Statewide Energy Issues – An Overview

Introduction: House Concurrent Resolution No. 21 (HCR 21) established the Alaska Energy Policy Task Force. The Task Force will examine how electricity is generated, transmitted, and distributed in Alaska in order to meet the State's existing and future electrical needs in a safe and efficient manner. The Task Force will then develop a long-term Energy Plan for Alaska that will enhance the State's economic future. AIDEA and AEA have prepared this outline to assist the Task Force in meeting its goals.

Some of the challenges to an Alaska Statewide Energy Plan: small isolated populations; isolated power grids; high power costs, and obstacles to utility restructuring.

- Alaska is a large state geographically with a very small population. Most of Alaska is not accessible by roads.
- The majority of Alaska's rural communities are not interconnected by electrical transmission lines.
- The average electric rates in rural Alaska are about five times the National average.
- Alaska has a limited Railbelt electrical grid with no connection to Canada or to the lower 48 states.
- Electric utility restructuring and competition in Alaska faces certain contractual and legal obstacles[1]. (e.g. The RCA authority to approve long-term power supply contracts is set out in AS 42.05.431(b). Once the RCA has approved such a contract, they can then modify it only for rate purposes. The Legislature would need to modify this statute before the RCA could terminate such contracts or revoke their authority to review such contracts altogether.)

There are three regions in the state with distinct energy systems.

1. Railbelt: Includes Anchorage, Fairbanks, Matanuska-Susitna, and the Kenai Peninsula, which roughly serves 75% of Alaska's population and accounts for over 85% of the state's electricity (see figures 1 and 2).

2. Copper Valley, Kodiak, and Southeast Alaska (Four Dam Pool): Includes Juneau, Ketchikan, Sitka, Kodiak, Valdez, Glennallen, and others. This region is primarily served by hydroelectric power and is not interconnected by a grid system. These communities are larger and more developed than the typical rural community.

3. Rural Alaska: Includes 187 remote villages that are accessible only by air or water and are predominantly populated by Alaska Natives who rely heavily on subsistence hunting and fishing. Generation and transmission systems have been proposed for two rural regions to support mining developments:

    - Northwest Alaska: a coal-fired generation plant and transmission line has been proposed to provide power for regional mines.

    - Southwest Alaska: a coal-fired plant and regional intertie system have been proposed by the Calista Corporation.

[1] Study of Electric Utility Restructuring CH2M Hill and RCA docket R-97-10(8) Regulations Defining the Future Market Structure of Alaska Industry, dated 9/28/01.

Each of these regions is discussed below.

1. RAILBELT REGION

There are seven primary utilities serving the railbelt, as noted below:

Utilities	MW Capacity @ 60 F
• Anchorage Municipal Light & Power (AML&P)	483 MW
• Chugach Electric Association, Inc. (CEA)	527 MW
• Golden Valley Electric Association (GVEA)	240 MW
• Homer Electric Association (HEA)	55.1 MW
• Matanuska Electric Association (MEA)	31.5 MW
• City of Seward	10.5 MW
• Aurora Energy	27 MW

These utilities are fueled by natural gas (67%), coal (5%), hydro (15%), and fuel oil (13%). The generating capacity of the railbelt electric utilities is about 1,374MWs. The transmission interconnections are mainly the Fairbanks to Anchorage transmission line – 170 miles, rated at 345kV that operates at 138kV, and the Anchorage to Kenai area transmission line rated at 115kV that operates at 115kV, with a transfer capability of 70MW.

Current Railbelt projects include:

The Northern Intertie between Healy and Fairbanks (see figure 3): As of May 2003, construction is 100% complete on three of the four sections – the Fairbanks/Tanana River Crossing section, the Tanana Flats section, and the Usibelli section. Construction resumed on the Foothills Section in mid-March 2003. Currently, crews are drilling for the piling installation and working on steel assembly. Work will continue on this section throughout the summer; the contractor will begin flying towers along the route line with a Chinook helicopter in June. This 24-mile section should be completed by October 2003.

- The Eklutna transmission line replacement project: This $19,300,000 project is just entering the design phase. An RFP to select an engineering firm should be completed by the end of May 2003.

- Alaska Intertie: This project will upgrade and extend the Anchorage to Fairbanks power transmission intertie to the Teeland substation. An AEA feasibility study should be completed by September 2003.

