Wind Energy Development In the Aleutian Pribilof Islands

"The Birthplace of the Wind"

Tribal Energy Program Review

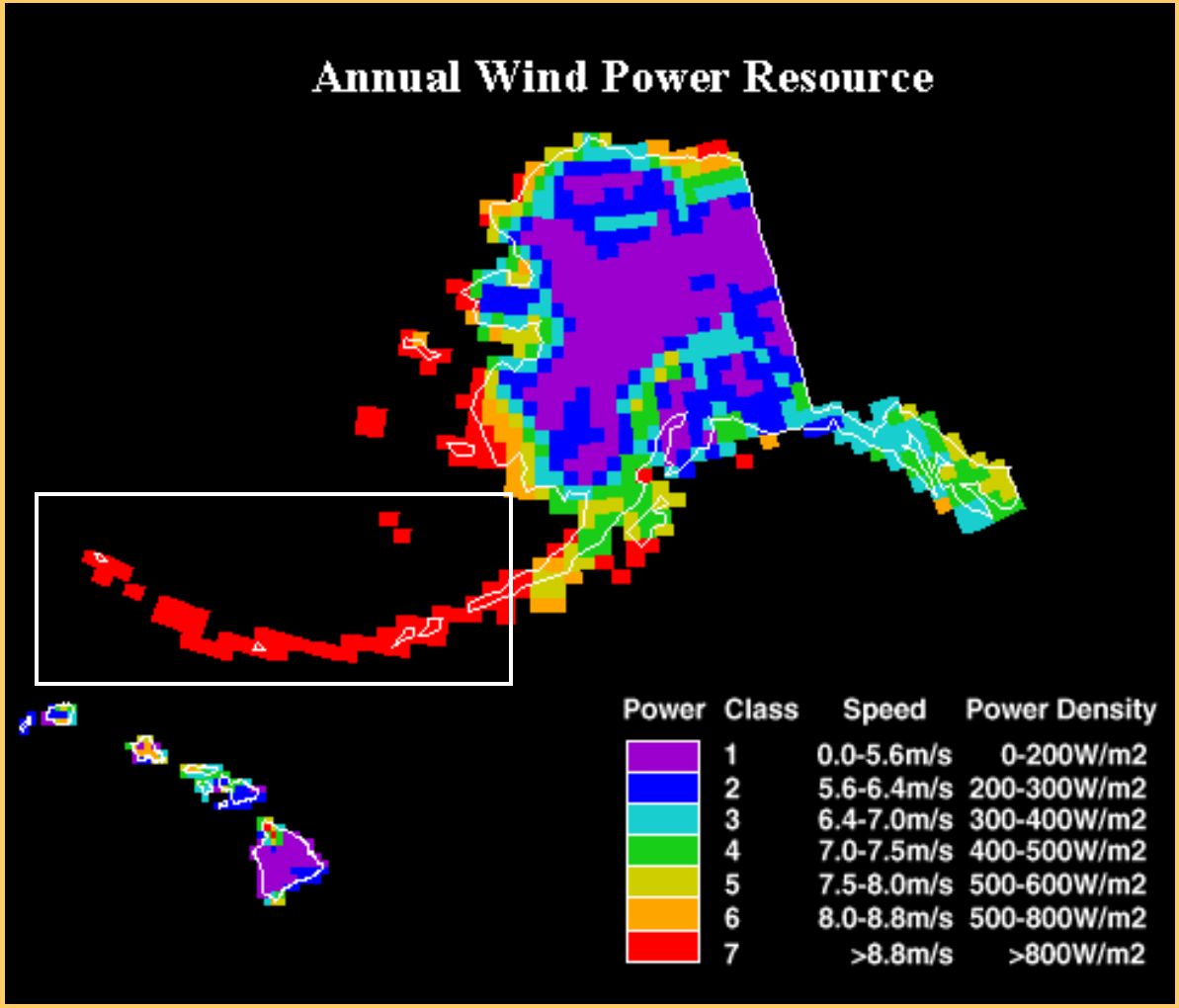
November 18, 2008

By Bruce Wright

Connie Fredenberg

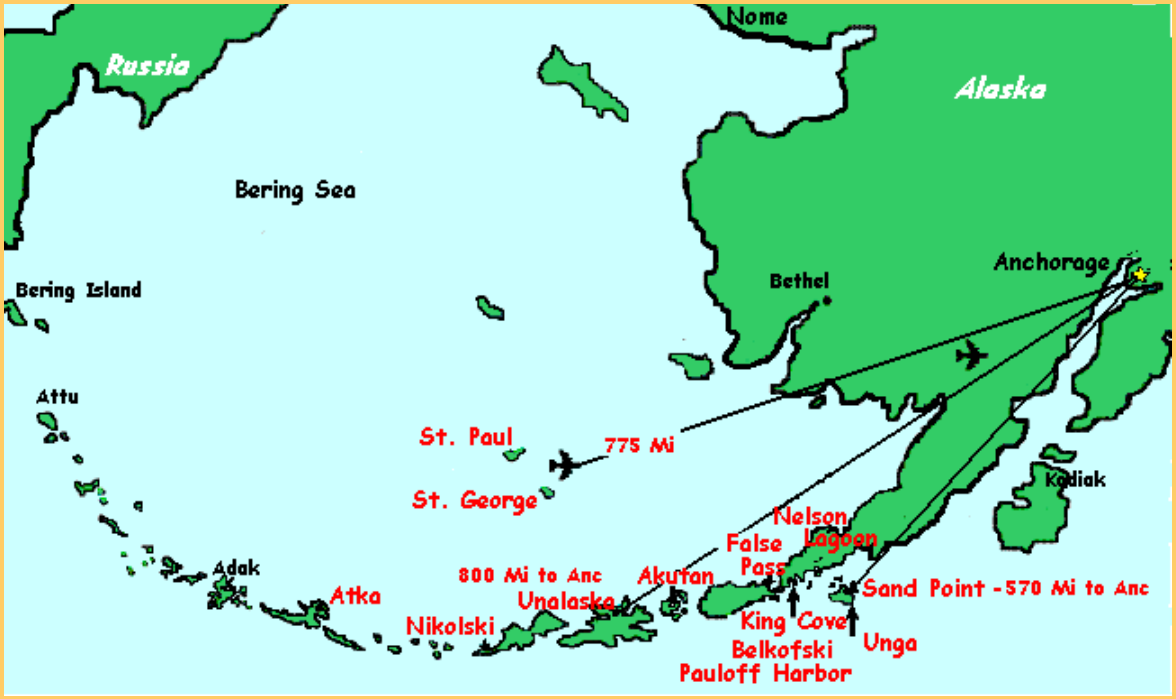
Aleutian Pribilof Islands Association

World Class Wind: A Mixed Blessing



- 150 mph gusts
- Extreme Turbulence Potential
- Corrosive Salt Spray

Aleutian Pribilof Islands Association, Inc.



LOGISTICS

- Anchorage to Nikolski is 916 air miles for $1,316 rt.
- During the fishing season a refundable ticket to Nikolski costs $2,648 rt.
- Last fuel delivery to St. George, the barge was weathered in for 2 weeks.
- Weather Rules.

Aleutian Pribilof Islands Association, Inc.

- Outmigration a big problem in rural Alaska

- All fossil fuels are imported. Deliveries are often delayed by weather and, increasingly, by fuel company policy.

- Diesel retails for up to $5.00/gallon.

- Electricity costs between $0.22/kWh to $0.58/kWh to produce. King Cove's hydro-diesel plant has the lowest cost energy in the region.

- The Aleutian and Pribilof Islands are blessed with an abundance of renewable energy resources.

Aleutian Pribilof Islands Association, Inc.

Millions of Migratory Birds live in the Region.

The World's Largest Breeding Colony of Red-legged Kittiwakes - St. George Island

APIA works with local hunters, bird watchers, students, USFWS and power plant operators to prevent and monitor avian interaction.

Aleutian Pribilof Islands Association, Inc.

