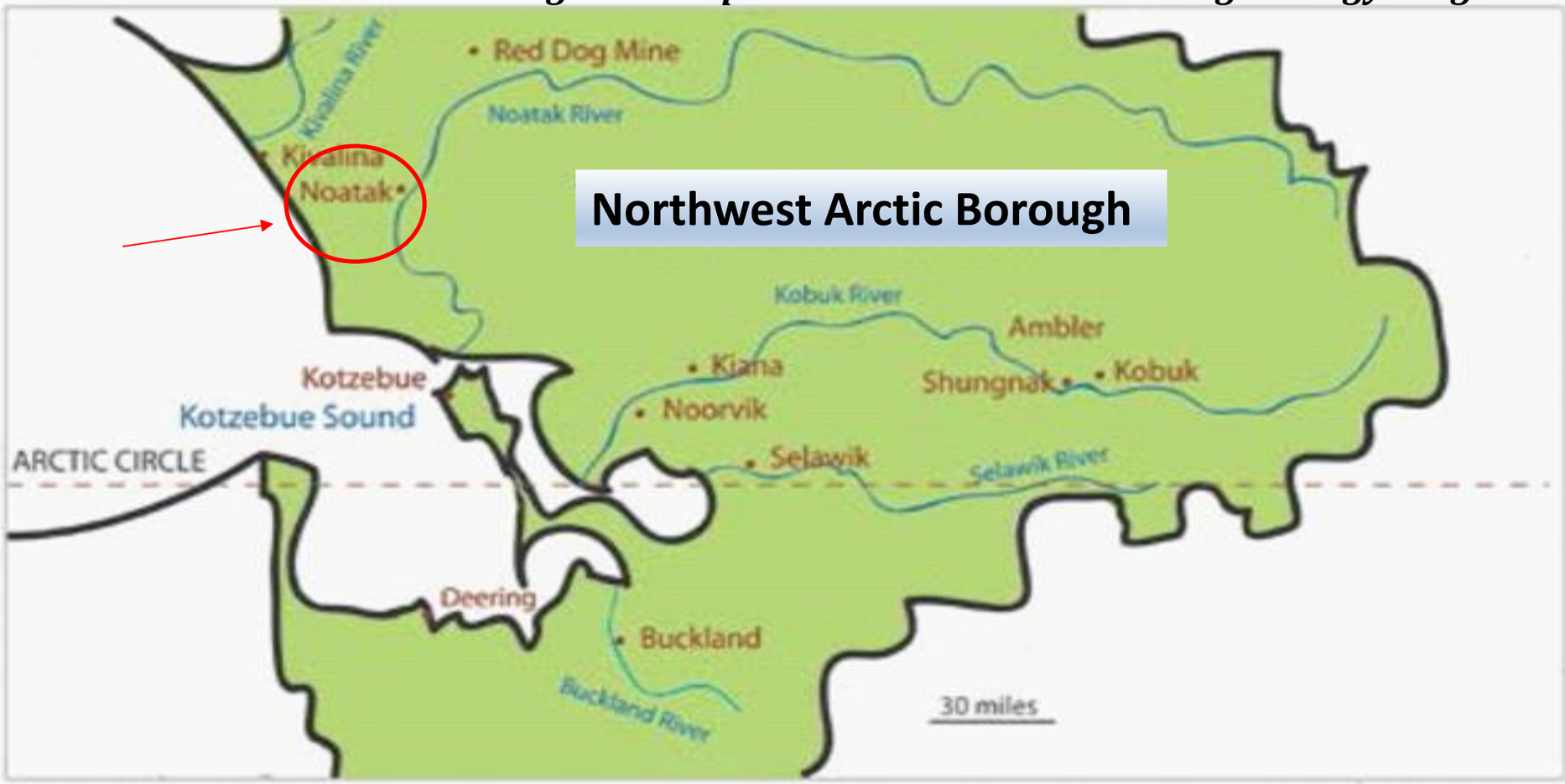
Northwest Arctic Energy program

Co-Hosted & Sponsored by:

Northwest Arctic Borough – Energy Program

NANA Regional Corporation – Alternative & Village Energy Program



DOE program review
Noatak Solar-Battery IPP project
11/20/2024 Denver, Co

Nautaaq “Noatak” Ak

Noatak was established as a fishing and hunting camp in the 1800s. Two identifiable groups of Inupiat resided on the Noatak River.