- GVEA's BESS System: GVEA has installed a 27MW battery system storage system (BESS) in Fairbanks as a part of the Northern Intertie.

- HEA Co-Gen System: HEA has recently completed construction of a co-gen gas-fired turbine adjacent to the Agrium Plant (Nikiski).

- Cooper Lake Hydro: Chugach's Cooper Lake Hydro commissioned in the 1950's was recently overhauled and upgraded and is currently in the process of a FERC license renewal application.

- Beluga Plant Overhauls: Major Overhauls on Chugach's Beluga 3, 4, and 8 were completed in 2002.

- Aurora Plant Upgrades: Retrofit of the Aurora coal and steam plant in Fairbanks.

Projects under consideration:

- Emma Creek Energy Project: Usibelli Coal Mine Inc. has proposed a $421 million, 200MW power plant at its mine near Healy.[2]

- GVEA's North Pole Expansion (NPE) project, using combined-cycle technology, would involve adding a 57MW highly efficient gas combustion turbine at the existing 120MW North Pole Power Plant site. The existing plant was built in 1975, and is GVEA's largest generating facility. The new NPE project would entail installing a 43MW gas turbine equipped with a waste heat boiler on its exhaust stack. The boiler would produce steam to power a 14MW steam turbine.[3]

- Southern Intertie: Proposed new construction of a 62-mile segment to increase reliability and to provide redundancy to the Quartz Creek transmission line (see figure 4).

- Bradley Lake Governor Repairs: Repair and upgrade of the Bradley Lake Hydroelectric Project's governor.

- HCCP: Healy Clean Coal Project (HCCP) retrofit.

- Coalbed Methane: Exploration and development of coalbed methane deposits is in progress in the Holitna basin (see figure 5), the Nenana area, the Beluga area, lower Kenai Peninsula area, and the Healy area.

- Donlin Creek explorations: Construction of power supply for the potential Donlin Creek Mine.

- Military Power Upgrades: Retrofit of the military's various coal generation plants, in the Fairbanks area. A Greater Fairbanks Regional Energy Study of Military Installations for long-term heat and power at Ft. Wainwright, Clear, Eielson AFB, and Ft. Greeley.

- Sutton-Glennallen Intertie: This intertie has been proposed to link the Copper Valley area (currently Four Dam Pool) to the Railbelt intertie system.

Some Concerns in the Railbelt:

- Heavy reliance on Cook Inlet natural gas to supply power and heat and subject to fluctuating oil and gas pricing.

  -- 67% of railbelt electricity generation is fueled by natural gas
  -- 80% of Anchorage households are heated by natural gas

- A single transmission line linking Anchorage, Fairbanks, and the Kenai Peninsula may be at its operating limits. The limitation of 70MWs of power transfer capability along the existing Quartz Creek transmission line reduces the ability to optimize dispatch of the 120MW generating capacity of the Bradley Lake Hydroelectric Project.[4]

[2] See Alaska Journal of Commerce 5/12/03.
[3] See GVEA web site projects (www.gvea.com).
[4] Final Environmental Impact Statement, Southern Intertie Project, Kenai Peninsula to Anchorage, July 2002.

- The 50MW Healy Clean Coal Power Plant is not in operation and has been idle since the completion of its 90-day test period in December 1999.[5]

- Long-term fuel and power supply contracts between the railbelt utilities will present a challenge for generating potential savings from cooperative efforts like power pooling and central dispatch.[6]

- AEA owns certain portions of the railbelt intertie system. AEA has entered into several agreements (18+/-) with railbelt utilities involving intertie grants, maintenance, power transmission, testing and monitoring. From time to time, AEA must renegotiate these agreements.

  Inter-utility relationships occasionally result in disputes, e.g. over wheeling charges, utility participation in upgrades, etc. These disputes tend to spill over into AEA's renegotiation of agreements. The renegotiation of an AEA agreement provides an opportunity for one utility to apply leverage to another utility, with AEA stuck in the middle as the "go between."

  AEA's current involvement in upgrading the Alaska Intertie, and extending a wheeling agreement, is impacted by inter-utility disputes.

