

Are micronuclear reactors an option for Alaska?

Gwen Holdmann,

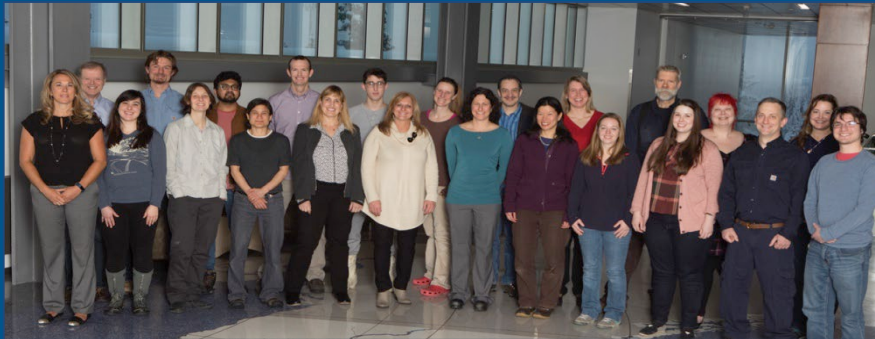
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Alaska Center for Energy & Power

Mission: Fostering development of practical, innovative and cost effective energy solutions for Alaska and beyond

- ❖ Applied energy research program
- ❖ Technology testing & optimization
- ❖ Energy systems modeling & analysis
- ❖ Knowledge network creation
- ❖ Commercializing energy innovation