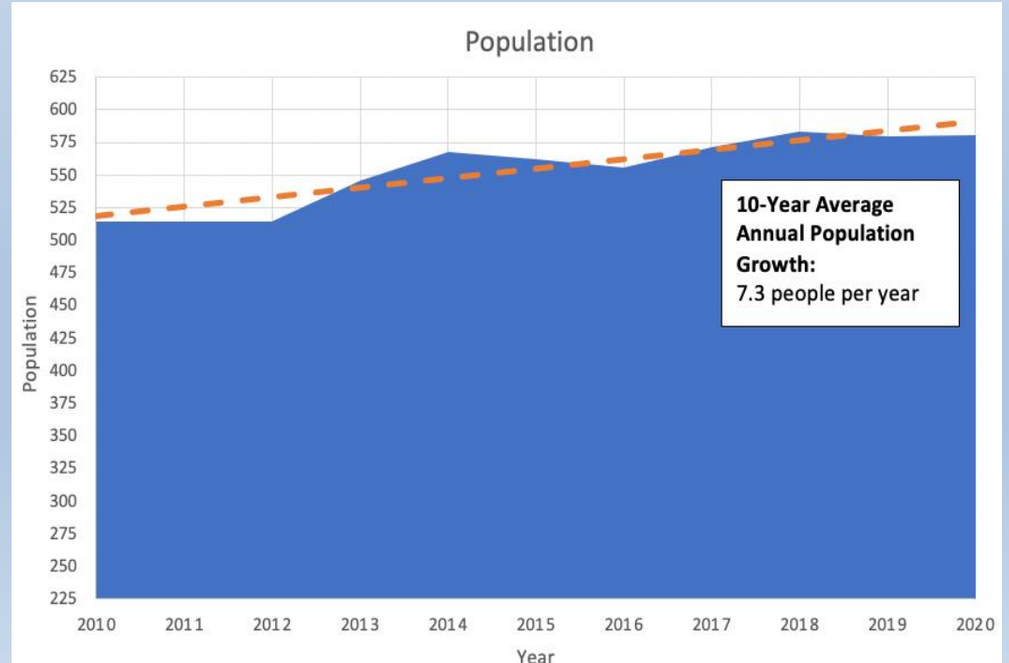
The *Nautaaġmiut* (called "Noatagamut" in the 1880 census), Inupiaq for "inland river people", lived upriver, and the *Napaaqtuġmiut*, meaning "people of the trees", lived downriver. By the early 20th century, the missionaries settled in what they called "Noatak". A United States post office was established in 1940.

Nautaaq “Noatak” Ak

DEMOGRAPHICS AND SOCIOECONOMICS

Year Incorporated Not Incorporated

Federally Recognized Tribe
Native Village of Noatak
Population (2020) 570
Median Age (2016-2020) 26.4
Percent Alaska Native / American Indian alone or in combination (2016-2020) 95%
Average Household Size (2016-2020) 4.28
Fuel Cost (2022)
$13.77/gallon (Gasoline)
$13.77/gallon (Heating Oil)
$ 0.91/Kwh electric rate pre PCE
Median Household Income (2016-2020) $55,000
Denali Commission Distressed Community (2018) Yes



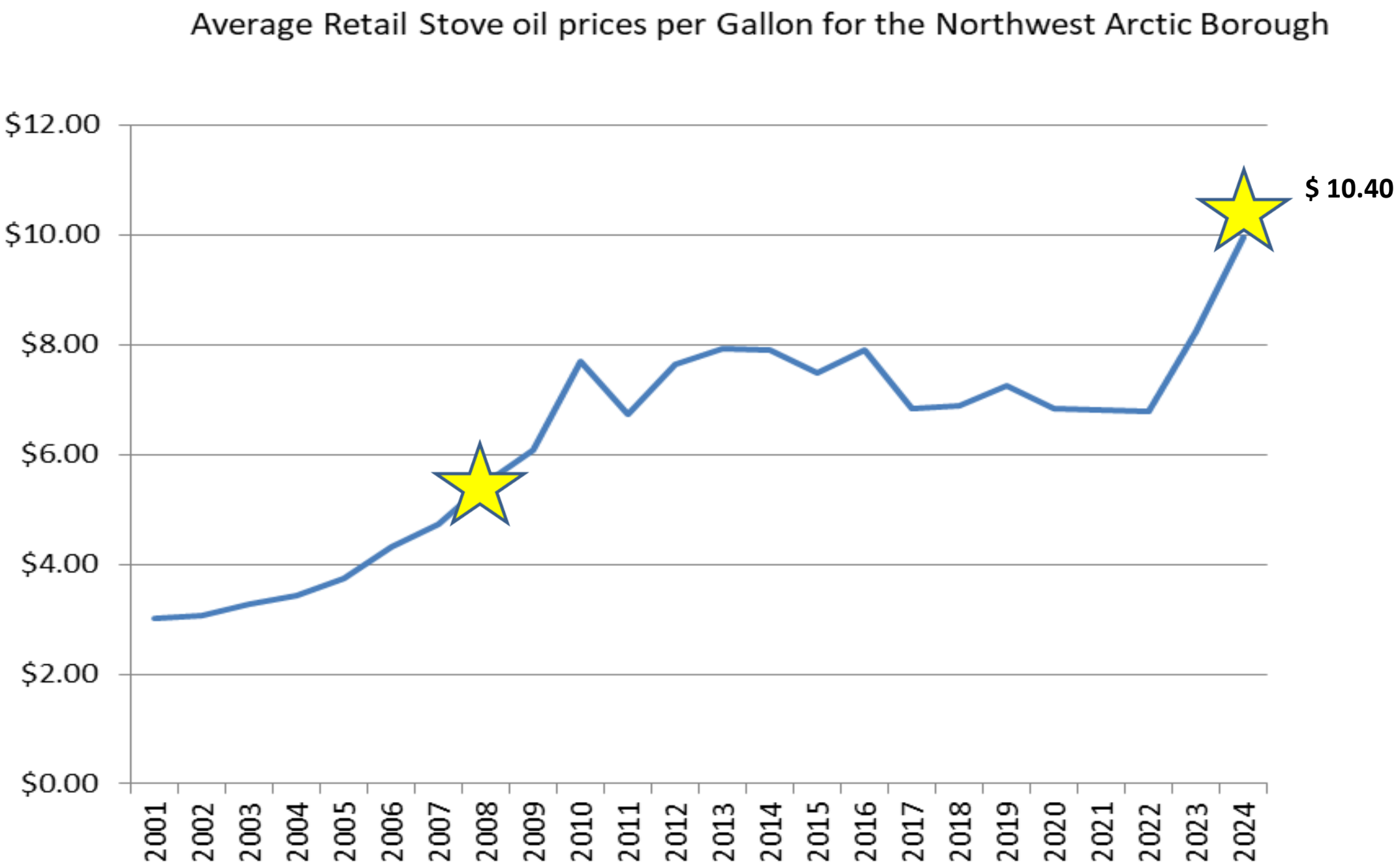
The Noatak River

Over several decades the river channels have been shifting and Noatak can no longer be accessed by barge service.