- Utilities continue to request state grant funds for upgrades, extensions, and parallel lines. Requests are made both as a group and by individual utilities. Most of the railbelt's generation capacity is 20-40 years old and will become more costly to maintain or replace. The existing line between Anchorage and the Kenai Peninsula was built in 1962. The existing line between Healy and Fairbanks was built in 1967. Due to transmission constraints that limit power imports from Anchorage, 35% of Fairbanks' demand must now be supplied at high cost from local, oil-fired generators.

- A long-term plan is needed to coordinate generation and transmission of power, to maximize the use of public funds, and to minimize the cost of power to the consumers.[7]

- Cook Inlet gas supplies are tightening. No other source of gas is presently available in the Railbelt. (See DOE report April 1999.)

  -- 2/3 of Cook Inlet gas production is presently exported from Alaska as LNG to Japan and as ammonia/urea products to Japan and the U.S. West Coast.

  -- The remaining 1/3 of Cook Inlet gas production supplies most of the energy used in the Railbelt for heat and power generation.

  -- U.S. DOE projects that reserves will be adequate through 2009, and recently extended the LNG export license on that basis[8]. The Anchorage area gas utility disagrees and has projected shortages within this time period. The Anchorage electric utilities have also expressed concern over tightening supplies.

[5] See AIDEA web site projects (www.aidea.org).
[6] See RCA web site (www.state.ak.us/rca) and Railbelt Fuel Supply and Wholesale Power Sales Contract and Power Pooling/Central Dispatch Planning Study by Black and Veatch – October 1998.
[7] See Study of Electric Utility Restructuring in Alaska – CH2M Hill June 30, 1999.
[8] The April 1999 decision by the U.S. Department of Energy to extend the Phillips-Marathon LNG export license concludes as follows: "DOE estimates that total gas resources available for production over the course of the extension period to be 4,545 Bcf, and the total estimated demand to be 2,847 Bcf…DOE is at a loss to understand the Protestors' contention the export extension should be denied because of domestic need for the gas. Our analysis of supply and demand shows emphatically that this is not true." [The Protestors are Enstar, Unocal, and Aurora.]

- The electrical transmission grid presently consists of a single line linking Anchorage, Fairbanks, and the Kenai Peninsula. In their assessment of the Railbelt transmission, the North American Electric Reliability Council (NERC) concluded that this single line is far less reliable than the transmission network in the lower 48, and poses a significantly higher risk for system-wide blackouts.[9]

- At the same time, the demand for railbelt power is increasing. New demand may come from the Pogo mine expansion, the Ft. Greely Missile development, decommissioning of Alyeska pump station diesel plants, shutdown of military coal plants, and economic growth in railbelt.

- Permitting and construction of new power generation equipment is a challenge in the current regulatory environment. Permitting on the most recent new grass-roots/greenfield power plant, HCCP, resulted in a 2-year construction delay.

- Because HCCP is idle, individual railbelt utilities may be reluctant to invest in new plant and equipment since potential capacity from HCCP added to the railbelt grid would impact timing for individual utility expansions.

Opportunities in the Railbelt:

- Diversify sources of energy to address heavy reliance on natural gas.

  -- The 50 MW Healy Clean Coal Project should be placed into commercial operation. During its 90-day operation test, the plant achieved all environmental and reliability goals.

- Diversify sources of natural gas to address impending Cook Inlet supply limitations.

  -- North Slope gas will be needed to augment and ultimately replace Cook Inlet gas for heat and power generation in the Railbelt. The state supports construction of a gas pipeline along the Alaska Highway for several reasons, one of which is that the Railbelt must have access to the gas for in-state use.[10]

- Recent exploration licensing for coalbed methane creates a potential opportunity for new gas supplies.

- Develop alternative energies: e.g., CEA is moving forward with a plan to develop wind energy. GVEA is also investigating wind energy options.

- Consider the potential for more cost-effective use of state royalty oil to power GVEA's oil-fired turbines.

- Strengthen the Railbelt electrical transmission system.

  -- In 1993, the State appropriated $90 million to help fund new transmission lines between Anchorage and the Kenai Peninsula (the "Southern Intertie"), and between Healy and Fairbanks

[9] NERC Reliability Assessment, March 1990. "The existing single line transmission interconnections … pose a significantly higher than traditional reliability risk for system-wide blackouts due to single contingency outages." NERC concluded that both the Northern and Southern intertie projects are necessary to address the inadequacy of the current system. "In fact, under traditional reliability criteria, a second transmission line between the Anchorage Bowl and the Fairbanks area would likely be required."

