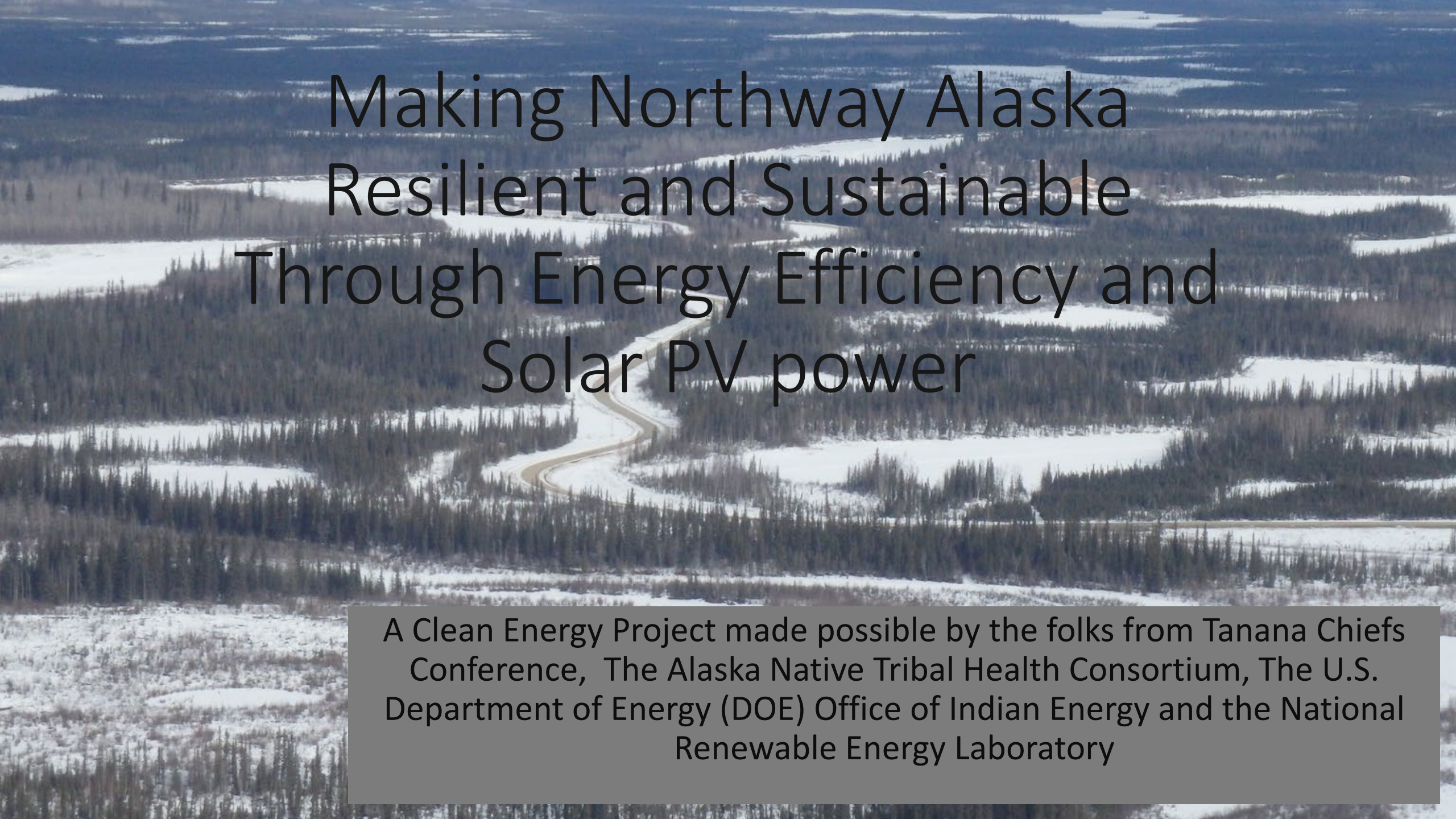
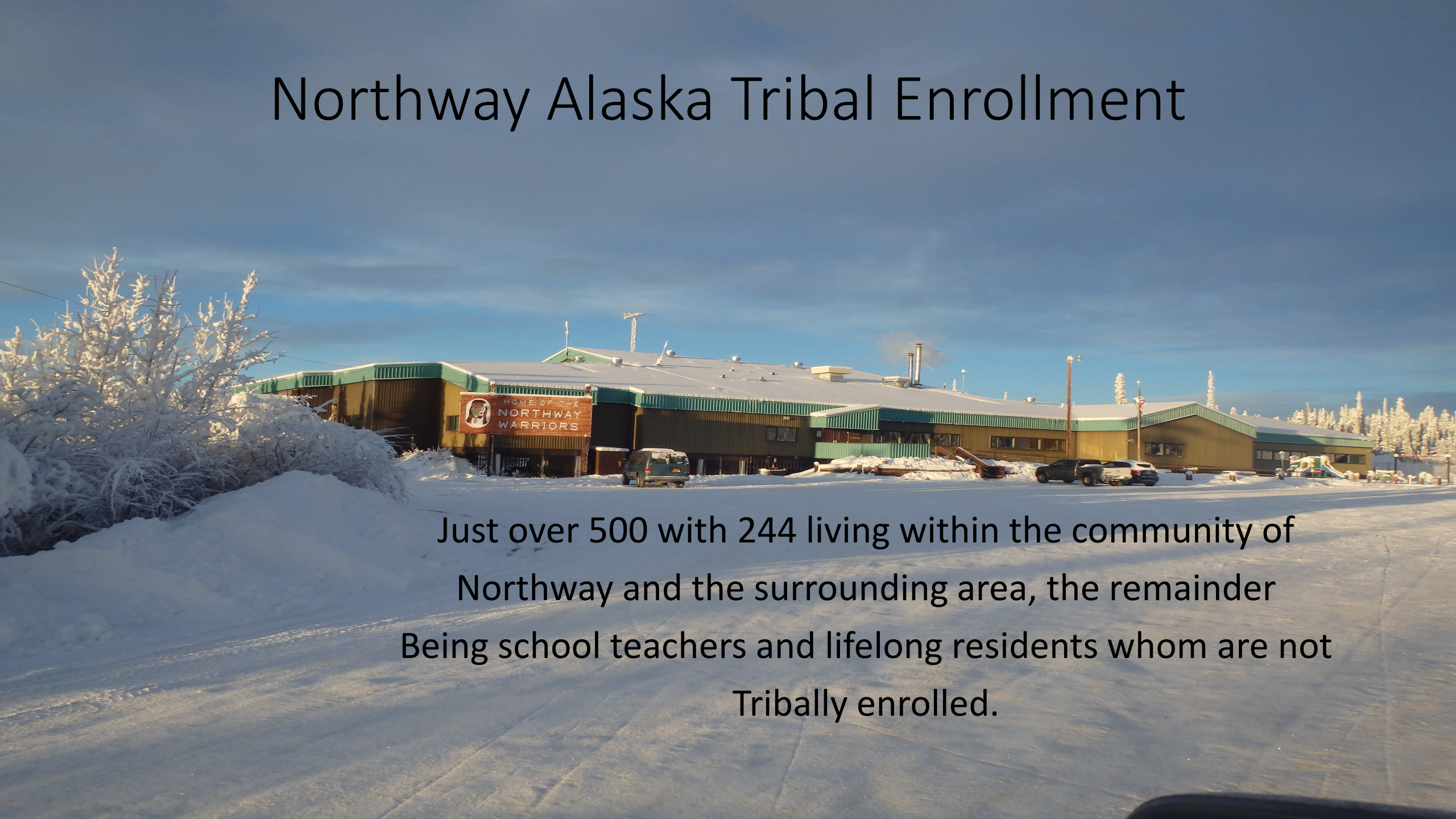