The Community is slowly moving west as seen by the new subdivision and new School building.
A new runway is planned 3 miles west of the community.

Some background

Crude oil prices over time


Average Retail Stove oil prices per Gallon for the Northwest Arctic Borough
$12.00
$10.00
$8.00
$6.00
$4.00
$2.00
$0.00
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
$ 10.40

Fuel prices (tax included on retail) Oct. 2024 & FY25

Community	Gasoline $/G Retail Aug 2023	Stove oil $/G Retail Aug 2023	Sales Tax included	Util. & AVEC Cost $ Barge/Air FY 2025	NWABS Cost $ FY2023- FY2024
Kotzebue KEA	8.99	9.12	6%	3.28	4.54/4.7605
Kotzebue Vitus	7.99	7.57	6%		
Kotzebue Crowley	7.80	7.97	6%		
Ambler	18.34	18.34	3%	4.49 /10.59	6.07/6.2505
Kobuk	13.91	15.45	3%	N/A	6.07/6.2505
Shungnak	14.03	16.14	2%	5.45 / 10.17	6.07/6.2505
Kiana	8.76	8.50	3%	2.82/4.18	4.71/5.0005
Noorvik	7.21	6.81	4%	2.96/4.63	4.71/5.0005
Selawik	6.39	7.72	6.5%	2.854.96	4.71/5.0005
Buckland	6.65	6.44	6%	2.13-3.547	5.25/5.0005
Deering	6.90	5.92	3%	2.13-4.057	4.71/5.0005
Kivalina	6.52	6.15	2%	2.78/4.18	5.16/5.0005
Noatak	13.47	14.44	6%	8.10/10.61	7.24/10.96

NAB Electric rates July 13 2023

Community	1-750Kwh $/Kwh with PCE	Tax	1-750 Kwh Actual cost/Kwh with tax	0-750 $/Kwh No tax	750-up $/Kwh No tax	Utility Non firm power purchase rate $/Kwh 1/30/2023
Kotzebue KEA	0.2275	6%	0.24	0.3949	0.3918	N/A
Ambler AVEC	0.2627	3%	0.2705	0.8580	0.7566	0.3285
Kobuk AVEC	0.3305		0.3305	1.0967	0.9912	N/A
Shungnak AVEC	0.3305	2%	0.3371	1.0967	0.9912	0.5736
Kiana AVEC	0.2561		0.2561	0.7254	0.6199	0.3003
Noorvik AVEC	0.2543	4%	0.2645	0.6896	0.5841	0.2606
Selawik AVEC	0.2534	7%	0.2711	0.6719	0.5664	0.2405
Buckland BEC	0.2781		0.2781	0.4900	0.4900	0.2823
Deering IEC	0.4081		0.4081	0.6747	0.6747	0.3575
Kivalina AVEC	0.2535	2%	0.2586	0.6295	0.5240	0.2442
Noatak AVEC	0.3982	6%	0.4221	1.1644	1.0589	0.6615

NAB Electric rates Sep. 2024

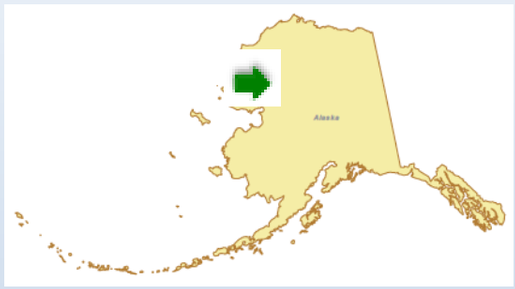
Community	1-750Kwh $/Kwh with PCE	Tax	1-750 Kwh Actual cost/Kwh with tax	0-750 $/Kwh Small Comm	750-up $/Kwh Large Comm	Utility Non firm power purchase rate $/Kwh 9/21/2024
Kotzebue KEA	0.2272	6%	0.2408	0.2238	0.2080	N/A
Ambler AVEC	0.3017	3%	0.3108	0.9276	0.7234	0.3958
Kobuk AVEC	0.3087		0.3087	1.0676	0.7636	0.5517
Shungnak AVEC	0.3087	2%	0.3149	1.0676	0.7636	0.5517
Kiana AVEC	0.2941		0.2941	0.7747	0.5705	0.3338
Noorvik AVEC	0.2945	4%	0.3063	0.7824	0.5782	0.3299
Selawik AVEC	0.2925	7%	0.3130	0.7437	0.5155	0.2817
Buckland BEC	0.2781		0.2781	0.4900	0.4900	0.4750
Deering IEC	0.2125		0.2125	0.6747	0.6747	0.4750
Kivalina AVEC	0.2933	2%	0.2992	0.7592	0.5550	0.3127
Noatak AVEC	0.3982	6%	0.4221	1.1644	1.0122	0.7185