[10] See Alaska Natural Gas Development Authority Act AS 41.41.

(the "Northern Intertie"). While construction of the Northern Intertie is in progress, additional funding will be needed to build the Southern Intertie.

-- The transmission line between Anchorage and Fairbanks is approximately 350 miles. The Healy-Fairbanks segment covers the last 100 miles of the route. The next priority is to strengthen the segment between the Anchorage area and Willow.

- Determine whether further integration of operations and management among the six interconnected Railbelt electric utilities would result in net efficiencies and reduced consumer costs.

  -- Power pooling, competition, and utility restructuring have recently been considered at some length by the Regulatory Commission of Alaska, the Alaska Legislature, and the Railbelt utilities.[11] However, no consensus has emerged on the merits of these proposals.

  -- Some sharing of the risk among the utilities associated with permitting, construction, and development of new power generation and transmission facilities, similar to the arrangement on Bradley Lake, may be an effective way to economically justify new construction.

  -- Alaska System Coordinating Council (ASCC) is a group of Alaskan utilities that have committed to completing a joint integrated resource plan (IRP) by October/November 2003.

RECOMMENDED TASK FORCE TOPICS:

- The Healy Clean Coal Project: _____
- Usibelli's Proposed 200 MW Emma Creek Energy Project: _____
- Coordinating with the military's power needs study: _____
- Reduced Cook Inlet Gas Supplies: _____
- The North Slope natural gas pipeline: _____
- Long Term O&M of AEA's Alaska Intertie: _____
- The Southern Intertie (Anchorage to the Kenai Peninsula): _____
- Sutton-Glennallen Intertie: _____
- Donlin Creek Exploration & potential power needs: _____
- Multiple utilities/power pooling, competition, restructuring, expansion and growth: _____

[11] See Power Pooling/Central Dispatch Planning Study, dated October 1998; RCA docket U-97-140(7) dated 03/13/02; Study of Electric Utility Restructuring in Alaska June 30, 1999; and RCA docket R-97-10(8) dated 09/28/01.

2. COPPER VALLEY, KODIAK, and SOUTHEAST ALASKA REGION

This region includes the following utilities.

• Ketchikan (KPU)	Municipally Owned
• Petersburg (PMP&L)	Municipally Owned
• Wrangell (WLD)	Municipally Owned
• Sitka (SMED)	Municipally Owned
• Juneau (AEL&P)	Investor Owned
• Valdez (CVEA)	Cooperative Owned
• Glennallen (CVEA)	Cooperative Owned
• Copper River Basin (CVEA)	Cooperative Owned
• Kodiak (KEA)	Cooperative Owned
• Other SE communities(AP&T)	Investor Owned
• Four Dam Pool Joint Action Agency	Owned by participating cooperatives

Approximately 90% of the total annual electricity generated in this region is by hydroelectric generation, with diesel and oil-fired turbine as a costly backup generation source.

The Four Dam Pool consists of Swan Lake, Tyee Lake, Terror Lake, and Solomon Gulch hydro plants. On January 31, 2002, AEA sold the Four Dam Pool projects to the Four Dam Pool Power Agency, an entity formed by Ketchikan Public Utilities, Wrangell Municipal Light & Power, Petersburg Municipal Light & Power, Copper Valley Electric Association, and Kodiak Electric Association, Inc.

Hydros in Southeast Alaska include the following:

Dams	Cities	Owners	MW Capacity
• Swan Lake	Ketchikan	Four Dam Pool Power Agency	22.6MW
• Tyee Lake	Wrangell & Petersburg	Four Dam Pool Power Agency	20.0MW
• Terror Lake	Kodiak & Port Lions	Four Dam Pool Power Agency	22.6MW
• Solomon Gulch	Valdez & Glennallen	Four Dam Pool Power Agency	12.0MW
• Ketchikan Lakes	Ketchikan	KPU	4.2MW
• Silvis Lake	Ketchikan	KPU	2.1MW
• Beaver Falls	Ketchikan	KPU	5.4MW
• Snettisham	Juneau	State owner/AEL&P operator	78.3MW
• Annex Creek	Juneau	AEL&P	3.6MW
• Gold Creek	Juneau	AEL&P	1.6MW
• Salmon Creek	Juneau	AEL&P	5.0MW
• Blue Lake	Sitka	City of Sitka	6.7MW
• Green Lake	Sitka	City of Sitka	18.6MW
• Crystal Lake	Petersburg	City of Petersburg	2.0MW

Other Projects Being Considered:

- Sutton-Glennallen Intertie

- Oil and Gas exploration in the Inside Passage south of Ketchikan in Canadian waters.

