Onya Stein
Project Manager

Courtesy of STG, Incorporated

Joint Venture

- Partnership between AVEC and SNC
  - To benefit the communities of Stebbins and St. Michael



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Stebbins Native Corporation

Established 1974, ANCSA village corporation

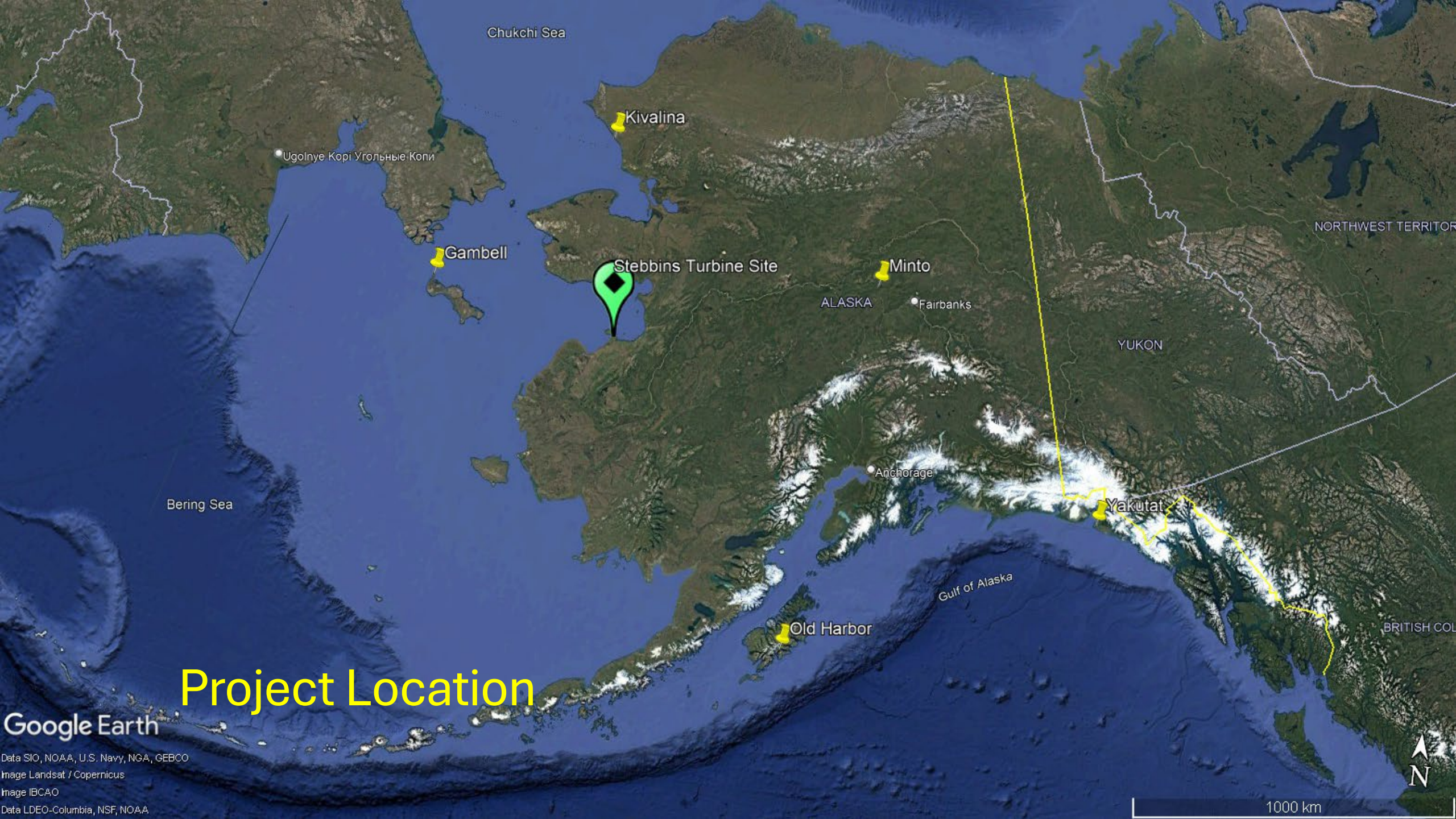
- John Nashoanak, President
- Thomas Kirk, Manager
- 501 Shareholders
- 80 Local employees during season
- 3 Subsidiaries: fuel, store, rock/gravel
- Partners in construction: Advanced Blasting, Tapraq Rock
- Own 100,000+ acres
- Landowner

Project Overview

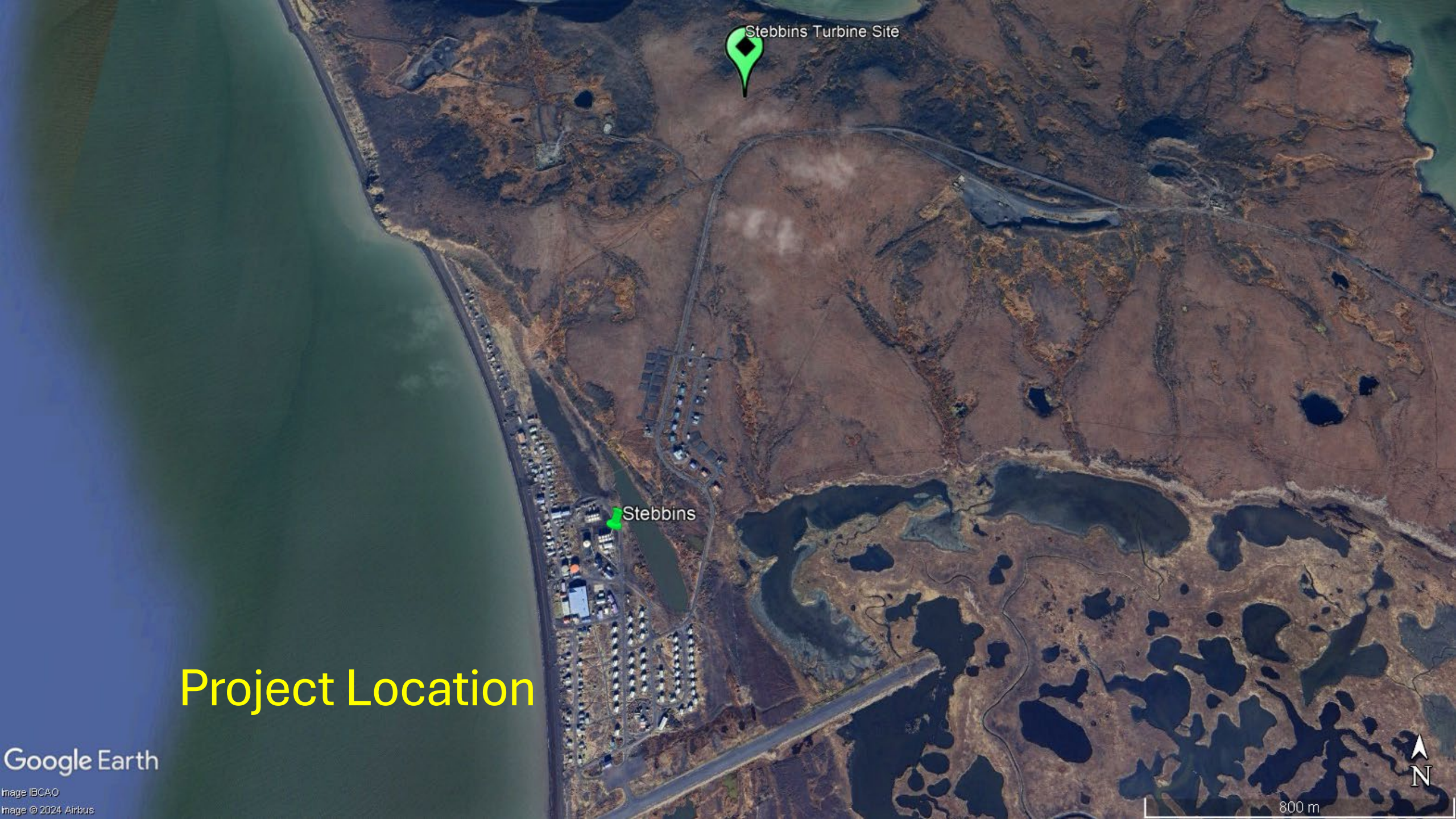
- Final stages of an energy vision for the area
- Installation of one Emergya Wind Technologies (EWT) wind turbine
  - 900 kW
  - 52 meter diameter rotor
  - 75 meter high tower
  - Direct drive
- Install wind to heat systems in Stebbins and St. Michael

