Touring the Electric North

Senate Special Committee On Arctic Affairs

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The “Electric North”

The Electric North refers to regions north of the interconnected continental grids of North America and Eurasia.

These areas are electrically served by a combination of regional grids, small distribution grids, or isolated microgrids.


Settlement by Connection Type
Weakly Tied Regional Grid (302)
Distribution Grid (235)
Isolated Community (771)
Regional grid (716)
End-of-Line (4910)
Electric North Boundary
ARCTIC OCEAN
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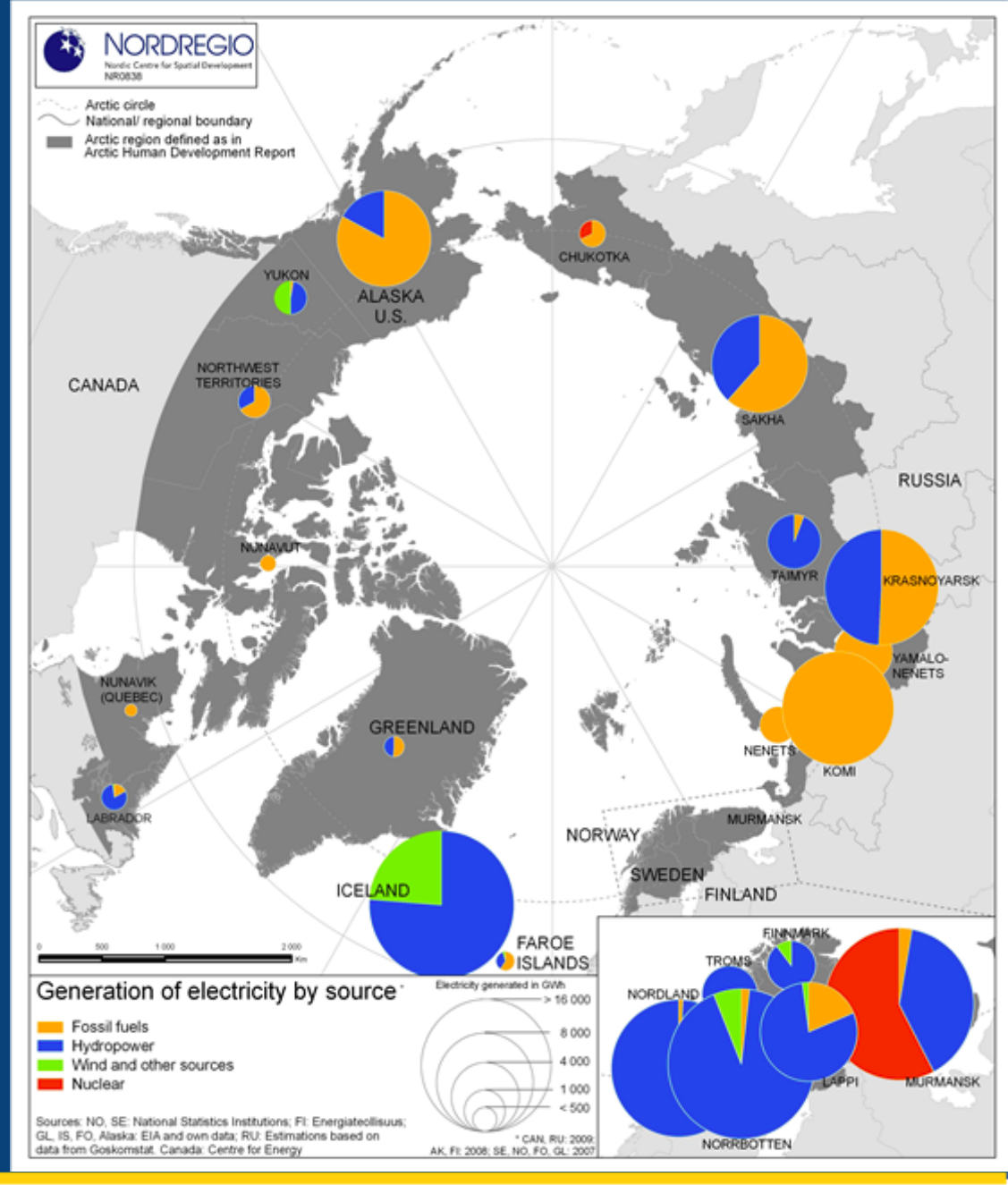
Queen Victoria Sea
Barents Sea
Kara Sea
East Siberian Sea
Beaufort Sea
Bering Sea
Sea of Okhotsk
Baffin Bay
Davis Strait
Hudson Bay
Labrador Basin
Greenland Sea
Norwegian Sea
Gulf of Alaska
Russia
Mongolia
Greenland
Canada
United States
Finland
Sweden
Norway
United Kingdom
Japan
Izevsk
Vyatka
Perm'
Kudymkar
Kotlas
Syktyvkar
Nar'yan Mar
Salekhard
Vorkuta
Murmansk
Narvik
Tromso
Vadso
Hammerfest
Torshavn
Reykjavik
Igarka
Noril`sk
Dudinka
Tura
Longyearbyen
Scoresbyund
Angmagssalik
Nuuk
Godhavn
Thule
Tiksi
Yakutsk
Uttyakh
Blagoveshchensk
Birobidzhan
Khabarovsk
Okhotsk
Magadan
Yuzhno-Sakhalinsk
Palana
Anadyr
Petropavloski-Kamchatskiy
Nome
Inuvik
Yellowknife
Fairbanks
Whitehorse
Anchorage
Seward
Juneau
Prince Rupert
Churchill
Moosonee
Goose Bay
Schefferville
Sept-Iles
3887
5604
6521
9578
6909

