Small Hydropower in Southcentral Alaska

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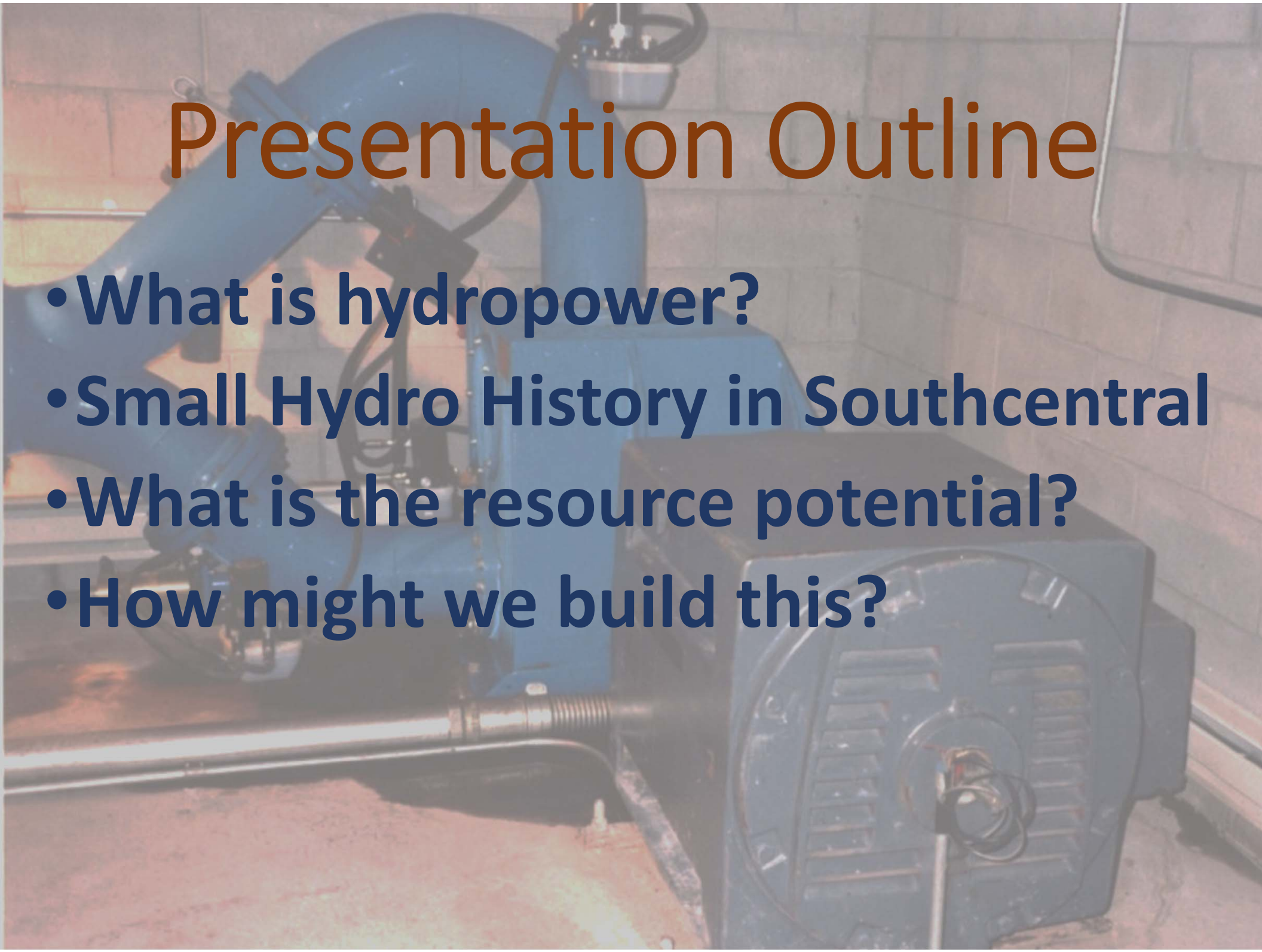
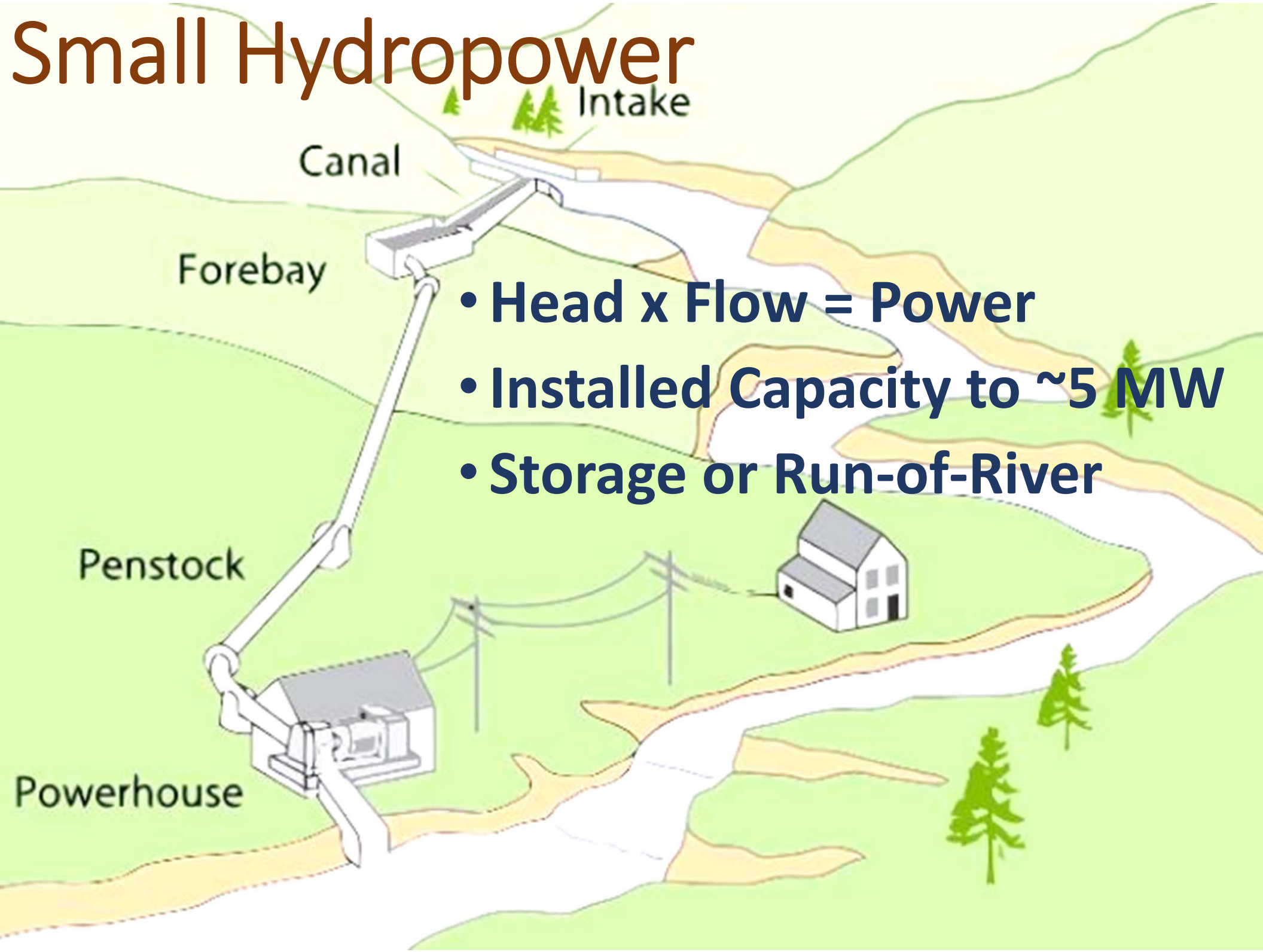