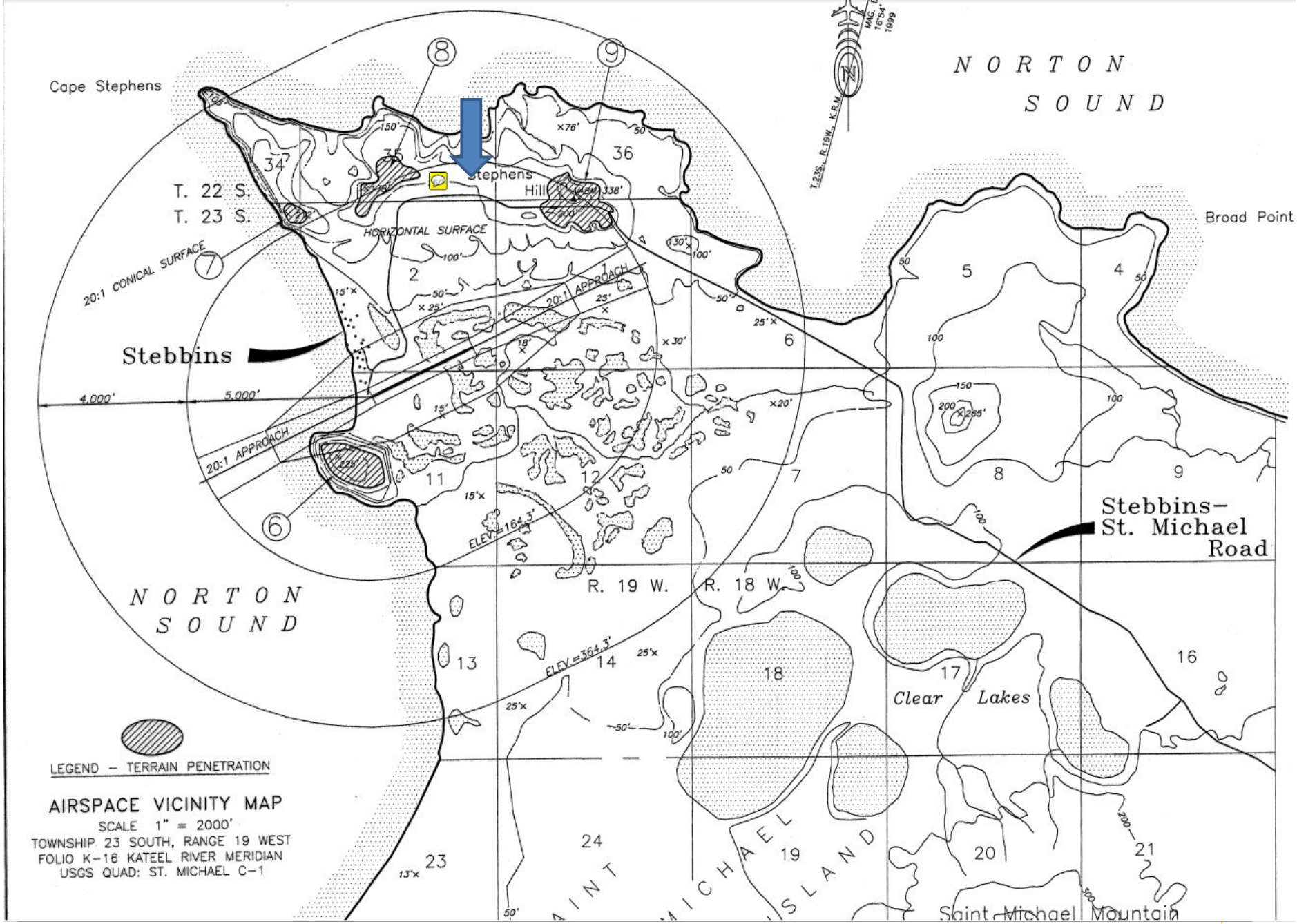
Image by EWT


~2,800
miles
Project Location
Chukchi Sea
NORTHWEST TERRITORIES
ALASKA
Fairbanks
YUKON
Canada
MANITOBA
ONTARIO
QUEBEC
Anchorage
SASKATCHEWAN
Gulf of Alaska
Winnipeg
Edmonton
MINNESOTA
BRITISH COLUMBIA
NORTH DAKOTA
Calgary
SOUTH DAKOTA
MONTANA
Vancouver
NEBRASKA
Seattle
WASHINGTON
WYOMING
United Stat
IDAHO
OREGON
COLORADO
UTAH
NEVADA
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
1100 km
N


Chukchi Sea
Kivalina
Ugolnye Kopi Угольные Копи
Gambell
Stebbins Turbine Site
Minto
ALASKA
Fairbanks
NORTHWEST TERRITOR
YUKON
Anchorage
Yakutat
Bering Sea
Gulf of Alaska
Old Harbor
BRITISH COL
Project Location
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image IBCAO
Data LDEO-Columbia, NSF, NOAA
N
1000 km


Stebbins Turbine Site
Stebbins
St Michael
Project Location
Google Earth
Image IBCAO
Image © 2024 Airbus
N
3 km


Stebbins Turbine Site
Stebbins
Project Location
Google Earth
Image IBCAO
Image © 2024 Airbus
N
800 m


Cape Stephens
NORTON SOUND
Stephens Hill
T. 22 S.
T. 23 S.
HORIZONTAL SURFACE
20:1 CONICAL SURFACE
20:1 APPROACH
Stebbins
4,000'
5,000'
ELEV. 164.3'
ELEV. 364.3'
R. 19 W.
R. 18 W.
Broad Point
Stebbins–St. Michael Road
Clear Lakes
Saint Michael Mountain
LEGEND – TERRAIN PENETRATION
AIRSPACE VICINITY MAP
SCALE 1" = 2000'
TOWNSHIP 23 SOUTH, RANGE 19 WEST
FOLIO K-16 KATEEL RIVER MERIDIAN
USGS QUAD: ST. MICHAEL C-1


Stebbins, Alaska
Population: 631
Gas: $6.37
Heating Fuel $7.05
Electric $0.70/$0.25


St. Michael, Alaska
Population: 435
Electric $0.70/$0.25

Stakeholders

Project Objectives

- Install 900 kW turbine
- Generate ~2,529 MWh/year
- Produce 50% of total energy for two communities
- Save 104,700 gallons/year
- $365,403 savings first year
- $11.4M savings over 25 years

Relevant Background Information

2010 Project Start → 2012 Tank Farm → 2013 Wind Study and Site Control → 2014 Power Plant & Standby → 2015 Intertie → 2016 SHPO Permit

2017 Corps Permit → 2019 Turbine Purchase → 2020 Final Design → 2021 FAA Permit → 2022 Construction → 2023 Commissioning

Let’s install a turbine.

• Procure Turbine	4Q2019
• Mob to site	3Q2022 / 2Q2023
• Site improvements	4Q2022 / 1Q2023
• Turbine Foundation	1Q2023 / 2Q2023
• Turbine Delivery / Installation	2Q2023 / 3Q2023
• Start up / Commissioning	3Q2023 / 4Q2023


September 2022
Courtesy of STG, Incorporated


January 2023

February 2023

Courtesy of STG, Incorporated

June 2023

Courtesy of STG, Incorporated

Courtesy of STG, Incorporated

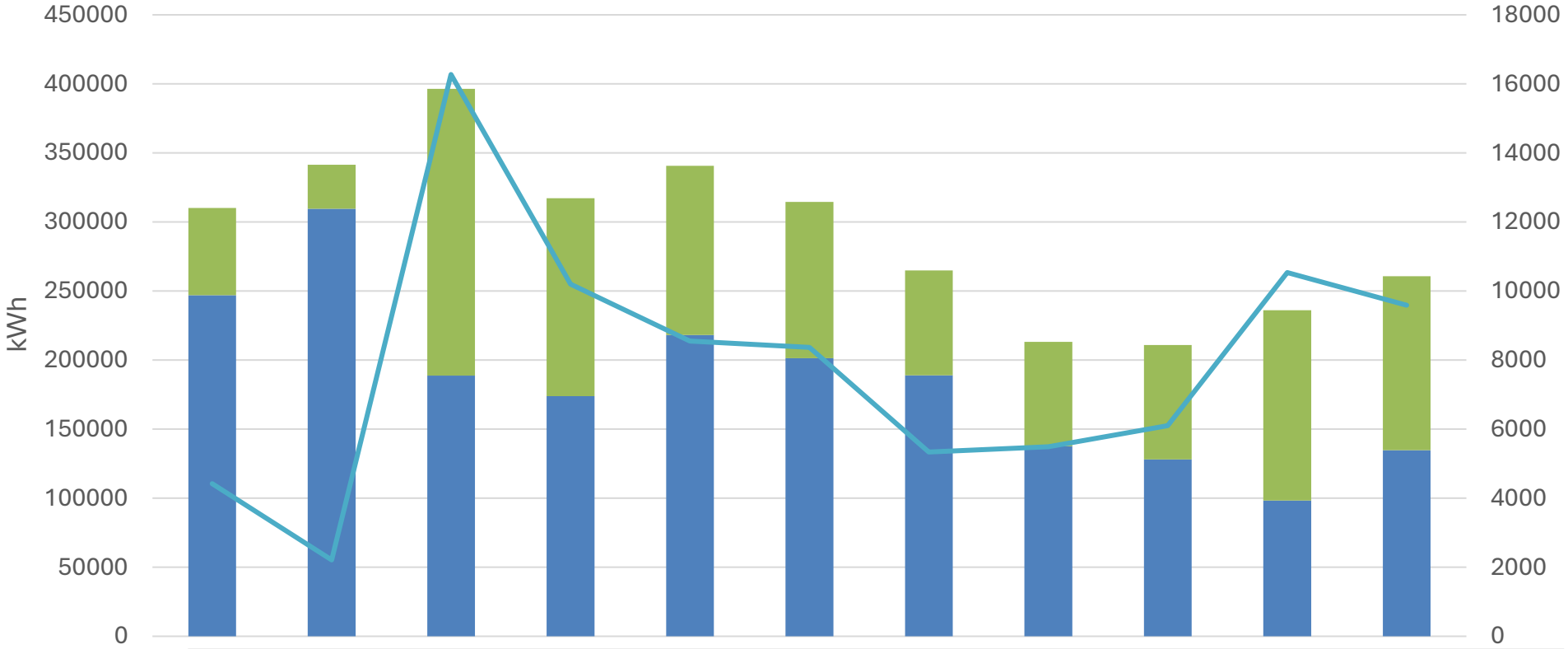
Courtesy of STG, Incorporated

Courtesy of STG, Incorporated


Courtesy of STG, Incorporated

Courtesy of STG, Incorporated

Net Generation (kWh) since November 2023



	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
Wind	63159	31844	207634	143319	122484	113189	75926	75509	83004	137648	126115
Diesel	247030	309597	188744	173962	218172	201326	189002	137660	127985	98365	134669
Gallons	4417	2211	16272	10201	8553	8366	5339	5492	6103	10532	9590

