

# Hurdles to Wind Development in Alaska

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**International Wind-Diesel Conference  
Girdwood, Alaska      April 25, 2008**



## Rural Alaska Challenges

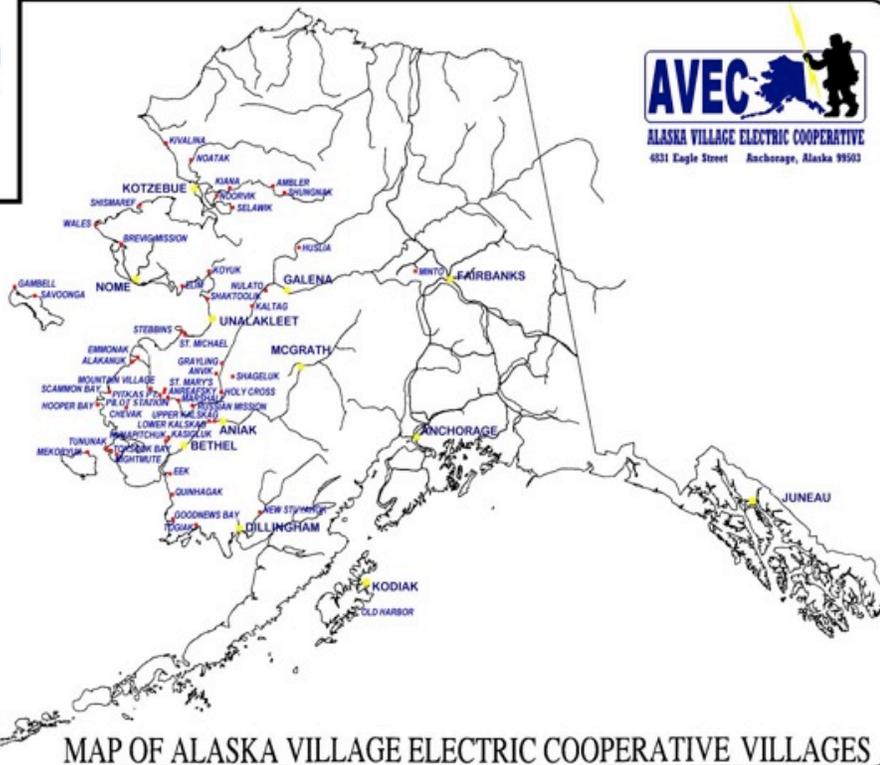
- Remote locations
- Complex logistics
- Difficult environmental conditions
- Small loads
- Poor soils
- Complex foundations
- Low temperatures
- Icing
- Few machines sized for village systems (100-500 kW)

# What Could Wind Mean to AVEC?

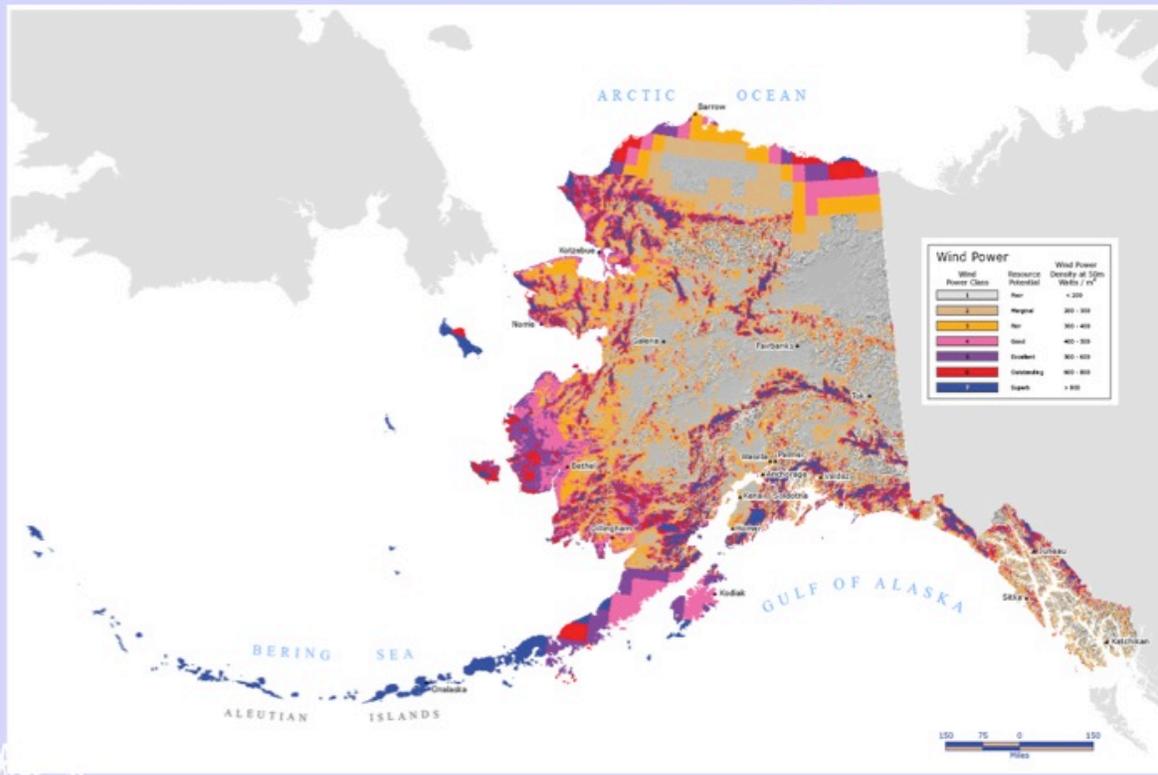
- 39 of AVEC's 53 villages are in 4+ wind regimes
- A high-efficiency generator yields 14 kWh/gallon
- A 100-kW turbine could produce 220,000 kWh/yr
- This could displace 15,700 gallons
- Three units could displace 47,000 gallons