Noatak Solar IPP

Courtesy ANRI

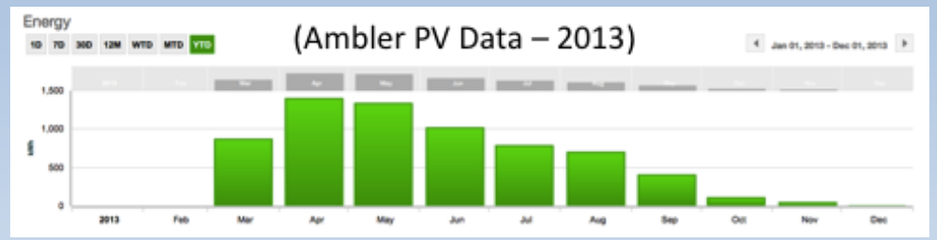
The Background to the project was the 2012-2013 NAB Synergy project

Noatak Water plant



Deering

- Borough population: 7,810
- Electricity for village water / sewer plants
- Launched in Ambler, replicating across borough
- 10,000 kWh/year from 10 kW array
- Peak production April-July
- Long sunlight hours in summer + 30% reflection from snow-covered ground in spring



Powering water treatment facilities with renewable energy

Noatak Solar-Battery IPP project
Phase 1 2022-23

- **Noatak 280.6 DC/250Kw AC Kw Solar/battery PV**

- **Using 432 pc Canadian solar Bifacial 650 W panels**
- **Kronus/Pylontech environmentally friendly LFP Battery @ 442Kwh capable of holding the community for 2 Hours without Generators or Solar power.**
- **Capacity 492Kw/352Kwh with room for expansion.**
- **Inverter is an EPC 500Kw**

- **Start of construction Sep 2022 and completed end of Aug. 2023.**

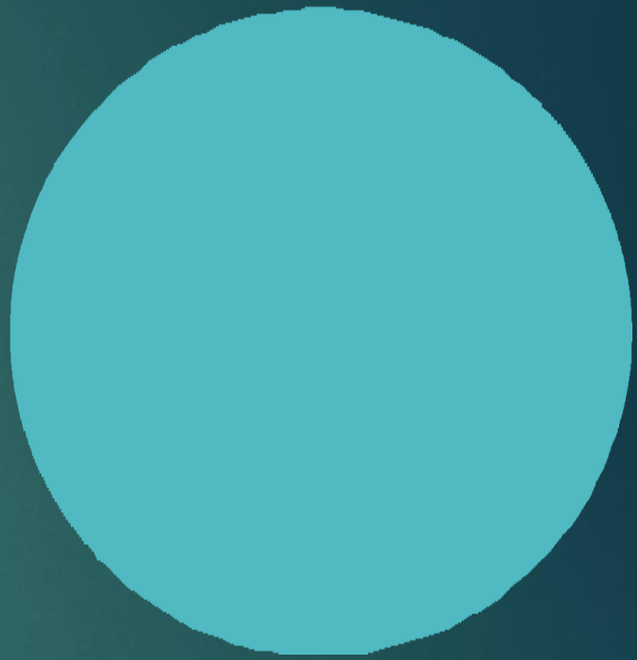
- **Site clearing and 95% engineering completed as of end of October 2022.**
- **Equipment was secured during the winter for mobilization to Noatak March-April 2023.**
- **Construction and commissioning April-Aug 30th 2023.**

The Noatak Solar IPP Project cost

Start of construction Sep 2022 and completed Aug. 2023.
Total project cost $ 2,946,886.00

