Award Number:	DE-FG36-05GO15183
Recipient Organization:	Aleutian Pribilof Islands Association
Project Title:	Aleutian Pribilof Islands Wind Energy Feasibility Study
Project Director:	Bruce Wright, brucew@apiai.org
Team Members:	Tanadgusix Corporation (TDX), Connie Fredenberg
Distribution Limitations:	None

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EXECUTIVE SUMMARY

Under this project, the Aleutian Pribilof Islands Association (APIA) conducted wind feasibility studies for Adak, False Pass, Nikolski, Sand Point and St. George. The DOE funds were also be used to continue APIA's role as project coordinator, to expand the communication network quality between all participants and with other wind interest groups in the state and to provide continued education and training opportunities for regional participants. This DOE project began 09/01/2005.

The Aleutian Pribilof Islands Association, with the assistance of many partners, working on feasibility studies necessary for supporting wind-diesel hybrids systems in Adak, False Pass, Nikolski, Sand Point and St. George. In Adak, the data card failed to log data and the wind tower was eventually knocked down by storms. The Alaska Energy Authority provided funding to fix and re-erect the met tower in 2011and complete the Adak wind feasibility study.

TDX Power completed the economic and technical feasibility studies for Adak. These were funded by the Alaska Energy Authority. Both wind and hydro appear to be viable renewable energy options for Adak (see Appendix 10 attached)

In False Pass the wind resource is generally good but the site has high turbulence. This would require special care with turbine selection and operations. False Pass may be more suitable for a tidal project. APIA is funded to complete a False Pass tidal feasibility study in 2012.

Nikolski has superb potential for wind power development with Class 7 wind power density, moderate wind shear, bi-directional winds and low turbulence. APIA secured nearly $1M from the United States Department of Agriculture Rural Utilities Service Assistance to Rural Communities with Extremely High Energy Costs to install a 65kW wind turbine.

The measured average power density and wind speed at Sand Point measured at 20m (66ft), are 424 W/m2 and 6.7 m/s (14.9 mph) respectively. Two 500kW Vestas turbines were installed and when fully integrated in 2012 are expected to provide a cost effective and clean source of electricity, reduce overall diesel fuel consumption estimated at 130,000 gallons/year and decrease air emissions associated with the consumption of diesel fuel.

St. George Island has a Class 7 wind resource, which is superior for wind power development. The current strategy, led by Alaska Energy Authority, is to upgrade the St. George electrical distribution system and power plant.

Avian studies in Nikolski and Sand Point have allowed for proper wind turbine siting without killing birds, especially endangered species and bald eagles.

APIA continues coordinating and looking for funding opportunities for regional renewable energy projects. An important goal for APIA has been, and will continue to be,

to involve community members with renewable energy projects and energy conservation efforts.

BACKGROUND

The Aleutian Islands extend westward over 1,300 miles from the southwestern corner of the Alaska Mainland, and include the Pribilof Islands, which lie to the north. This area is distributed over approximately 100,000 square miles, a region about the size of Colorado.

The APIA was chartered as a non-profit in 1976 and is a federally recognized tribal organization of the Aleut people in Alaska. The 13 communities represented by APIA are Akutan, Atka, Belkofski, False Pass, King Cove, Nelson Lagoon, Nikolski, Pauloff Harbor, Sand Point, St. George, St. Paul, Unalaska, and Unga.

Aleutian communities are all wind rich, earning "Excellent" to "Superb" ratings on The Alaska Wind Resource Map produced by the USDOE/National Renewable Energy Lab (1987). The Alaska Energy Authority (AEA) completed a higher-resolution map of Alaska, which further documents what local people know well; the Aleutians are truly "the birthplace of the wind." The Aleutian and Pribilof Islands and Alaska Peninsula are officially amongst the windiest places in the world.

PROJECT OBJECTIVES

The objective is to complete all the required feasibility studies necessary prior to wind diesel plant developments in Adak, False Pass, Nikolski, Sand Point and St. George. APIA will complete feasibility studies, improve communication amongst regional and statewide rural communities developing wind energy projects and continue coordinating and funding opportunities for regional participants to attend alternative energy conferences and workshops. An important goal for APIA has been, and will continue to be, to educate and involve community members in their own projects.

PROJECT ACTIVITIES

TASK 1: SITE SELECTION AND RESOURCE MONITORING

The five communities to be addressed under this project, (Adak, False Pass, Nikolski, Sand Point and St. George) each obtained anemometers (some of which were funded separately with Alaska Energy Authority funds) and used carefully chosen installation sites.

The Aleutian Islands, Pribilof Islands and Alaska Peninsula are officially amongst the windiest places in the world. TDX Power, a subsidiary of Tanadgusix Corporation, was widely respected as a world leader in the wind-diesel field. APIA was fortunate to have this local village ANCSA Corporation from St. Paul as its partner. With USDOE funds, APIA and TDX Power worked on the wind energy assessments. TDX Power, under contract to APIA, conducted a feasibility study for False Pass similar to the one they produced for Port Heiden, another Alaska Peninsula community. With funds from DOE,

TDX Power was contracted by APIA to conduct wind studies for Sand Point, Nikolski, St. George and Adak.

John Wade, a meteorologist from Oregon, specializes in siting wind turbines. John looked at topographical maps of the region and spoke with local people prior to giving his recommendation regarding turbulence issues in each community. Avian issues required coordinating consultation and achieving consensus between local subsistence bird hunters, USFWS agents, utility owners, TDX Power and the Alaska Energy Authority in consideration with John Wade's recommendations (see also **TASK 2: AVIAN COLLISIONS MONITORING** below).

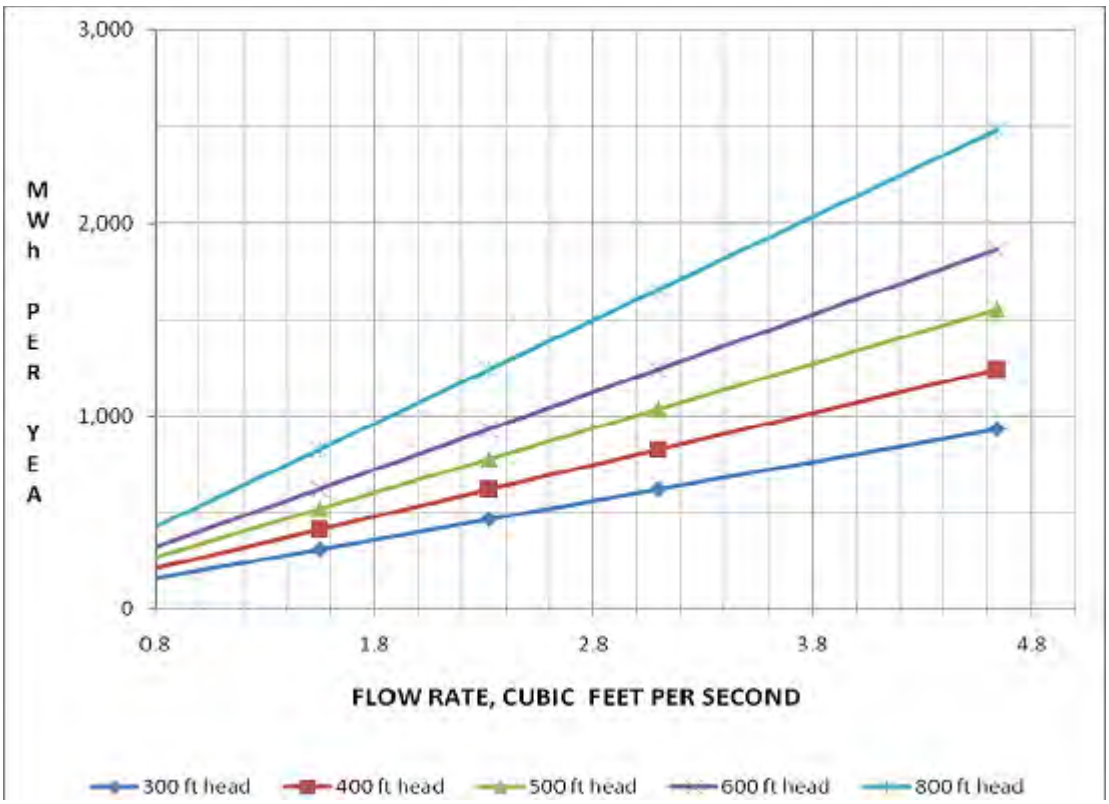
The six communities obtained anemometers and used carefully chosen installation sites. Sand Point's utility, owned and operated by TDX Power, erected an anemometer on loan from the USDOE/NREL in February of 2004. St. George, False Pass, King Cove, Nikolski and Adak all received 30-meter anemometer towers on loan from the Alaska Energy Authority (AEA). In September 2004, Tanaq Corporation (the St. George Island village ANCSA corporation) employees Andronik Kashevarof, Rodney Lekanof and John Lyons from TDX Power, Rueben Loewen from AEA, and Connie Fredenberg from APIA installed the anemometer during the St. George community visioning meeting. In December of 2004 the City of Adak's utility crew attempted to erect their anemometer, but had some technical difficulties (see below). False Pass and Nikolski installed their anemometers in 2005. APIA, through BIA training funds, provided travel costs for TDX Power to assist these local utilities with installation of their anemometer towers. Reuben Loewen, from AEA, assisted with the installation in False Pass.