Activities to be Completed

- 12 months of turbine production monitoring
- Finish upgrades including boiler installations in Stebbins and St. Michael
  - RFP for installation
  - First barge 2025
  - Construction 2025

Wind to Heat Upgrades Status

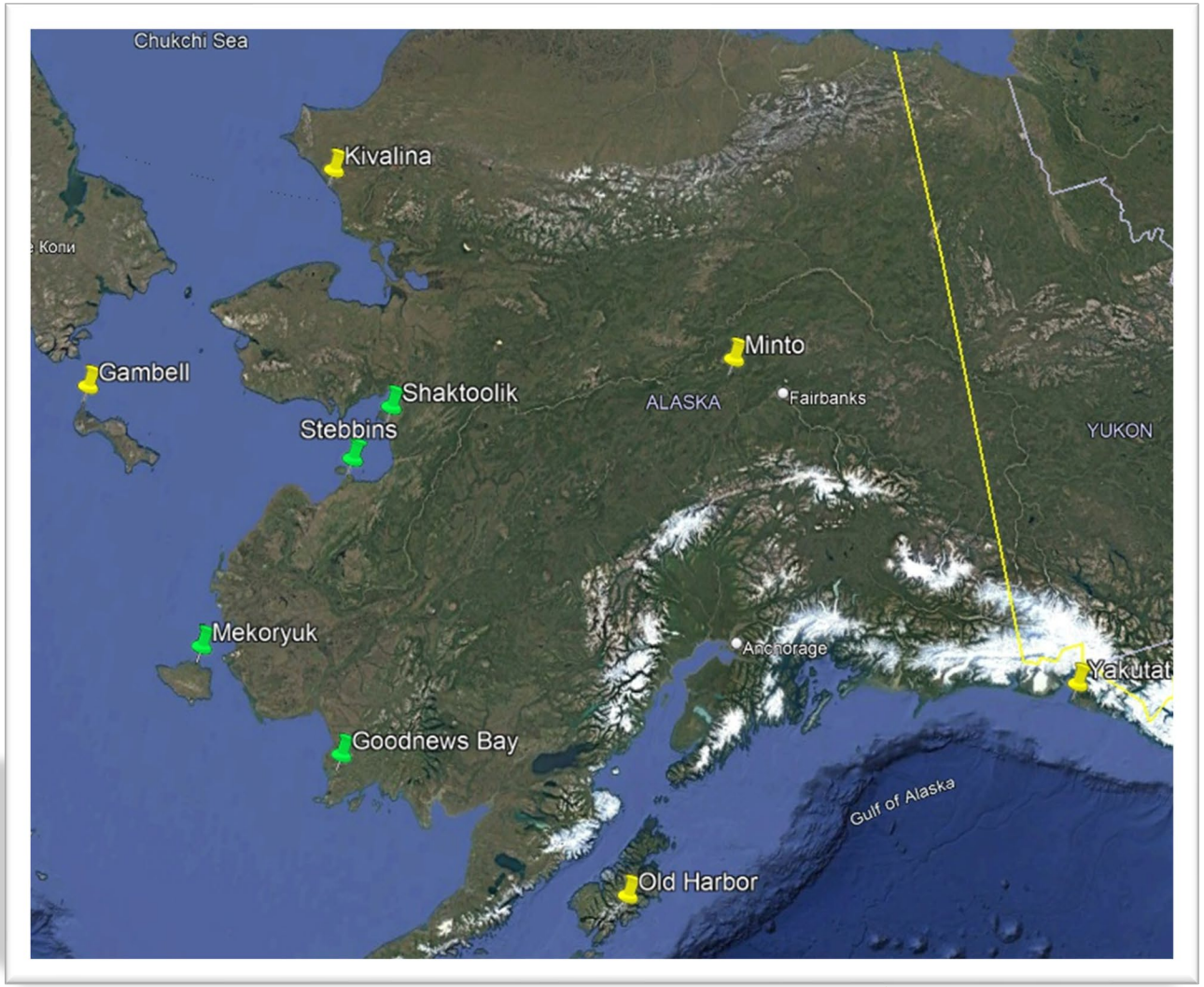
- Long lead items acquired, boilers are at AVEC headquarters
- RFP June 2024 for Stebbins and St. Michael
  - One response, too high
- AVEC to perform Stebbins
- Bid for St. Michael out soon

Lessons Learned

- Poor weather impacts
- Sequence of Site Work
- Coordination with foreign entities
- Staffing availability
- Sufficient materials
- Troublesome equipment

Other Projects

- Shaktoolik Battery Energy Storage System
- Goodnews Bay Renewable Energy Project
- Mekoryuk Repower



RENEWABLE ENERGY?
I'm a big fan.

Phil Pletnikoff, STG; Onya Stein, AVEC; David Cooper, HDL Engineering

Thank you!

Questions?

Onya Stein

Alaska Village Electric Cooperative

Project Manager

ostein@avec.org

907.561.1818

www.avec.org

Shaktoolik Battery System Construction Project

Alaska Village Electric Cooperative/
Shaktoolik IRA Tribal Council
Renewable Energy Joint Venture

2024 Program Review
Denver, Colorado
November 20, 2024

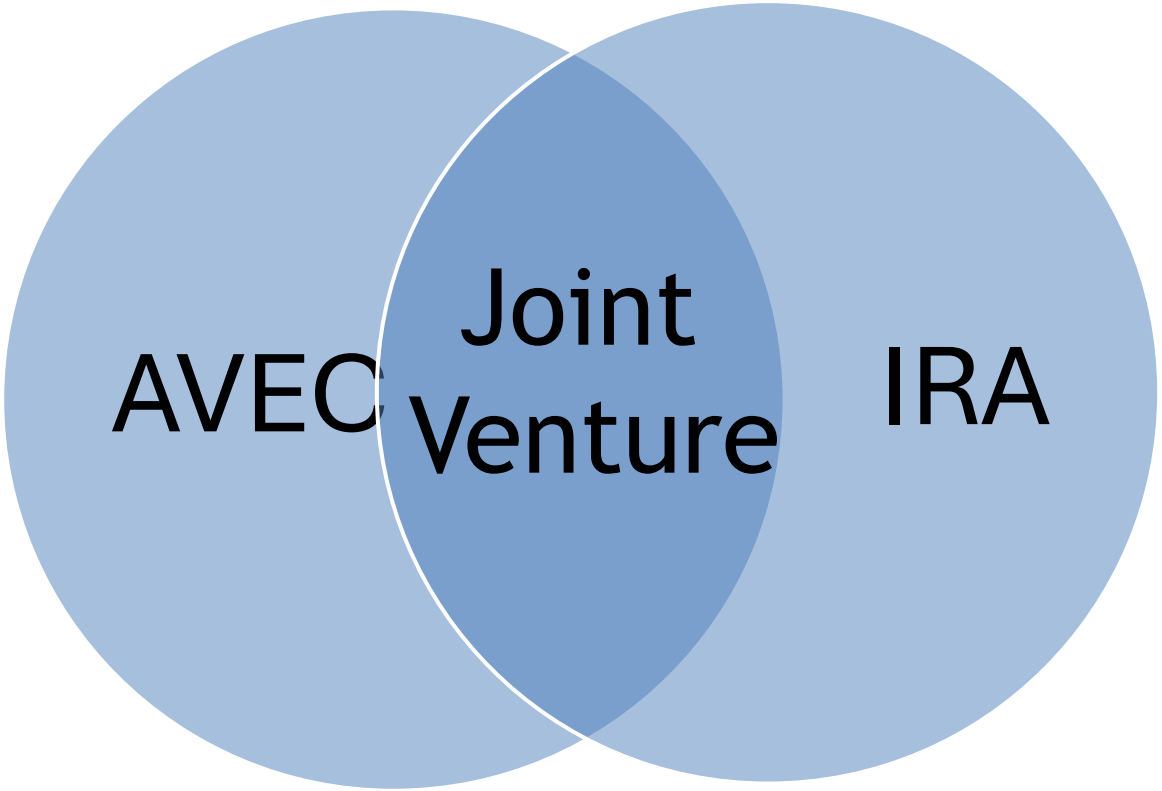
Onya Stein
Project Manager

Shaktoolik, Alaska

Image Credit: Alaska Village Electric Cooperative

Joint Venture

- Partnership between AVEC and Shaktoolik IRA
  - To benefit the community of Shaktoolik



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Kivalina
Wales
Gambell
Minto
Mekoryuk
Anchorage
Yakutat
Old Harbor
0
400
Miles