The Arctic region is the global leader in renewable energy development

Primary energy source for electric power generation:

- Finland 39% (biomass)
- Sweden 48% (hydropower, biomass)
- Norway 99% (hydropower)
- Iceland 100% (geothermal, hydropower)
- Greenland 70% (hydropower)



Arctic countries are clean technology leaders (example H2/Ammonia in Berlevåg, Norway)

Berlevåg hydrogen production from wind; planned 100 MW green ammonia facility in using renewable power from Varanger Kraft's adjacent wind farm on Raggovidda.

Arctic countries are clean technology leaders
Waste to Energy (Nuuk and Sisimiut, Greenland)

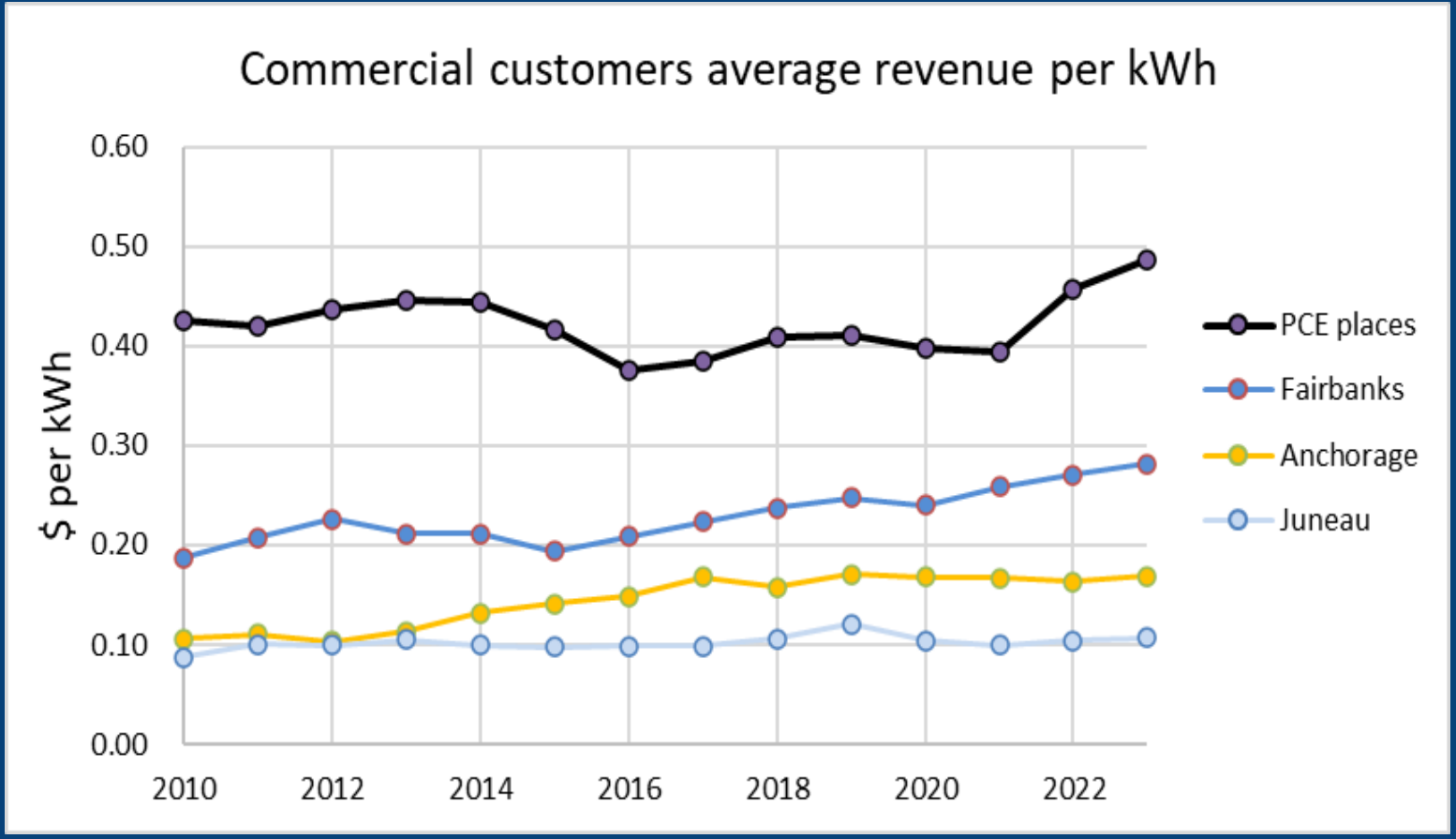