**Many of AVEC's villages are in Western Alaska have Class 4 or better wind regimes.**



# Updated Wind Map



## Cost of 700 Residential kwh Today

- Anchorage \$ 87.81
- Fairbanks \$134.58
- Juneau \$ 76.29
- Kodiak \$104.15
- Kotzebue \$158.00\*
- AVEC Village \$231.88\*
- MKEC Village \$374.88\*
- Napakiak \$420.98\*

– \*After PCE

# What is AVEC Doing?

## Installing wind generation

- Wales, Selawik, Toksook Bay, Kasigluk, Gambell, Savoonga, Hooper Bay, New Stuyahok, Chevak...

## Capturing recovered heat where feasible

- More than 40 AVEC locations

## Building Interties

- Toksook Bay to Tununak
- Toksook Bay to Nightmute
- Developing HVDC concept

## Welcoming new villages

- Nightmute (1998), Teller (2005), Kotlik (2007)

# Wind Diesel Efficiency:

## Penetration Levels

- **Low**
  - Max 30% Wind
  - Grid Connected
- **Medium**
  - Max 80% Wind
  - Load Control
- **High**
  - 100% Wind
  - Diesel Off
  - Load Control
  - Short Term Storage

Typical AVEC Systems

## Integration of wind generation could mean

- A hedge against increasing fuel costs
- A hedge against possible future carbon taxes
- A reduced need to build expensive additional fuel storage on hard-to-acquire or difficult-to-construct sites