In St. George, monitoring the wind resource is not considered as crucial as in other sites and was completed by May of 2005. St. George is located a mere 40 miles from St. Paul Island. The wind regime is likely to be quite similar, if not identical, to that at the site of TDX Power's 225 kW Vestas wind turbine.

The Aleutian East Borough was funded by Alaska Energy Authority to complete the Renewable Energy Resource Assessment for the Communities of Cold Bay, False Pass, and Nelson Lagoon (see Appendix 1 attached). This document is of great value for making progress with renewable energy development in these communities.

Adak

A met tower was purchased with Alaska Energy Authority funds and shipped to Adak. Due to technical difficulty with the installation including the logistical problems, the met tower was installed in 2007. The data card failed to log data and the wind tower was eventually knocked down by storm winds. In 2009 Bruce Wright, then of TDX Power, wrote a proposal which was funded by the Alaska Energy Authority to fix and re-erect the met tower (which was accomplished in 2011) and complete the Adak wind feasibility study. Data is still being collected, but a hydro feasibility study indicates hydro may be a good renewable energy option for Adak (see below graph provided by Roger Taylor, Bureau of Indians Affairs).



With a head of 700 feet, friction loss 0.2 in 12" pipe @1000 gpm we can produce about 3 MWh?

TDX Power completed the economic and technical feasibility studies for Adak. These were funded by the Alaska Energy Authority and the grant proposal was written by Bruce Wright when he worked for TDX Power. See Appendix 10 attached)

False Pass

The wind resource as the False Pass met tower site is generally good with measured wind power class 4 by measurement of wind power density (Class 3 if considering only mean annual wind speed). Given the moderately cool temperatures of the False Pass test site, air density is moderately higher than standard conditions. By other measures important for wind power analysis, the site has a low 50-year return period extreme wind probability but high turbulence; the latter apparently due to the high mountains that border Isanotski Strait and that are very near the met tower to the north, west and south. Turbulence intensity calculated from the met tower data indicates much higher than desirable turbulence conditions. This would require special care with turbine selection and operations.

It is not immediately clear if an alternate wind site that has good wind exposure and less turbulence exists in the near proximity of the village of False Pass. Siting restrictions include the obvious constraints of geography – mountains and Isanotski Strait – and the location and orientation of the False Pass airstrip. Computation fluid dynamics (CFD)

modeling may lend insight into wind flow patterns at False Pass and would be a useful tool to investigate other wind turbine siting options (see Appendix 2 attached).

Data dates	May 7, 2005 to August 19, 2005 and November 30, 2005 to September 4, 2007 (24 months); status: operational
Wind power class	Class 3 to 4 (fair to good)
Wind power density mean, 30 m	338 W/m2
Wind speed mean, 30 m	6.11 m/s
Max. 10-min wind speed average	26.5 m/s
Maximum 2-sec. wind gust	39.0 m/s (January, 2007)
Weibull distribution parameters	k = 1.62, c = 6.76 m/s
Wind shear power law exponent	0.291 (high)
Roughness class	3.80 (suburban)
IEC 61400-1, 3rd ed. classification	Class III-S
Turbulence intensity, mean	0.173 (at 15 m/s)
Calm wind frequency (at 30 m)	35% (winds < 4 m/s)

Nikolski

Nikolski has superb potential for wind power development with Class 7 wind power density, moderate wind shear, bi-directional winds and low turbulence. (See Appendix 3 attached)

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)	40.9 m/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

Sand Point

As part of the NREL Native American Anemometer Loan Program an anemometer was installed near Sand Point, Alaska to assess the area's wind energy potential. The monitoring period ran from 14 February 2004 to 6 July 2005. The measured average power density and wind speed, measured at 20m (66ft), are 424 W/m2 and 6.7 m/s (14.9 mph) respectively. This is consistent with the resource indicated by publically available wind maps. For example, the 3Tier wind map (Figure 4 in Appendix 4) estimates the average wind speed at the site (@ 20m AGL) at between 5.9 and 10.6 m/s. (13.1 mph – 23.6 mph) (see Appendix 4 attached).

St. George
Wind resource data was collected from mid September 2004 through October 2005 on St. George Island, Alaska. The data was compared to long-term trends in the area. Based on correlations with the St. George ASOS weather data, estimates were made to create a long-term dataset for the St. George met tower site. This information was used to make predictions as to the potential energy production from various wind turbines at the site. It is estimated that the long-term annual average wind speed at the site is 9.3 m/s at a height of 30 meters above ground level. Taking the local air density into account, the average wind power density for the site is 921 W/m2. This information means that St. George Island has a Class 7 wind resource, which is superior for wind power development. (see Appendix 5 attached). The current strategy is to upgrade the St. George electrical distribution system and power plant (see Appendix 6).

TASK 2: AVIAN COLLISIONS MONITORING

The APIA Region is a major stop in the flight path of millions of migratory birds, home to the largest seabird breeding colonies in the world, is home to many bald eagles (Wright, B.A. and P. Schempf. 2005. The book on bald eagles. pages 8-14. in: Wright, B.A. and P. Schempf (Eds.). 2005. *Bald Eagles in Alaska.* Bald Eagle Research Institute. http://www.hancockhouse.com/products/akbal.htm) and is the wintering grounds of endangered Eiders. The US Fish and Wildlife Service (USFWS) is decidedly concerned about avian interactions with wind energy development in Alaska. As subsistence hunters, avoiding avian interactions with wind energy development is important to local people as well. APIA was awarded a grant from the USFWS to fulfill the required monitoring for avian interaction (outside this grant). After extensive consultation with USFWS Endangered Species Department, a plan acceptable to the USFWS was created and was followed. Avian monitoring by high school students occurred in Nikolski while professional staff was employed to do the avian study at Sand Point.

Adak
Adak has been a military establishment since WWII. There are many towers and other obstacles that are prime targets for avian collisions. The USFWS is not very concerned at this time about avian strikes with wind energy equipment in Adak. However, care was taken to site the anemometer properly with regard to flyways.

False Pass and Nikolski
In False Pass and Nikolski, wintering endangered Eiders are of major concern. The plan was to collect data on bird strikes at the met tower and to construct a fence around the met tower to keep any killed birds from being removed by foxes, dogs, wolves and bears. The 100 square foot, 6-foot high chain link fence surrounded the anemometer towers, and the posts were buried 2 feet underground to prevent predators from digging underneath. APIA contracted with a local entity for constructing the fences within one month of installing the anemometer. No dead birds were found within the Nikolski met tower

fence. The False Pass fence didn't survive the brown bears tearing it down and damaging met tower equipment and wiring. No dead birds were seen at the False Pass site.

High school avian study included training following an observation protocol and a protocol developed in case an injured or dead endangered eider was found (see below).