Presentation Outline

- What is hydropower?
- Small Hydro History in Southcentral
- What is the resource potential?
- How might we build this?

Small Hydropower



- **Head x Flow = Power**
- **Installed Capacity to ~5 MW**
- **Storage or Run-of-River**

Big Storage Hydro

Bradley Lake
Homer, Alaska
120 MW

Small Storage Hydro

Chuniisax Creek
Atka, Alaska
270 kW

Big ROR Hydro

Forest Kerr Project
British Columbia, Canada
195 MW

Small ROR Hydro

Juniper Creek
Eagle River, Alaska
300 kW

2. Small Hydro History

Early generation in Southcentral

- Canneries – 1910s
- Mines (Hatcher Pass, etc.) 1910s – 1950s
- Communities (Seward, Valdez, others…)
- Eklutna River (2 MW, 1920s)

…Hydro History & Lessons

Hydro Independent Power Producers (IPPs)

- 1991 – 100 kW McRoberts Creek ($0.04 / kWh)
- 2013 – 1.1 MW South Fork ($0.07 / kWh)
- 2021 – 300 kW Juniper Creek ($0.07 to 0.08 / kWh)
- No government subsidies!
- Short lead (2 to 50 years)!
- Unique circumstances – not commercially replicable
- Intriguing potential…

→ OLD HYDRO IS THE CHEAPEST POWER THERE IS.