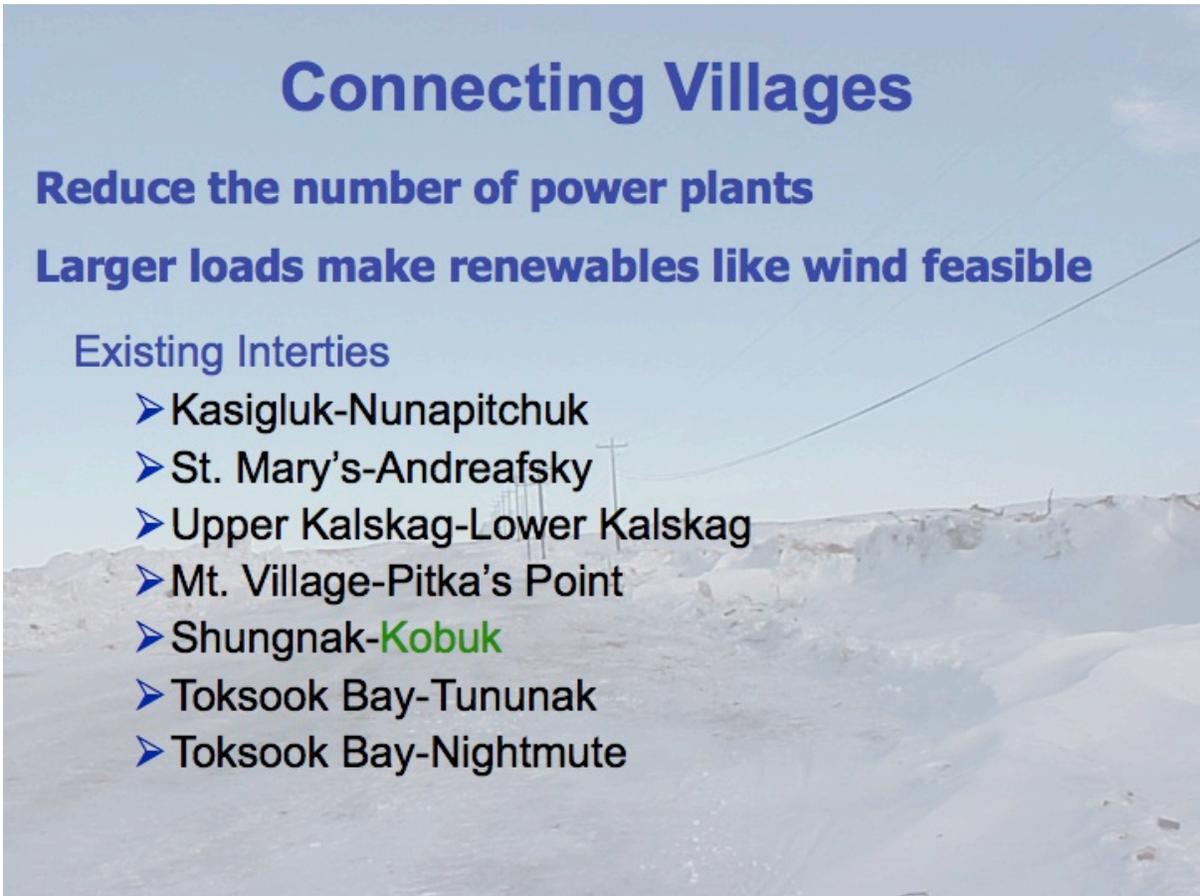
## Connecting Villages

**Reduce the number of power plants**

**Larger loads make renewables like wind feasible**

### Existing Interties

- Kasigluk-Nunapitchuk
- St. Mary's-Andreafsky
- Upper Kalskag-Lower Kalskag
- Mt. Village-Pitka's Point
- Shungnak-Kobuk
- Toksook Bay-Tununak
- Toksook Bay-Nightmute



# Possible Future Interties

- Brevig Mission-Teller
- St. Mary's-Mt. Village – HVDC Project
- St. Mary's-Pilot Station
- St. Michael's-Stebbins
- Emmonak-Alakanuk
- New Stuyahok-**Ekwok**
- Togiak-**Twin Hills**

## A key issue is the availability of heavy construction equipment

- Dovetailing wind projects with other local projects reduces construction costs



## Wind Assessment is critical

- Determine estimated output of a project
- Avoid misplacement of a project
- Identify potential problems...

AVEC



## Such as...

- Land ownership and land use in the area
- Geotechnical issues for foundations
- Historical and cultural resource impacts
- Bird issues
- Equipment accessibility
- Proximity to power lines



# Foundations in permafrost are a major hurdle

Warming trends are affecting the expanse and depth of permafrost



AVEC

## Challenging Foundation Solutions





Poor roads, water and sewer lines,  
boardwalks and existing overhead power  
and phone lines present hurdles





## Transportation Issues





# Difficult Environmental Conditions



# Geotechnical Conditions



Soils present unique challenges:

- High variability
- Lack of stability
- Climate change impacts



## Geotechnical information is critical

- It is important to have information from the actual turbine site in order to recognize local variances
- One must acquire the permafrost temperature and, if possible, install a temperature acquisition cable to monitor temperatures up to the time of construction
- Continue thermal monitoring of the turbine site after construction



# Other Hurdles

- **Dilution of Effort**
  - Federal agencies parcel out funding to a multitude of players that can only deliver tiny projects or none at all
- **Ghosts of the Past**
  - The 100+ Alaskan federal and state-funded wind projects of the 1980s were near universal failures that cast a blight on the industry for the next 15 years



# Fractured Funding

- **Utility level**
- **Tribal level**
- **Municipal level**
- **Schools**
- **Businesses**
- **Individuals**



# Alaskan Realities are Different

- **Well-intentioned outside developers and consultants misrepresent systems like the PCE Program**
- **Not all kWh benefit (30%)**
- **If it was easy, we would have done it already**

## The False Promise of Net Metering

- **Benefits the few at the expense of the rest**
- **Affects power quality for neighbors**
- **Gives false impression of environmental responsibility**
- **Owner still expects utility to provide 75+% of power needs**
- **Misdirects grants to individuals instead of communities**
- **Poorer customers would subsidize the wealthier ones who can afford to install alternative energy**
- **Avoided cost is more fair, but even that does not yield any rate reduction**

**Thank You**

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**Alaska Village Electric Cooperative**



Toksook Bay