Protocol for Handling
Sick, Injured, and Dead Spectacled and Steller's Eiders
revised 5/25/05

Reporting
All distressed, disabled, and dead spectacled and Steller's eiders found should be reported as soon as possible. Attempt to contact the following people in the order listed until you succeed in reaching someone (numbers are listed below in the *Contacts* section): Greg Balogh, Charla Sterne, Kim Trust, Ted Swem, Dan Mulcahy, Dave Dorsey, Cindy Palmatier, Robert Suydam, Dr. Derrick Leedy, Fred Broerman.

Illegally Killed Birds
If you find eiders that appear to have been killed illegally, contact a Service Law Enforcement office immediately (see *Contacts* section). When possible, notification should occur before the dead birds are removed from the site.

Notification should include:
1. Species, number of birds, date, time and location found;
2. Suspected cause of death;
3. Circumstances under which found;
4. If known, the names of witnesses or suspects, and a description of any vehicles or boats involved (non-law enforcement individuals are not expected to conduct investigations to obtain information that is not readily available).

If a camera is available, photograph birds and other evidence such as shotgun shells or casings, and persons and vehicles involved. Note photo date, time, and location.

Note: If you observe an eider being killed illegally and recover the dead bird, please refer to "Note" section under shipping instructions.

Handling Injured or Sick Birds
For apparently minor injuries (e.g. small lacerations, web tears, minor stunning), you should release the bird on site if: (1) you are so advised; or (2) you are out of radio/phone contact and the bird meets ALL OF THE FOLLOWING CRITERIA.

<u>Criteria for determining whether bird should be released:</u>
1. Bird can stand and walk using both feet.
2. Bird can flap both wings and there is no apparent wing droop.
3. Bird is alert, active, holds its head up and reacts to stimuli.

4. Bird is not bleeding freely.
5. Wing and tail feathers have not been lost and are in good condition.
6. Bird is waterproof (water beads up on feathers).
Retain birds that do not meet ALL of the above criteria, provide preliminary and secondary field care and report the bird (see *Reporting* section)

Preliminary Field Care:
1. Transport the bird to camp in a manner that is least likely to further injure or stress it.
2. Minimize bird handling (wear rubber gloves to prevent loss of feather waterproofing).
3. Keep birds in a quiet place.

Secondary Field Care:
1. Attempt to contact one of the following people in the order listed: Greg Balogh, Charla Sterne, Kim Trust, Ted Swem, Angela Matz, Dan Mulcahey, Dave Dorsey, Cindy Palmatier, Robert Suydam Dr. Derrick Leedy, Fred Broerman. They will help determine whether the bird should be shipped to Anchorage, will arrange for shipping and subsequent care of the bird, and will arrange for pick-up in Anchorage.
2. Note recovery location, time, persons involved, and reason bird was recovered.
3. Keep bird in a cage or box with adequate ventilation and access to cool or cold fresh water. Overheating is a common problem with captive eiders. If bird is dry, be careful not to place bird in overly warm environment. Wet birds should be placed in a warm (not hot) place to dry off. If possible, place absorbent materials or a frame covered with fine mesh Dacron netting in the bottom of the container to minimize contact between bird and feces.
4. Food may be offered if bird is alert. Try moistened cat or dog food, boiled egg, or seafood.
5. Record when bird eats and drinks.
6. Minimize handling of the bird. Wear rubber gloves to prevent loss of feather waterproofing.

Sacrificing Birds
If the bird is seriously injured, sick or suffering (and appears to be dying) and you cannot reach the listed contacts, you may euthanize it. An endangered species permit and this protocol authorize this activity. If appropriate, and if you know how, you may take samples before and after sacrificing the bird (contact AFWFO regarding which samples are needed). Otherwise, continue treating the bird as directed above or as advised by a D.V.M. until shipment to Anchorage can be arranged (see *Shipping Birds* section). Birds suffering from toxicity (e.g., lead poisoning), gunshot wounds, head injuries, or broken bones should be shipped live to Anchorage as soon as possible (unless circumstances warrant euthanasia). Field biologists who anticipate that they may need to sacrifice birds should receive training prior to their field season. Contact AFWFO or Dr. Dan Mulcahy to arrange for training. In locations near veterinary facilities, birds that warrant

euthanasia may be transported to a veterinary office where the procedure can be administered professionally. [1]

Field Procedures for Sacrificing Birds

If you are trained and equipped, obtain blood samples before euthanizing the bird. Administer euthanasia away from the general public. The preferred field methods for euthanizing birds are cervical dislocation (breaking the neck) and decapitation.

Cervical Dislocation

Place the head, bottom of the bill down, on a flat, solid surface. Place a solid rod (stick, dowel, etc.) on the neck directly behind the head. Holding the rod firmly on the neck, seize the body in the other hand, and give a quick, definite, and strong yank backwards, without letting the head move. You should feel the neck stretch and break. A slow or tentative pull will not work. It may help to pull the bird's body up as well as backward. The bird may shudder or tremble for a minute. Repeat the procedure if necessary.

Decapitation

Use a large, heavy blade or ax. Cut through the neck in one stroke. This procedure is quick and minimizes suffering. However, it is messy and carries risk of injury to yourself.

Shipping Live Birds

Reporting

Attempt to contact one of the following people in the order listed: Greg Balogh, Charla Sterne, Kim Trust, Ted Swem, Angela Matz, Dan Mulcahey, Dave Dorsey, Cindy Palmatier. They will help determine whether the bird should be shipped to Anchorage, will arrange for shipping and subsequent care of the bird, and will arrange for pick-up in Anchorage.

Preparation

Stabilize and rehydrate birds (offer cool or cold water in a stable bowl) before shipping.

Shipping

Ship birds in a cat or small dog carrier. Place absorbent cardboard or shredded paper in the bottom (if you can fit a wooden frame to the bottom of the carrier and affix fine-mesh Dacron netting to it; that is even better). Do not ship with food or water. Block the front grate of the carrier with tape or cardboard to minimize stress to the bird (but ensure adequate ventilation). Tape the bird's records to the container. If you want the container back, include name and address for return. Clearly label the container with: LIVE BIRDS, U.S. Fish and Wildlife Service, Anchorage, AK. (907) 271-2778.

[1] Note that, in all likelihood, a village veterinarian will not be covered under an endangered species permit. His or her assistance would, technically, be in violation of the ESA. Presumably, in situations where the vet was acting as a good Samaritan for a permittee, we would exercise discretionary enforcement.

Expenses
Some airlines will carry the birds for free, often in the crew's compartment. They do this as a favor and should be approached with courtesy. If the bird is being sent to the Bird TLC, it may be helpful to use their name in the conversation. Also mention the threatened species status where appropriate. If payment is necessary, AFWFO or FFWFO will cover shipping expenses.

Shipping Dead Birds
Note: Law Enforcement Concern - If the bird died as a result of an illegal act, such as shooting, and the illegal act was directly observed by the individual collecting the dead bird, a law enforcement office should be contacted for shipping instructions. Desired samples can be taken prior to shipping the bird to a law enforcement office. However, in order to properly pursue any related investigation, it will be necessary for law enforcement to take custody of the dead bird/s as soon as possible.

Storage
Obtain desired samples as soon as possible (e.g., blood or tissues for approved recovery task). Keep the carcass refrigerated if the bird will be sent within 48 hours for necropsy or additional samples. Only freeze birds after samples are taken or if shipping delays are inevitable. When in doubt, refrigerate until you talk to appropriate person(s). In remote field camps, place carcass in a pit dug down to permafrost.

Packaging
Wrap chilled carcass in absorbent material, if possible, and place in large ziplock or other waterproof plastic bag. Include a tag with complete information about the bird, its death and collection, and your name, address and phone number. Ship in an insulated container. Pack with frozen gel packs if available. Do not ship with wet ice. If it is obvious to you that the carcass will spoil during shipping, contact AFWFO or FFWFO prior to shipping for further instructions.

Shipping
Notify receiving person(s) of flight arrival time so the package will not sit at the airport. Avoid shipping to government offices on Thursdays or Fridays (There is no mail delivery there on Saturdays and Sundays).