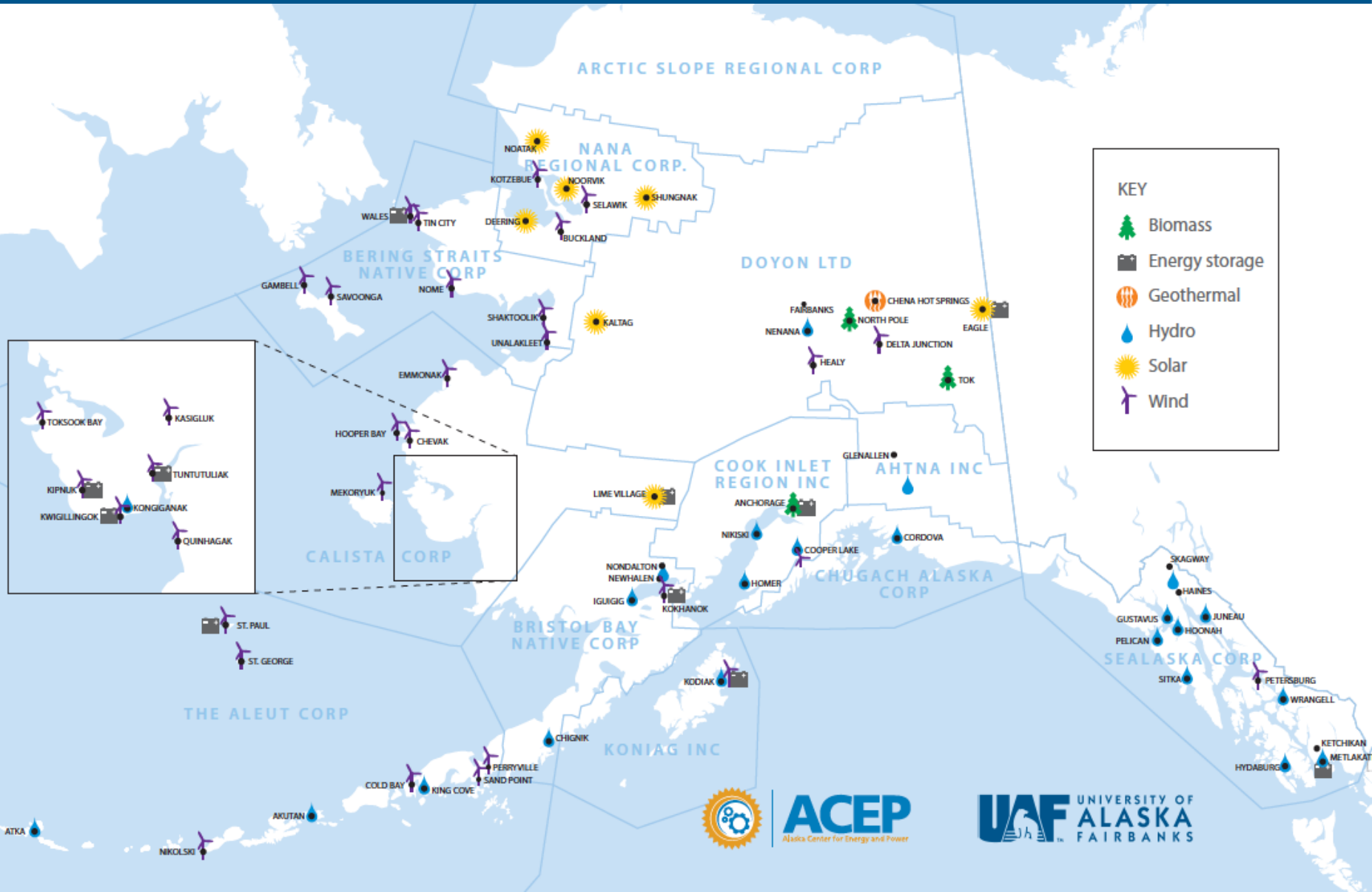
Context for 2010 Study on SMRs

“Small Modular Nuclear Power: *an option for Alaska?*”

- Requested by Alaska State Legislature in 2009
- Response to 2008 Global oil price spike that exposed vulnerabilities of Alaska to annual (and intra-annual) fluctuations in oil prices
- Interest in solutions that can provide baseload power (many remote locations only have access to intermittent renewables)
- Interest in options that can offset heating loads as well as electric power



Over 70 Communities in Alaska are served by renewable energy-powered microgrids



Example of Variability in Community Load



The challenge of incorporating variable renewable resources is exacerbated by daily and seasonal load swings