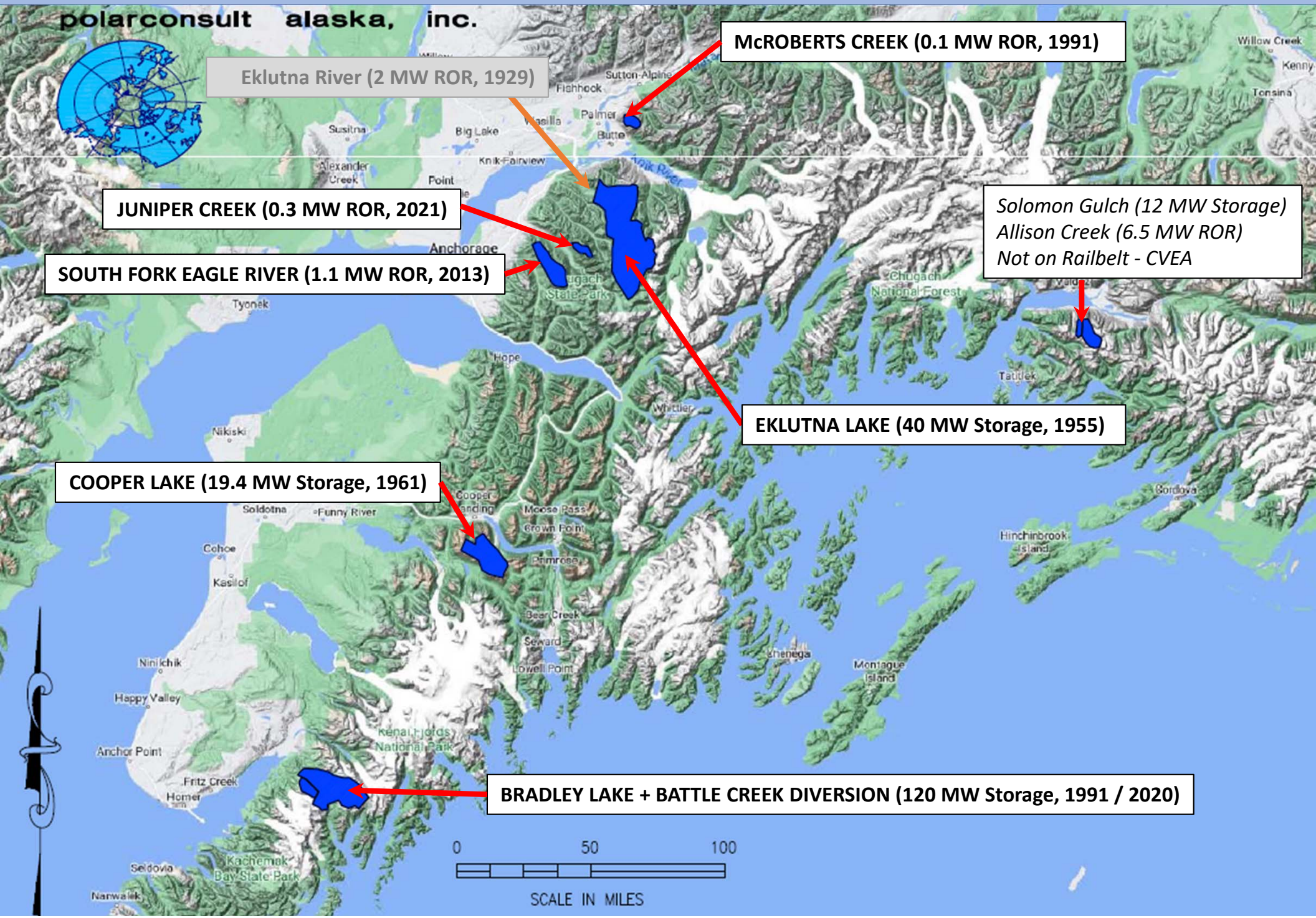
→ IPP SMALL HYDRO IS ON THE CUSP OF COMM. VIABILITY.

