ABSAROKA ENERGY

- Over 12 years of renewable energy development experience.
- Leading developer of pumped storage hydro in the United States.
- Developing projects that increase grid reliability and resiliency including:
  - Pumped Storage Hydro
  - Modular Pumped Storage Hydro
DEVELOPMENT LOCATIONS

- Green circles: Pumped Storage Projects
- Blue squares: Modular Pumped Storage Projects
- Orange triangles: Transmission Projects
RENEWABLES IN ACTION
CHARACTERISTICS OF WIND

FIRE ISLAND WIND ENERGY - ANCHORAGE, ALASKA

Typical 12-Month Wind Profile, Eastern Montala
CHARACTERISTICS OF SOLAR
WILLOW SOLAR FARM - ANCHORAGE, ALASKA
TYPICAL DAILY SOLAR PRODUCTION
YUKON, CANADA
GRID INSTABILITY IN ACTION
NEW YORK CITY BLACKOUT, 2003
GORDON BUTTE PSH
ULTIMATE FLEXIBLE CAPACITY

A ROBUST TOOL FOR VARIABLE GENERATION INTEGRATION
DAILY OPERATION OF PSH
GORDON BUTTE MODEL

[Graph showing daily operation of PSH with labels for Generation Drop and Daily Solar Peak]
REAL-TIME PSH DISPATCH
SIMULATED 24 HOUR OPERATION OVER CRITICAL PEAK DAY, 2019

= Reserve Regulation

= Peak Shaving

= Energy Arbitrage
ABSAROKA’S PSH OFFERINGS

CLOSED-LOOP UTILITY SCALE

OVER 50 MW

MODULAR PSH

1 - 50 MW
CLOSED-LOOP UTILITY SCALE HIGHLIGHTS

- Installed Capacity: **400 MW**
- Estimated storage: **3,400 MW/hours**
- Equipment Units: **3 pairs**
- Off-stream, closed-loop
- Not connected to surrounding fisheries or watersheds
- Evaporative makeup estimated at 5% - 10% annually
MODULAR HIGHLIGHTS

- Scalable
- Minimal environmental impact
- Under 1 MW to 10 MW systems
- Off-the-shelf components to reduce costs
- Off-stream, closed-loop
- Not connected to surrounding fisheries or watersheds
- Esthetically integrates into the surrounding landscape
- Designed to minimize seepage and evaporative losses
RAILBELT + PSH

- Operates like a giant water battery
- Reduces reliance on fossil fuels and protects against fuel pricing variation
- Provides enhanced grid stability and reliability to facilitate renewable expansion
- Offers cost savings by allowing the Railbelt to be operated more efficiently and by preventing the build out of gas turbines
Alaska has roughly 200 Microgrid communities

- Easily integrates into existing Microgrids, regardless of energy source or generation type
- Smaller scale system allows for lessened siting requirements
- Lower lifetime cost alternative to batteries
Energy + Environmental Economics, Inc. (E3) is an independent consulting firm specializing in modeling and analysis of electric markets and systems. Absaroka hired E3 to perform the “Analysis of the Capabilities and Lifecycle Costs of Storage/Capacity Resources.”
In Summary

Pumped Storage Hydro offers many possibilities and benefits to Alaska.

- Low environmental impact
- Enhances stability of the Railbelt and Microgrids
- Lowers cost for consumers
- Integrates well with traditional and renewable technologies
QUESTIONS & DISCUSSION
THANK YOU

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