Expenses
If needed, AFWFO/FFWFO will arrange for shipping and expenses.

Taking Samples
Sample needs change with time. Contact AFWFO/FFWFO for current sample needs and procedures.

Contacts

Greg Balogh AFWFO, Anchorage	(800) 272-4174 toll free (907) 271-2778 work

Contacts

	(907) 345-9899 home
Charla Sterne, AFWFO, Anchorage	(907) 271-2781 work
Ted Swem FFWFO, Fairbanks	(907) 456-0441 work
Kim Trust, AFWFO, Anchorage	(907) 271-2783 work (907) 276-0005 home
Angela Matz, FFWFO, Fairbanks	(907) 456-0442 work
Dan Mulcahy, D.V.M., National Biological Service	(907) 786-3451 work (907) 694-2514 home
Dave Dorsey, Bird TLC volunteer	(907) 351-4968 cell
Cindy Palmatier, Bird TLC director	(907) 522-4573 home
Bird TLC/Arctic Animal Hospital	(907) 562-4852 clinic
Pet Emergency Treatment, Inc.	(907) 274-5636
Robert Suydam, N.S. Borough, Barrow	(907) 852-0350
Dr. Derrick Leedy, DVM, Nome	(907) 443-2800
Fred Broerman, Yukon Delta NWR, Bethel	(907) 543-3151
Law Enforcement, FWS, Fairbanks	(907) 456-0255 (877)-535-1795 toll-free (907)-456-0459
Law Enforcement, FWS, Nome	(907) 443-2479 (907) 443-2938 fax
Law Enforcement, FWS, Regional Office	(907) 786-3311 (907) 786-3313 fax
Law Enforcement, FWS, Anchorage	(907) 271-2828 (800) 858-7621 toll-free (907) 271-2827 fax

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Sand Point
The USFWS required a two year avian study for Sand Point, but they were mostly concerned with Bald Eagle strikes. The following study design sufficed for collecting the data (see Appendix 11).

Sand Point Wind Farm Bald Eagle/Bird and Scavenger Monitoring Protocol

Birds have been observed to collide with the blades of wind generators and associated infrastructure (e.g., meteorological stations). This project is designed to assess potential and real bird strikes at the guyed meteorological tower and subsequent 500-KW wind-generator towers at Sand Point, Alaska. The field technicians, Anne Morris (907-383-6075, 907-383-2487, phttec@arctic.net) and Peter Devine (phone # and email), will follow established procedures for collecting data to help evaluate the hazard of the towers to birds. The two technicians were selected because of their experience in the local area with observing and identifying birds and other species of interest (e.g. dogs).

To insure observation consistency the field technicians will be trained. The instructor will go Sand Point to train both field technicians and gather data on a couple of occasions to reduce variability and increase confidence in search techniques.

Ms. Morris will:
(1) Make observations at least three times every week throughout the year to include spring and fall migration periods, and morning, afternoon, evening and night observations.
(2) Make observations from a location about 100 m from the guyed met tower and from the wind farm once it is built.
(3) Approach the site in a vehicle to about 100 m from the guyed met tower; spend 30 minutes in auto and record any predators or scavengers, especially dogs, ravens, or bald eagles. We are interested in collecting data on animals that may be scavenging tower-killed birds.
(4) Record all birds sighted during the observation period(s), their numbers, and approximate flight altitudes.
(5) After the ½-hour observation period is finished, exit the auto and walk the area under the tower(s) up to 50 m (150 ft) out from tower(s) or as permitted by thick vegetation; record any dead birds that you find, including partially scavenged ones. Photograph all dead birds. Note any tracks in the snow or dirt, including rabbit (introduced snowshoe hare) and dog tracks and any other signs of predators (e.g., scat).
(6) Record all observations of dead or downed birds. Include date, time of observations, observer's name, weather conditions, visibility, and observations (to include species of birds moving in the area and their proximity and altitude in relation to the met tower and proposed wind turbine; flight behaviors near the tower [e.g., fly through wires, avoid wires, etc.]); if dead birds are found, note their location on an area map, photograph the dead bird to help determine how it died, and revisit location on daily searches to determine when/if it is scavenged.

Mr. Devine will:
(1) Make observations three times/day when fueling his fuel-delivery truck. Some overlap in sampling time is expected and will be used to compare results of the two observers.
(2) Make observations every week day (Monday–Friday).
(3) Make observations from a location about 100 m from the guyed met tower.
(4) Record all birds sighted during the observation period(s), their numbers, and approximate flight altitudes; also record all scavengers that may be present, as described above.
(5) Record all observations of dead or downed birds. Include date, time of day, observer's name, weather conditions, visibility and observations.

Date:
Time of day:
Observer's name:
Weather conditions (windy, cloudy, rainy, sunny, snowy, etc):
Visibility (excellent, good, poor or bad):
Observations (Any predators or scavengers sighted? Any bald eagles sighted? List any birds sighted including magpies and crows. Note scavengers such as dogs.):

St. George
As home to the world's largest breeding colonies of Red-legged Kittiwakes and Whiskered Auklets, siting the anemometer in St. George was serious business. Several sessions of site visits were required before consensus was achieved between USFWS, local bird hunters, landowners, and project developers. USFWS determined that Adak and St. George did not need fencing around their met towers. They were instead required to have cameras and motion detecting sensors installed on the gin poles. Strict monitoring was required to make sure every bird strike was counted. Local bird hunters, APIA, and USFWS worked with schools to have students perform an Avian Collisions Monitoring Study. The study required students to: create a grid map of the anemometer area; monitor the site daily; document the weather conditions; and, with assistance from hunters and field guidebooks, identify and record any dead birds found. The USFWS in Alaska is mainly concerned with the guyed anemometer towers. With funds from USFWS APIA purchased reflective bird deterrent devices. Sixteen of these devices were strategically placed on the 12 guy wires to increase visibility. The towers themselves were also decorated with multiple colors of reflective tape. The question of the effectiveness of reflective bird deterrents needs to be studied; we don't even know if these things act as attractants or deterrents so APIA and Alaska Energy Authority are proposing to DOE to study the effectiveness of bird deterrents.

TASK 3: TRAINING AND PROFESSIONAL DEVELOPMENT

APIA began coordinating training and professional development for wind energy projects in August of 2004. DOE/NREL provided travel money to APIA for 3 participants from the region to attend the Wind Energy Application and Training Symposium (WEATS) in Boulder, Colorado. APIA requested the St. George Tribal Council and The Aleut

Corporation to choose a representative to accompany Connie Fredenberg to WEATS. Phillip Lekanof, St. George Traditional Council, and Tara Bourdukofsky, The Aleut Corporation, traveled to Boulder. APIA covered the per diem for Phillip and Connie and TAC covered per diem for Tara.

In September of 2004, funding was rapidly and roughly cobbled together by APIA personnel to provide for 4 regional participants to attend the Wind-Diesel Conference in Anchorage and Girdwood, Alaska. In addition to Connie Fredenberg, APIA contributed money to bring in: Paul Melovidov, the TDX Power wind-diesel plant operator from St. Paul; Phillip Lekanof, St. George Tribal Council representative; George Jackson, the Municipal Utility Operator from False Pass, and Rex Willhite, the Tribal Utility Manager from Nikolski. Additional funding came from the Aleutian Pribilof Island Community Development Association (APICDA) and TDX Power.

BIA training funds for wind energy development became available in December of 2004. APIA was able to provide training and professional development opportunities for two participants from each of the 6 communities during 2005. AEA, the Renewable Energy Alaska Project (REAP), Earth Energy, SECAP and APIA have had worked together on the Alaskan Alternative Energy Event in late 2005.

With additional DOE funds, training and professional development opportunities for regional participants continued through 2006. By that time, plant and hardware specific training was required, APIA worked with turbine vendors, TDX Power, AEA, SECAP and Alaska Village Electric Cooperative (AVEC) to provide a class in Alaska for wind-diesel plant operators from around the state. APIA has a very successful training program and circuit rider O&M assistance program in place for water/waste water operators and will offer that as a model. Training and professional development continues including attending professional conferences (see Task 4 below).

