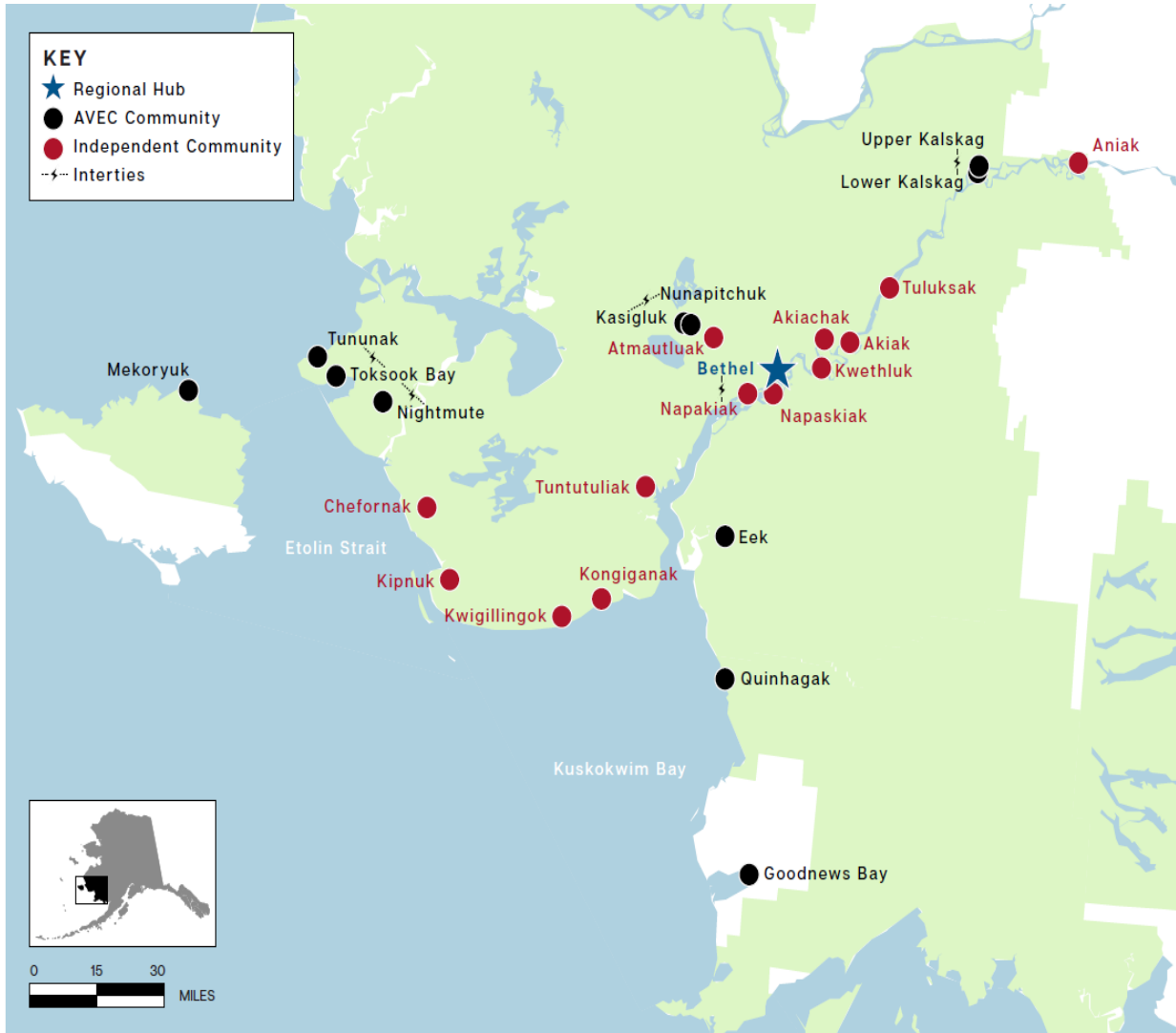


How is AVEC doing?