- Other new hydro projects such as Lake Bart (part of Lake Dorothy), Mahoney Lake and a project near Gustavus.

Some of the Energy Concerns:

- Many small communities in Southeast Alaska are accessible only by air or water.
- A lack of transmission interties to export surplus hydroelectric to communities that need it.
- Costs of Southeast interties are estimated to be approximately $500 million.
- Electric rates are 20% higher than the railbelt rates.
- Fuel oil provides 70% of heating requirements, and electric heat 20% -- both are costly.
- Utilities continue to request grant funds for upgrades, extensions, and parallel line. Requests are made both as a group and by individual utilities. (E.g. Southeast Conference $100,000 grant from USDA and another $100,000 from the legislature.)
- A long-term plan is needed for coordinated generation and transmission of power, to maximize the use of public funds, and to minimize the cost of power to the consumers.
- Southeast Conference works effectively as an organization consolidating the interests of the region and has been successful in obtaining federal authorizations and funding.
- The ability to form an ownership entity for the Southeast Intertie may be problematic, because of the different types of utilities, such as Municipally, Cooperative, and Investor Owned and the different types of contracts of each utility.
- The source of matching funds on Southeast Intertie projects as well as funds to support ongoing maintenance and operation of a completed Intertie is an issue.

Opportunities in Kodiak, Copper Valley, and Southeast Alaska:

- Congress has authorized a $435 million Southeast Alaska intertie project (see figure 6) that would connect the major load centers from Skagway, Haines, and Juneau in the north to Ketchikan and Metlakatla in the south. Funding is needed to initiate construction of major segments.

- Prior studies by the state have indicated that the most needed segments in the near term include:

  -- The Swan Lake–Tyee Lake segment: This segment is being developed by Ketchikan Public Utilities (KPU). This would link Ketchikan, which has outgrown its local hydro capacity, with Wrangell and Petersburg, which presently have surplus to export from the Tyee Lake project. The project cost is estimated at $77.2 million. The project has received 95% of funds expected to total $57.2 million in state and Federal grants, and a $20 million state debt loan.

  -- The Juneau–Greens Creek—Hoonah segment (see figures 7 and 8). This proposal would link the Kennecott Mining Company's Greens Creek mine, which presently runs diesel generators, with Juneau, which has surplus to export from the Snettisham hydro project. It would also link to the electric system of Tlingit-Haida Regional Electric Authority (THREA) in Hoonah. Greens Creek is located within the Admiralty Island National Monument and therefore faces tight constraints on diesel powerplant emissions. The project cost estimate is $33.6 million.

  -- Kake–Petersburg segment (see figures 9 and 10). This intertie would connect the community of Kake on Kupreaof Island to the interconnected electric systems of Petersburg and Wrangell. The project cost estimate is $21 million.

  -- A draft Southeast Alaska Intertie Study Phase 1 by D. Hittle & Associates concluded the following:

1. Both the Juneau–Greens Creek–Hoonah Intertie and the Kake–Petersburg Intertie are technically feasible. Proposed routes for both Interties have been studied before and are identified in existing U.S. Forest Service land use plans. Although two primary route alternatives have been identified for the Kake–Petersburg Intertie, the Southern route alternative has been, and continues to be, the preferred alternative from a cost and constructability perspective.

2. Forest Service roads exist along the majority of the length of the proposed routes. Construction of the Interties adjacent to these roads, to the extent possible, should provide for lower costs of construction and maintenance. Single wood-pole structures are preferred for placement along roads.

3. The estimated costs of developing and constructing the Interties are $33.6 million and $21.0 million for the Juneau–Greens Creek–Hoonah line (Hoonah's electric service customers in 2002 were 342 residential, 69 commercial, and 22 public facility) and the Kake–Petersburg line (Kake's electric service customers in 2002 were 280 residential, 60 commercial, and 12 public facility), respectively.