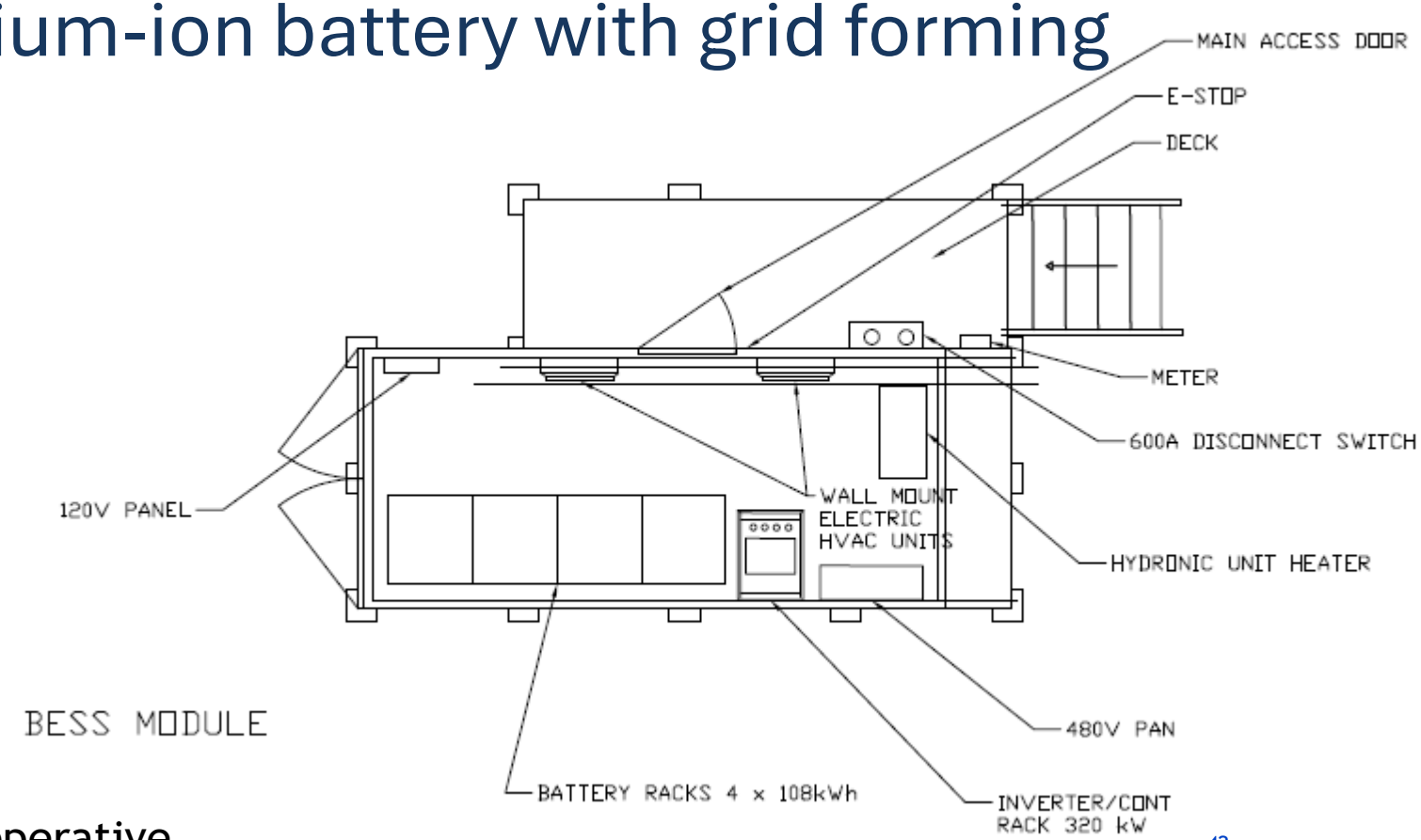
Shaktoolik IRA Tribal Council

- Formed in 1936
- Axel Jackson, President
- 6 Member Board
- 7 Employees
- Fun fact “Our school has extremely talented athletes and our High School Basketball teams have placed at the State tournament for the past few years! GO WOLVERINES!”

Project Overview

- Improve utilization of excess wind energy by installing a 320 kW/361 kWh Lithium-ion battery with grid forming inverter

Image Credit: Alaska Village Electric Cooperative




~2,800 miles
Project Location
NORTHWEST TERRITORIES
ALASKA
Fairbanks
YUKON
Canada
MANITOBA
ONTARIO
QUEBEC
Anchorage
Gulf of Alaska
ALBERTA
SASKATCHEWAN
Winnipeg
Edmonton
BRITISH COLUMBIA
MINNESOTA
NORTH DAKOTA
Calgary
SOUTH DAKOTA
MONTANA
Vancouver
Seattle
WASHINGTON
NEBRASKA
WYOMING
United States
IDAHO
OREGON
COLORADO
Google Earth
Image IBCAO
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
1000 km

Project Location

Project Location

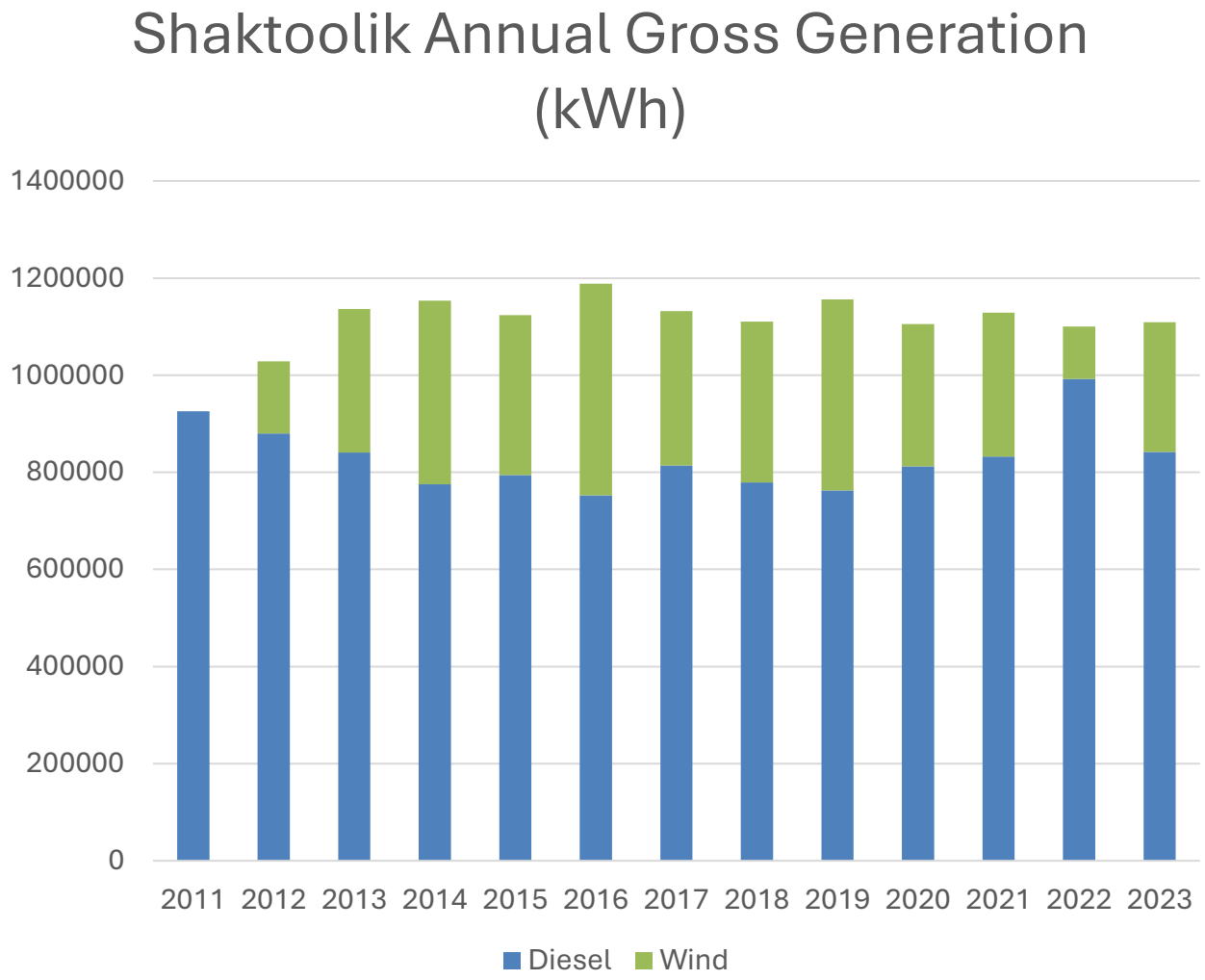
Project Location

Image Credit: Alaska Village Electric Cooperative

Project Participants

Project Objectives

- Increase wind energy output, 80%
- Fuel Savings, $99K/yr
  - Less diesel generation
  - Use smaller engine
  - “Diesel’s Off”
- Maintenance Savings, $6K/yr
- Improve Power Quality, 2 system outages
- Reduce Operational Concerns



Relevant Background

Wind Turbines

2011

BESS

2024

Image Credit: Alaska Village Electric Cooperative

Progress to Date

- Design and Purchase BESS and Foundation, 1Q2024
- Fire Marshal Plan Review, May 2024
- Materials On-site, 2Q2024
- Install, 3Q2024
- Commissioning and Troubleshooting, 4Q2024

