

ALASKA VILLAGE ELECTRIC COOPERATIVE



ENERGIZING RURAL ALASKA SINCE 1968

QUADRENNIAL ENERGY REVIEW
ISLANDED MICRO-GRIDS
FEBRUARY 8, 2016
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Alaska Village Electric Cooperative

Who (or What) is AVEC

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A non-profit member-owned electric cooperative providing electric service to 56 communities.

Combined population 30,000

Smallest village 80

Largest village 1,200

Bethel (added 2014) 6,300

Alaska 738,000

Anchorage 299,000



System Information

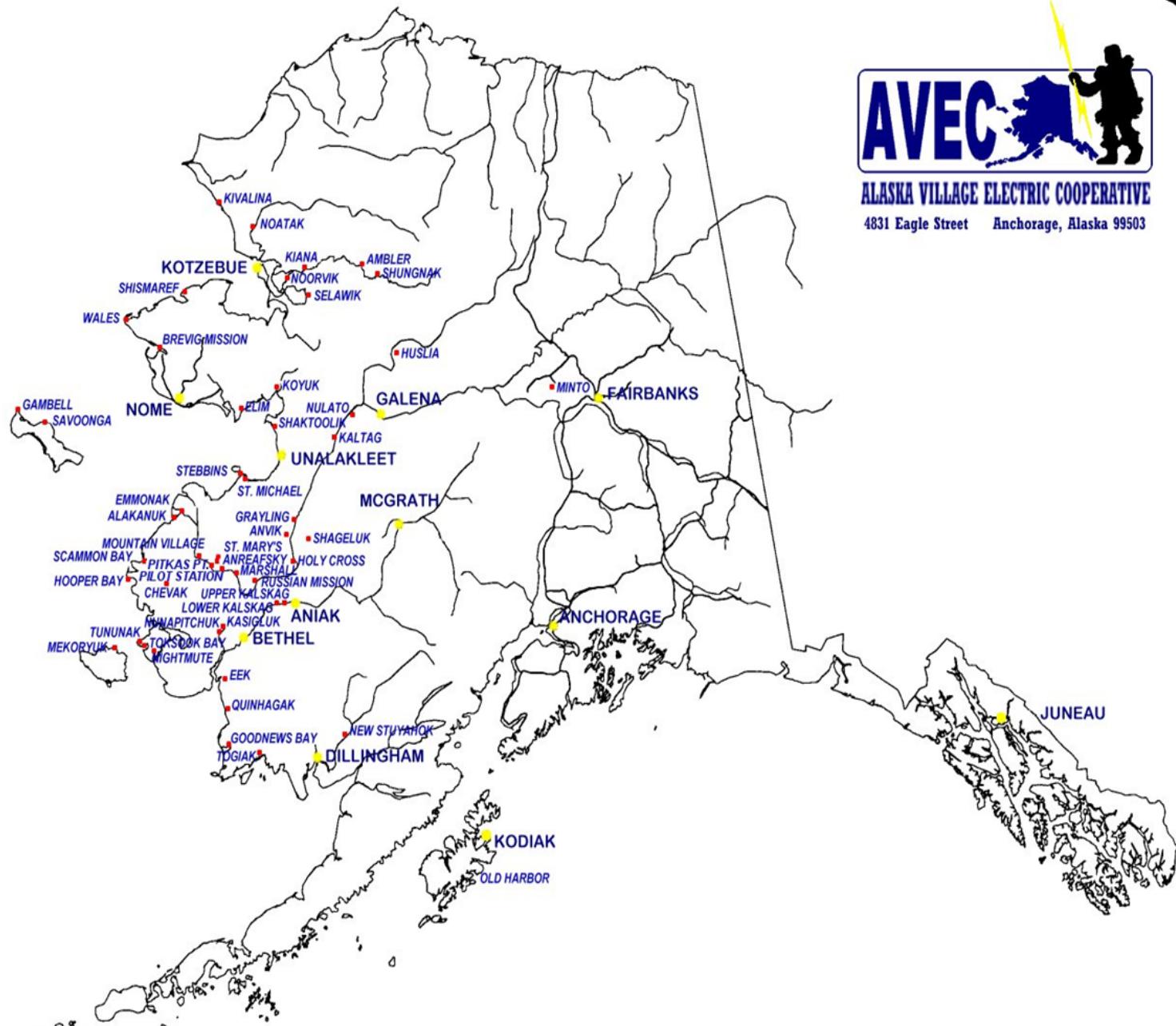
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- 90 full time employees
- 95 village plant operators
- 10,800 services
- 48 power plants
- 170 diesel generators
- 46 tank farms
- 8.5 million gallons of diesel
- 34 wind turbines serving 15 villages
- Two tug and barge sets