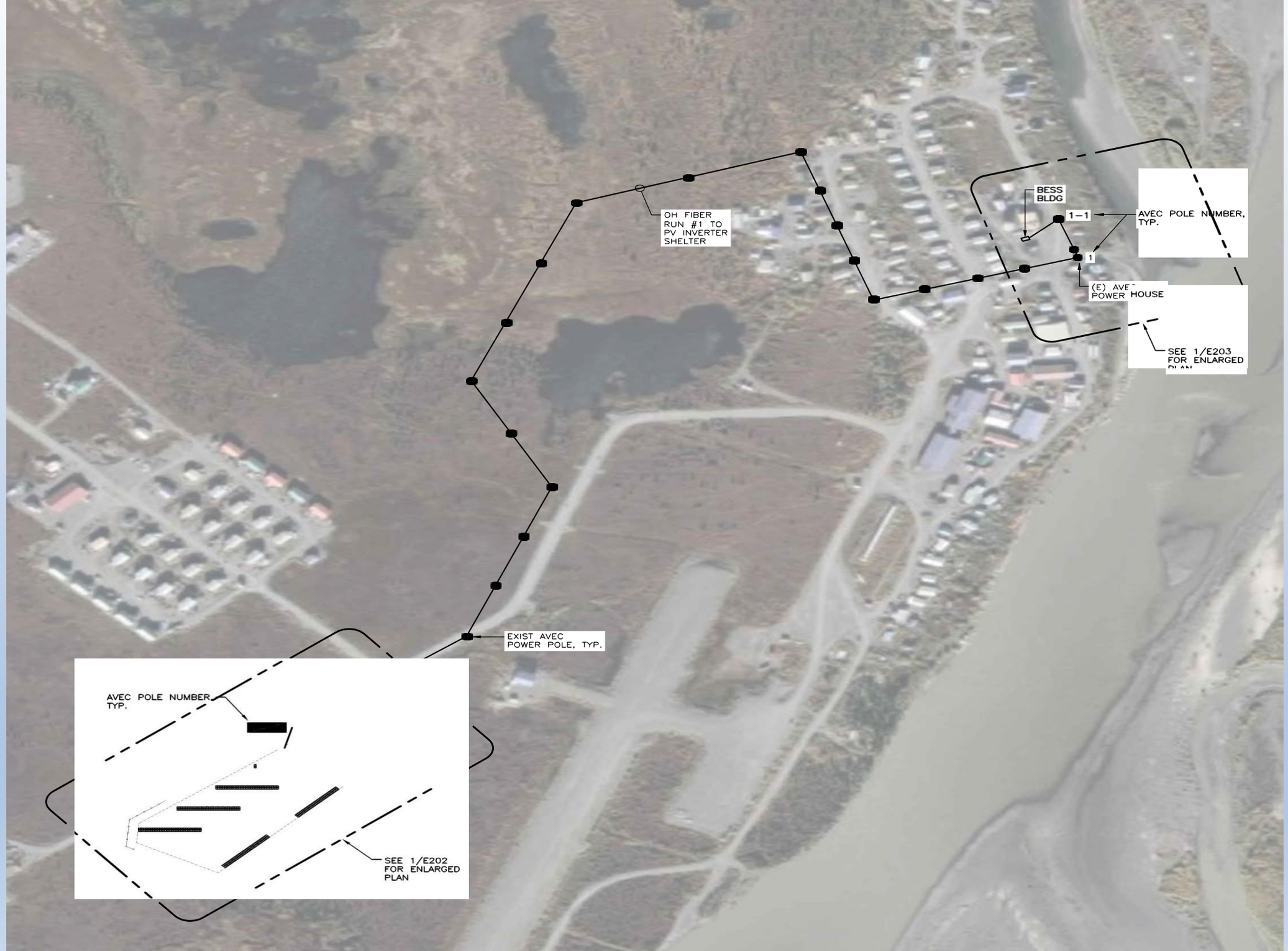
Funded by DOE Tribal grant @ $ 2,008,765.00

Denali Commission $ 134,079.00
Teck (Red Dog) $ 100,000.00
NANA VEI and inkind $ 309,998.00
In-kind VIF and NAB funds $ 394,123.00



Designated area close to airport


Legend
Path Measure
Main St
Noatak Rd
30x20
fenced in
battery
building with
1- 4' gate
AVEC plant
Google Earth
Image © 2022 CNES / Airbus
N
200 ft


OH FIBER RUN #1 TO PV INVERTER SHELTER
BESS BLDG
1–1
AVEC POLE NUMBER, TYP.
1
(E) AVEC POWER HOUSE
SEE 1/E203 FOR ENLARGED
EXIST AVEC POWER POLE, TYP.
AVEC POLE NUMBER, TYP.
SEE 1/E202 FOR ENLARGED PLAN


ON
OFF


PYLONTECH


epcpower
HM3A180


22G1
GROSS
OAD
CAP.

Ribbon cutting and prayer for the Solar project
Mid July 2023

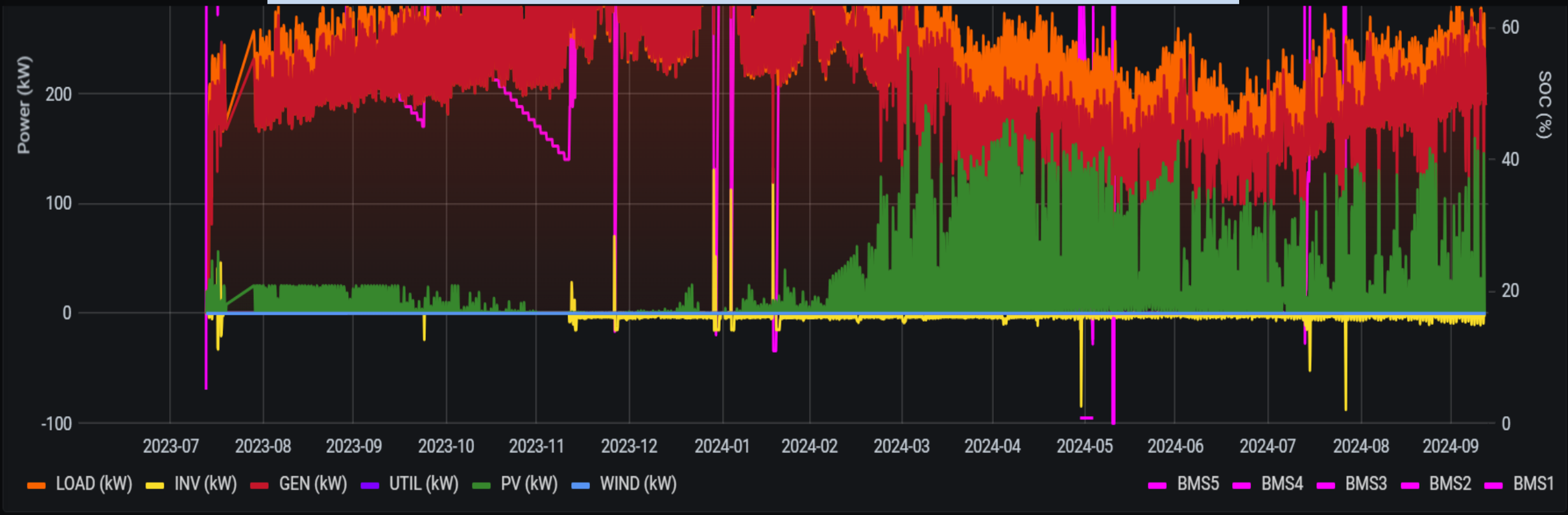
Elder Rachel Sherman doing the dedication prayers