Site Preparation

Image Credits: Alaska Village Electric Cooperative

Materials On-site

Image Credits: Alaska Village Electric Cooperative

BESS Container

Image Credits: Alaska Village Electric Cooperative

Batteries

Image Credits: Alaska Village Electric Cooperative

Interconnection

Image Credits: Alaska Village Electric Cooperative

Activities to be Completed

- System controller and full automation of BESS

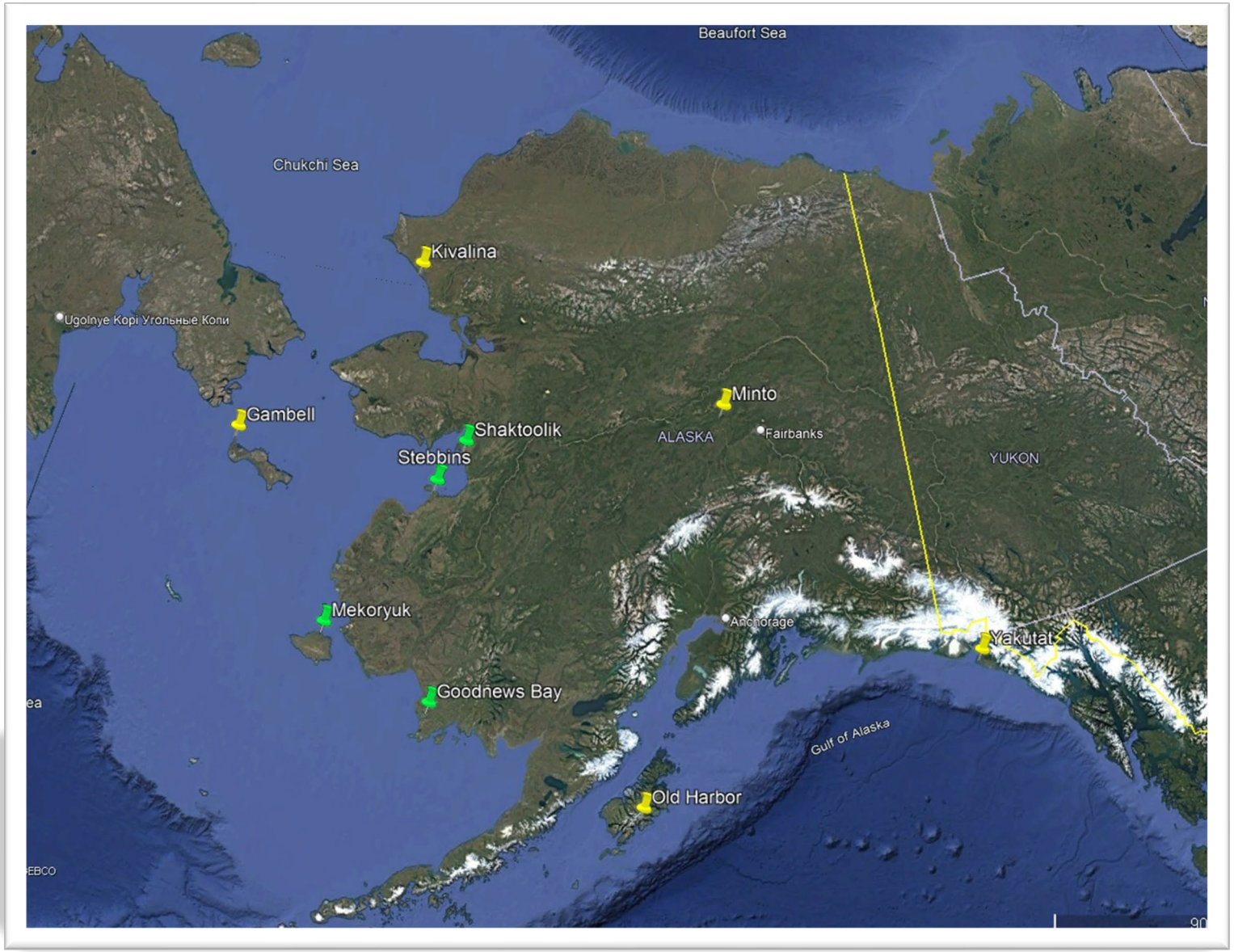
Lessons Learned

- Capable heavy equipment
- Shipping logistics
  - Batteries separate
  - Packaging waste
  - Shipping hazards
- Coordination with foreign entities
- Long lead items

Image Credits: Alaska Village Electric Cooperative

Other Projects

- Goodnews Bay Renewable Energy Project
- Stebbins/St. Michael Renewable Energy Project
- Mekoryuk Repower



Batteries?
I'm feeling positive today!

Thank you!

Questions?

Onya Stein
Alaska Village Electric Cooperative
Project Manager
ostein@avec.org
907.561.1818
www.avec.org

Shaktoolik, Alaska

Image Credits: Alaska Village Electric Cooperative

Goodnews Bay Renewable Energy Project

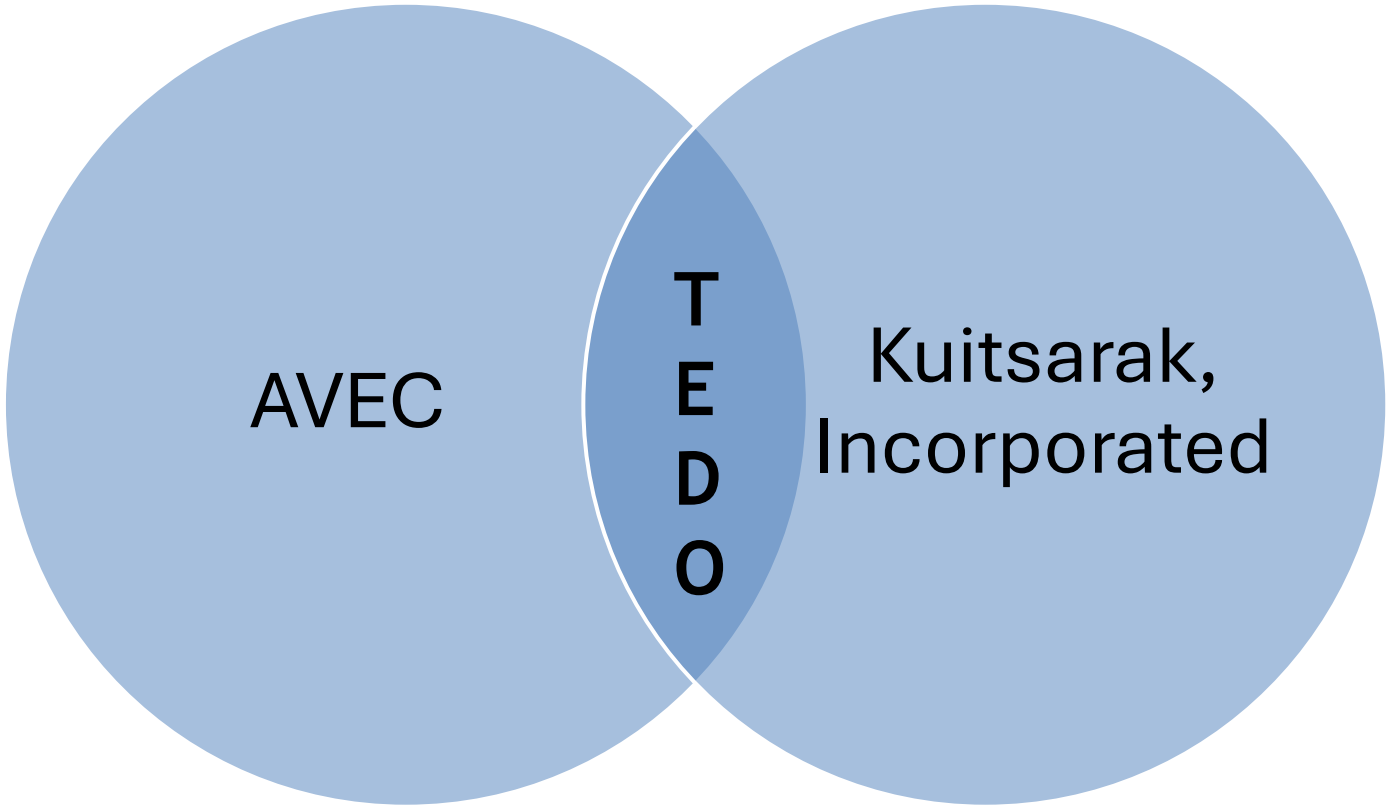
Alaska Village Electric Cooperative/
Kuitsarak Incorporated
Renewable Energy Joint Venture

2024 Program Review
Denver, Colorado
November 20, 2024

Onya Stein
Project Manager

Joint Venture

- Partnership between AVEC and Kuitsarak Incorporated
  - To benefit the community of Goodnews Bay



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Kivalina
Wales
Gambell
Minto
Mekoryuk
Anchorage
Yakutat
Old Harbor
0
400
Miles