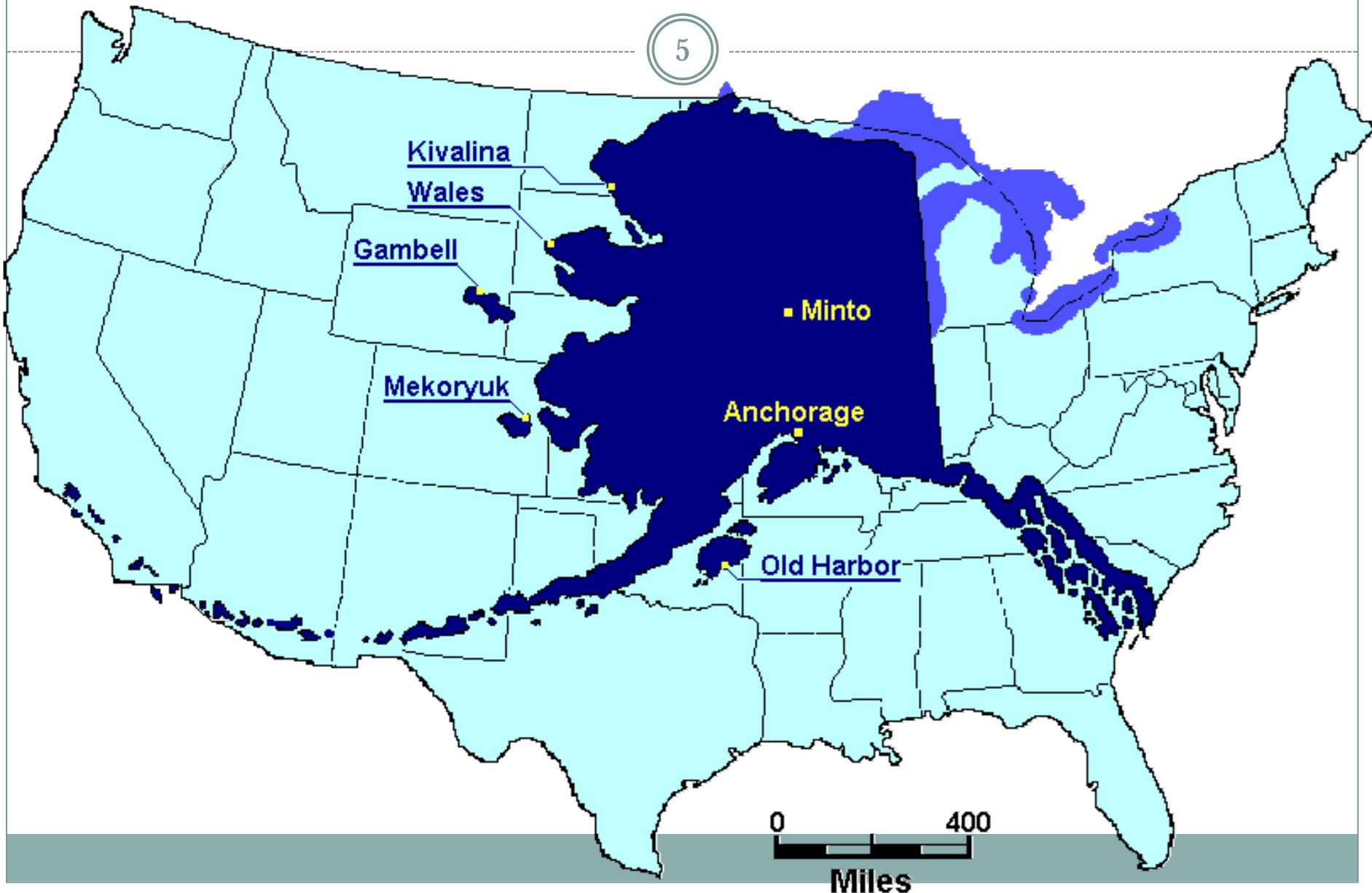


AVEC
ALASKA VILLAGE ELECTRIC COOPERATIVE
4831 Eagle Street Anchorage, Alaska 99503



MAP OF ALASKA VILLAGE ELECTRIC COOPERATIVE VILLAGES

Putting it in Perspective



Electricity Sales

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55 Villages 72,000 mWh

Average per village 1,300 mWh

Average load 150 kW

Bethel Sales 40,000 mWh

Average load 4,500 kW

AVEC customers = 4% of Alaska's population

AVEC sales = 1.8% of Alaska electric
consumption

What Electricity Costs in Cents/kWh

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Fuel	28.58
Power Production	9.97
Admin and General	2.97
Depreciation	2.91
Consumer Accounts	2.39
Distribution	1.19
Interest	1.11
Taxes	0.44
Total	49.56