3. Small Hydro Resource Potential

How much are we talking about?

Existing Grid-tied Hydropower in SCAK

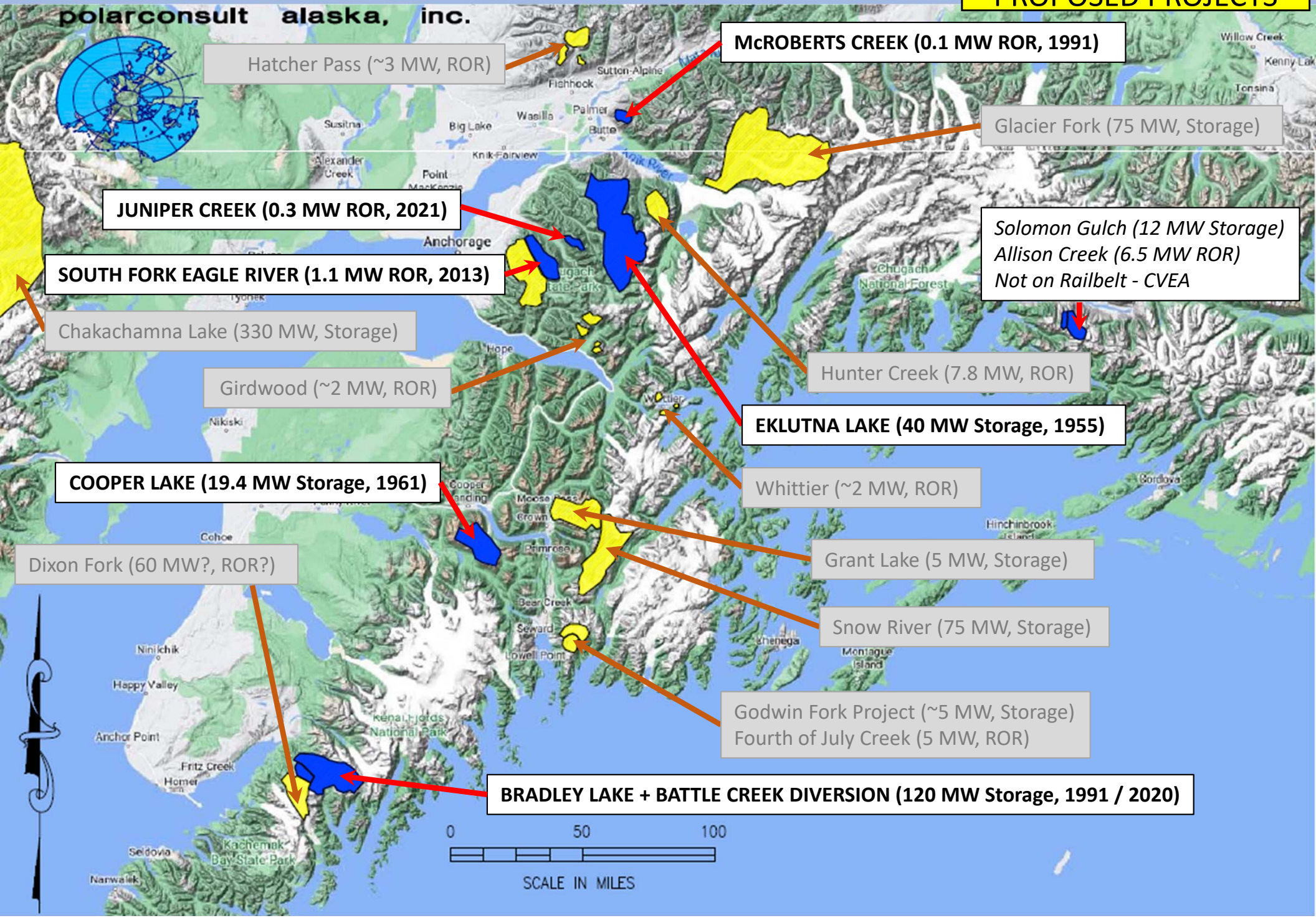
EXISTING PROJECTS