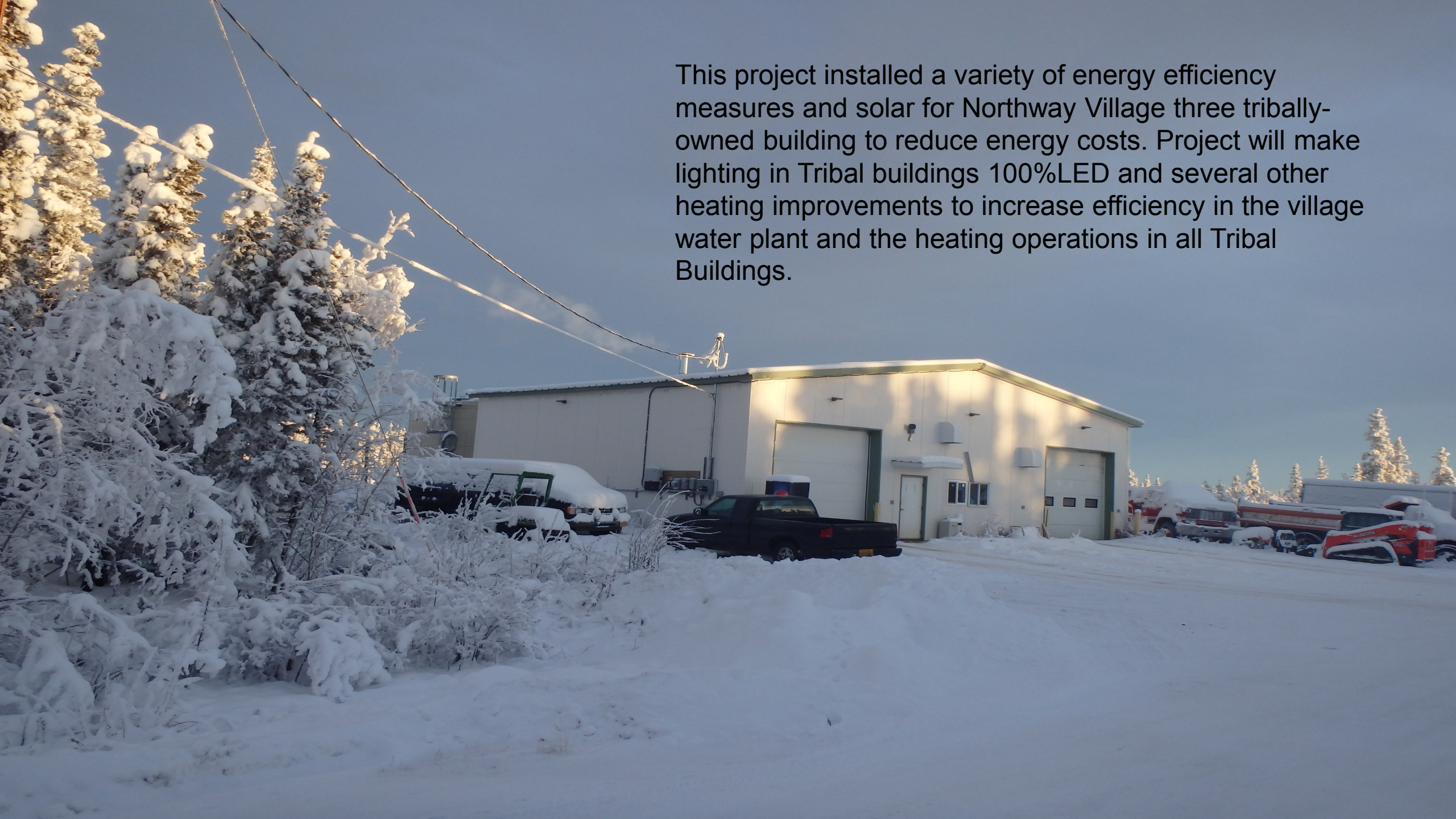
Making Northway Alaska Resilient and Sustainable Through Energy Efficiency and Solar PV power