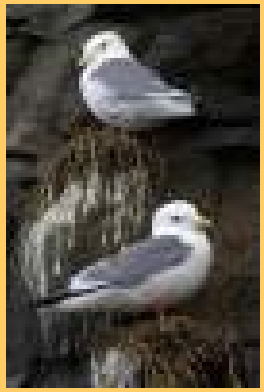
PROJECT STATUS: A vision became a dream

Phase → Community / *Utility Owner* ↓	Met Tower Installation 1 Yr. Data Collection	Wind Resource Report	Economic and Technical Feasibility Study	Financing	Construction
Sand Point *TDX Power*	Installed 5/04	Complete 20 mph	Complete: Plan to install (2) 500 kW Refurbished Vestas	AEA $1.47 M TDX $1.3 M + AREF	Summer 2007, Summer 2008, Summer 2009
St. George *City of St. George*	Installed 9/04	Complete 21.5 mph	Complete: Plan to install a 225 kW Refurbished Vestas	AREF proposal	?
King Cove *City of King Cove*	Installed 5/05	Site 1 draft nearly ready; Met tower to be moved 3/07	In Progress Hydro/wind/diesel	?	?
False Pass *City of False Pass*	Installed 5/05	Site 1 draft nearly ready; Met tower to be moved 3/07	In Progress Wind/diesel	?	?
Nikolski *Umnak Power (IRA)*	Installed 12/05	Complete Class 7, superb	Nearly Complete: Installed 65 kW Refurbished Vestas	USDA/RUS $474,475 APICDA/Green Tags $200,000	Summer 2007

ST. GEORGE ISLAND *Population 89*

"The Galapagos of the North"

Aleutian Pribilof Islands Association, Inc.