Incinerate municipal waste generated locally and imported from surrounding communities and use it for space heating

Remote communities are largely diesel-dependent

Longyearbyen, Svalbard (Norway). The furthest north permanently inhabited settlement in the world.

Diesel power module in foreground with shuttered coal plant in the background.

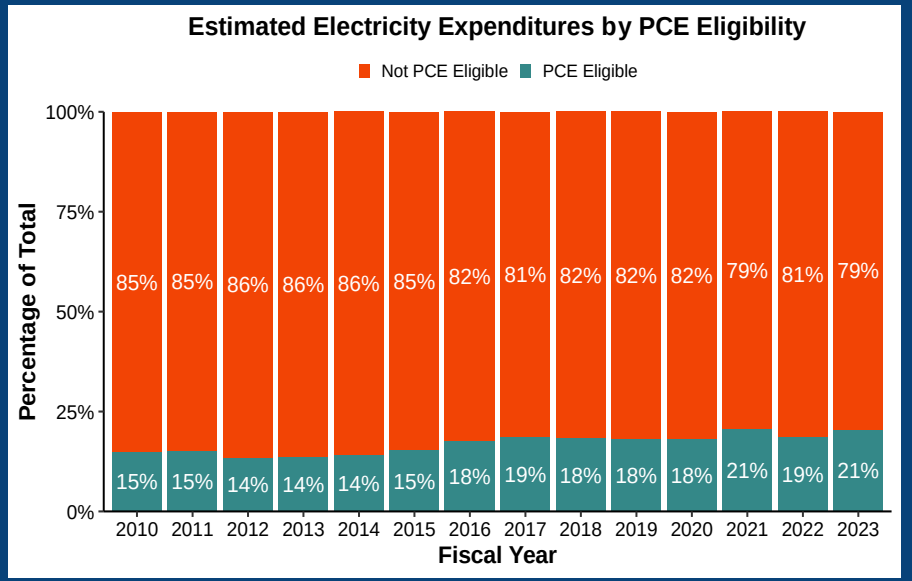
Diesel-based communities face high energy costs



(Above) Comparison of residential prices for electricity – Juneau, Anchorage, Fairbanks and PCE-eligible communities

(Bottom) Proportion of expenditures for electricity covered by the PCE program.