And a Feast for everyone in the community Hamburgers and Hot dogs

Customer / 10074 N

Screen shot of operation since commissioning

AKDT



INV	BMS	PV	GEN	LOAD
-1 kW	1.84 kW	0 kW	199 kW	198 kW

INV #	BMS #	PV #	GEN #	LOAD #
1	3	2	1	3

Energy Totals

Load	2405013 kWh
Generator	2198767 kWh
Solar	220705 kWh
Battery Charge	20498 kWh
Battery Discharge	10008 kWh

Type here to search

53°F Windy

10:29 AM
10/12/2024

Noatak Power outage avoidance

Noatak

Monthly Energy Report
Aug 01, 2024 - Aug 31, 2024

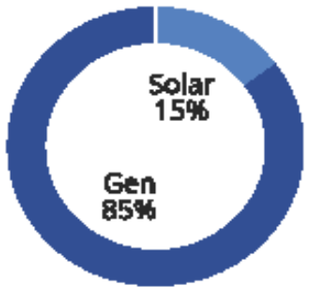
ageto

Your microgrid this month

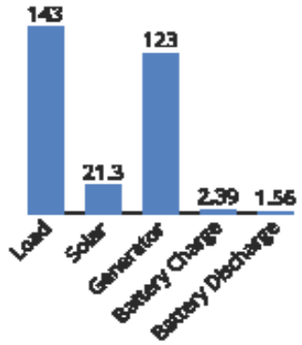
Produced	Offset	Avoided
21.3 MWh of solar	16.4 tons of CO_2	1,575 gal of fuel

That's like planting 249 trees!

Energy produced



Energy totals (MWh)



You went renewables only!

This month your system operated

4 hours

generators off

Weather

Avg daily high
52°F

Avg daily low
43°F

Renewables accounted for **15%** of your energy consumption this month resulting in **$10,431** in fuel savings

All values and amounts listed in this report are generated based on estimated constants, variables, and assumptions. The avoided fuel value is based on diesel equivalent. While this report is meant to closely and accurately represent the actual amounts saved or earned, Ageto assumes no responsibility or liability for any errors, omissions, or misrepresentations of data used to generate this report.

- **As of end of Sep. 2024, since commissioning in Sep. 2023.**
- **221 Mwh of electricity have been generated**
- **Equal to about 15,786 Gallons not needed & 166 Tons of CO2 offset**
- **Together with a total of 36 Hours of Diesel/off operation.**

Noatak financials expected

Estimated Gross Annual Revenue	$179,625.00
Insurance	$3,771.32
Electric	$1,958.05
Ageto service fee	$3,242.28
Tribe Employee	$8,683.44
Fuel	$3,150.00
Total Estimated Expenses	$20,805.09
Estimated Net Income	$158,819.91
Estimated Administrative Fee (10% Annual Net)	$15,882.00
Annual Income Less Admin Fee	$142,938.00

Noatak 280.6-550 Kw expansion
Phase 2 in 2025-26

- **Initial Solar array size 280.6 Kw**
- **Will be expanded to 550 Kw**
- **Kronus Pylontech battery system – 123 kw/rack – 492 kwh 90% usable – 442 kwh**
- **with expansion to 738 kwh 90% = 664kwh**
- **Inverter is an EPC 500Kw will be expanded to 1 Mw.**

- **This project is expected to displace 21,428 Gallons of diesel annually in phase 1.**
- **and 39,285 Gallons annually after phase 2 build out.**
- **982,000 gallons over the 25-year life of the project.**

Future Energy Projects –

Community-Wide Residential LED Lighting Upgrade

- Upgrade all residential lighting fixtures to energy efficient LED lighting
  - Survey type and quantity of lighting fixtures in all homes
  - Apply for Village Improvement Fund support
  - Procure and install energy efficient lighting
- Reduce residential electricity costs

Water Treatment Plant Upgrade

- Water treatment plant (WTP) will be reinforced or relocated due to unstable ground
  - Changes in permafrost and erosion threaten stability of WTP
  - The well is not producing enough water
  - Opportunity to prioritize energy efficiency upgrades in facility upgrade
- Energy efficient construction
- Optimize recovered heat system

New Fuel Line / Power Plant Relocation

- Construct a new fuel line from the new airport to the AVEC bulk fuel tanks
  - Flown-in fuel necessitates new fuel line from new airport
- Power plant relocation
  - Currently built on land that is eroding into the Noatak River and at risk of flooding
  - AVEC interested in relocating power plant and new bulk fuel tank siting

Additional Community Goals –

- Reduce cost of residential space and water heating
  - Implement energy efficiency measures and upgrades
  - Maintain and/or replace aging residential heating appliances
- Enhance resiliency of residential heating by diversifying heating appliances and fuel types

- Develop long-term strategies to mitigate the high costs and delivery frequency of flown-in fuel
  - Construct new fuel line
  - Develop additional sources of renewable energy
  - Reduce fuel consumption through energy efficiency upgrades