Least Auklets

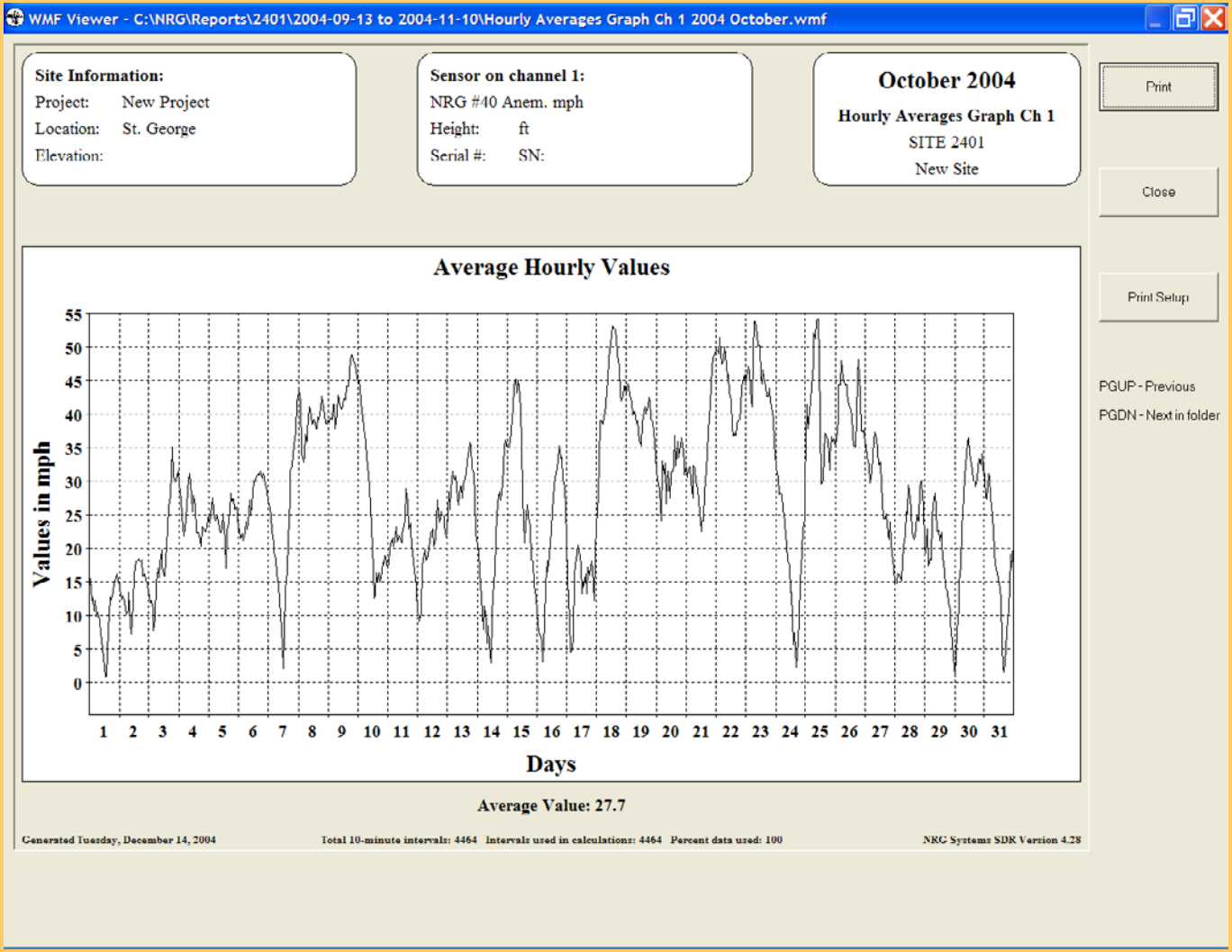
Red Legged Kittiwakes

ST. GEORGE ISLAND

Official USFWS approval becomes necessary if the project is to receive federal funding.

After two years of observations by locals, USDA employees, and various USFWS personnel and interns, avian interaction appears negligible, if not absent.

Aleutian Pribilof Islands Association, Inc.



St. George Wind Data

21.5 mph

Turbulence Intensity 0.11

7+ Superior

Capacity Factor 53%

Aleutian Pribilof Islands Association, Inc.

St. George Project

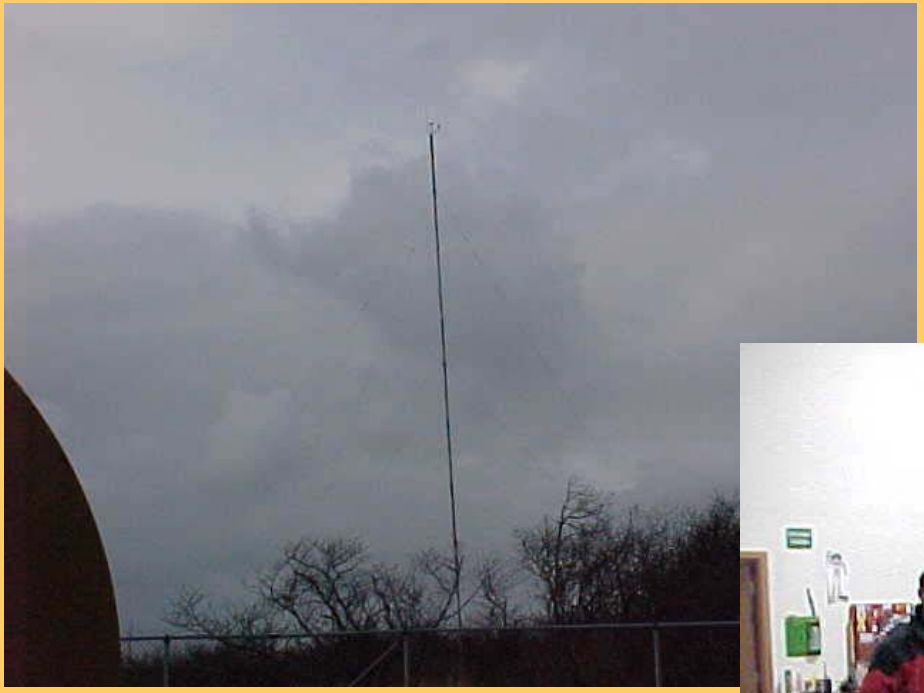
- Utility owned and operated by The City of St. George
- Average Electric Load is 225kW
- Peak Load is 280 kW
- Existing power plant has 2 Caterpillar 175 kW generators and a Detroit Series 60 350 kW generator
- Annual Average wind speed is 21.5 mph
- Ampy Pre-pay Electric Meters were installed March ’06 for improved utility sustainability and consumer energy conservation
- Energy efficient light bulbs given to every household when pre-pay meters were installed

Aleutian Pribilof Islands Association, Inc.

SAND POINT

Population 951

Aleutian Pribilof Islands Association, Inc.



Average Annual Wind Speed is 20 mph

John Lyons, Justin Godbehere and Art Torres at Sand Point Generating, Inc.

Sand Point Project

- Utility owned and operated by TDX Power, Sand Point Generating, Inc.

- Average Load is 600kW

- Peak Load is 900kW

- Caterpillar Diesel Generators: 2 350 kW (rarely used), 650 kW, 800 kW, 1200 kW

- TDX Power was awarded $1.47 million from the Alaska Energy Authority to install (2) 500kW Vestas wind turbines. Planned to install summer of 2007!