A Clean Energy Project made possible by the folks from Tanana Chiefs Conference, The Alaska Native Tribal Health Consortium, The U.S. Department of Energy (DOE) Office of Indian Energy and the National Renewable Energy Laboratory

Northway Alaska Tribal Enrollment



Just over 500 with 244 living within the community of Northway and the surrounding area, the remainder Being school teachers and lifelong residents whom are not Tribally enrolled.



This project installed a variety of energy efficiency measures and solar for Northway Village three tribally-owned building to reduce energy costs. Project will make lighting in Tribal buildings 100%LED and several other heating improvements to increase efficiency in the village water plant and the heating operations in all Tribal Buildings.

Prior to starting work on the DOE Grant, Northway started upgrading our building

New doors and windows were installed at the Community Hall and Perma-chinking the Community Hall,. When we started our community Hall renovation, office building addition, it was documented that we wanted the building to be energy efficient.

Project Implementation

List of materials and equipment required was completed by staff which was reviewed by TCC Energy and a request for quotes was issued.

All supplies and Equipment were delivered on site in Northway and system improvements were completed Boiler Cleaning and maintenance, programmable thermostats were installed as well as a vending machine miser, low flow shower heads, electronically commutated motors with built invariable speed motors the heat tape has been replaced by a glycol heating loop all the tribal building lighting system has been replaced with LED lighting.