This price support is lower than any other Arctic country.



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Varied Price Support for Rural Residents – example from Greenland:

- 70% hydro from 5 projects
- “unified rate” is 24 ¢/kWh for residents
- Fisheries get a 58.5% discount on the local electricity generation costs; equates to rates of 10-24 ¢/kWh
- Alaska and Greenland have inverse structures for subsidies – Greenland prioritizes critical industries, Alaska prioritizes residential consumers.

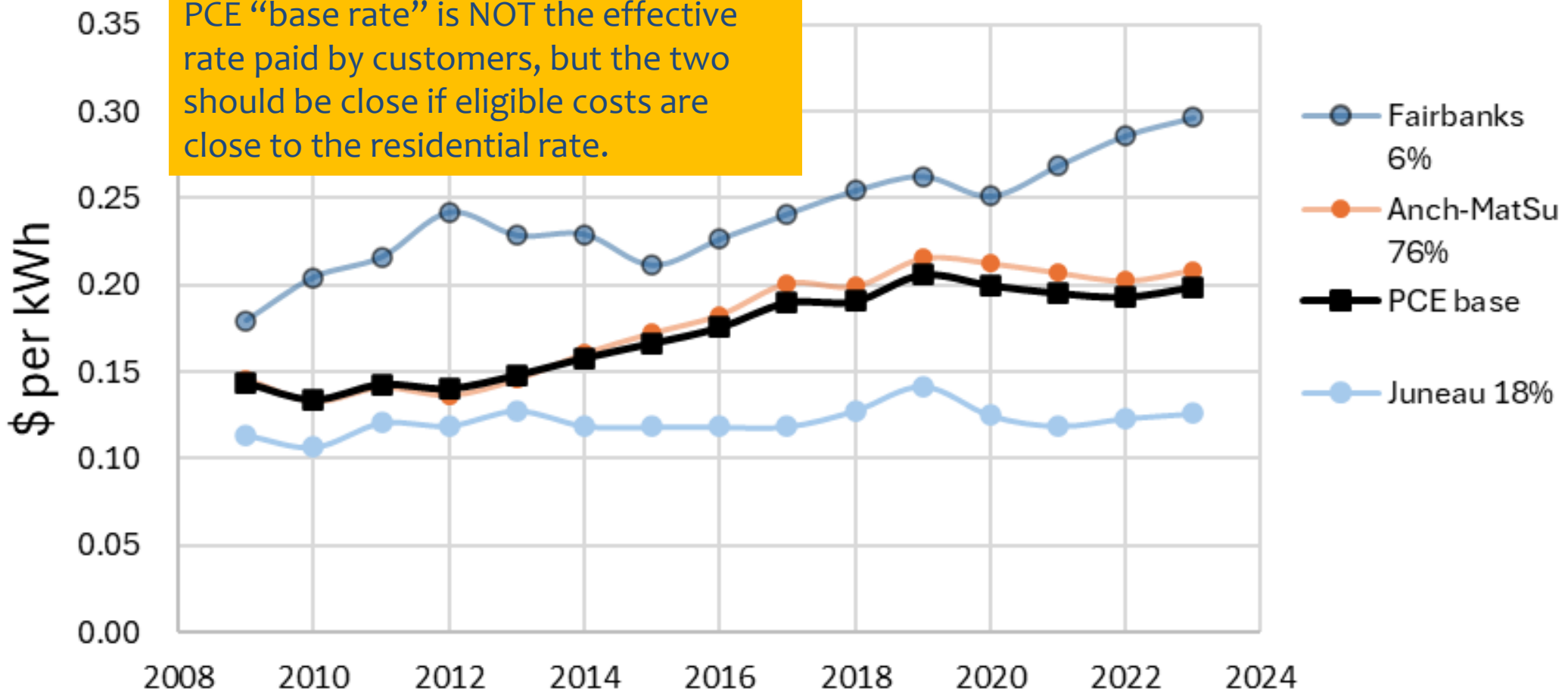
Sources: Naalakkersuisut, 2018

Varied Price Support for Rural Residents – example from Canada:

- Canada's utilities are mostly "Crown Corporations". Most use postage stamp rates of some sort.
- Subsidies vary by territory; in Nunavut, for example, low-income residents—who make up approximately 35% of the population—pay only $0.06 per kilowatt-hour (kWh) for electricity.