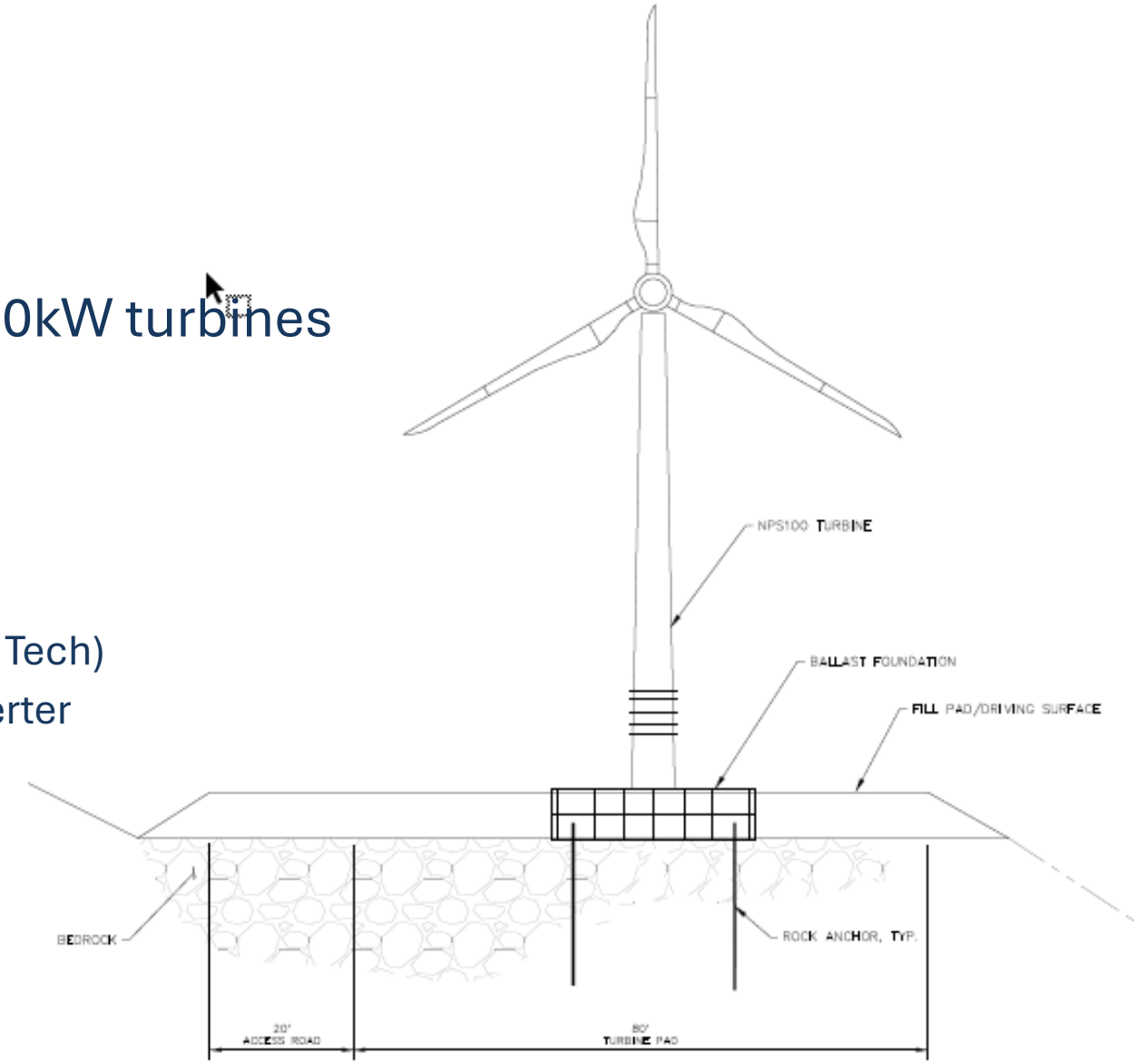
Kuitsarak Incorporated

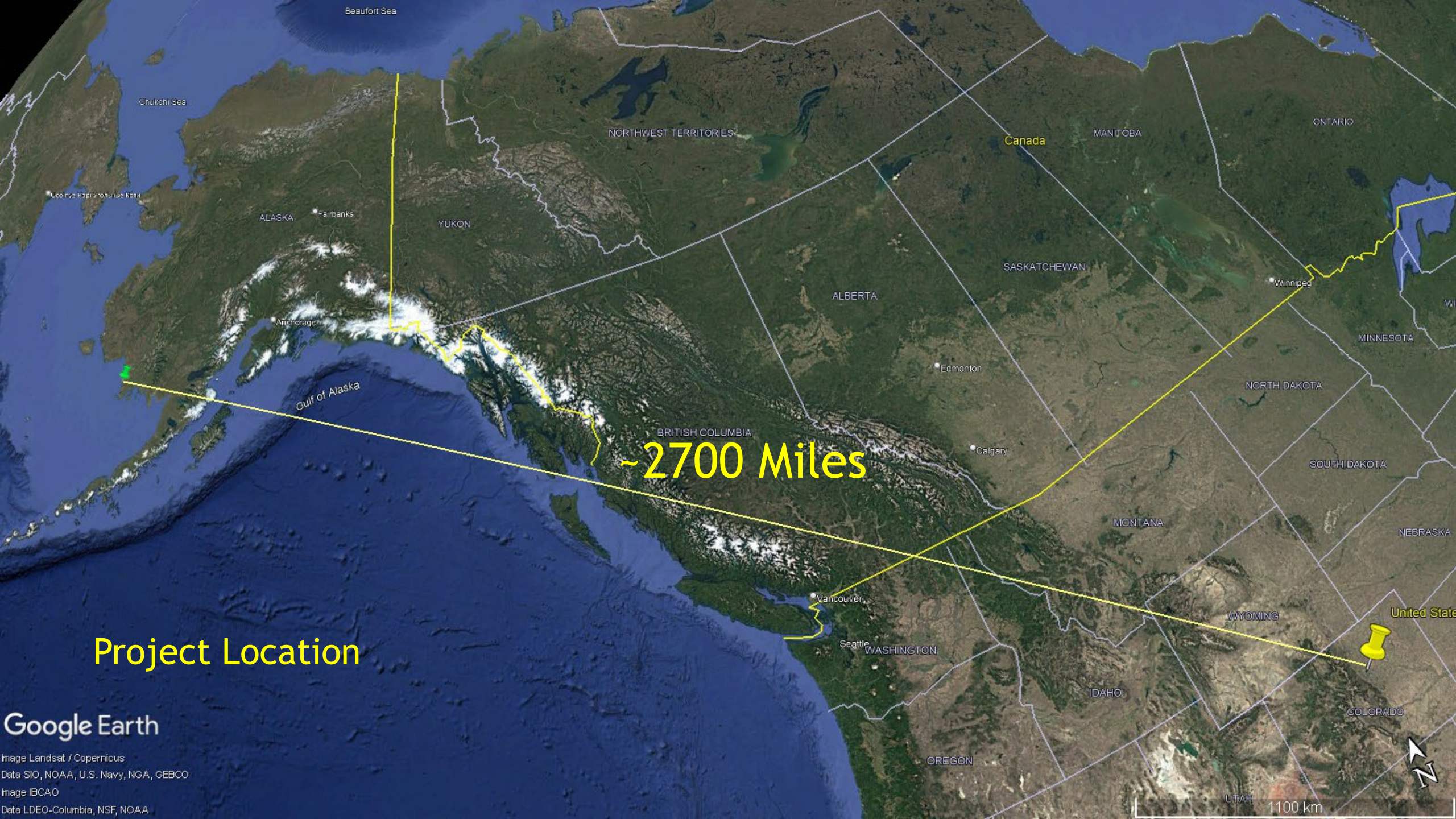
ANCSA village corporation

- Formed in 1971
- Bessie Galila, President
- 7 Employees for Kuitsarak
- 21 Employees for Mumtram Pikkai (subsidiary)
- Represent +/- 80 households
- Tribal Lands owner

Project Overview

- Final Design
- Install two Northern Power Systems 100kW turbines
  - 23-meter tip-up tower design
  - 21-meter rotor
  - NPS100C-21
- Install battery system
  - 324kWh/240kW Lithium-ion LFP battery (Pylon Tech)
  - Oztek Ozpcs-RS40 grid forming, integrated inverter
- Install electronic controls
- Install wind-to-heat system