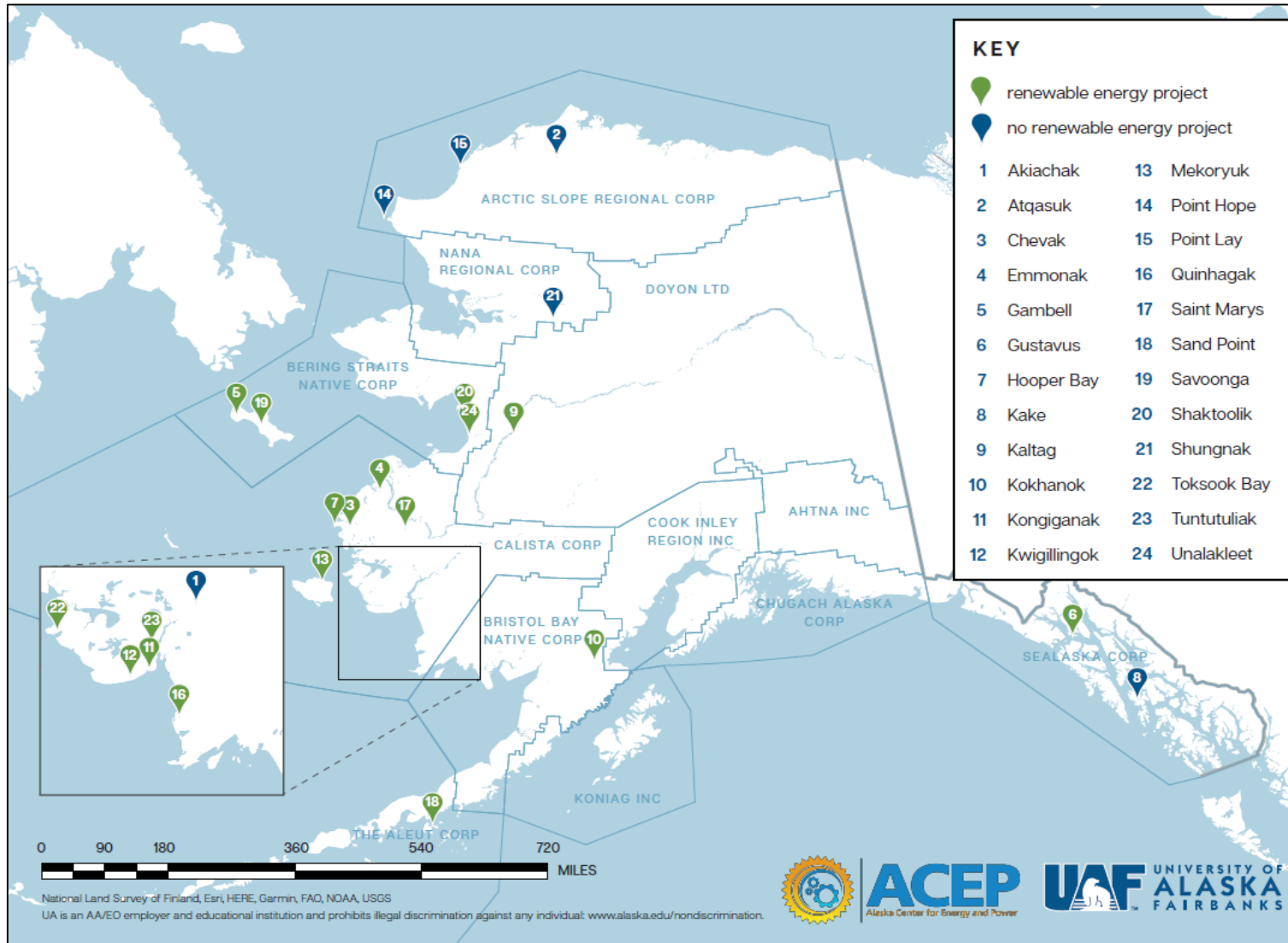


Bethel Census Area Communities
(excluding Bethel)

11 AVEC Communities (median
number of residents = 377)

14 Independent Communities
(median number of residents = 441)

Pathways to Renewable Energy Development



- 37 conditions/factors analyzed using qualitative comparative analysis
- 24 communities included in the analysis
- 3 explanatory factors: high capacity, pooling of resources, no additional subsidy beyond PCE