PCE base rate and its components

PCE "base rate" is NOT the effective rate paid by customers, but the two should be close if eligible costs are close to the residential rate.



Source: RCA PCE base rate determinations. Dockets U-24-011, U-23-10, U-22-021, U-21-19, U-20-17, U-19-28, U-18-032, U-17-031, U-16-056, U-15-074, U-14-80, U-13-110, U-12-073, U-11-069, U-10-030

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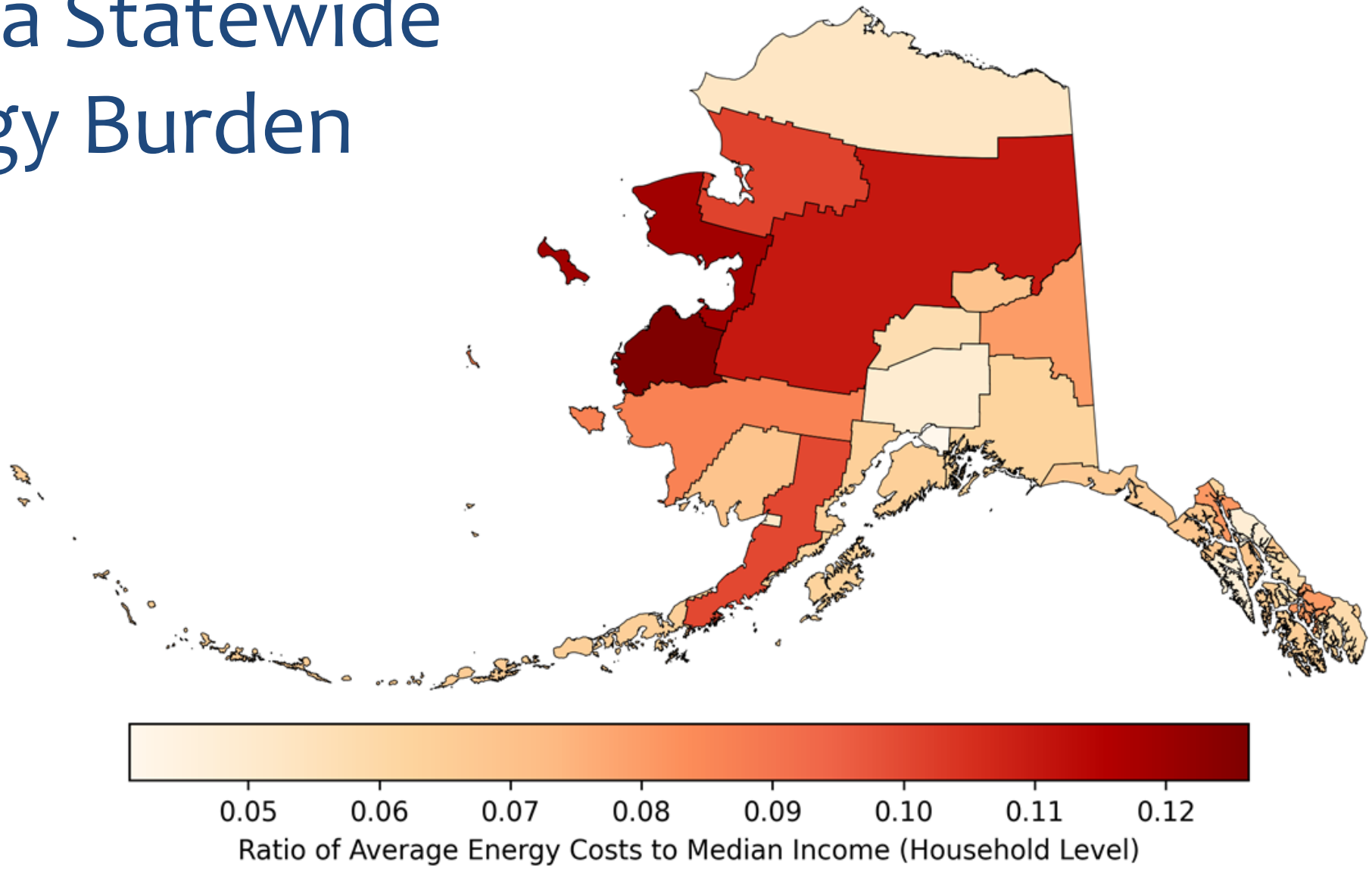