Existing / Proposed Grid-tied Hydropower

EXISTING PROJECTS

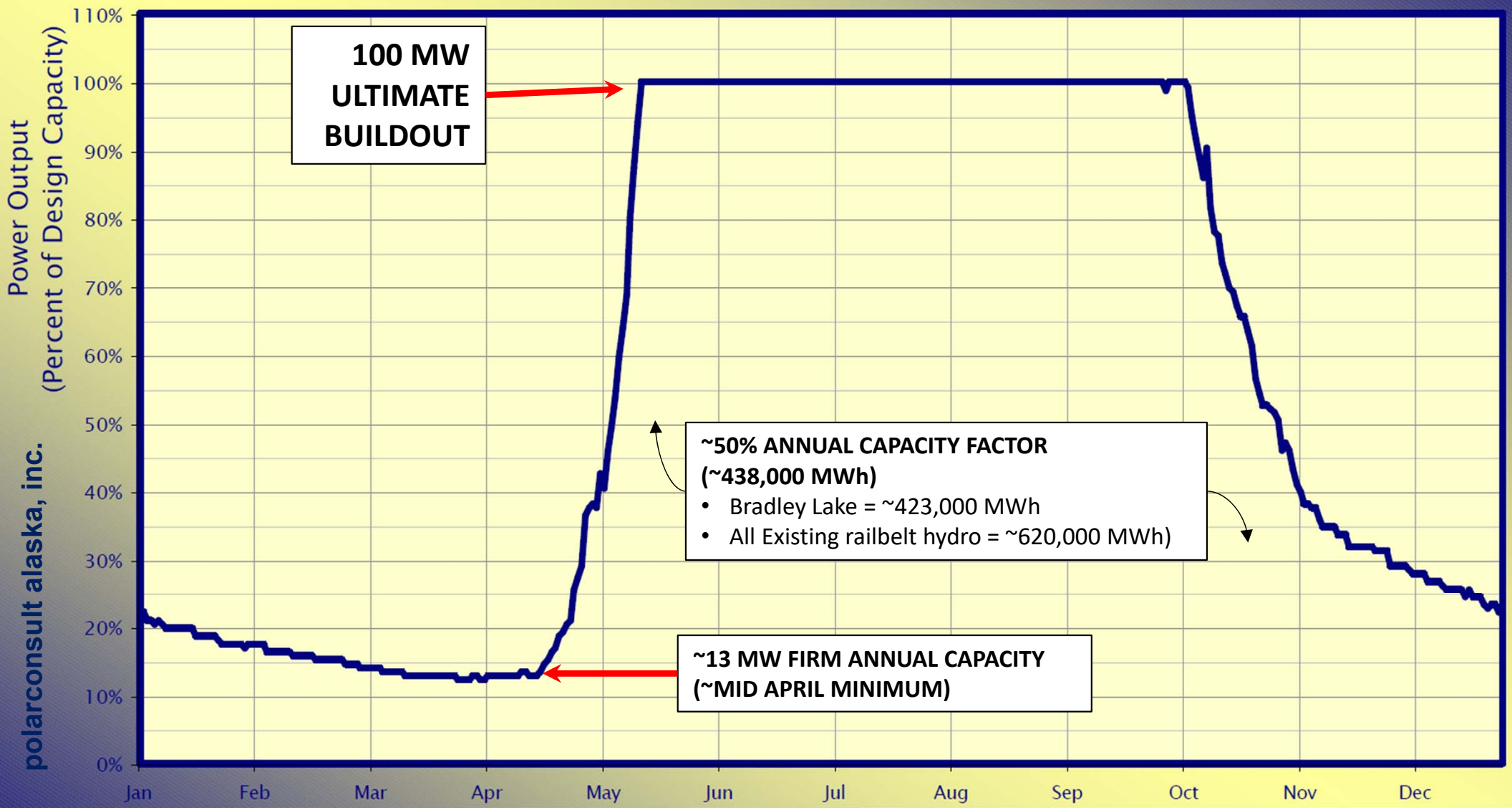
PROPOSED PROJECTS



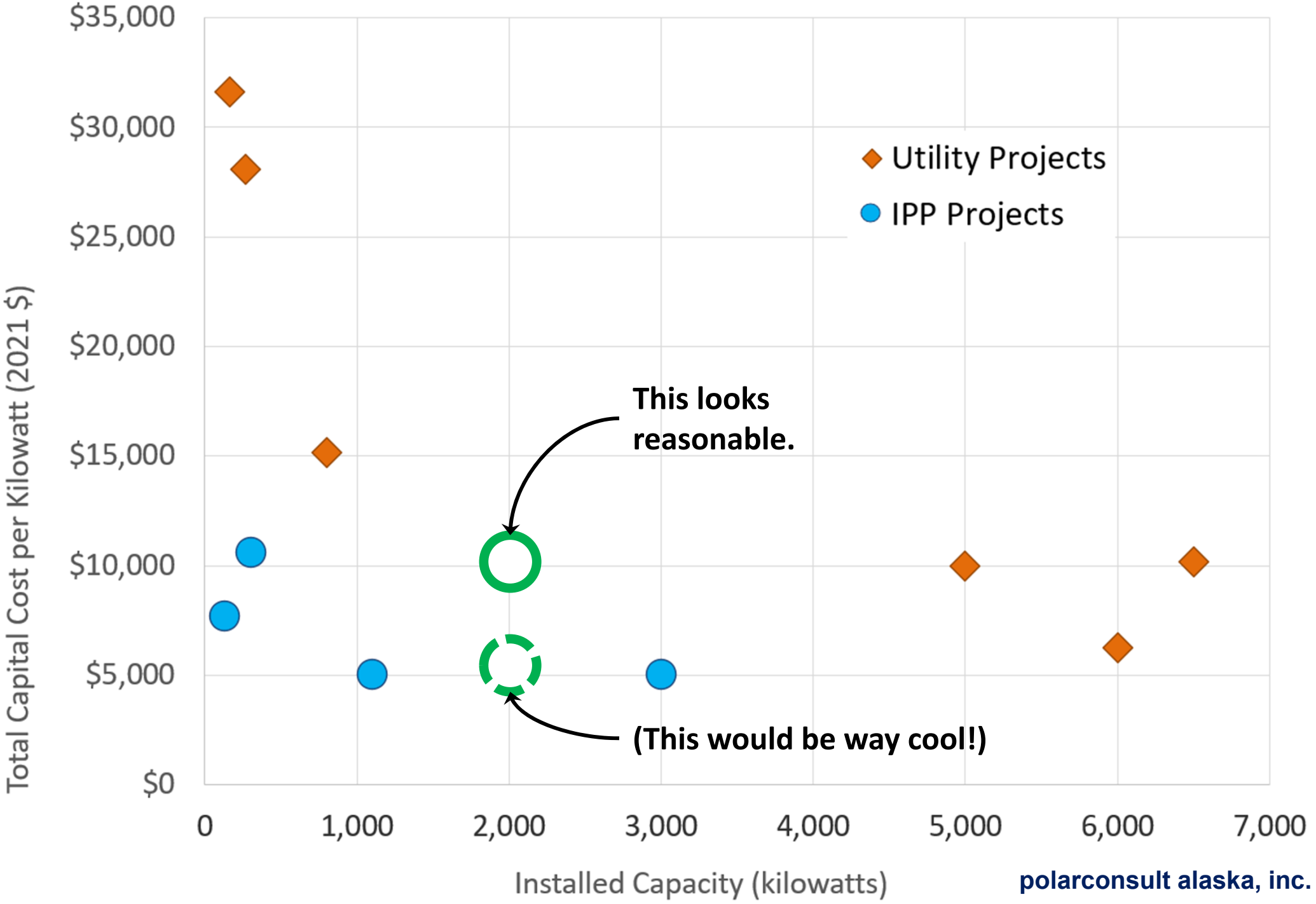
SOUTHCENTRAL SMALL HYDRO RESOURCE POTENTIAL