TASK 4: COMMUNICATION NETWORK

St. George Island Community Visioning Meeting

In St. George, the anemometer tower was installed during the first and second days of a Community Visioning Meeting. The 3-day event was organized by the St. George Traditional Council as a response to a community in crisis. APIA contributed to funding the event and representatives from 5 different departments attended.

St. George high school students participated in the Visioning Meeting and were included in the breakout sessions. Wind energy dominated the thoughts of the Energy Group as we kept coming back to the successful project on St. Paul Island – just 40 miles away. As the groups reunited for discussion, the Economic Development Group presented first. All their suggestions for possible development hinged on economical energy. The Environmental Group’s concerns included costs of and contamination from use of fossil fuels. Pribilovians take their role as stewards of the seabird colonies, fur seal and sea lion rookeries very serious. Subsistence hunting remains an integral part of life in the Pribilof

Islands. The negative effects of fossil fuel spills, emissions, and (possibly related) global climate change on their community are increasingly.

There was no question in anyone's mind that finding a clean, reliable and sustainable way to produce energy is the bottom line to a future on the Island. The City of St. George, the utility owner, had to borrow money in 2005 to repay the 2004 bulk fuel loan from AEA so they could purchase fuel again for 2005. A vicious circle is becoming a downward spiral. The weight of the crisis rests with energy. The entire community of St. George supported and continues to support wind energy development.

Sand Point Community Wind Energy Development Meeting
A meeting took place January 17, 2005 at the Sand Point City Chambers. Connie Fredenberg, APIA, contacted the Qagan Tayagungin Tribe (QTT), Unga Tribe and Pauloff Harbor Tribes. QTT, as the primary tribe, was asked for assistance to coordinate a contact with the school. Peter Devine chose John Cochran, advisor to the Junior Class at Sand Point School, as lead contact. Principal Dennis Simmons approved school participation in the project and the choice of contact. Gary Jacobsen, Superintendent for Aleutian's East School District, approved the proposed school involvement with project in Sand Point and also, in advance, for False Pass.

Beginning with the 3 tribes, information and agendas spread to: all 3 village ANCSA corporations (Shumagin, Sanak, and Unga); Stanley Mack, Mayor of the Aleutians East Borough; the City of Sand Point; representatives of the Alaska Migratory Bird Co-Management Council; and the local radio station. The junior class hung Community Wind Project Development Meeting flyers around town. John Lyons, Nick Goodman, TDX Power CEO, and Connie Fredenberg attended the meeting. Everyone supported renewable energy development in Sand Point.

Other meetings were held in all 5 communities. In addition, APIA staff attended:
Nikolski Wind-Diesel Project Presentation at Wind Energy Application Training in Anchorage.
Arctic Energy Summit presentation and panel discussion on Aleutian region renewable development.
Renewable Energy Alaska Project meeting attendance
Wind Energy Application Training and Symposium presentation
DOE Tribal Energy conference in Denver, November 2008, 2009, 2010, 2011
AFN's Energy Committee, the Southwest Alaska Municipal Conference (SWAMC) Energy Task Force and the Renewable Energy Alaska Program (REAP)
Renewable Energy Conference (Girdwood, September 2008)
Present on the Aleutian region renewable energy development at the Alaska Forum on the Environment
Assisted the Alaska Energy Authority in their development of the Alaska State Energy Plan, and many, many more.

An effort to take charge of the energy problems that plague Aleutian communities gained steam at the 2010 Aleutian Pribilof Islands Energy Summit in Anchorage in late April

2010. More than 84 representatives of towns, boroughs, tribal groups and other Aleutian entities met in Anchorage to develop a plan to reduce local dependency on fossil fuels through alternatives that are sustainable, accessible, reliable and affordable. The goal is to ultimately reduce fossil fuel use in Aleutian communities by 85 percent and to develop a regional plan. The follow-on meeting of the A-Team energy group was held October 13, 2010 and significant progress on energy conservation and renewable energy was obvious. The Alaska Energy Authority requested APIA to submit an energy planning proposal to them.

Outreach is also provided by giving energy presentations at a rate of approximately 2 per month, mostly in Alaska, writing energy articles for the popular press and maintaining energy related material at the two web sites: http://www.aleutianenergy.org and APIA is developing an energy web page.

DOI Renewable Energy Program
In 2011, APIA participated with Alaska Federation of Natives meeting with Secretary Salazar at which the Secretary requested his staff to work on an Alaska Tribal energy initiative. APIA has continued to work with DOI staff on the government's Alaska renewable energy program.

Anemometer Study
Bruce Wright of APIA and Rich Stromberg of Alaska Energy Authority completed an evaluation of the Power Predictor 1.0™, a low-cost anemometer, vane and pyranometer used to determine energy potential at a given site. You can see the study results at http://www.akenergyauthority.org/PDF%20files/PowerPredictorEvaluation.pdf.

Peer Reviewed Publication
Much of the energy used in Alaska is for heating homes and facilities. In the typical Alaska village micro-grid connect wind energy system, the electric utility must continue to supply energy regardless of wind speed and wind energy contribution. Here, the wind generator(s) run in constant parallel with the utility, which serves to reduce the electric load at the facility. This configuration produces no cogenerated by-product such as hot water, as there is no excess energy. By integrating wind turbine generating capacity to achieve energy conservation as an aggregate of all energy, as well as the simultaneous production of a beneficial thermal, our conceptual design produces far greater total energy avoidance in terms of fuel savings and superior long term total system operating efficiencies. Accordingly, this design is focused on the low to mid penetration model with thermal electric integrating thermal storage nodes as its first priority use for wind generated energy. Secondarily, excess wind generated energy will be used to off-set electric energy consumption. (see: Wright, B. A., B. Hirsch and J. Lyons. 2012. A Better Use of Wind Energy in Alaska and Applicability for Russian Villages**.** In; Biological Diversity and Ecological Problems in Priamurie and Adjacent Territories. Regional Scientific Work with International Participants, Far Eastern Federal University for the Humanities. Issue 3). (Appendix 8 attached)

TASK 5: ENERGY CONSERVATION / ENERGY EFFICIENCY

When considering the exponentially rising economic, environmental and social costs of the fossil fuel economy, Alaska's many remote communities resemble the proverbial canary in the coalmine. At a representative price of $3.45/gallon (St. George per Bob Pawlowski in December 2004) for diesel, a fossil fuel future is not sustainable in remote communities. Without an alternative energy source, there is no economic future for rural Alaskans in their homelands. With good reason, whole communities are involved and committed to pursuing wind energy.

In December 2004 the City of Adak contracted with Clarissa Quinlan through Precision Power in Anchorage to come to the community and install PowerStat meters on all occupied housing units. PowerStat meters are a pre-pay system that allows customers to monitor how their household utilizes electricity. It enables customers to manipulate their use of appliances to optimize their energy savings. And, perhaps even more importantly, it provides the utility with a 100% collection rate

Energy conservation issues in the region are being addressed in multiple ways. Alaska Energy Authority (AEA) has energy conservation training available that communities can schedule. APIA, in conjunction with the Aleutian Housing Authority and Alaska Building Science Network, accomplished energy conservation training in May 2005 and again (with additional DOE funding) in 2010-2011 (Appendix 9 attached or at http://www.osti.gov/bridge/product.biblio.jsp?query_id=1&page=0&osti_id=1022118&Row=0&formname=advancedsearch.jsp). Several communities have installed PowerStat meters. PowerStats pre-pay systems show account funds running backwards. The meters ensure collections by the utility and provide consumers a clear and easily manipulated picture of their energy use. The meters are proven effective at energy conservation.

Energy Savers Tips for Alaska

APIA's Bruce Wright joined a team (APIA, Alaska Energy Authority, Southwest Alaska Municipal Conference and others) to adapt a booklet on energy efficiency and energy conservation entitled Energy Savers Tips For Rural Alaska (see at http://www.akenergyauthority.org/Efficiency/Energy_Savers_Tips_2011.pdf). Alaska Energy Authority printed copies for each rural Alaska household; APIA distributed the booklets to every household in the Aleutian Pribilof Islands Region.