*Data provided by
Cordova Electric
Cooperative*

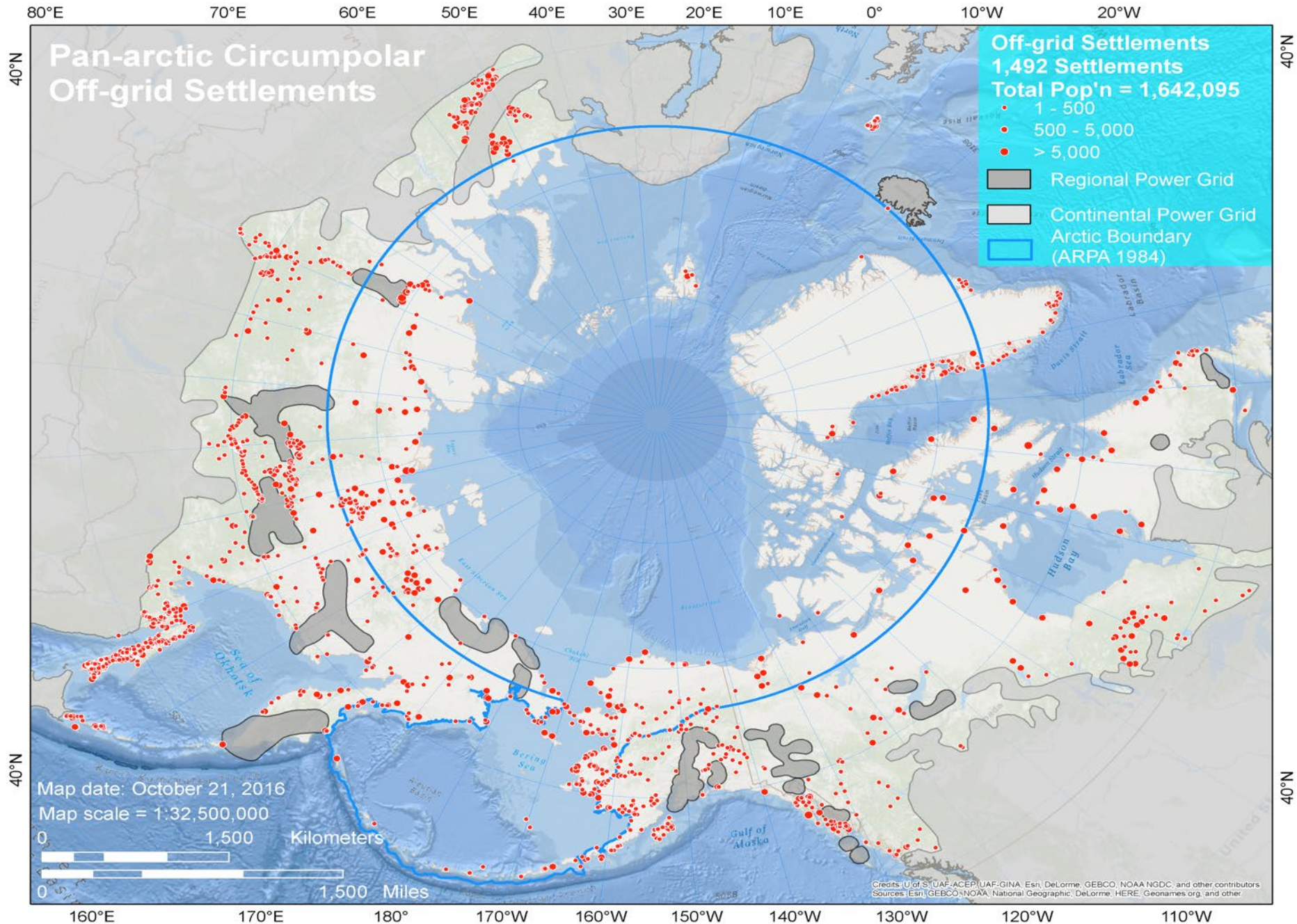


Diesel Generation – the status quo



Complex logistics and storage of fuel to provide reliable diesel-based power in rural Alaska. Top left, tank farm in Kongiganak; bottom left, diesel power house in Anaktuvuk Pass.





Diesel (Fuel Oil) for Space Heating

In rural Alaska, 80% of energy is used for heating.*



Example of typical residential heating system in Huslia (top); Healy and Renda deliver fuel oil to Nome in 2012 (left)

* WHPacific Report: “Alaska Energy Authority End Use Study: 2012”, April 30, 2012

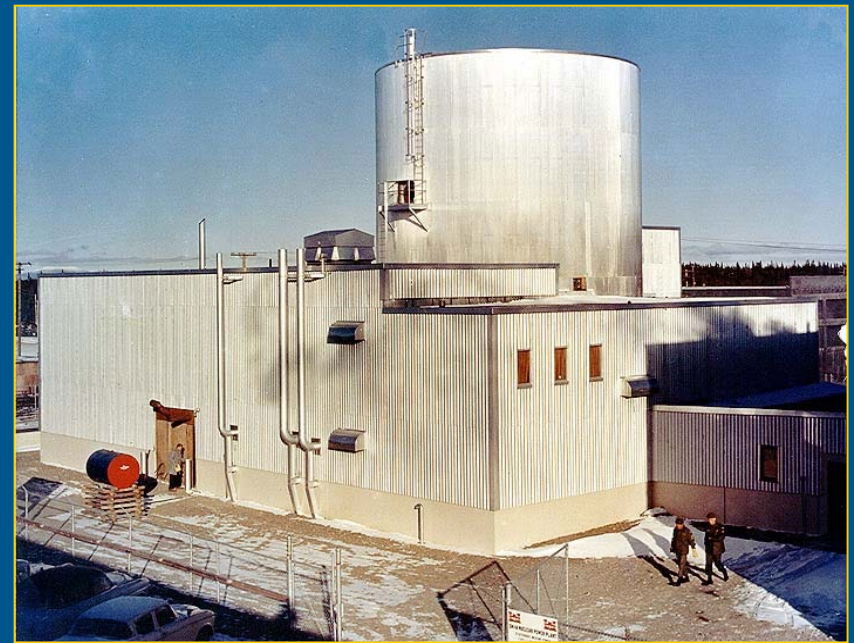


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Small Modular Nuclear Power: *an option for Alaska?*

2010 Report published by ACEP and ISER

- Review history of nuclear technology utilization in Alaska
- Consider technical and economic feasibility of proposed SMR technology
- Assess siting and permitting requirements/barriers to implementation
- Host a workshop as a forum for discussion and knowledge exchange
- Create recommendations and develop a roadmap for the State of Alaska

