

# AVEC's Village Wind Projects



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Alaska Village Electric Cooperative

**Tribal Energy Conference**

**Denver, Colorado**

**October 28, 2010**

*New turbines in  
Hooper Bay*

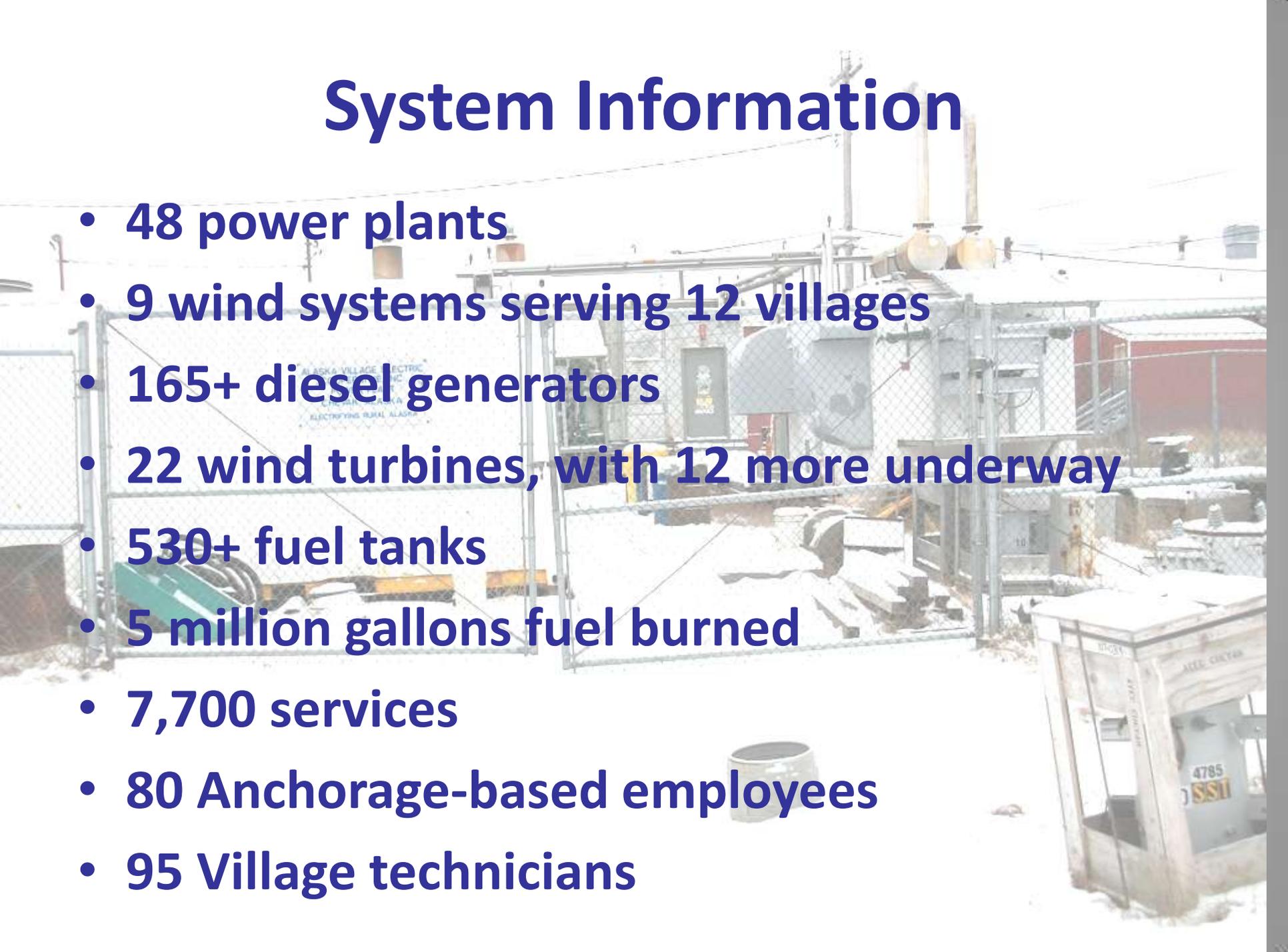


# AVEC is a non-profit member-owned co-op

- 53 villages
- 22,000 population
  - Would be the 4th largest city in Alaska after Anchorage, Fairbanks and Juneau
- 44% of Village Alaska population
- Anvik (smallest) 94
- Hooper Bay (largest) 1,097
- Average population 420
- Anchorage 284,994
- 94% Alaska Native

# System Information

- 48 power plants
- 9 wind systems serving 12 villages
- 165+ diesel generators
- 22 wind turbines, with 12 more underway
- 530+ fuel tanks
- 5 million gallons fuel burned
- 7,700 services
- 80 Anchorage-based employees
- 95 Village technicians