National Environmental Policy Act (NEPA)

NEPA kicks in if Federal Funding is awarded.

NEPA requires:

Agency Approvals From:

- USFWS
- SHPO
- FAA
- DOD

Community Approval

USFWS / Endangered Species Department of USFWS
Ellen Lance 907-271-1467 Ellen_Lance@fws.gov

State Historical Preservation Office Joan Dale 907-269-8711 joan_dale@dnr.state.ak.us

FAA Robert Van Haastert 907-271-5863 robert.van-haastert@faa.gov

All Your Local Airline(s)

Air Force Center for Environmental Excellence/ DOD
Clare Mendelsohn 415-977-8849 clare.mendelsohn@brooks.af.mil

Aleutian Pribilof Islands Association, Inc.

National Environmental Policy Act (NEPA)

Two Jacobs wind turbines located near the proposed turbine site, non-operational for years, have become a favorite eagle perch.

Removal of the old generation may be necessary to get approval from USFWS for installation of the new generation of wind power.

Eagle Monitoring

The Pauloff Harbor Tribe in Sand Point is under contract to APIA to document observations about eagles in the vicinity of the proposed turbine installation. The documentation is for USFWS.

BIA NEPA Training

Tribes can contribute significantly to wind energy projects in their community by performing or contracting a professional to do the Environmental Assessment.

Contact: Val Thomas
Bureau of Indian Affairs
Juneau, AK
907-586-7146

Aleutian Pribilof Islands Association, Inc.

National Environmental Policy Act (NEPA)

Local approval for the presence of wind turbines is required for federal funding.

APIA hired Global Energy Concepts to create a Sight and Sound Analysis of the Sand Point Wind Turbine Installation.

53 Public Comments were collected from Sand Point residents at a public meeting, at places of employment, over lunch at the Chinese restaurant, from the store at rush hour, and from an early evening at the local bar.

100% in favor.

Aleutian Pribilof Islands Association, Inc.

KING COVE

Population 723

Aleutian Pribilof Islands Association, Inc.

KING COVE

Nick Goodman, TDX Power CEO, watches as Harlen Newman explains the data logger to Environmental Coordinators "Doll" Kochuten and Tatiana Samuelson.

The Belkofski Tribe and APIA try to involve high school and middle school science teachers and students.

May 2005 : students flew kites to check turbulence at the met tower site.

March 2007: KidWind curriculum and model turbines will be demonstrated and donated to the school by Environmental Coordinator Delores Kochuten and APIA staff.

Aleutian Pribilof Islands Association, Inc.

Harlen found a pole from the dump when our tower kit arrived without one.

Screw in anchors were dug in, anchored with rocks, dirt, and then more rocks.

Ingenuity: a requirement in Rural Alaska.

Aleutian Pribilof Islands Association, Inc.

King Cove Project

- Utility owned and operated by the City of King Cove
- 850 kW Hybrid hydroelectric- diesel power plant
- Average Load is 500 kW
- Peak Load is 650 kW
- Glacier now feeding hydro is melting; a new stream is being studied as well as wind potential to integrate with new diesel plant being planned.
- Anemometer will be moved to be closer to the proposed new diesel plant.

Aleutian Pribilof Islands Association, Inc.

Aleutian Pribilof Islands Association, Inc.

FALSE PASS

This scenic location has proven hard to access and connection costs will be prohibitive without a proposed road.

Aleutian Pribilof Islands Association, Inc.

FALSE PASS

A bear chewed through wiring in July 2005, delaying data collection.

Mia Devine and George Jackson raise the data logger.

Raising the data logger to 25' in November 2005 prevented repeat damage. But attempts to install the predator proof fence around the tower (required by USFWS) were abandoned after persistent bear "intervention".

Aleutian Pribilof Islands Association, Inc.