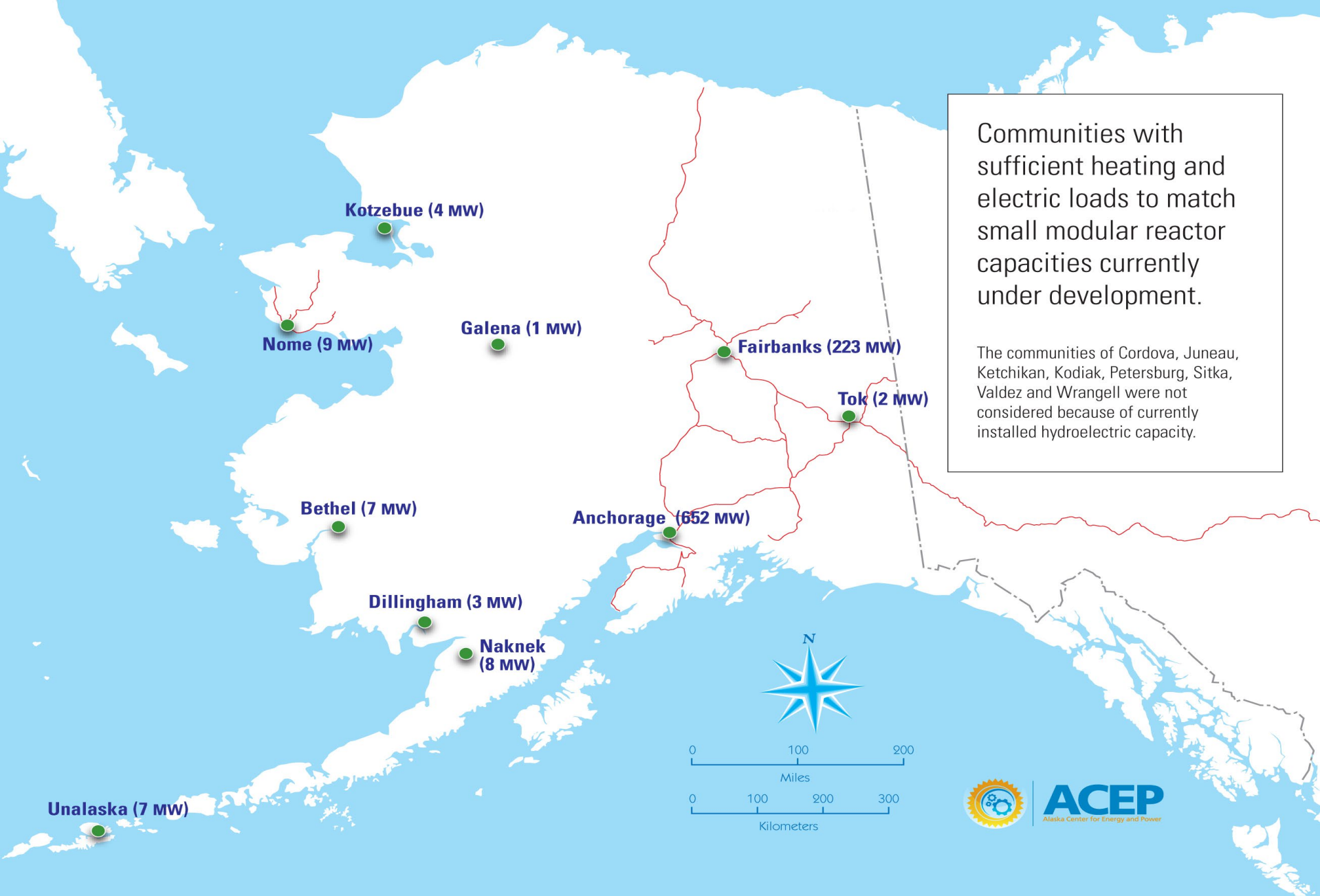


Fort Greely SM1 primary reactor facility.
Commissioned in 1962, decommissioned in 1972.
20.2 MW_{th}, generated 1.6 kW_e

Report Findings

- Lots of proposed designs exist, but what most people consider small is quite big by Alaska standards.
- The technology is not mature, with detailed engineering data for most small reactor designs only 10-20% complete, and very preliminary cost data is available.
- Current project investment decisions cannot be made, since the technology is not expected to be available for a decade or more.
- There are limited sites for deploying SMRs exist in Alaska.