Greenhouses

APIA considers greenhouses to be an important use of renewable energy, and APIA coordinated the writing and submission of a greenhouse proposal to the Alaska Legislature. The project would include one 51' diameter geodesic greenhouse fitted with lights, vertical axis wind turbines and staff time to make the operation work sustainably. Each community would be responsible for their greenhouse project which would cost about $324K or nearly $3.5M if all our communities are funded. The project team included our communities, University of Alaska, Tribes, AEB, APICDA and APIA (see greenhouse proposal 3-pager below).

Food Security in Rural Alaska, Controlled Environment Agriculture: Greenhouses
As energy prices increase, communities at the far end of the supply chain like the Aleutian and Pribilof Islands region experience significantly higher food prices and shipments delays; and sometimes no shipments at all. However, as a direct result of this experience, these communities seek to construct small, commercial-scale, greenhouse agriculture using locally available renewable energy resources.

These communities are small and remote. Frequently, planes carrying passengers and supplies are weathered out. Barge service is infrequent, often months between landings. We will use the village of Saint George as an economic "example" for discussing the communities of the region. St. George receives weekly scheduled air service directly from Anchorage; and is a good representation of the "averaged" economic values for the region. At the time of this writing, the price of #2 diesel fuel for power generation cost $5.46/gal. The price of grocery items vary, fresh produce regularly costs 10 to 80 percent higher than similar items in Anchorage. This cost estimate does not include the cost of items that spoil, freeze or otherwise become unfit for human consumption between the time of purchase and time of arrival, often one or two weeks later. All small communities in the region suffer these same problems.

In order to address the nutritional needs and high cost of food, these communities propose the construction of renewable energy powered greenhouses. Though each community is looking at which renewable energy option is best for their village, nearly all communities of this region have "Class 7" winds and are capable of generating commercial grade electricity year-round. This provides a unique opportunity to construct the greenhouse operations with a stand-alone power source, capable of local power integration for emergency back-up.

Though the primary purpose of these greenhouses is to provide affordable and fresh nutritional food items to the communities, other direct advantages from the greenhouses include: greater food security; increased community self-reliance; economic stimulus; sustainable economic activity; increasing the body of knowledge of greenhouse agriculture; and diversification of the local skill sets. The longer-term goal of these projects is to provide year-round produce to the village stores for local sales to village residents and the fishermen who may chose to refuel and resupply in their villages.

The communities seek funding to purchase a greenhouse, grow lights and power system for these operations. Due to the unique environmental conditions of the Aleutian and Pribilof region, the communities seek to purchase a geodesic dome greenhouses and small wind turbines, with associated storage and distribution systems, in order to produce and deliver 40 kWh of power. The greenhouse system that these communities seek to construct are, on average, intended to provide approximately 2000 square feet of year-round commercial vegetable production, with a seasonal shift to plant starts, for outside production. Cost analyses indicate that using renewable energy resources can make this endeavor economically viable on either a community or commercial scale.

An economic analysis for the St. George Greenhouse Project (a community of 111 residents) indicates an initial investment of approximately $270,000 for a controlled environment greenhouse facility should conservatively produce a mixed crop harvest, with a minimum annual wholesale value, of approximately $46,500. This translates into a retail value of approximately $66,500 once the standard 30% markup is factored in for the local stores. These figures do not include any outside agriculture, initiated from greenhouse starts. Using the upper level of the greenhouse structures to initiate plant starts for the beginning of the outdoor season could yield an additional $30,000 wholesale/$43,000 retail. Together, these combined agricultural assets have a potential for bringing in over $76,000 (wholesale dollars) into the community. This revenue is enough to sustain a profitable, well-maintained operation with a well-paid full-time employee, or a combination of repayment note and a part-time employee.

The economic model of the greenhouse operation is designed to be profitable and self-sufficient.

Capital Costs (as of January 2011)

Item	Individual Expense	Quantity	Item Expense
Greenhouse Dome	$ 41,900	1	$ 41,900
Wind Turbine	$ 20,000	4	$ 80,000
Storage and Inverter	$ 60,000	1	$ 60,000
Lights	$ 400	10	$ 4,000
Heating	$ 2,000	1	$ 2,000
Fertilizer	$ 3,100	1	$ 3,100
Shipping	$ 15,000	1	$ 15,000
Labor (3 person crew)	$ 16,000	1	$ 16,000
Plumbing	$ 3,800	1	$ 3,800
Admin, Setup & Supervision	$ 44,200	1	$ 44,200
Total		$ 270,000	

The idea of using greenhouses in Alaska villages is becoming more popular. See: http://www.newsminer.com/view/full_story/14799034/article-Remote-Aleutian-villages-seek-greenhouses--renewable-energy-projects?instance=home_news_window_left_bullets

TASK 6: LOAD ASSESSMENT, ECONOMIC AND TECHNICAL ANALYSES

Adak

TDX Power completed the economic and technical feasibility studies for Adak. These were funded by the Alaska Energy Authority and the grant proposal was written by Bruce Wright when he worked for TDX Power. See Appendix 10 attached)

False Pass
False Pass was chosen as the first regional recipient of the study because a new power plant just put in by AEA; it made sense to start with False Pass. The wind resource has proven to be good but the community's location near the mountains also creates turbulent winds. More will be known after completion of the current Alaska Energy Authority study, but False Pass may be more suitable for a tidal project. APIA is funded to complete a False Pass tidal feasibility study in 2012. See Appendix 12.

Nikolski
APIA secured nearly $1M from United States Department of Agriculture Rural Utilities Service Assistance to Rural Communities with Extremely High Energy Costs to install a wind turbine. It was clear to APIA and their partners in the project that this wind diesel configuration would produce the greatest potential future savings for the community, the greatest leverage against increasing fuel prices and other liabilities associated with diesel only generation, and flexibility for future electric and thermal load growth within the communities.

TDX Power completed the design and procured materials, equipment, labor, permits and supervision to construct a fully operational 65 kilowatt Wind Turbine Generator System (WTGS) and associated equipment and interconnect to the newly commissioned diesel fuel based power plant in Nikolski in accordance with the International Electrotechnical Commission (IEC) Wind Turbine Standards. This was accomplished by July 28, 2007.

The fully functional turbine could not be connected to the power plant through the installed transmission line due to potentially significant incompatibility with the control panels. Umnak Power, TDX Power, APICDA and Alaska Energy Authority (AEA) worked with the control panel manufacturer on the design and engineering aspects, including financing and development of the new control panels. By August 2010, and after many extra trips to Nikolski, project extensions and additional costs, all construction phases of the project meet substantial completion. In September 2010 AEA accepted that the wind system as "Commissioned", AEA (Kris Noonan) took control of the software and CPI, and TDX Power has an O&M contract with Umnak Power to provide support services as required (see attached Appendix 7).

Sand Point

(From the *Sand Point Wind Installation Project Draft Environmental Assessment,* see Appendix 11) The DOE's Wind & Hydropower Technologies Program is managed in accordance with the National Energy Policy. The U.S Congress and DOE's Wind and Hydropower Technologies Program supports wind power in an effort to stimulate rural economic development, displace harmful emissions created by traditional fuels, diversify the Nation's options for low-cost electricity generation, and increase energy and national security. The Proposed Action and the decision to provide federal funding for AWE's wind turbine installation project are intended to support the National Energy Policy and to continue deployment of wind generated power in rural Alaska.

The Proposed Action would provide a cost effective and clean source of electricity, reduce overall diesel fuel consumption, and decrease air emissions associated with the consumption of diesel fuel. TDX projects that the Proposed Action would produce 1 megawatt (MW) of renewable power, which would decrease diesel fuel consumption by an estimated 130,000 gallons/year under normal operating conditions. As recent prices of

diesel in Sand Point have fluctuated between $4 and $5 per gallon, such a decrease in consumption would result in reduced fuel costs of $520,000 - $650,000 per year. The Environmental Protection Agency (EPA) estimates that one gallon of diesel can produce 22.2 pounds (lbs) of carbon dioxide (CO2); hence about 1,443 tons of CO2 emissions per year would be avoided if the Proposed Action is implemented.