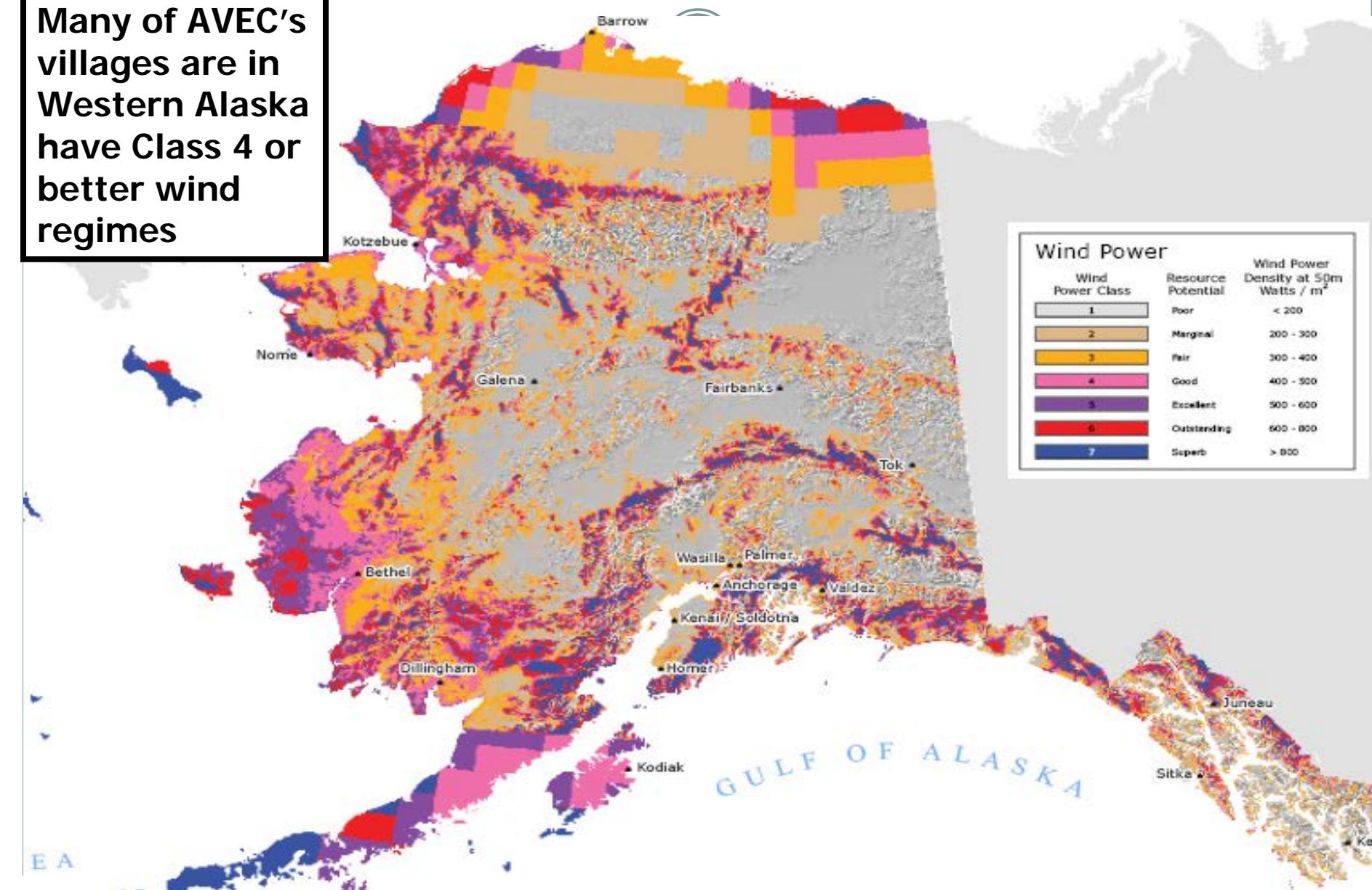
Capital Costs in Rural Alaska

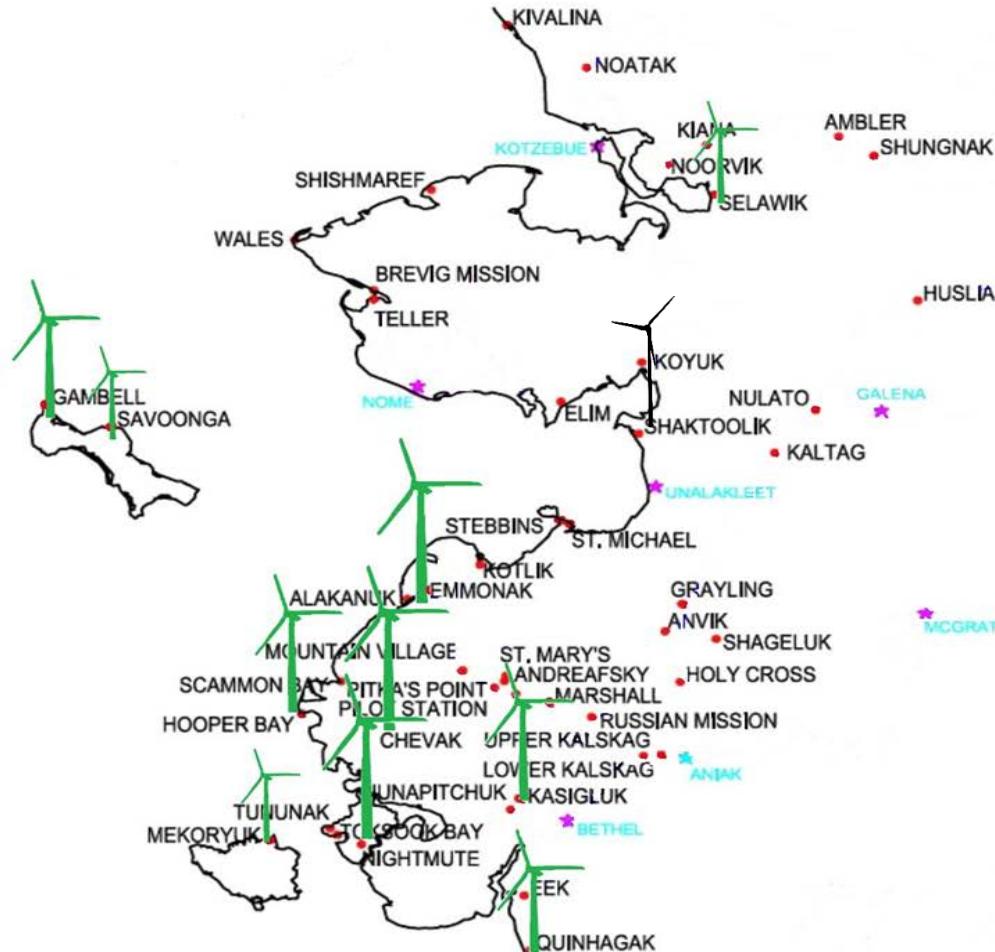
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1,500 kW diesel plant	4.5 million
150,000 gallon tank farm	3.0 million
Local distribution system	1.0 million
100 kW wind turbine	1.0 million
Electronic control/dispatch	1.0 million
Tieline to connect villages	500k/mile
Hydropower 500 kW	8.5 million

Alaska Wind Map

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





A Snapshot of Wind Production in 2014

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Community		Pop'n	mWh Sales	Average kW load	kW Wind	Wind Percent
Selawik	2003	876	2,500	285	260	1.91%
Kasigluk +1	2006	1,163	2,900	330	300	13.55%
Toksook Bay +2	2006	1,288	3,000	340	400	22.41%
Hooper Bay	2008	1,178	3,000	340	300	12.25%
Savoonga	2008	718	2,000	230	200	12.94%
Gambell	2009	713	1,800	205	300	23.08%
Chevak	2010	989	2,400	275	400	35.16%

AVEC Major Projects

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- New Stuyahok – Ekwok Intertie
- Emmonak Tank Farm and Power Plant
- Wind Studies – Stebbins, Eek, Elim, Mt. Village, St. Mary's, Teller, Bethel
- Wind Construction – St. Mary's
- Wind to Heat – Chevak, Gambell, Mekoryuk, Shaktoolik
- Heat Recovery – New Stuyahok, Noorvik, Stebbins
- Old Harbor Hydro FERC license imminent



Arctic Alaska's Sustainability Depends Upon...

- Connecting communities
 - Medium voltage DC is needed
- Energy storage solutions
 - Electricity for heat is wasteful
- A “Grid-Bridging” solution
 - Capacitor system for 10-15 sec.
- Technical training
 - Old school isn’t enough
- Technical support
- Help us design solutions – teach a man to fish...



Thank You!



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