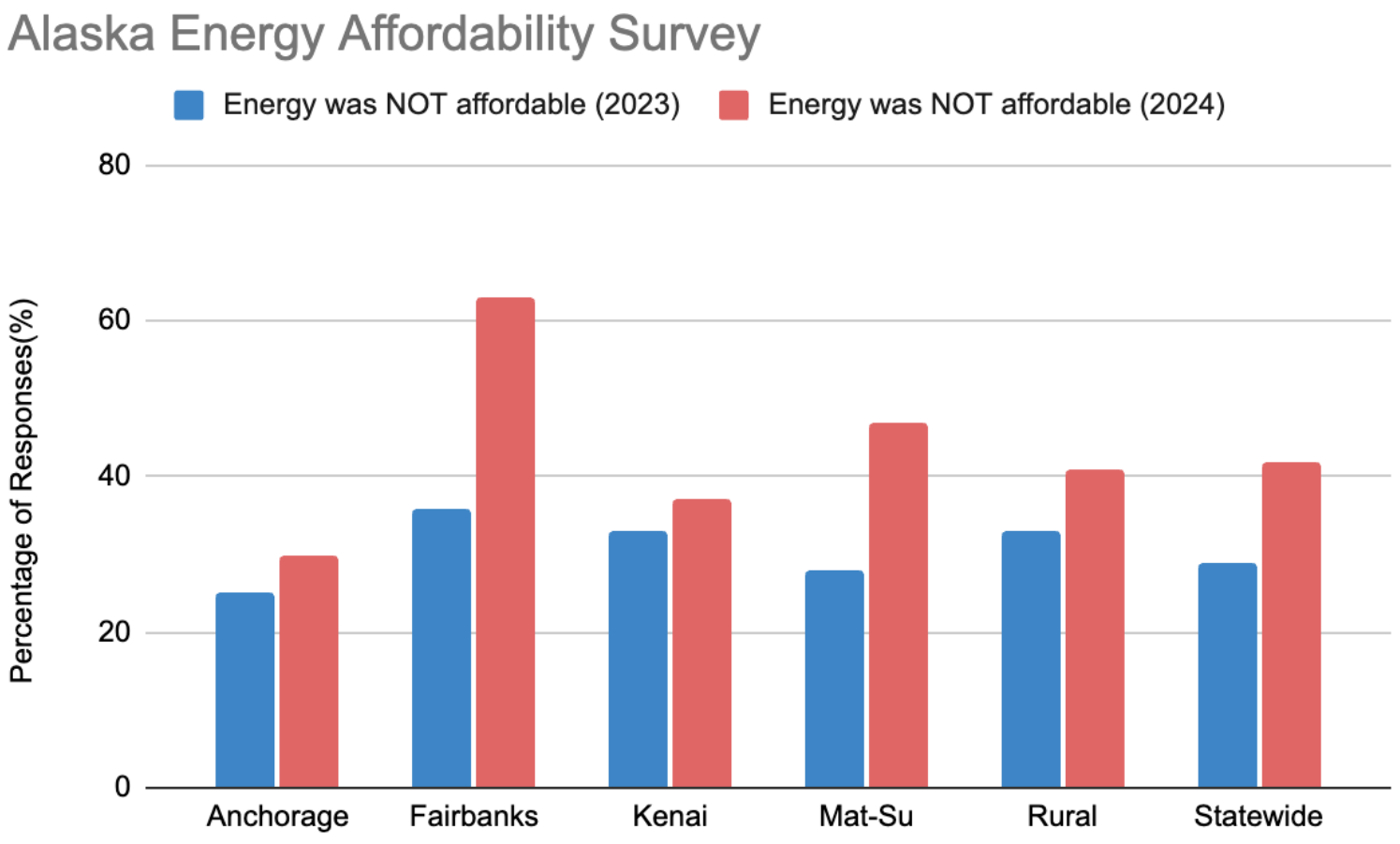
Alaska Statewide Energy Burden



Energy cost estimates are from the Alaska Housing Finance Coorporation's 2018 Housing Assesment. All data, including prices, are from 2017 are represent single family homes. Energy costs include space heating and electricity. Income data is the median household income from the American Community Survey 5-year estimates.