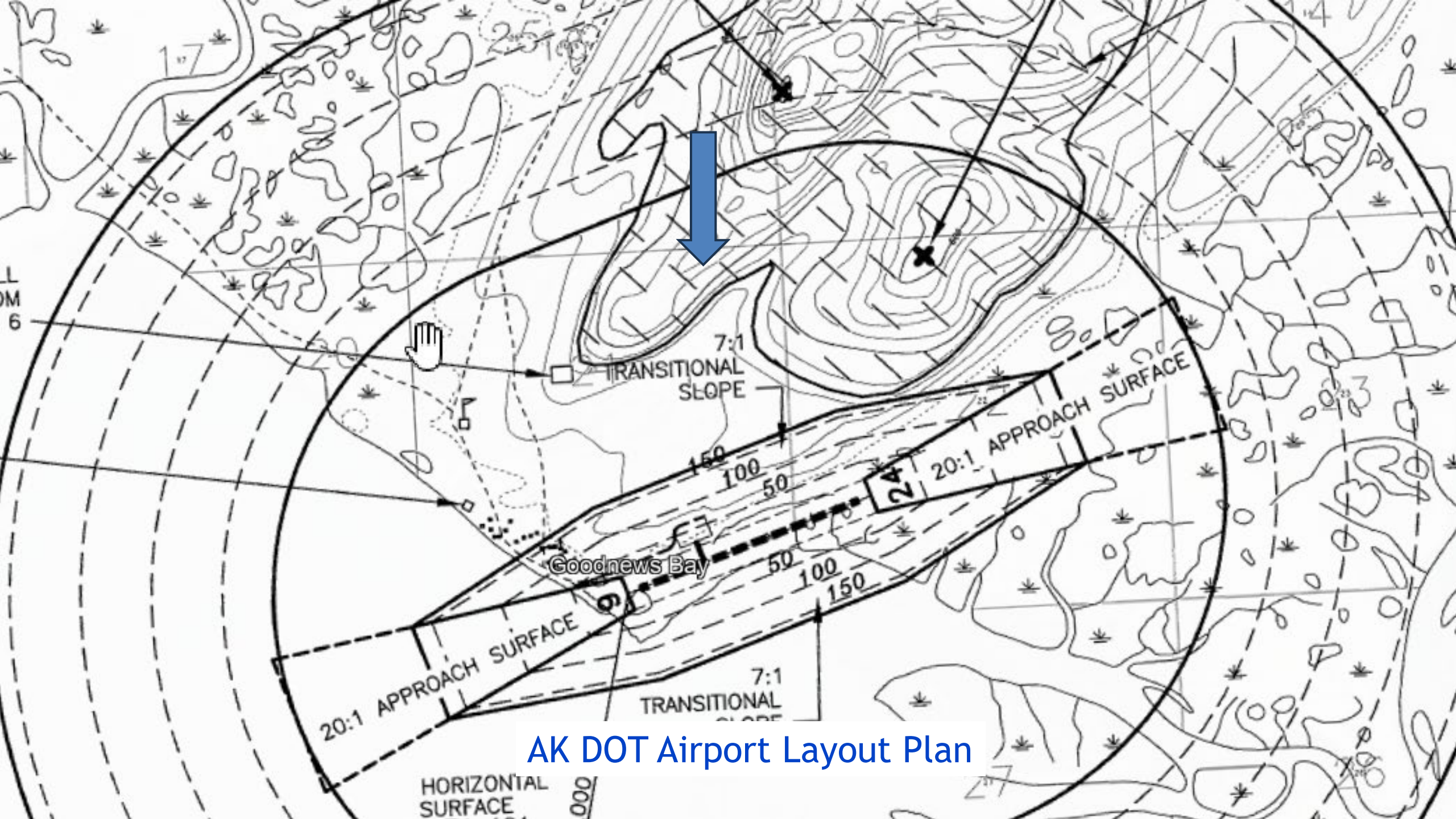



~2700 Miles
Project Location
Beaufort Sea
Chukchi Sea
NORTHWEST TERRITORIES
Canada
MANITOBA
ONTARIO
ALASKA
YUKON
SASKATCHEWAN
ALBERTA
Winnipeg
MINNESOTA
Edmonton
NORTH DAKOTA
Gulf of Alaska
BRITISH COLUMBIA
Calgary
SOUTH DAKOTA
MONTANA
NEBRASKA
Vancouver
WYOMING
Seattle
WASHINGTON
IDAHO
COLORADO
OREGON
UTAH
Google Earth
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
Data LDEO-Columbia, NSF, NOAA
1100 km
N


Kotzebue
Selawik
Nome
Koyuk
Alakanuk
ALASKA
Fairbanks
St Mary's
Bethel
Talkeetna
YUKON
St Paul
Goodnews Bay
Anchorage
Togiak
Dillingham
Project Location
Google Earth
Image IBCAO
Data LDEO-Columbia, NSF, NOAA
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
500 km


Goodnews Bay
Project Location
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image © 2024 Airbus
Image © 2024 Maxar Technologies
N
7 km

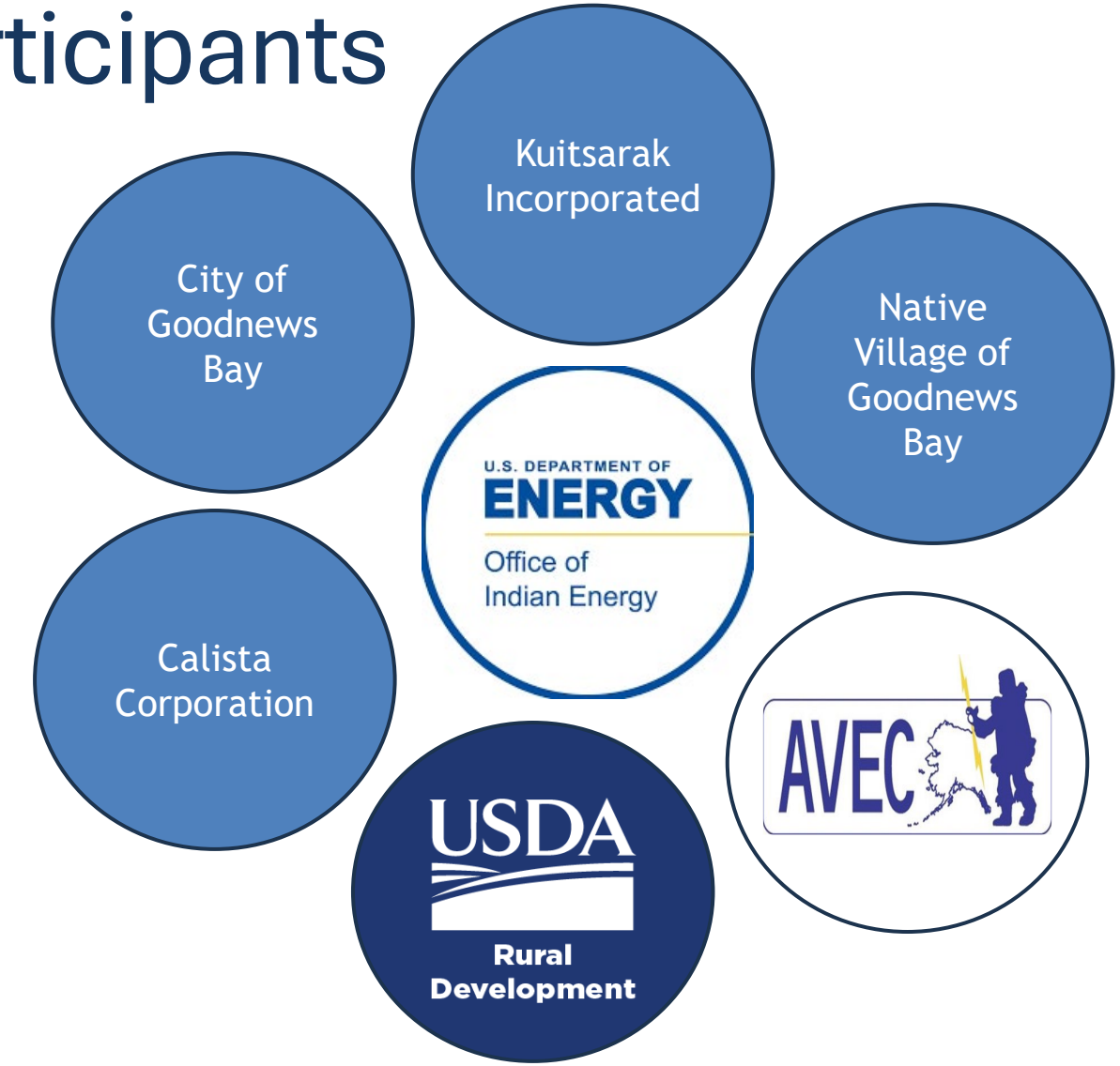

Goodnews Bay Proposed Turbine 1
Goodnews Bay Proposed Turbine 2
Goodnews Bay
Project Location
Google Earth
Image © 2024 Maxar Technologies
600 m
N



