

Alaska Power Association

56th Annual Meeting



Krag Johnsen

Chief Operating Officer

September 14, 2007



History of Rural Energy

- 1950s
 - First village electricity (BIA Schools)
- 1975
 - 85 rural communities still without central power systems
- 1975-85
 - Gov. Hammond Rural Energy Policy
 - ~\$70/barrel Oil (today's dollars)
 - Fear of oil embargoes
 - **Result: Lots of state & federal funding for Alternative Energy projects and studies**
 - State spent \$1.7 Billion on energy programs (~\$51M on Alternative Energy)
- 1985-90
 - Most agreed rural alternatives to Diesel were not economic or feasible
 - Price of oil began to fall
 - Federal Gov't investment in Alternative Energy declined as oil crisis dissolved
 - PCE established
 - State in recession



History of Rural Energy

■ 1990-1998

- No program of state government for alternative energy
- Little investment in rural power and bulk fuel needs
- Bulk fuel crisis rises with EPA & Coast Guard threats of shut down

■ 1998-2007

- Denali Commission created
 - Over \$383M in Energy Infrastructure funding
 - 82.2% Bulk Fuel and Power Plants
 - ~7.4% in wind & hydro
 - ~10.4% interties



Lessons from History?

- So what did we learn during last “focus” on alternative/renewable energy?
 - When oil is high State will provide funding
 - Government agencies lacked methods for assessing technical and financial feasibility of projects
 - Government agencies lacked coordination and strategy
 - Lessons learned were not documented
 - Unrealistic expectations of alternative energy projects led to “failures”
 - Failures created the general perception that:
 - “there are not realistic alternatives to diesel power generation in rural communities”

- Can we do better this time?



Rural Energy Present

■ 2007

- High priced oil
- Fear of foreign oil dependency
- Fear of human caused climate change
- **Result: Increasing state and federal funding for Alternative Energy study and projects**
- Denali Commission \$5M for 2007 Alternative/Renewable Energy Program
- State of AK \$1M for 2007 Alternative/Renewable Energy Program



Alternative/Renewable Energy

- Denali Commission Alternative Energy Projects to date:
 - Demonstration projects
 - Eagle In-River Hydro– AP&T (funded this year)
 - Chena Hot Springs Geothermal
 - Exit Glacier Fuel Cell
 - AVEC – High Voltage DC
 - Wind-Diesel
 - \$13.5M funded to date
 - Selawik, Toksook, Kasigluk completed
 - Gambell, Savoonga, Hooper Bay, Unalakleet, Fire Island studies & others
 - Hydro-Diesel
 - \$14.9 funded to date
 - South Creek (POW Island), Kasidaya Creek (Skagway), Falls Creek (Gustavus), Humpback Creek (Cordova) Atka, Pelican, & others
 - Other
 - Naknek Electric geothermal seismic study



Alternative/Renewable Energy

■ Current:

- FY 07 Commission Work Plan \$5M Alternative/Renewable Energy (10% of 'base' funding)
 - First time ever
 - New program
 - Letter of Interest received over 100 responses
 - State (AEA) and Commission working together
 - Competitive RFP expected in near future to select grants



Some Letters of Interest (Of ~175 projects ~\$1.3B+)

- 25 MW Bristol Bay Regional Geothermal energy and transmission
 - Deep drilling though construction
 - \$200M
- Wood Pellet manufacturing plant
 - Resource assessment of availability/sustainability of wood
 - \$95K for feasibility to \$9.2M for full design and construction
- Residential (1.8kW) wind turbine to prove wind resource for community
 - Anticipated annual savings of \$1.8K in residential power costs
 - \$15.5K
- Lighting Upgrade in commercial buildings
 - Change out T-12 lighting fixtures with T-8 or T-5
 - \$51K
- Two 400kW fuel cells on North Slope
 - use local natural gas as fuel
 - displace 1100 gallons of diesel per day
 - \$2.3M



More LOI Samples

- 6.5MW 3rd hydro turbine addition
 - Reduction in diesel → offset 4092 tons/yr CO₂
 - \$15.9M
- Wood Recycling facility
 - recycle wood forest products, reduce burn piles
 - \$200K
- Wind Energy feasibility
 - Lease two anemometers for year-long study
 - Provide local monitoring and support
 - \$13K
- Propane Demonstration project
 - North Slope produced propane trucked and barged community
 - Test implementation, logistics, costs, evaluate potential of spur gas line
 - \$100K
- Generator System waste heat recovery
 - Provide heating requirements of Community Center
 - Designed and ready for construction
 - \$305K



Still More LOI Samples

- Wood-Fired hot water boiler
 - Fuel available from home and Village firebreak clearing
 - \$150K
- 25MW wind energy facility in South Central
 - \$40M
- Health facilities energy efficiency improvements
 - Upgrade controls & equipment per energy audit
 - Annual savings of \$172K (over 10% of annual cost)
 - \$720K
- 50 to 150MW Geothermal project Mt. Spurr
 - Utility scale opportunity ~70miles from railbelt
 - \$300M to \$600M
- Ocean current generation phased demonstration project
 - 32kW turbine generator units deployed singly and in arrays over three development phases to commercialization by 2012
 - Emission free electricity
 - \$10M



Even More LOI Samples!

- Solar Energy demonstration project
 - Determine feasibility of photo-voltaics (PVs)
 - \$72K
- Methane Hydrates characterization and quantification
 - Resource assessment—phased approach
 - \$762K
- Flow Battery Energy storage for excess wind generation
 - Power stabilization and load leveling from renewables
 - Proven technology not yet demonstrated in micro-grid
 - \$2.6M
- Ground Source Heat Pump Demonstration for commercial buildings in SE
 - Proven technology little used in Alaska
 - Uses ground wells to capture heat of earth for use in building heat
 - \$600K
- Fish Oil Biodiesel Improvement in Rendering, Processing and Storage
 - Readily available in many rural Alaskan communities
 - Present use limited by lacquer films developing on fuel injectors & pumps
 - Oxidization of fuels during storage causes lacquer films
 - \$???



Investment Challenges

- Limited funding
- Balancing Alternative Energy and Bulk Fuel and Power Plant upgrade needs lists
- Difficult to predict the future economic conditions
 - Gas line?
 - Oil up or down?
- Differing Projects
 - Naknek Geothermal vs. small community wind project
- Assessing Projects:
 - Technical feasibility
 - Will it work in AK?
 - Economic feasibility
 - Is the 30 yr life cycle cost better than the alternative (diesel)?
 - How much backup required (diesel)?
 - O&M feasibility
 - Is there the technical, managerial and administrative support within a community to take care of the equipment?



Future Funding

- FY 08 Commission Appropriations Uncertain
 - Senate bill \$31.8M vs. \$50M for FY07
 - 10% again would be only \$3.1M
 - RUS High Cost Energy may also be reduced
 - Less available for legacy programs
- Possible State Alternative Energy Fund
 - Requires both legislation and funding to come about
- Other
 - Green tags
 - Clean Renewable Energy Bonds
 - Other?

www.denali.gov



Credit: ISER May 24 1999 report to the Denali Commission;
“Short (and Informal) Review of Alaska Rural Energy
Policy, with Particular Reference to Alternative
Technologies”