False Pass Project

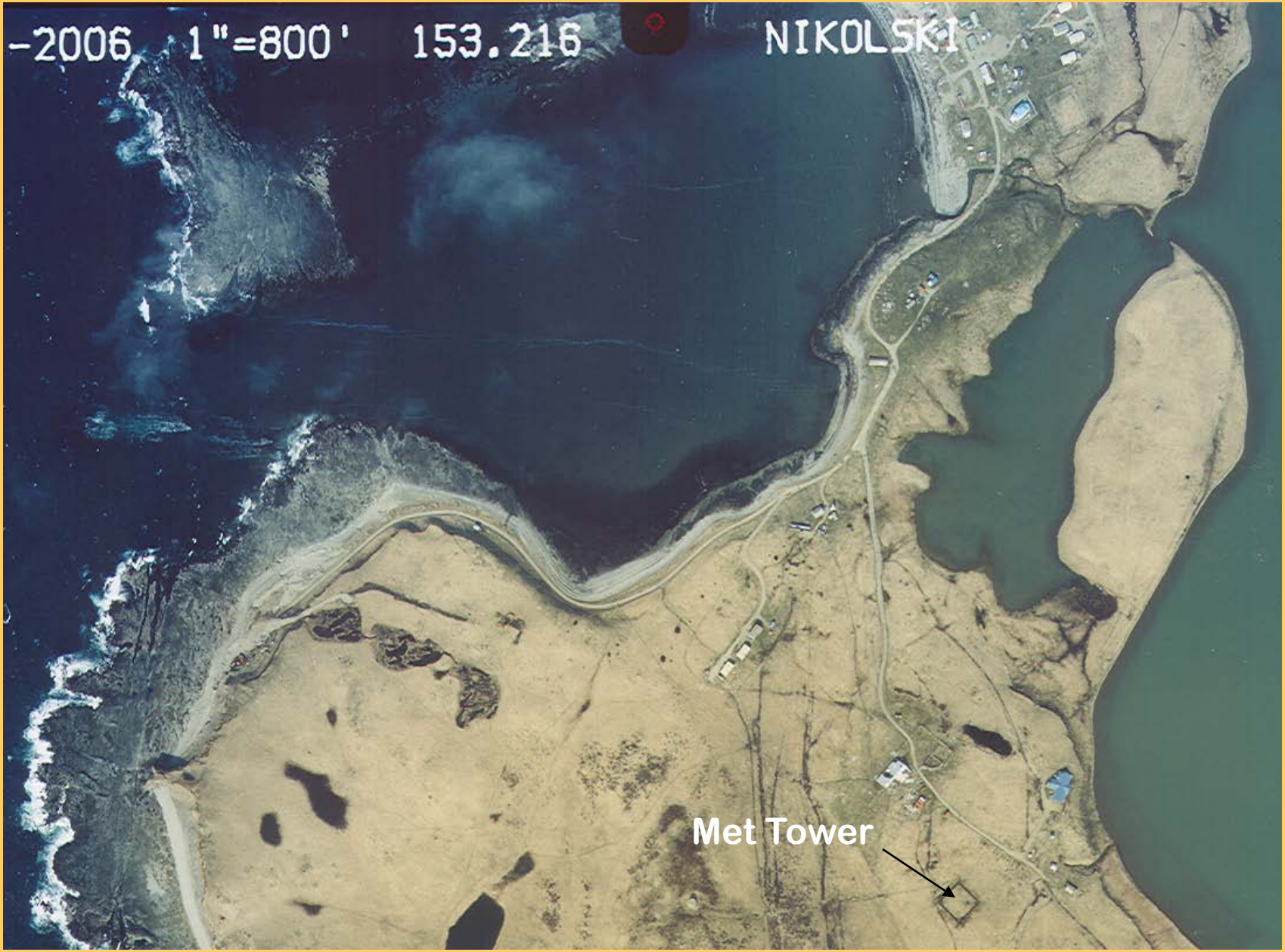
- Utility owned and operated by the City of False Pass.
- Average Load is 36 kWh.
- The anemometer tower will be moved.

Nikolski, Umnak Island

Continuously inhabited for over 10,000 years

Population 39

Aleutian Pribilof Islands Association, Inc.


-2006 1"=800' 153.216
NIKOLSKI
Met Tower

Rock basket anchors hold satellite dishes down.

Nikolski

Wild horses, cattle, reindeer and sheep wander the island and visit town.

A Nikolski Lodge visit is prized by wealthy fishermen and duck hunters. Weather determines the winners.

Mia Devine makes sure AJ Lestenkof and Rodney Harris learn how to operate the data logger.

We assembled the met tower in sideways rain with eye-piercing sleet.