TCC Energy and NVC put out an RFP for a solar PV project

- This work included discussions with Northway Council staff regarding the roof angles, pitches and types of roofing needed to mount solar PV racking.
- A review of the PV watts estimates for positioning solar PV on the east and west aspects of the roof and a comparison between this positioning and a southern angled position.
- The work also included managing the process of sending the RFP out to qualified solar supply companies in Fairbanks and the review of each bid as well as the selection of the final supplier.
- Once the supplier was selected TCC also worked to coordinate with Alaska Power and Telephone regarding interconnection requirements and submitted 1 line diagrams from the selected bidder for their approval
- NVC did lots of work on gathering information on current electrical systems in the three buildings. Pictures of power systems, hookups and electrical boxes completed. Also roof system of each to match up for bid request.
- The RFP for bids was posted for three separate PV solar systems, four bids received; we have accepted one based on cost and policy.
- **worked on materials list to receive quotes for new roofing for community hall which has to be completed before solar arrays could be installed on this roof.**

The NVC Hall had roofing that was in place some 30 odd years mounting a Solar system could not be done until the roofing was replaced through a community grant from TCC NVC removed and replaced the roofing.


Weather Delays-supplies.
Our schedule of one-two weeks was extended by a combination of rain and our supplier sending the wrong size mounting screws for the solar mounting system.


June and July TCC and NVC installed Solar systems
on the Community Hall the Water Sewer Garage
and the Clinic/Laundry building


ADDITIONAL
PARTS INSIDE
SIEMENS
SIEMENS
QTY

After Final Install of all solar arrays
A contract electrician and TCC energy completed final hook up and activated two of the three systems the 3rd system had a bad rapid shut down and required replacing.
Alaska Power and Telephone came and installed new meters

Approved Budget $214,042

DOE Share: $96,332 – materials

Cost Share 55%: $124,423

- TCC- Project Management
- Northway Council – Labor, rental equip
- ANTHC – Labor and Oversight

Changes/Problems:

- The bad rapid shut down delayed the activation of the last system. When solar installation began there was missing parts and materials to securely mount on the roof were not the needed length, this caused a delay and more time that planned. The vendor had to make arrangements to bring the material to Northway; installation in general took longer than anticipated.
- Moving forward with the DOE solar PV project we have accomplished our stated goals of installing solar PV on the tribally owned community hall, water plant, and water sewer garage. The benefit of solar on our buildings is currently being logged through the SMA inverters and we are actively working to get those inverters connected to the internet so we can more easily connect to the data online. However what we have seen in our electric bills is that although the solar PV is producing electricity throughout the day that is being used by the building, there is a significant amount of energy that is being consumed and sent back onto the grid with no quantifiable benefit to the Northway Tribal Council.
    - One of our stated goals in our approved SOPO was to save money on our utility bills to invest back into the community. Looking at the available AC coupled battery storage technology that is available we believe it will be able to help us better accomplish this goal. Batteries were originally not included as part of this project because it was believed to be too expensive and too maintenance intensive. As we have continued to look at the technology the industry has been changing and both the cost and complexity of these systems have come down. Reviewing technical articles regarding these commercial available battery storage systems reveals that the reason they are not more widely used is because **30 of the states in the US have net-metering** and that allows the customer to essentially use the grid as storage. The customer sends electricity into the grid and is credited for each kWh that they send to the grid at the full retail rate. **APT, the utility in Northway does not have a requirement** to do this and does not net meter, making an AC-coupled battery storage system a perfect fit for Northway's water sewer garage and community hall.

TESLA POWERWALL

POWERWALL 2 AC

The Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, load shifting and backup power.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	208 V, 220 V, 230 V, 277 V, 100/200 V, 120/240 V
Feed-In Type	Single & Split-Phase
Grid Frequency	50 and 60 Hz
AC Energy[1]	13.2 kWh
Real Power, max continuous[2]	5 kW (charge and discharge)
Real Power, peak (10 s)[2]	7 kW (discharge only)
Apparent Power, max continuous[2]	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s)[2]	7.2 kVA (discharge only)
Imbalance for Single-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor (full-rated power)	+/– 0.85
Depth of Discharge	100%
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	89.0%
Warranty	10 years

[1] Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2] Values region-dependent.
[3] AC to battery to AC, at beginning of life.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Storage Temperature	–30°C to 60°C (–22°F to 140°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Altitude	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring)
Noise Level @ 1m	<40 dBA at 30°C (86°F)

