Clean Energy Innovation in Alaska

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Renewable Energy Alaska Project (REAP)

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Founded in 2004, REAP is a statewide non-profit coalition of over 80 electric utilities, Alaska Native Corporations, clean energy developers, businesses and other NGOs.

REAP promotes renewable energy, energy efficiency and energy literacy in Alaska.
Clean Energy is *Risk Management*

- Fossil Fuel Price Volatility
- Energy Security
- Business Competitiveness
- Climate Change
Pillars of Clean Energy Development

- Technology
- Financing
- Operations and Maintenance
- Policy
Energy Efficiency First!
Alaska's Annual Billion Dollar Bonfire

Each year, Alaskans collectively spend approximately $5 billion on electric, heating, and transportation energy. At least 20% of that energy is wasted and goes up in smoke.
Quinhagak, Alaska

Average house: 1,000 gallons heating oil/yr
CCHRC Prototype: 180 gallons/yr
Technology
Alaska’s Energy Infrastructure

Infrastructure

Average Electrical Generation

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<th>MW</th>
<th>Gas</th>
<th>Oil</th>
<th>Coal</th>
<th>Hydro-electric</th>
<th>Wind</th>
<th>Biomass</th>
<th>Solar</th>
<th>Geothermal</th>
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Electric Transmission

- - - > 100 kV
- - - < 100 kV

Major Pipelines

- Natural Gas Pipelines
- Trans-Alaska Pipeline

Major Transportation

- Roads
- Railroad
Microgrid Communities

**Technical Challenges**
- Integration & control systems
- Thermal and electrical storage
- Internet Bandwidths

**Human Challenges**
- Training & capacity building
- Project development
- Operation and maintenance
- Lack of Solid Baseline Data

**Logistical Challenges**
- Remote
- Expensive
Renewable Energy Grant Fund

Established in 2008
$259 million in state appropriations have leveraged another $140+ million in federal and private dollars

In 2017, projects completed through the Fund displaced the equivalent of 30 million gallons of diesel fuel
Tuntiluliak, Kongiginak, Kwig: Wind Heat System
Diesel off with wind + energy storage + distributed heating

Images: Left: 20+ thermal electric stoves installed in elder and low income homes; Windmatic direct drive turbines (30-40% wind penetration annually)
Kodiak

- (6) GE 1.5 MW SLE wind turbines
- (2) 1 MW ABB flywheels
- 3 MW lithium ion battery system
- Wind supplies 33% of the community’s annual electricity
- Annual diesel savings: 1.8 million gallons
Alaska is the global leader in microgrid development

“Alaska has the world’s greatest concentration of experience and expertise for integrating renewable and conventional power in hybrid systems.”

—Peter Lilienthal, CEO HOMER Energy

HOMER Energy is the world’s leading microgrid modeling software company, with over 100,000 users in 193 countries.
Financing
Why Private Financing is Lacking

- Short track record
- Projects are small
- No secondary market
- Human nature
Elements that Distinguish Green Banks

A focus on commercial technologies

A dedicated source of capital

A focus on leveraging private investment

A relationship with government
The Model

Basic Green Bank Model

Create New Public Institution to Channel Public & Private Investment

1. Capitalization of Green Bank
2. Innovative financing structures
3. Private investment flows

Government → Green Bank

Creation & Public Capitalization

→ Payback

Risk Mitigation

Private Investors

→ Payback

Low Carbon Projects

→ Consumer Savings, Job Creation, Taxpayers Protected, GHG Reductions
Example of Green Financier Model Products and Programs: Connecticut Green Bank

**Incentives**
- Green Bank Capital
- Project

**Co-Investment**
- Green Bank Capital
- Project
- Private Capital

**Credit Support**
- Senior Private Capital
- Green Bank Credit Enhancement
- Project

**Warehousing**
- Project
- Green Bank Origination
- Private Purchase of Portfolio

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SPARKED BY CONNECTICUT GREEN BANK

solarize connecticut
SPARKED BY CONNECTICUT GREEN BANK

smart-e-loan
SPARKED BY CONNECTICUT GREEN BANK

cpace
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Operations & Maintenance
In 2008, Alaska Should Have Considered...

• Comprehensive Training for Operation, Maintenance and Optimization of Microgrid Projects

• Mandatory Instrumentation of all Grant Funded Projects to Acquire and Analyze Project Performance Data
Capacity Challenges

- *Training* is critical for O&M
  - Need to evaluate operations and maintenance plans closely

- *Energy literacy* will pay future dividends

- REAP reached 5,000 K-12 students in 2017
Alaska Network for Energy Education and Employment (ANEEEE)

• Aimed at bringing together and aligning the K-12, workforce and university sectors in Alaska

• Two primary goals of energy literacy and clean energy career paths
Policy
Policy defined:

*prudence or wisdom* in the management of affairs

*a definite course* or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions

Webster Dictionary
Challenges, Disruptors & Upcoming Changes that Policy Should Consider

- Carbon Pricing
- Energy Efficiency
- Customer Preference
- Electric Transportation
- Energy Storage
- Distributed Energy Resources (DERs)
- Advanced Metering
- Performance Based Regulation
Carbon Pricing is Risk Management

“Climate change is going to affect both risks and opportunities for our fund. Carbon pricing is needed to make the market more efficient in capturing this particular risk.”

Anne Simpson, director of corporate governance at the California Public Employees’ Retirement System (Calpers)
Alaska’s Policy Challenges

• Develop an Energy Vision

• Make energy efficiency our first objective

• Create true, binding policy, not just programs

• Focus on Public-Private Partnerships

• Invest in education and workforce development

• Align energy subsidies and programs with other long-term state goals
Thank you!

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