4. AEL&P has already undertaken certain efforts to develop the Juneau–Greens Creek–Hoonah Intertie, which should contribute to expediting the time required for development of this system. The total time required to develop and construct the Kake–Petersburg line is approximately four years, of which construction is estimated to require about two construction seasons.

5. Energy generation capability is projected to be available from the Four Dam Pool Power Agency's Lake Tyee hydroelectric project to sell to THREA for use in Kake if the Kake–Petersburg Intertie is constructed. A power sales contract will need to be negotiated between THREA and the Four Dam Pool Power Agency.

6. AEL&P will need to construct the Lake Dorothy hydroelectric project to have sufficient energy generation capability, above the current hydro surplus, to supply KMC-GC and THREA's Hoonah service over the proposed Intertie. AEL&P is presently in the process of obtaining necessary permits and approvals to develop the Lake Dorothy project.

7. Assuming that construction and development costs of the interties are grant funded and that reasonable power supply contracts can be arranged, THREA and KMC-GC should be able to realize savings in their respective costs of power supply with the interties when compared to continued diesel-fueled power generation.

8. The annual costs to operate, maintain, and administer the interties should be minor and could be recovered through charges for transmission services or, bundled in with the delivered cost of power.

9. With the interties, THREA may be able to offer economic incentive rates in Kake and Hoonah, with certain limitations, to encourage new commercial activity. The economic incentive rates could be tied to the cost of purchased power with a nominal margin.

10. A direct current (DC) transmission system is technically feasible for the interties, but is estimated to cost significantly more than a standard alternating current (ac) system.

- A proposal was developed by a private firm to deliver natural gas or propane to Southeast Alaska communities, with a piped distribution system. Government support has been requested. Funds are needed for a feasibility study to determine if piped natural gas or propane can be delivered at a price that would compare favorably with bottled propane, oil, and electricity for space and water heating requirements.

RECOMMENDED TASK FORCE TOPICS:

- Swan Lake–Tyee Lake intertie: _____
- Juneau-Greens Creek-Hoonah intertie: _____
- Kake-Petersburg intertie: _____
- Natural gas or propane to Southeast Alaska (piped distribution system): _____

3. RURAL ALASKA REGION

This section summarizes the Rural Energy Plan, AEA's & AVEC's rural energy programs, the Power Cost Equalization Program, the Denali Commission, two proposed coal-fired regional energy systems, and a proposed intertie linking the Railbelt to the Copper Valley area.

Some Concerns with Energy in Rural Alaska:

- In rural Alaska, ninety utilities service 187 rural communities. The communities range in size from small villages such as Stony Creek with 35 people, to Bethel with 5,471 people.
- Access for most rural villages is by air or water making energy costs extremely high – roughly five times the national average. (e.g. Typical rural village is $.45 per kWh vs. Anchorage is $.10 per kWh vs. lower 48 states $.085 per kWh.).[12]
- Over 50% of powerhouse structures need replacing.
- Over 65% of electrical distribution requires major repairs or replacement.
- Approximately 50% of fuel storage facilities are in poor condition.
- Full funding of the Power Cost Equalization (PCE) program is not being met.
- Over 66% of Rural Alaska households use fuel oil as their heating source, priced at two to four times the national average.

The Rural Alaska Energy Plan:

The Rural Energy Plan is being prepared by MAFA on contract to AEA. The DRAFT was completed December 31, 2002, public comments are due August 1, 2003, and the Final Report is due September 30, 2003. The Rural Energy Plan provides guidance to AEA and AVEC for upgrading the following programs: Rural Power System Upgrades, Bulk Fuel Upgrades, Power Cost Equalization (PCE), Alternative Energy and Energy Efficiency, and training.

Rural Alaska utilities, schools, and residential households account for about $170 million in annual energy expenditures (utility payments for fuel & non-fuel costs; school payments for heating fuel & electricity; residential household payments for heating fuel & electricity; PCE payments to utilities).

Promoting a combination of utility management best practices, investments in commercially available cost-effective production and end-use technologies, and fine tuning of the power cost equalization

[12] Energy Information Administration www.eia.doe.gov/mer

incentive structure, rural energy efficiency could be increased by as much as 20% over the next 15 years, compared to current practice.