		Economic	Technological	Social	Political	Environmental	Infrastructural
Screening Criteria	Community is eligible for PCE subsidy	●		●	●		
	Community has economically viable renewable energy resource		●			●	●
	Community is not a regional hub but has >100 residents	●		●	●		
Utility Ownership	Utility ownership type (community or private)			●	●		●
	Membership in the Alaska Village Electric Cooperative				●		●
	The utility shares or pools resources across multiple communities	●		●	●	●	
Power Costs	Partial or total postagestamp rate ^a	●					●
	Fuel price paid by utility for diesel (\$)	●					
	Annual total fuel costs	●					
	The average fuel cost per kilowatt hour (\$/kWh)	●					
	The average nonfuel cost per kWh (\$)	●					
	The cost to generate 1 kWh of electricity before subsidies ^b	●					
	The residential rate for 1 kWh (of electricity) after subsidies	●					
	The commercial rate for 1 kWh after subsidies	●					
Community Power Sales	Total annual electricity sales in kWh		●				●
	The average number of kWh sold to residential customers	●	●				
	Total annual residential electricity sales in kWh		●				●
	The number of the utility's residential customers			●	●		
	Industrial anchor tenant in community is purchasing electric from the local utility			●		●	●
Subsidy	Total PCE eligible kWh sold by the utility		●				●
	The non-PCE eligible kWh sold by the utility		●				●
	Percentage of total kWh sold that are not eligible for PCE		●				●
Community Capacity	The community has an additional subsidy (beyond the PCE)	●		●	●		
	The number of residents in the community			●	●		
	The number of community facilities eligible for PCE			●	●		●
	% of qualifying facilities (i.e., >20 % eligible for PCE subsidies)	●		●	●		
	The % of kWh claimed under the PCE program			●	●		
	The total number of PCE eligible kWh for a community			●	●		●
	Community capacity (as a fuzzy variable)	●		●	●		
Regional Government	The community is located in an organized borough			●	●		
	Total residents in the borough, including remote & non-remote communities			●	●		
	Total number of remote communities within borough			●	●		
	Total tax revenue collected by the borough in 2015	●		●	●		
Poverty	Median household income in area (borough)	●		●			
	Poverty levels (% of residents under the poverty line)	●		●	●		●
	Utility costs to average household income (ratio)	●		●	●		●
	Average household income in the community ^c	●		●			

^a Whether the community has a partial or total postagestamp rate. Inside Passage Electric Cooperative (IPEC) communities have a total postage stamp rate, while Alaska Village Electric Cooperative communities only have a postage stamp rate for non-fuel costs.

^b The cost to generate 1 kWh of electricity before utility and end-user subsidies have been applied.

^c Based on census data [50].