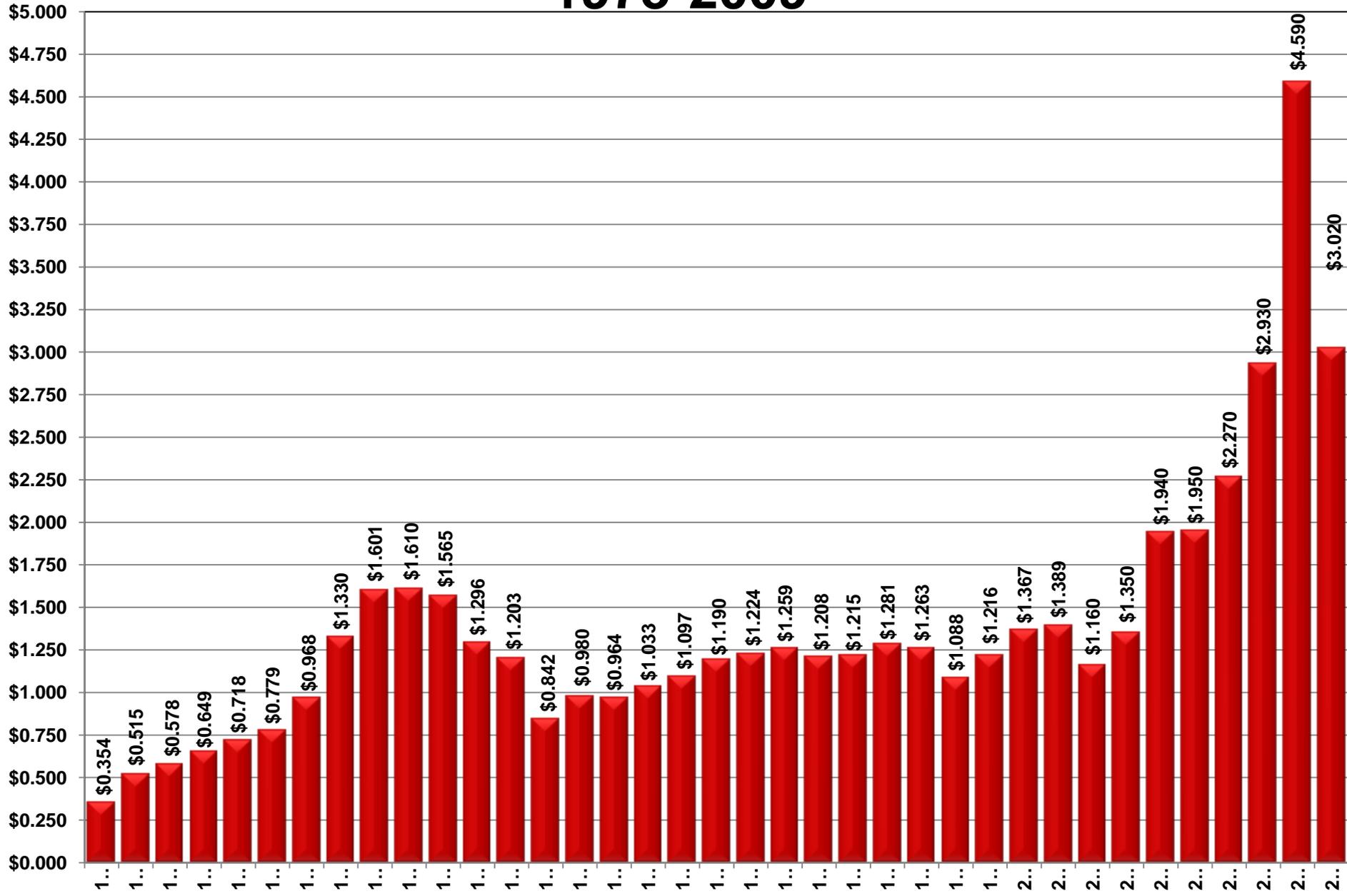
# Alaska Vs. Lower Forty Eight



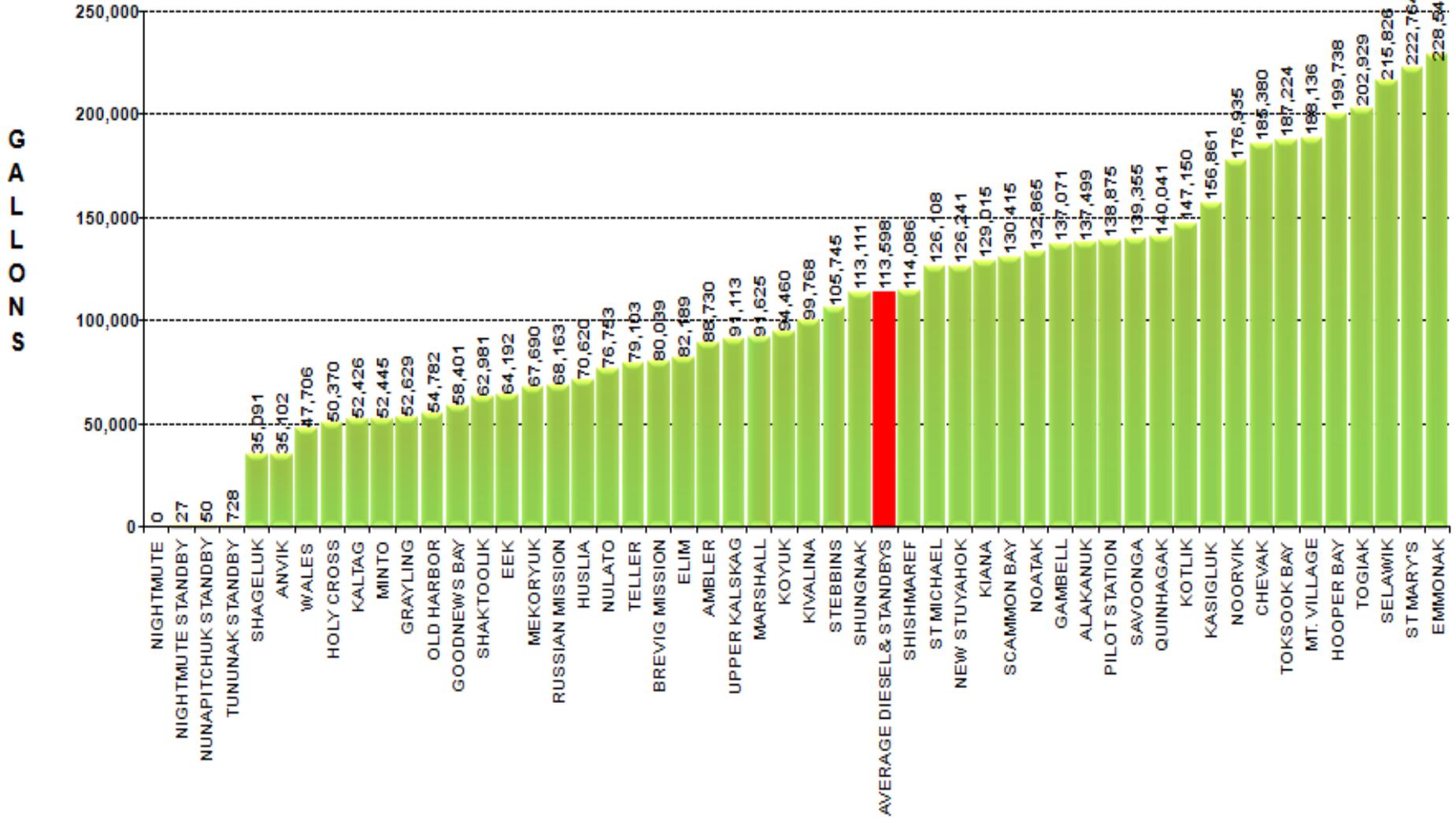
# AVEC Delivered Fuel Cost

• Average 2002	1.29	
• Average 2003	1.47	+.18
• Average 2004	1.98	+.51
• Average 2005	2.26	+.28
• Average 2006	2.26	
• Average 2007	2.93	+.67
• Average 2008	4.55	+1.62
• Average 2009	3.02	
• Average 2010	3.30	
Increase between 2002 - 2010	\$2.01	+256%

# AVEC System-wide Average Fuel Prices 1973-2009



# AVEC 2009 Fuel Use By Village



# AVEC

## Board Goals

- Reduce diesel use **25%** in 10 Years
  - 1,250,000 gallons
  - 77% of our fuel is used in Wind Class 4+ villages
- Reduce power plants **by 50%** in 10 Years
  - Interconnect another 24 villages
- Reduce non-fuel costs **by 10%**
  - Plant costs, depreciation, interest...
  - **Rate reduction of 2 cents/kWh as of 1/1/2010**

# Goal – Reduce Diesel Use **25%**

- **80 100KW machines would displace 1,250,000 gallons**
- **22 units now operational**
- **12 scheduled for commissioning in 2010-11**
- **In 2009, 11 machines were operational**
  - **2.8% of gross generation**
  - **Displaced 143,000 gallons of fuel**
  - **Worth \$433,000.**