More Alaskans find energy bills to be unaffordable



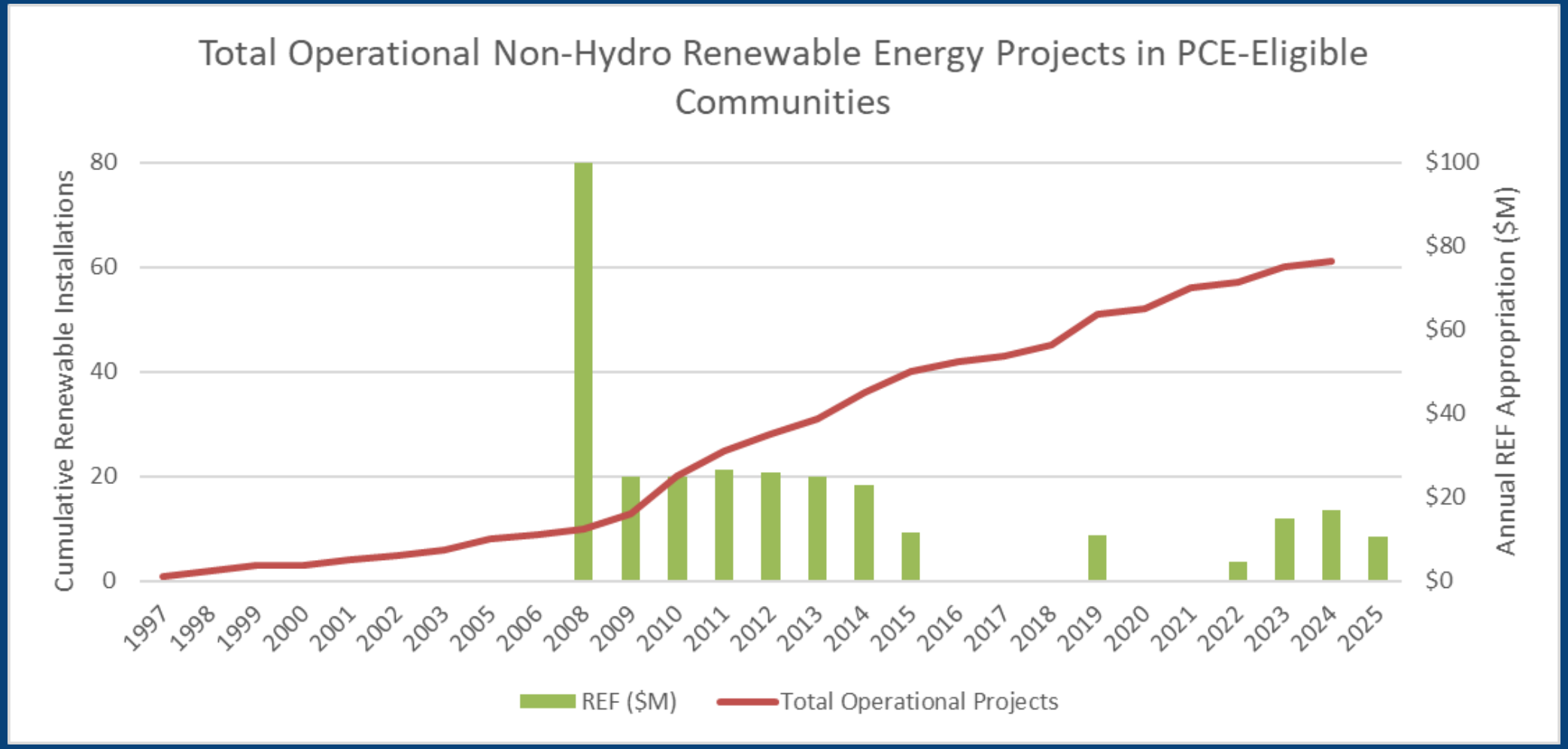
- Multi-modal survey of 600 registered voters in Alaska. Conducted via phone and online by ACEP/S360. Error +/14%
- Polls administered 16 months apart (May 2023 and September 2024)