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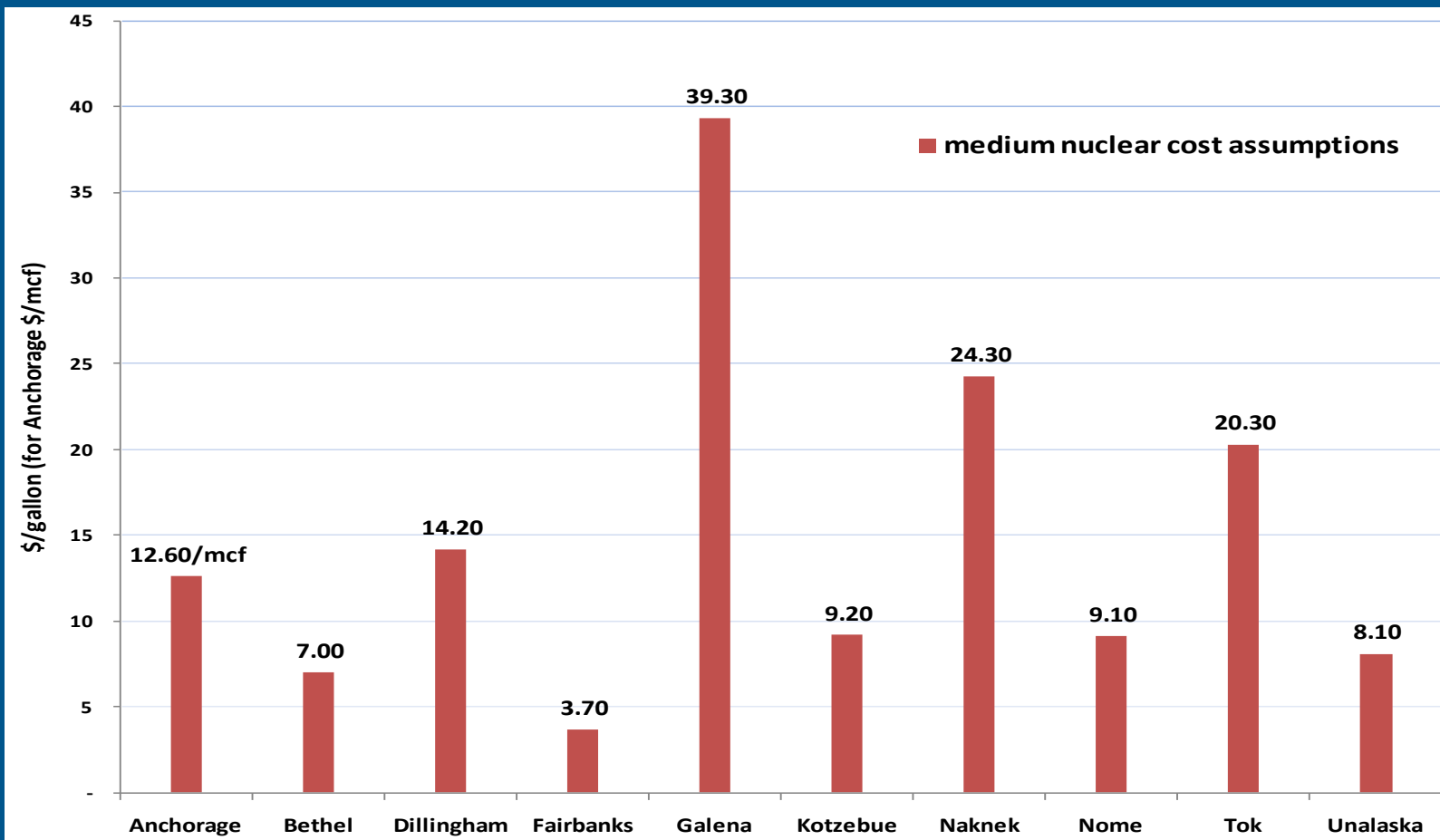


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Local Price Thresholds

(for SMR economic feasibility)