Pathway 1

Community
Capacity

No additional
subsidy

Presence of a
RE Project

Pooled
Resources

No additional
subsidy

Pathway 2

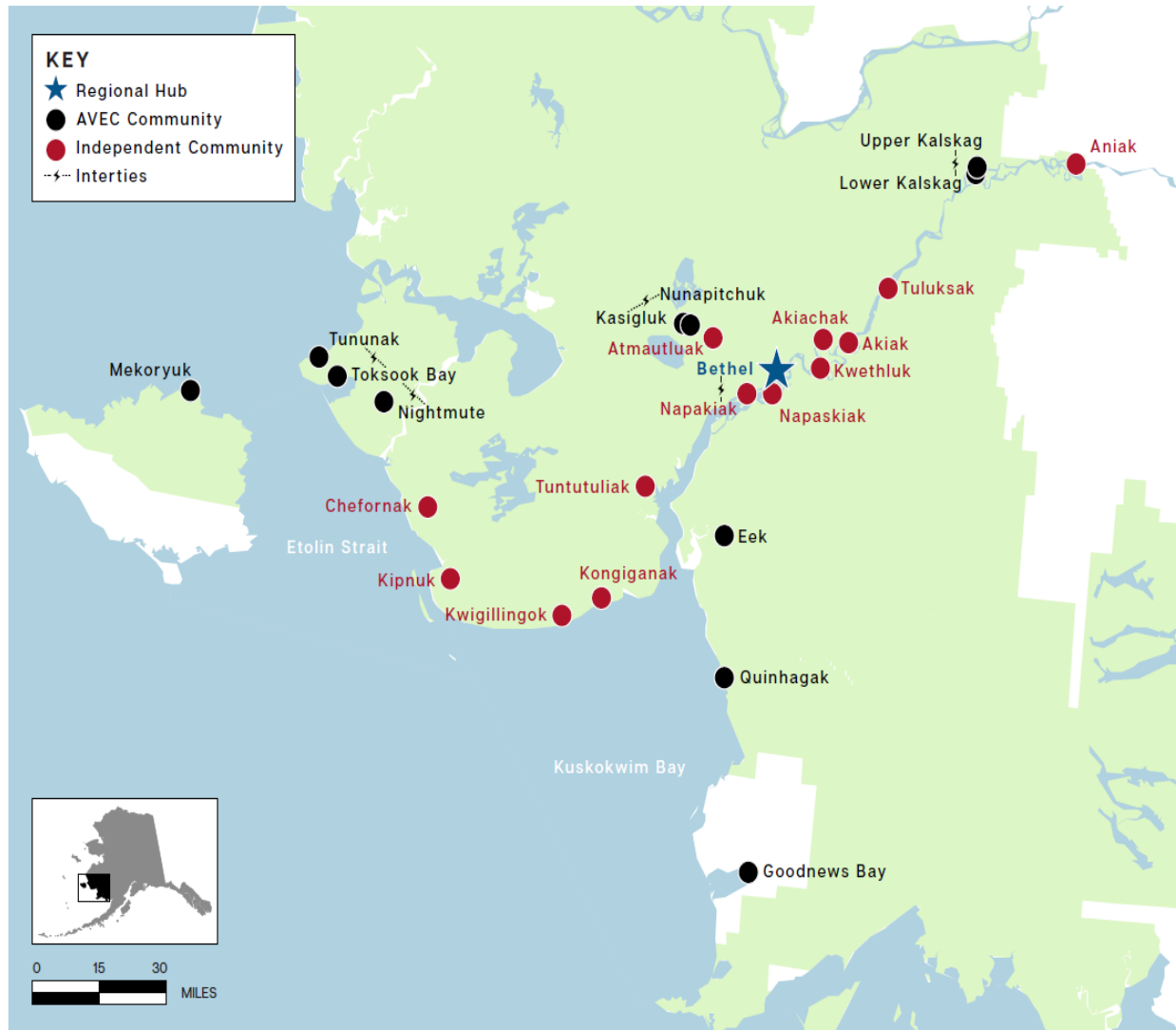


Example:
Unalakleet



Example:
Kongiganak

Analysis of AVEC's Performance



Statistically significant variables:

- 1) Delivered cost of fuel
- 2) Non-fuel costs
- 3) Line loss (kWhs of electricity produced but not sold)
- 4) Diesel efficiency
- 5) Non-PCE rate (\$/kWh)
- 6) PCE rate (\$/kWh)
- 7) Proportion of available PCE credits for qualifying community facilities used