- Enhance funding to support local AVEC operator
  - Expand responsibilities to include operation and maintenance of solar PV and battery systems
    - Create additional training opportunities for operators to enhance skills and understanding of microgrid

- Partner with Northwest Inupiat Housing Authority to implement policy changes to prioritize and invest in energy efficiency in newly constructed home

Thank you from The Tribal Council of Noatak, to all Noatak Solar/Battery IPP Partners

NANA

TECK

DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA ·

NORTHWEST ARCTIC BOROUGH
INCORPORATED JUNE 2, 1986

DENALI COMMISSION
ALASKA

ALASKA NATIVE RENEWABLE INDUSTRIES

Deerstone Consulting

ageto

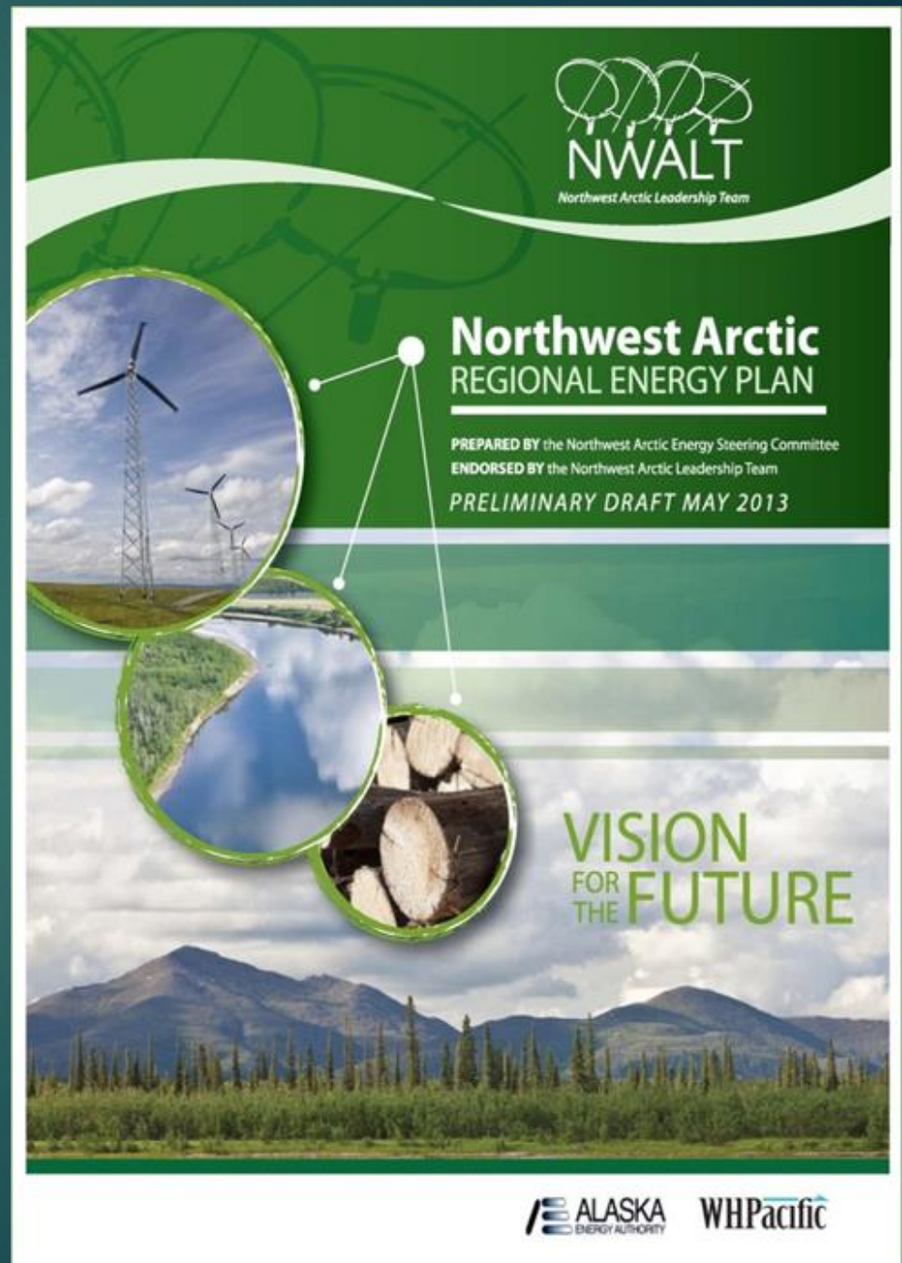
AVEC
ALASKA VILLAGE ELECTRIC COOPERATIVE