Alaska leadership in renewables

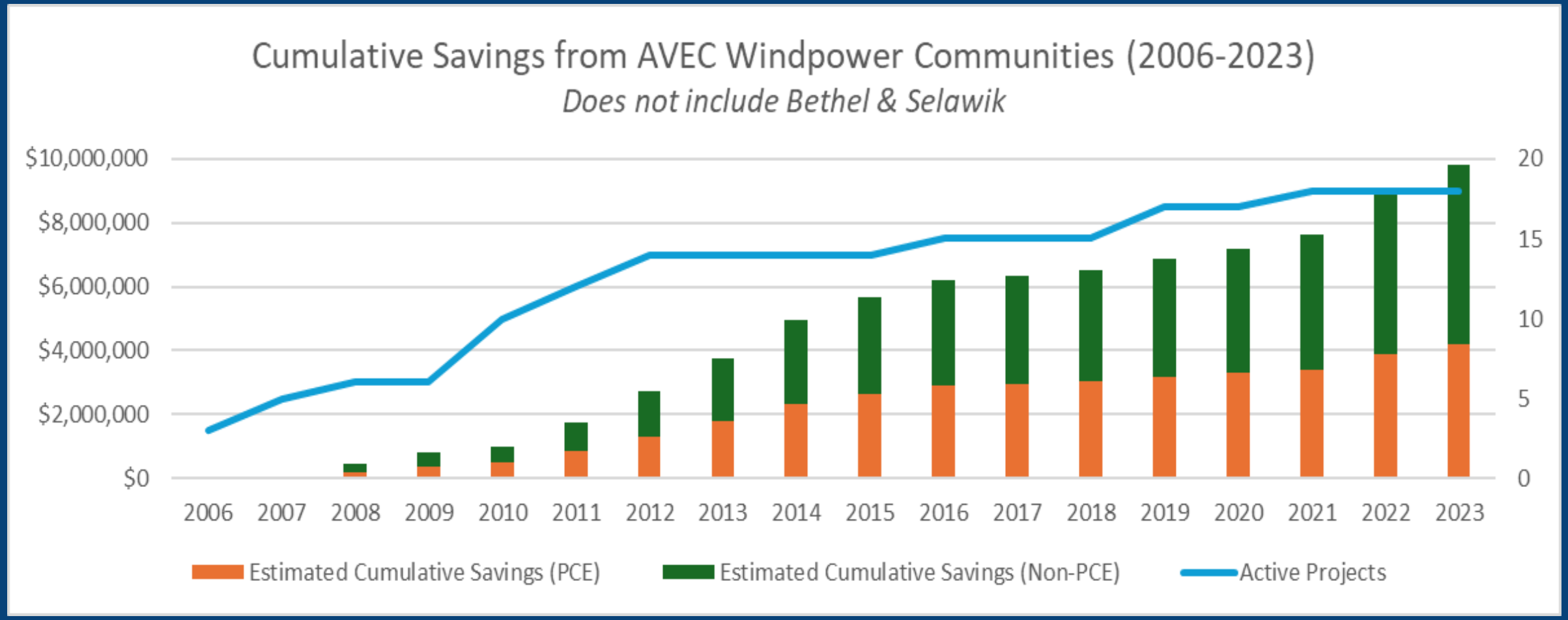
- Alaska has by far the most renewably-powered microgrids of any country in the Arctic.
- Alaska utilities and communities are sharing their expertise in this area (example: Arctic Remote Energy Network Academy).

2022-23 ARENA cohort in Kotzebue
2024-25 cohort is enroute to Iceland!

REF was a key catalyst for renewables



Renewables are resulting in lower cost power



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Thank you!

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