Other Possible Locations

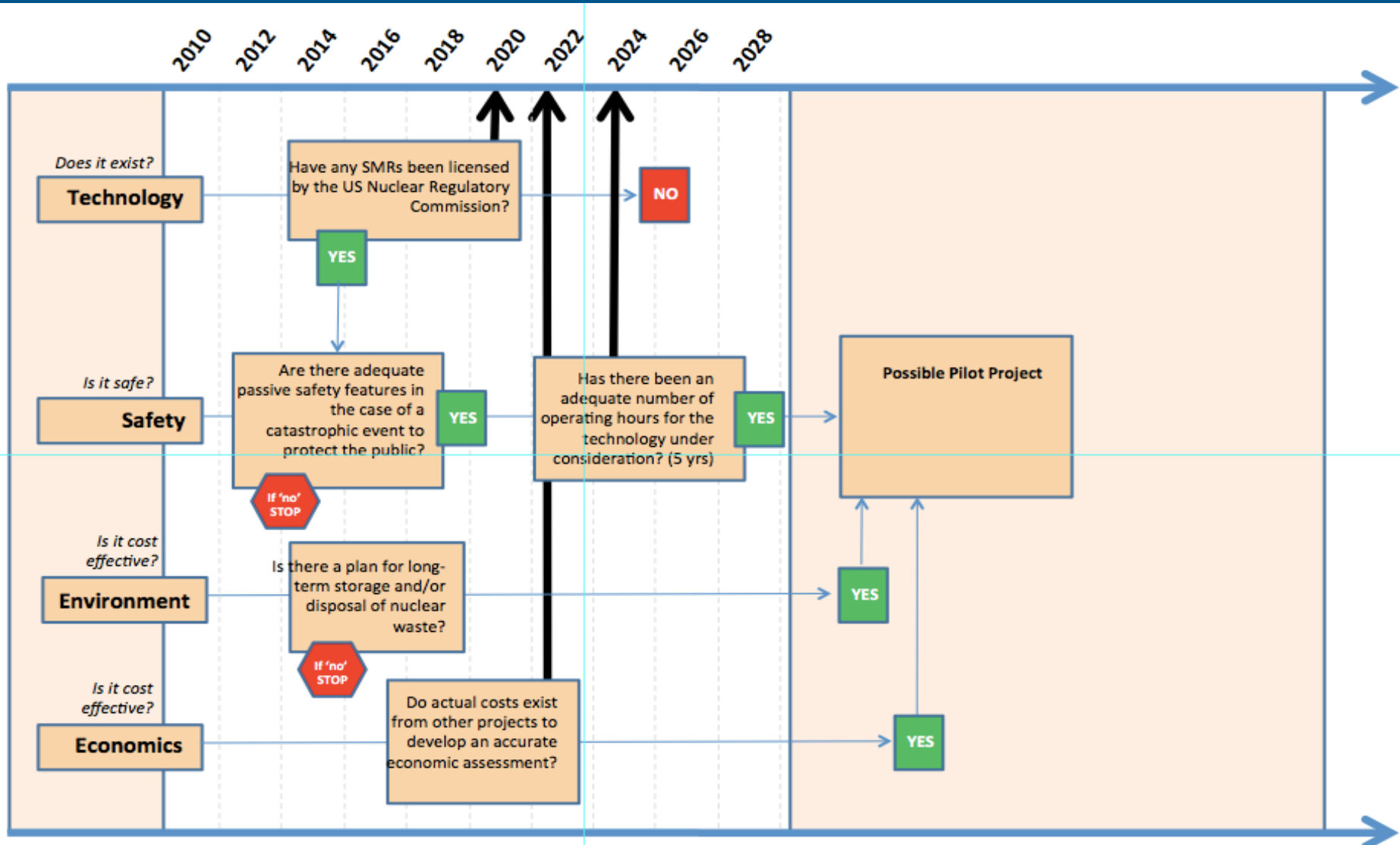


Military bases (image of Fort Wainwright)



Mining Operations (Image Red Dog Mine)

Alaska Roadmap



Whale oil exported from Alaska circa 1880's



Images courtesy of the Museum of the North
archives, University of Alaska Fairbanks



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Cordwood used to fuel paddlewheelers in



*Images courtesy of the Museum of the North
archives, University of Alaska Fairbanks*

Question: Is there a future where microreactors replace diesel generation in Alaska?



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Thank you!

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