MECHANICAL SPECIFICATIONS

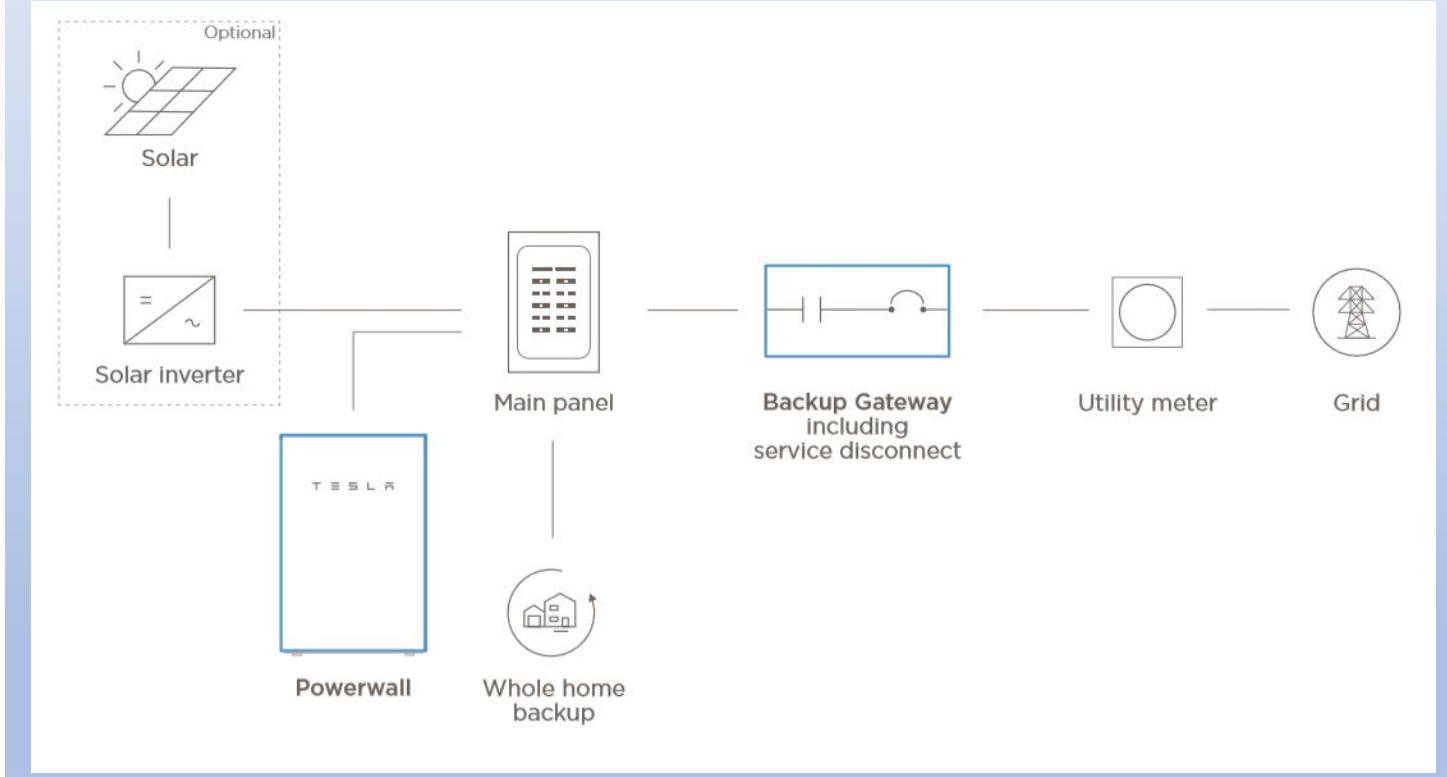
Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	122 kg (269 lbs)
Mounting options	Floor or wall mount

ENERGY GATEWAY SPECIFICATIONS

User Interface	Tesla App
Connectivity	Wi-Fi, Ethernet, 3G
AC Meter	Revenue grade
Operating Modes	Support for wide range of usage scenarios
Backup Operation	Optional automatic disconnect switch
Modularity	Supports up to 9 AC-coupled Powerwalls

COMPLIANCE INFORMATION

Safety	UL 1642, UL 1741, UL 1973, UL 9540, UN 38.3, IEC 62109-1, IEC 62619, CSA C22.2.107.1
Grid Standards	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003, EN 61000 Class B
Environmental	RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU, 2006/66/EC
Seismic	AC156, IEEE 693-2005 (high)



NVC Hall and Tribal Offices 2018.


Thank you
2015/04/09