DAYLIGHT ENERGY SERVICES

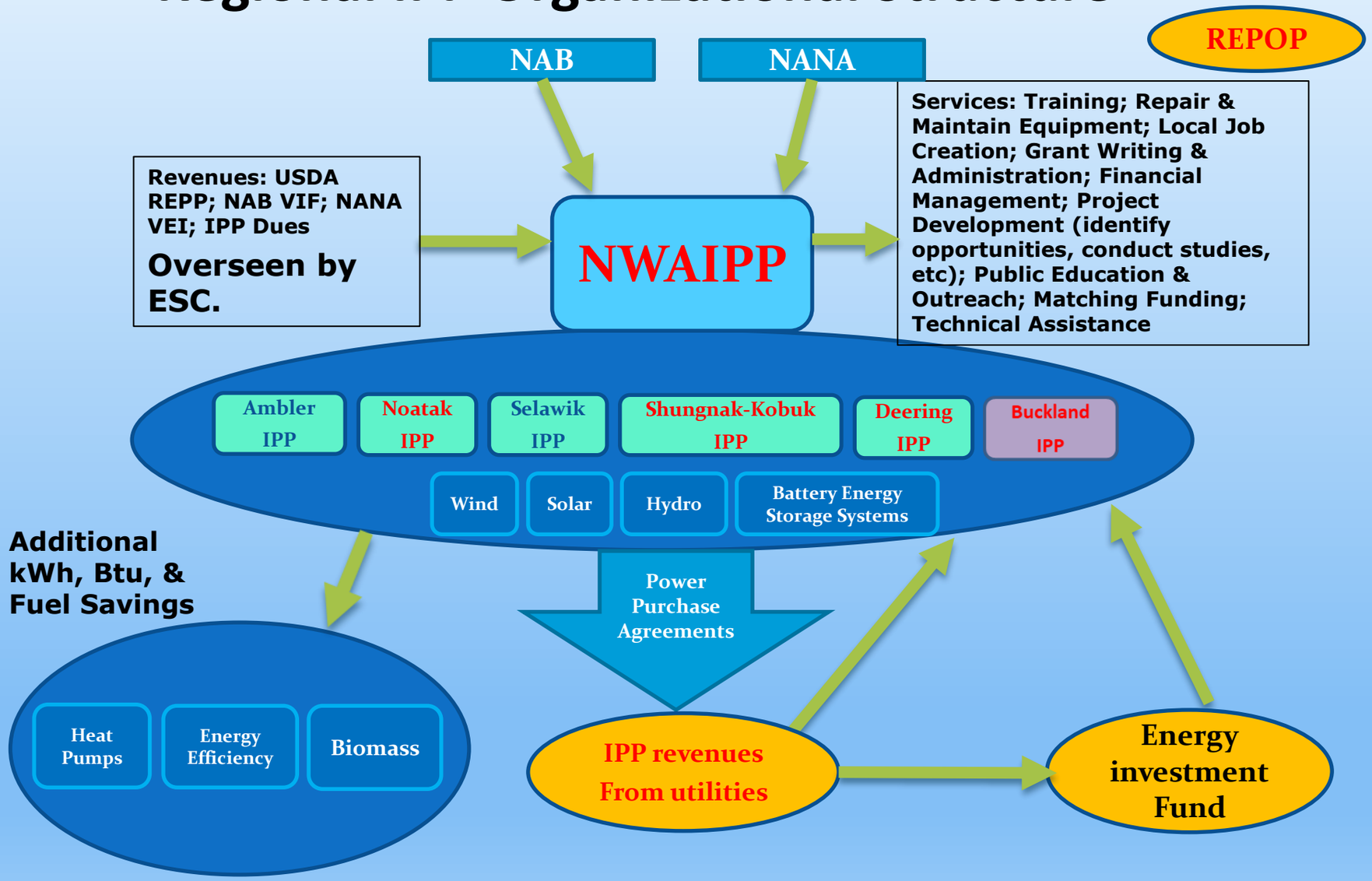
The Energy Plan & Management

Built on the success of the Regional Energy Steering Committee, the IPP's will be overseen by an executive board of Directors, one each from the regions Communities and Stakeholder entities that will meet twice a year to ratify the Regional Energy plan.

The vision is for the Northwest Arctic region to be 50 percent reliant on regionally available energy sources, both renewable and non-renewable, for heating and generation purposes by the year 2050.
And to combat rapid climate change due to greenhouse gas emissions like Co2, Methane and other harmful effects of fossil fuel usage.



Regional IPP Organizational Structure



Estimated Solar IPP production per year at full build out of all communities.

Community	Total			Total	Utility Non-Firm Power Purchase	Estimated IPP Annual Revenue
	Solar PV	BESS	Combined	Diesel offset		
	kW	MW	MWh/year	Gallons/year	$/kWh	$
Ambler	400	1	360	25,714	$ 0.3949	$ 142,164
Buckland	450	1	405	28,929	$ 0.2823	$ 114,332
Deering	250	0.5	225	16,071	$ 0.2733	$ 61,493
Kiana	400	1	360	25,714	$ 0.2733	$ 98,388
Kivalina	450	1	405	28,929	$ 0.2442	$ 98,901
Noatak	550	1	495	35,357	$ 0.6682	$ 330,759
Noorvik	550	1	495	35,357	$ 0.2507	$ 124,097
Selawik	500	1	450	32,143	$ 0.2053	$ 92,385
Shungnak-Kobuk	500	1	450	32,143	$ 0.6138	$ 276,210
TOTALS	4050	8.5	3645	260,357		$ 1,338,728
Kotzebue KEA	**966**	**8**	**950**	**67,857**	**$ 0.2321**	**$ 220,495**
Total Region	**5,016**	**16.5**	**4,595**	**328,214**		**$ 1,559,223**

A Dream you dream alone is only a dream.
A dream you dream together is reality. Yoko Ono

Cosmos Hills Hydro Project

Kogoluktuk River falls a possible Hydro project for future development

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Credits to :
NANA ; Sonny Adams
Deerstone Consulting; Brian Hirsch
ANRI ; Edwin Bifelt

Thank You DOE