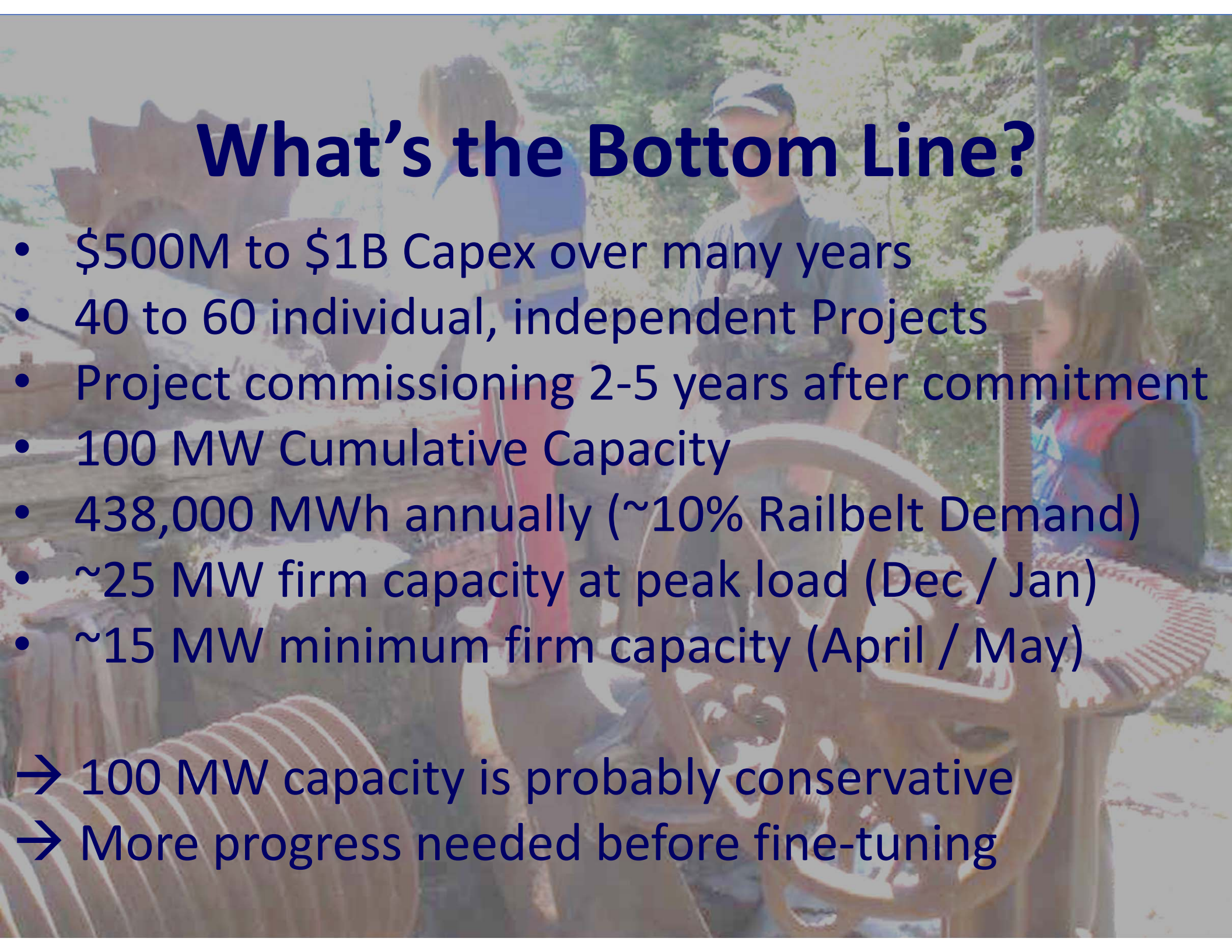
- 100 MW small hydro capacity is achievable
- Roughly equal to 2nd Bradley Lake Project
- Environmentally sustainable
- Distributed Generation (~40-60 projects)
- Recreational Enhancements
- Grid Resiliency Benefits
- Distributed Risk (development, operation, natural disaster, etc.)

RUN-OF-RIVER HYDROPOWER GENERATION



COST?


$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
Total Capital Cost per Kilowatt (2021 $)
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
Installed Capacity (kilowatts)
Utility Projects
IPP Projects
This looks reasonable.
(This would be way cool!)



What's the Bottom Line?

- $500M to $1B Capex over many years
- 40 to 60 individual, independent Projects
- Project commissioning 2-5 years after commitment
- 100 MW Cumulative Capacity
- 438,000 MWh annually (~10% Railbelt Demand)
- ~25 MW firm capacity at peak load (Dec / Jan)
- ~15 MW minimum firm capacity (April / May)

→ 100 MW capacity is probably conservative
→ More progress needed before fine-tuning

4. Barriers to Small Hydro on the Railbelt

Three new projects totaling 1.5 MW in 30 years is not a solution.

Small Hydro Barriers

- **Regulatory Reform**

→Permit Agencies need binding, uniformly applied decision deadlines

→Reform to state land authorization processes

- **Market Reform**

→Utilities recognize full value of hydro projects

→De-monopolize (monopsonize) energy market

Thanks for Listening!

Questions?

polarconsult alaska, inc.