St. George
A preliminary wind assessment was completed for St. George showing that a high penetration wind-diesel plant in St. George would be a viable project. As the price of diesel continues to increase, the projects economic benefits can only rise. Alaska Energy Authority is conducting a more in depth load analysis, economic and technical feasibility study. The first priority for St. George will be to upgrade the diesel power plant and the ready it for a wind project (see Appendix 6 attached).

TASK 7: POWER MARKET ASSESSMENT
In isolated Aleutian villages, there is no opportunity for selling power outside the community, other than to seafood processors. At this time seafood-processing plants located in almost every Aleutian community produce their own power with their own diesel generators. However, under this grant, APIA explored the possibility of selling power generated in these communities.

TASK 8: ENVIRONMENTAL EVALUATION
APIA assisted communities with environmental evaluations and preparation of the NEPA documents required to continue development of these wind energy projects. This effort went to completion at Sand Point where APIA's Bruce Wright managed the avian data collection and avian evaluation. The results from the study can be found in the attached Sand Point environmental assessment (see Appendix 11).

TASK 9: LONG-TERM OPERATING AND MAINTENANCE PLANNING
APIA continues to assist community utilities with O&M as a follow-up component to the economic and technical feasibility study and renewable energy installations. Special attention was given to linking communities with like equipment for parts exchange and technical assistance. APIA has worked with the Alaska Energy Authority, TDX Power, Marsh Creek, LLC and others to address O&M issues such as training, circuit rider visits and contracting for services in much the same way as we currently do with water/waste water plants.

TASK 10: BUSINESS AND ORGANIZATIONAL PLANNING
APIA and its contractor regularly provide advice and direction to communities regarding financial strategies for developing the projects in conjunction with their economic and technical feasibility studies.

Many individuals and organizations have joined our effort to reduce the use of fossil fuel in the Aleutian and Pribilof Islands Region. Our partners, their tasks and funding sources for this project (2005-2007) are described below:

Equipment and other expenditures	**Funding source(s)**
Anemometer towers, including freight	Alaska Energy Authority (AEA)
Bird diverters and fencing	US Fish and Wildlife Service (USFWS)
Bird monitoring cameras and sensors	USFWS
Conference/Training fees	TDX Power / The Aleut Corporation (TAC) / Aleutian Pribilof Island Community Development Association (APICDA) / APIA / Bureau of Indian Affairs (BIA)
Consultation with John Wade Meteorologist and turbine siting expert	AEA
Consultation with Mia Devine Economic analysis expert	National Renewable Energy Lab (NREL)
Salary for APIA Coordinator	APIA / BIA / USFWS
School Stipend	BIA
Subcontracts:	
Community Participants	BIA / USFWS
Doug Vaught	USFWS
TDX Power	BIA
Travel:	
TDX Power	TDX / BIA
APIA	APIA / NREL / BIA
Regional Representatives	APIA / NREL / APICDA / BIA

* USFWS and BIA funds are secured and administered by APIA

Participants and Roles:

TDX Power:
John Lyons, Operations Manager
Nick Goodman, Business Director
Bruce Levy, Developer
Ron Philemonof, President/CEO of Tanadgusix Corporation (Parent company of TDX Power)

- Participate in siting decision
- Lead installation of anemometer towers
- Work with AEA on wind resource profile and evaluation
- Participate in community meetings to provide technical information regarding wind energy and project development
- Conduct economic and technical feasibility study in False Pass
- Begin economic and technical feasibility study in Nikolski

Alaska Energy Authority:
Peter Crimp, Alternative Energy Development Project Manager
Reuben Loewen, Wind Resource Development, Anemometer Loan Program
Rebecca Garrett, Energy Conservation

- Distribute anemometer towers to communities that submit a successful application
- Coordinate monitoring of wind resource data
- Create wind resource profile and evaluation for each community
- Provide communities with energy conservation education
- Recommend projects to the Denali Commission for funding

APIA:

Connie Fredenberg, Wind Project Coordinator and Bruce Wright, Program Manager

- Work with USFWS and local bird experts to ensure equipment is sited, installed and monitored properly regarding avian concerns
- Ensure that all concerns regarding siting are heard by all parties involved and that a consensus is achieved
- Assist Reuben at AEA with the packing and delivery logistics for anemometer towers
- Purchase and arrange delivery of cameras, sensors, and fencing materials
- Assist in raising anemometer towers, placing bird diverting devices on the guy wires and reflective tape on tower
- Assist with installation of camera and sensors or predator proof fence per direction of USFWS
- Co-coordinate with tribes the community meetings
- Co- coordinate with tribes the school participation in monitoring the sites
- Keep participants informed via e-mail, teleconferences and newsletters about:
    - Wind energy development in the region, in Alaska, and around the world
    - Funding opportunities
    - Upcoming conferences and trainings
    - State and federal energy policy matters relating to alternative energy
    - The evolution of green tag sales.
- Coordinate regional participation in alternative energy conferences, workshops and training sessions
- Contribute to the planning and implementation of a rural wind interest conference
- Write subcontract agreements.
- Write proposals, document projects and complete required grant reporting

Tribal

Nikolski IRA Council, Native Village of St. George, False Pass IRA Government, Agdaagux Tribe of King Cove, Qagan Tayagungin Tribe of Sand Point, Unga Tribe of Sand Point, Pauloff Harbor Tribe of Sand Point:

- Assist Project Coordinator and Utility Manager to select the appropriate representative and operator to attend trainings, conferences and workshops
- Coordinate involvement of appropriate community member(s) or entity for assistance in raising anemometer tower, monitoring the tower, and providing necessary heavy equipment and labor for construction of fencing where necessary
- Co-coordinate and co-host community meetings

- Co-coordinate school involvement and student participation
- Assume the position of "Wind Energy Central" for their community, housing and making available to the community:
  - up to date reports on the local project
  - wind energy newsletters from around the country
  - upcoming conferences, workshops and training opportunities

Community Participants:

False Pass:

John Nickels	City Manager, Manager of City owned Electric Utility
George Jackson	City of False Pass, power plant operator
	President, Native Village of False Pass
	President, False Pass Village Corporation
	Science Teacher at False Pass High School

St. George:

Max Malavansky, Sr.	City Administrator, City of St. George
Martha Malavansky	Concerned resident and Former TAC CEO
Bob Pawlowski	Acting CEO, Tanaq Corp.
Andronik Kashevarof	President, Tanaq Corporation; Traditional Bird Hunter
Anthony Merculief	President, St. George IRA Council
Andy Malavansky	Member of the Regional Management Body for the Alaska Migratory Bird Co-management Council (RMB / AMBCC)
Carol	St. George High School Coordinator
Chris Merculief	APIA Board Member

King Cove:

Clark Corbridge	Administrator, City of King Cove
	President, Agdaagux Tribe
	Science Teacher at King Cove High School
	APIA Board Member

Nikolski:

Tanya Kyle	Administrator, Nikolski IRA Council
Rex Willhite	Utility Manager, Nikolski IRA Council
Scott Kerr	RMB / AMBCC
	Teacher at Nikolski School
Arnold Dushkin	APIA Board Member

Sand Point:

Peter Devine, Jr.	Regional Representative to the AMBCC
Dorothy McCallum	President, Qagan Tayagungin Tribe
David Osterback	President, APIA Board of Directors
John Foster	APIA Board Member, Unga Tribe
Arlene Gundersen	APIA Board Member, Pauloff Harbor Tribe

APIA current renewable energy pre-proposals to BIA:
APIA researches and provides information regarding all possible funding options, including grants and loans. For example, the city of Akutan is interested in studying the use of residual hot geothermal water for use to heat homes and facilities, and Nelson Lagoon is interested in measuring their tidal energy potential. APIA contacted BIA concerning funding for these projects and was requested to submit pre-proposal for consideration (see below).