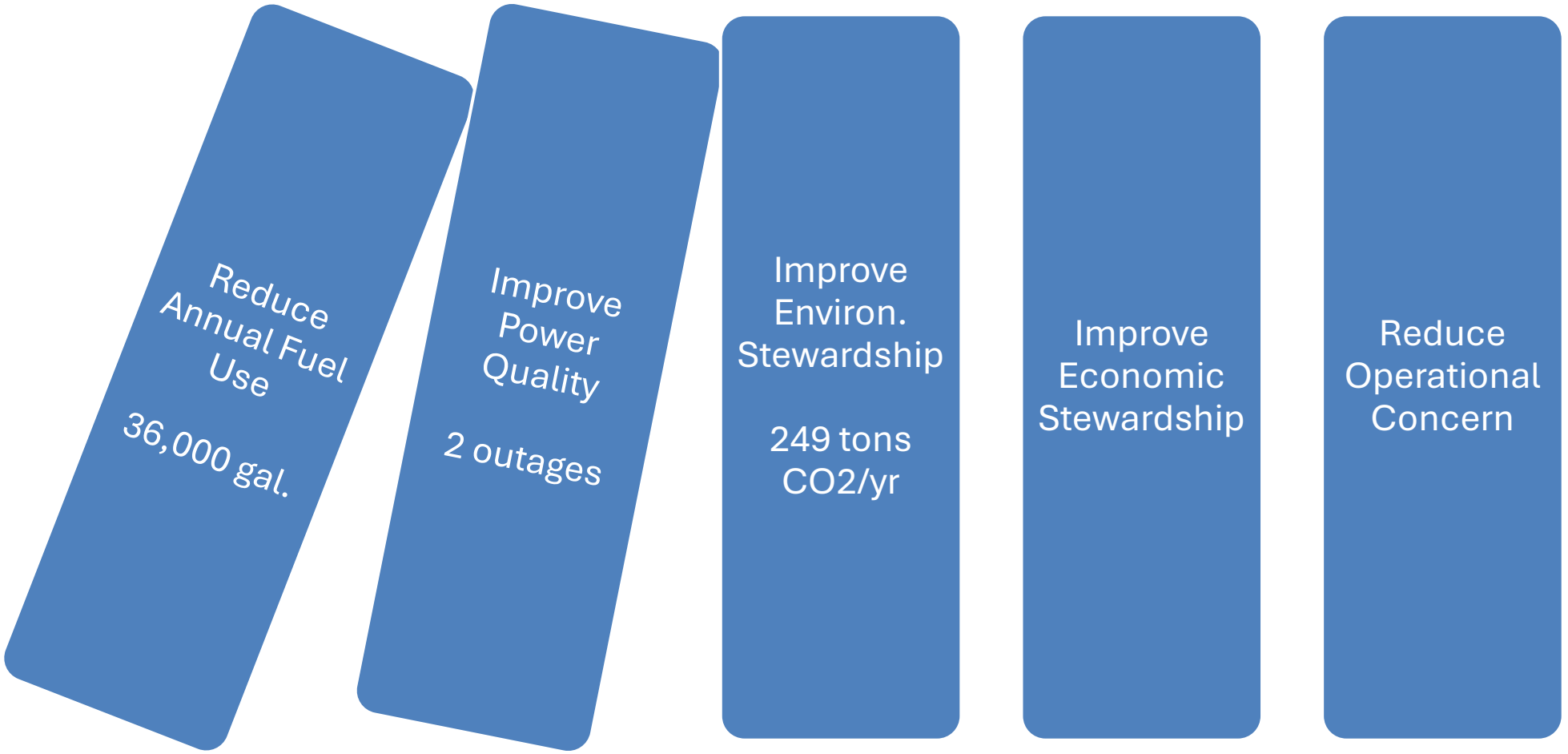
AK DOT Airport Layout Plan


Goodnews Bay, Alaska
Population: 253
Gas: $5.89
Heating Fuel $4.89
Electric $0.25 /$0.70

Project Participants



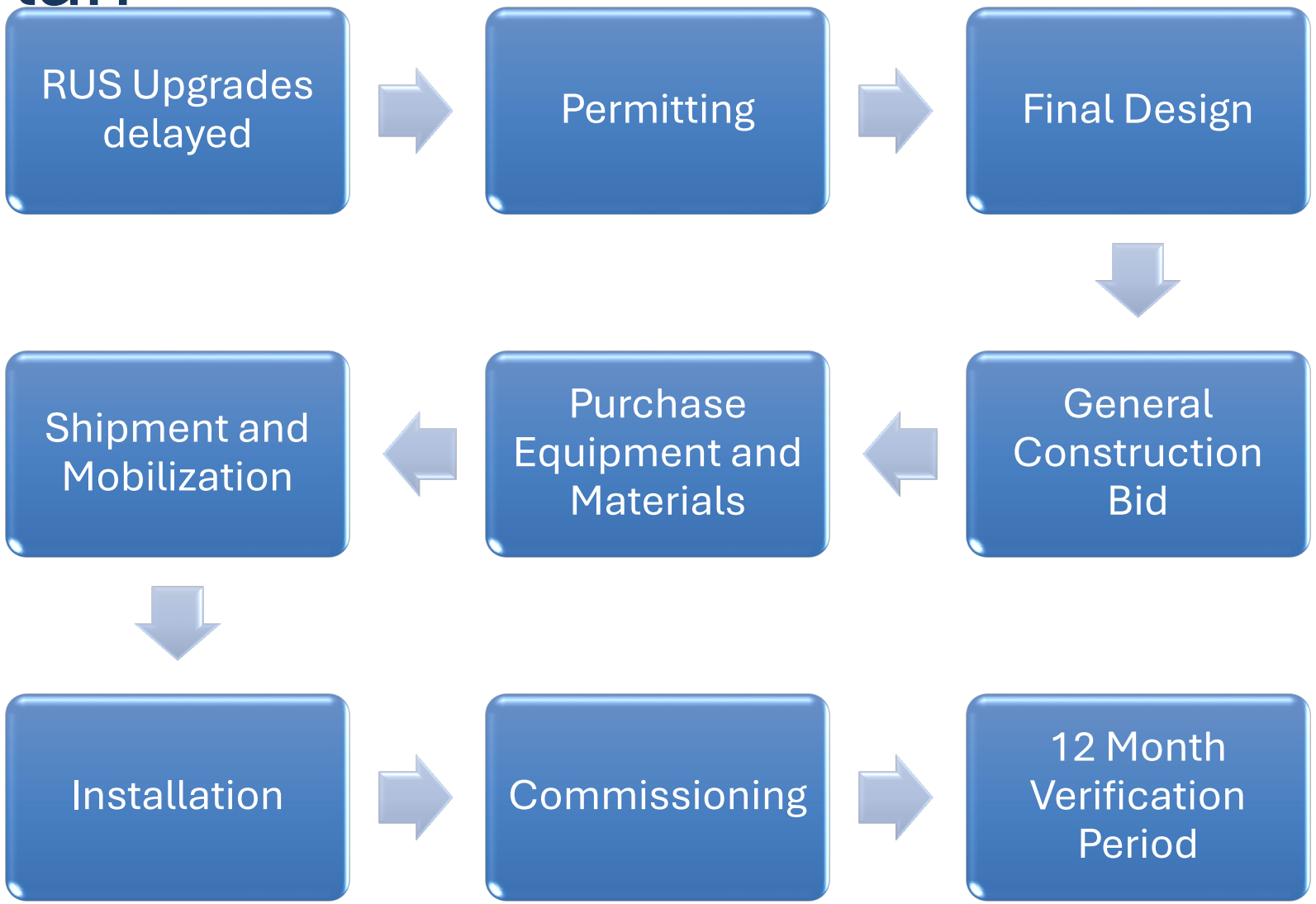
Project Objectives



Background Information

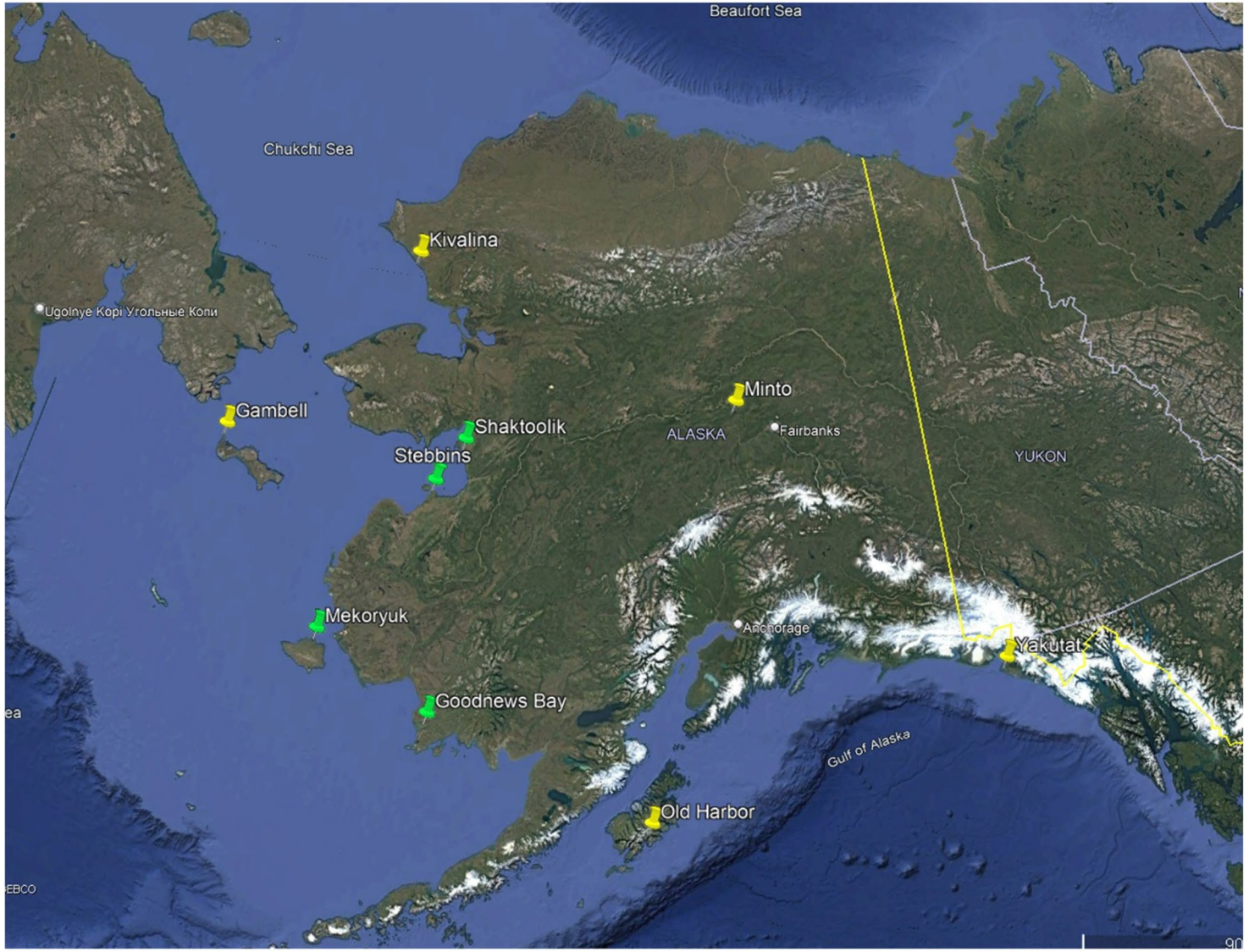
- Single phase system
- 2015 wind data was analyzed in 2022, Class 5
- Funding from RUS in place for power system improvements to make it ready for renewables by 3Q2025.

Project Plan



Other Projects

- Shaktoolik Battery Energy Storage System
- Stebbins/St. Michael Renewable Energy Project
- Mekoryuk Repower



Goodnews Bay Renewable Energy Project

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