# **AVEC has considered wind generation in the past, but there were challenges:**

- **Lack of small (100kw) machines**
- **Equipment reliability**
- **Too few machines to support service providers**
- **Difficulty in integrating intermittent wind with small diesel systems**

# The State and federal governments funded over 100 wind projects in Alaska in the 1980s



Nearly all failed

Lack of maintenance and poor sites were factors





**Often we have to be patient, learn and wait  
for the right conditions to come along**

# Wind Potential for AVEC

- **39 villages are in Class 4+ wind regimes**
- **A diesel generator yields 14 kWh/gallon**
- **One 100-kW turbine could displace 15,000 gallons/yr (Class 6-7 regime)**
- **Three units = 47,000 gallons/yr**
- **Average village uses 113,000 gallons/yr**

# Current Challenges to Wind Development

- Remote locations
- Complex logistics
- Difficult environmental conditions
- Small electric loads
- Poor soils
- Complex foundations
- Turbulence
- Low temperatures/Icing
- Limited turbine options for remote villages

*AVEC's work truck got stuck and needed help!*

## Challenge:

### Foundations in permafrost

- They must not settle, tilt or be uplifted
- Pile foundations (six to eight piles) may extend  $\frac{1}{3}$  to  $\frac{2}{3}$  the height of the tower into the ground (40-60 feet)



**Challenge:**

**Access for specialty  
equipment required  
to place foundations  
and erect turbines**





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





# Transportation Issues







*Hauling equipment  
between villages*

Handwritten text on the wooden crate:  
15 5140 SSI  
Kotlik  
ENM  
AVEC

AVEC  
AVEC  
AVEC  
AVEC

AVEC  
Kotlik



*And here's the  
power pole!*

# Summer Tundra/ Permafrost



# AVEC Wind Projects

- 2003 Selawik
- 2006 Kasigluk – with tie line to Nunapitchuk
- 2006 Toksook Bay - with tie lines to Tununak and Nightmute
- 2008 Hooper Bay and Savoonga
- 2009 Gambell and Chevak in construction, commissioning in process in 2010
- 2009 Mekoryuk erected, commissioning in 2010
- 2010 Quinhagak - in construction
- 2010 Shaktoolik and Toksook (one more)
- 2011 Emmonak/Alakanuk



*Kasigluk*

# Future Plans

- **Meteorological towers are collecting information in several locations**
- **Evaluation of sites for future funding in several more western Alaskan village sites is underway**
- **Denali Commission and RUS funding is declining**
- **State funding is competitive and challenging to administer**

- We are building local capacity by training wind technicians who live in the villages
- These trainees have worked in the construction and operation of the new systems

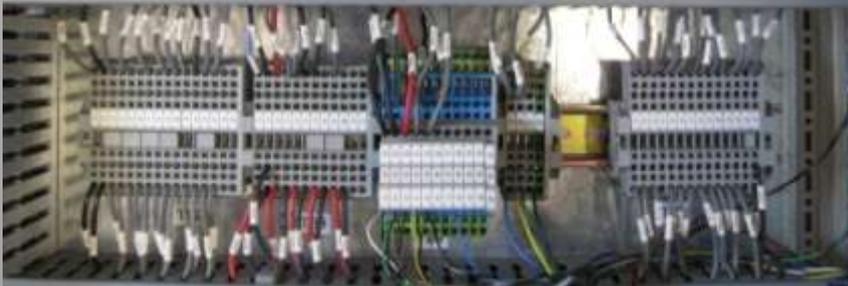
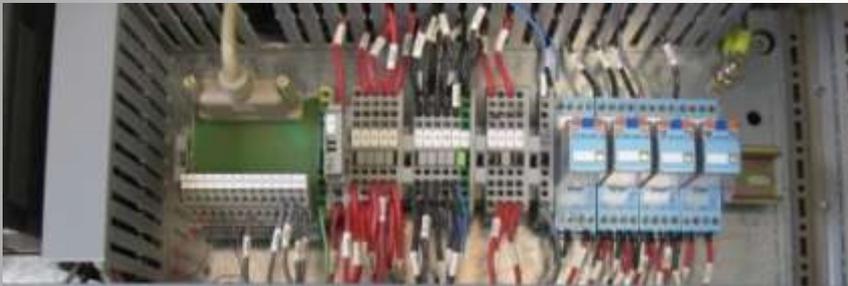


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**Training for several  
wind technicians  
underway at Kasigluk  
(March 2010)**



# Some of the equipment is complex



**Safety is  
important**



**because it is a long way up**



**But the work and results are rewarding**



# Questions?

*Toksook Bay, Alaska*



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