In the morning the wind held its breath while we raised the tower, beginning to blow again just minutes after we finished.

Nikolski Project

- Utility owned by Nikolski IRA / Secondary Operator is TDX Power.
- Average electric load is 25 kW.
- Peak load is 50 kW.
- AEA recently commissioned a new diesel plant with 2 John Deere70 kW generators and one 37 kW generator.
- July 2006 the USDA/RUS awarded APIA $474,475 to incorporate high penetration 65 kW Refurbished Vestas wind turbine with the diesel plant.
- Increasing costs for steel and transportation has raised the price by nearly $100,000 since grant award.
- Unfunded modifications to the controls in the diesel plant required. Cost to be determined.
- Additional costs will be covered by selling Green Tags to NativeEnergy and a donation by APICDA.
- Alaska Energy Authority promised to fund the diesel plant's controls.

Aleutian Pribilof Islands Association, Inc.

Mt. Visavidov and Mt. Rechesnoi dominate the scene on a clear day.

Photo Courtesy of Tyler Schlung

- Fuel deliveries are often delayed by weather and, increasingly, by fuel company policy.
- Diesel retails for up to $5.00/gallon.
- Electricity costs $.42/kWh to produce.

Nikolski Winds

Summary Information

Nikolski has superb potential for wind power development with Class 7 wind power density, moderate wind shear, bi-directional winds and low turbulence.

Meteorological Tower Data Synopsis

Wind power class (measured to date)	Class 7 – Superb
Average wind speed (30 meters)	9.01 m/s (at 30 meters)
Maximum wind gust (2 sec average)	40.9m/s 1/24/07, 12 p.m.
Mean wind power density (50 meters)	1,118 W/m2 (predicted by calculation)
Mean wind power density (30 meters)	881 W/m2 (measured)
Roughness Class	1.77 (few trees)
Power law exponent	0.174 (moderate wind shear)
Turbulence Intensity (30 meters)	0.108
Data start date	December 11, 2005
Most recent data date	March 13, 2007

Three winches, fitted with strain gauges, are operated by a master hydraulic control unit.


The tower must come down within ¼ inch of the bolts set in concrete.

- 65 kW Refurbished Vestas
- The tilt up tower was designed and built by TDX Power and Halus at a cost of $60,000.
- The tower was shipped in pieces and assembled on site.
- The tower is a rectangular metal frame as opposed to the straight pole used for the met tower.

- The turbine was successfully installed on July 28, 2007.
- Connection to the diesel plant is pending completion of the assessment of existing controls and necessary adjustments or additions.
- Penetration level is pending evaluation of new technology – Static versus Dynamic mean VAR support.

Education and Training

Paul Melovidov and Art Torres

Fepuali Valelei, Robert Kochuten, Rodney Harris

Vestas Operations and Maintenance Training

Portland, Oregon September 5-9, 2006

Aleutian Pribilof Islands Association, Inc.

St. Paul Island

Population 489

Aleutian Pribilof Islands Association, Inc.

OUR PARTNER AND MODEL FOR TECHNICAL SUCCESS

TDX POWER

a subsidiary of

Tanadgusix Corporation

St. Paul Island, Alaska

CEO Ron Philemonof points to a still turbine. A rare site; the wind isn't blowing in St. Paul.

- A Vestas V-27 Wind Turbine (225 kW) is integrated with two 150 kW Volvo Diesel generators to create a high penetration wind-diesel system.
- Excess electricity heats water to offset diesel heat for the industrial camp owned by TDX at the airport in St. Paul.
- At a cost of $1,000,000 the plant paid for itself in 5 years.

Aleutian Pribilof Islands Association, Inc.

Two Refurbished Vestas V-27 wind turbines were added to the St. Paul installation in the summer of 2006.

At this time, the new turbines are not connected to anything.

"Technology is only half the problem—the human element is the other half."

Ron Philemonof, CEO Tanadgusix Corporation

Aleutian Pribilof Islands Association, Inc.

Made Possible with Funding and Assistance from:

USFWS

USDA/RUS

Bureau of Indian Affairs

US Department of Energy

State of Alaska Energy Authority

Tanadgusix Corporation / TDX Power

Aleutian Pribilof Islands Development Corporation

Aleutian Pribilof Islands Association, Inc.