Akutan Geothermal Steam Energy Project Feasibility Study; Heating Homes with Piped Steam

A proposal by the Aleutian Pribilof Islands Association

The City of Akutan intends to develop an existing geothermal resource in the Hot Springs Bay Valley of Akutan Island. A resource assessment and a feasibility study have been completed in order to identify the location and characteristics of the reservoir, and to determine the feasibility of developing the resource for electric power generation. A screening study was performed to identify and compare various development alternatives, to develop pro forma financial models for each alternative, and to recommend a preferred alternative for development.

After thorough analysis and due consideration of the alternatives, the City intends to construct, operate and maintain two 5 Megawatt (MW) non-condensing steam plants, along with four production/injection wells, access roads, transmission lines and support facilities necessary to convey power to the City of Akutan and the Trident Seafoods Shore Plant, located adjacent to Akutan village.

The purpose of this project proposal is to request funds to study the feasibility of using residual steam and hot water to provide facility and home heating in Akutan, also referred to as teleheating. Over 50% of the energy used in Alaska communities is for heating and electrical resistance heating and is the most expensive while use of residual hot water from the geothermal steam plants in anticipated to be cost-effective.

This project will be managed by the Aleutian Pribilof Islands Association (APIA). APIA is the federally recognized tribal organization of the Aleut people in Alaska. APIA's mission is to promote the overall economic, social, and cultural development of its beneficiaries and to provide for the Aleut tribes of communities (Atka, Akutan, False Pass, King Cove, Nelson Lagoon, Nikolski, Sand Point, Saint George, Saint Paul and Unalaska) in the region designated by the Alaska Native Claims Settlement Act as the Aleut Region, which is also known as the Aleutian/Pribilof Islands region. Many of the Aleut Region organizations, collective known as the A-Team, have been working

together to reduce their dependence on fossil fuels; they have established a long-term regional goal of reducing fossil fuels use by 80%. This proposed study is timely and appropriate as energy prices continue to rise and the A-Team continues to seek innovative ways to meet their goal.

A number of financial scenarios have been stress tested and analyzed, with a conclusion that an estimated development cost of $61 million will provide ten megawatts of power at a cost between $0.157 kWh and $0.179 kWh over the planned 20-year life of the project. By comparison, diesel fuel cost during the same period would be in excess $240 million, with a cost of power in the range of $0.21per kWh and $0.32 per kWh (after Power Cost Equalization subsidy).

Final design and permitting for the proposed system (Phase III) is being funded by Alaska Energy Authority and the City of Akutan under a Round IV Renewable Energy grant. The results of Phase III will determine the inputs, variables and cost estimates needed to complete the final operational and business plan for the project. Results from this space heating with hot water feasibility study would be considered in subsequent funding requests to the State of Alaska's Renewable Energy Fund.

The benefits and impacts of this project are both socio-economic and environmental. If the conceptual project design is deemed feasible through this study, as partners believe will be the case, a large percent of the community's heating energy demand could be met by clean, sustainable, flat-priced home heating from geothermal. Akutan could be the first community in Alaska to install geothermal district heating. By reducing carbon dioxide emissions, Akutan as a community will do its part to address climate change and ocean acidification, both of which threaten the subsistence and commercial livelihood of this maritime community. At the same time the associated economic benefits of producing fuel free electricity and heat, and creating local high quality sustainable jobs would enliven the community, creating economic stability and the associated social benefits to the community. Efforts here would be transferrable to many similarly placed Alaskan communities and could serve as a blueprint for other geothermal energy projects which would bring a necessary new source of power to remote predominately Alaska Native communities which suffer from high fossil fuel prices.

Project Costs and Timeline:
APIA will contract for feasibility of economic and engineering design and cost services estimated at $45,000. Project management and report writing is estimated to be $15,000. We expect one trip to the site with the contractor at $4,000. The APIA negotiated indirect rate is 37.5% and the project total is $88,000. If funding is received by September 30, 2012, we can expect to have the contractor working by January 2013 and their draft report available by June 2013. The final report will be completed by September 30, 2013. The contract services with be by University of Alaska, Cold Climate Research Center.

Salary and benefits: $15,000

Contract	$45,000
Travel	$ 4,000
Subtotal	$64,000
Indirect (37.5%)	$24,000
TOTAL	$88,000

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(907)279-4351 fax
brucew@apiai.org

Nelson Lagoon Tidal Energy Project Feasibility Study

Applicant
Aleutian Pribilof Islands Association, Inc. (APIA)
1311 East International Airport Road, Anchorage, AK 99518
(907)276-2700 voice; (907)279-4351

Project Title
Feasibility of Tidal Current Energy in Nelson Lagoon, Aleutian Islands, Alaska

Project Locations
Nelson Lagoon, Aleutian Islands, Alaska

Project Objectives
1) Collect existing bathymetric, tidal, and ocean current data at the site to develop a basic model of current circulation at Nelson Lagoon.
2) Measure current velocities at site for a full lunar cycle to establish the viability of the current resource.
3) Perform analysis based on current costs of energy and amount of energy anticipated from and costs associated with tidal energy project conceptual design.
4) Compile a report for project partners.

Project Description
Residents of Nelson Lagoon have long known the power of the water that rushes daily through the Lagoon. A 2009 study funded by the Alaska Energy Authority confirmed the need to study more fully the area's potential for tidal power. To this end, and to address their fossil fuel reduction goal, the Aleutian Pribilof Islands Association and community of Nelson Lagoon are working together to determine if a tidal energy project could provide much needed sustainable energy to the community of Nelson Lagoon.

APIA brings expertise to this project. APIA, a past recipient of BIA, USDA-RUS and Department of Energy grants, is a capable business and technical lead and APIA has experience running multi-faceted projects, as well as the ability to reach out to and involve local community members. The contractor, Ocean Renewable Power Corp. (ORPC), with unmatched experience in the nascent tidal power industry, will supply technical expertise, manage site characterization and resource assessment data collection, provide key inputs to economic analysis through development of project installation and operation costs and benefits, and provide a conceptual design for the tidal energy project.

The **benefits and impacts** of this project are both socio-economic and environmental. If the tidal resource and conceptual project design are deemed feasible through this study, a large percent of the community's electricity demand could be met by clean, sustainable, flat-priced power from the ocean. Nelson Lagoon would be the first community in Alaska to install an ORPC power system for use in an ocean pass. By reducing carbon dioxide emissions, Nelson Lagoon as a community will do its part to address climate change and ocean acidification, both of which threaten the subsistence and commercial livelihood of this maritime community. At the same time the associated economic benefits of producing fuel free electricity and creating local high quality sustainable jobs would enliven the community, creating economic stability and the associated social benefits to the community. Efforts here would be transferrable to many similarly placed Alaskan communities and could serve as a blueprint for other tidal energy projects which would bring a necessary new source of power to remote predominately Alaska Native communities suffer from high fossil fuel prices.

Project Costs and Timeline:
APIA will contract for feasibility of economic and engineering design and cost services estimated at $60,000. Project management and report writing is estimated to be $15,000. We expect one trip to the site with the contractor at $4,000. The APIA negotiated indirect rate is 37.5% and the project total is $88,000. If funding is received by September 30, 2012, we can expect to have the contractor working by January 2013 and their draft report available by June 2013. The final report will be completed by September 30, 2013.

Salary and benefits:	$15,000
Contract	$60,000
Travel	$ 4,000
Subtotal	$79,000

Indirect (37.5%)	$29,625
TOTAL	$108,625

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CONCLUSIONS:

Under this project, the Aleutian Pribilof Islands Association (APIA) conducted wind feasibility studies for Adak, False Pass, Nikolski, Sand Point and St. George, and using resources, including funding, met and exceeded the requirements and deliverables of this (DOE funded) project. The DOE funds were also be used to continue APIA's role as project coordinator, to expand the communication network quality between all participants and with other wind interest groups in the state and to provide continued education and training opportunities for regional participants. APIA would like to thank DOE for their support of our efforts to reduce the use of fossil fuels in the Aleut Region by 85%.