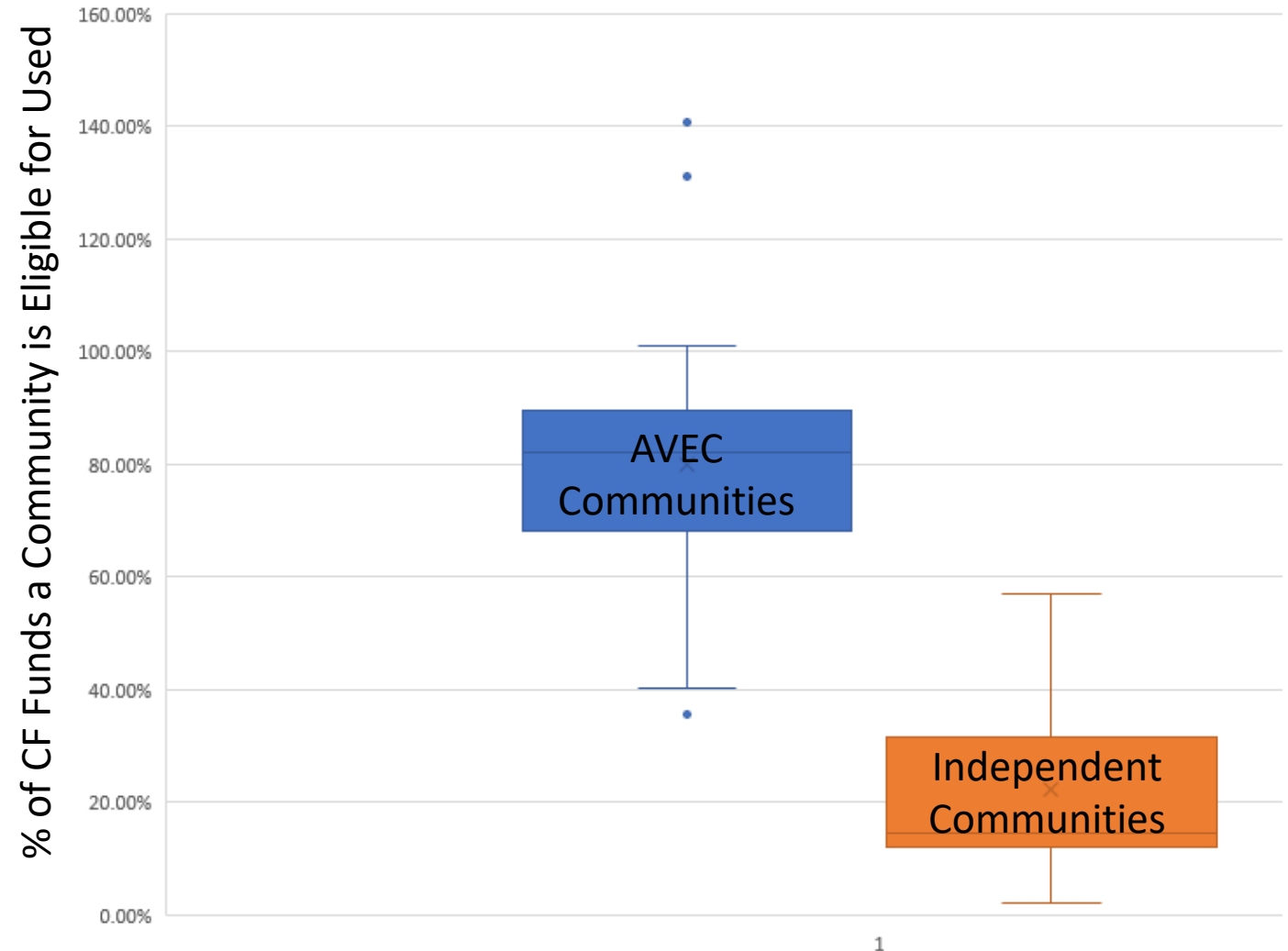
Variables – Statistically Significant

	AVEC (avg)	Independent (avg)	Difference
Line Loss (%)	4.49	8.78	4.29%
Fuel Cost (\$/gal)	2.89	3.11	\$0.22/gal
non-Fuel Cost (\$/kWh)	0.21	0.27	\$0.06/kWh
Fuel Efficiency (kW/gal)	13.4	11.97	1.43 kW/gal
Subsidized Rate (\$/kWh)	0.25	0.32	\$0.066/kWh
Unsubsidized Rate (\$/kWh)	0.52	0.66	\$0.14/kWh

PCE-Eligible Community Facilities

The PCE Program allows communities to apply a subsidy to power used by community facilities such as the washeteria, tribal hall, street lights or water/sewer treatment plant

The maximum allowable sales eligible for the PCE credit (70 kWhs/month/resident)



References (published)

Renewable Energy Integration in Alaska's Remote Islanded Microgrids: Economic Drivers, Technical Strategies, Technological Niche Development, and Policy Implications

by Holdmann, Wies, Vandermeer. Published in Proceedings of IEEE (2019):

<https://ieeexplore.ieee.org/document/8801901>

Critical pathways to renewable energy transitions in remote Alaska communities: A comparative analysis

by Holdmann, Pride, Poelzer, Nobel, Walker. Published in Energy Research and Social Science (2022):

<https://www.sciencedirect.com/science/article/abs/pii/S221462962200216X>

References (to be published ... soon)

- Case History of the Alaska Village Electric Cooperative
- Does Ownership Matter: Quantitative Analysis of AVEC's Performance
- Goldilocks Zone: Balancing Local Control Versus Economies of Scale in Remote Rural Electricity Utilities