The Rural Energy Plan envisions investing approximately $65 million for energy efficiency over *five* years and achieving benefits on the order of $78 million over *fifteen* years, for a benefit cost ratio of 1.23, and net benefits on the order of $13 million (See Attachment 3).

While estimates of the savings potential may vary significantly depending upon future market conditions, especially the price of fuel, there appears to be general agreement among those interviewed for this report that the potential for improved energy efficiency for utilities, schools, and households in rural Alaska remains significant.

The new program initiatives include:

- Investments in measurement and monitoring systems to improve operations, maintenance, and management performance.
- Annual rural energy conference to share operations, maintenance and management best practices.
- Improvements in management efficiency incentives (i.e. allow all utilities to capture some potential benefit of the non-fuel cost, remove disincentives to equity capital investments in rural electric utilities to treat return on equity as a cost eligible for reimbursement).
- Rural community energy awareness meetings.
- Capital Investments:
    - Diesel system technology, including new efficient generation sets.
    - Combined heat and power (cogen) systems.
    - Wind-Diesel hybrid systems.
    - End-Use lighting and appliances.
- Rural School Model Energy Code.
- Cogeneration Template Agreements for Schools, Water Utilities.

<u>The Power Cost Equalization (PCE) Program and Endowment Fund</u>:

The State has played a role in bringing affordable power to urban Alaska in many ways. For example, the state has contributed hundreds of millions of dollars in grant funding for the construction of hydro projects such as Bradley Lake and the Four Dam Pool; for transmission lines such as the Anchorage-Fairbanks intertie that allows inexpensive power from natural gas and hydro power to be exported to the Fairbanks area, and for the Healy Clean Coal Project. Although small hydro projects and interties have been built in rural Alaska as well, most rural communities still rely exclusively on isolated diesel power plants since the prevailing characteristics of rural Alaska, such as low population density and remote village locations render most alternatives to diesel power infeasible. Recognizing this, another form of providing more affordable power through direct rate reduction (the PCE program) was initiated for rural Alaska. A comparison of rural power rates, to urban rates, is given below:

- In 2003, the average cost of power in Anchorage-Fairbanks-Juneau for residential customers is 10.6 cents per kWh.

- In PCE eligible communities, the average residential cost of power prior to the State's rate reduction credit was 27.6 cents per kWh for 2003. This is an average for two categories of PCE communities: For PCE eligible communities that sell more than 1 million kWh, the average rate prior to PCE credit being applied is 22.6 cents per kWh; however, for communities that sell less than 1 million kWh, the average rate prior to PCE credit being applied is 34.69 cents per kWh.

- The average urban household in Alaska uses approximately 700 kWh per month, while the average household in rural Alaska uses approximately 425 kWh per month.

Legislation enacted in 2000 established the Power Cost Equalization Endowment Fund and appropriated $100 million into the Endowment Fund from the Constitutional Budget Reserve. In addition, a Memorandum of Understanding was executed in April 2000 by the Alaska Energy Authority and the Four Dam Pool purchasing utilities that deposited the $81 million in proceeds from the sale of the Four Dam Pool projects into the Endowment Fund. The sale was finalized in January 2002. The Endowment Fund is invested and managed by the Alaska Department of Revenue.

When the Endowment Fund was created, it was anticipated that most, but not all of the funding to support the estimated $15.7 million statutory PCE formula would come from the earnings of the Endowment Fund. However, even with the more optimistic market earning assumptions at that time, the projections showed that approximately $2.3 million in additional funding would be needed each year from other sources. The full program demand for FY2003 was approximately $18.4 million if funded at 100%. As of January 31, 2003, the Market Value of the fund is $150 million.

The expenditure of $15.5 million in FY2002 was not sufficient to pay the "full formula" requirement. PCE benefits were therefore prorated by an amount equivalent to 85.83% over the entire year.

PCE-Fiscal Year 2002 Statistical Data:

Population of Participating Utilities	79,555
Residential Customers	25,495
Commercial Customers	6,810
Community Facilities	1,746
Miscellaneous Customers	1,369
Total Number of Customers	35,420
Total Number of Eligible Customers	27,241
% of Total Customer Base Eligible for PCE	76.91%
Eligible kWh's Residential	89,314,504
Eligible kWh's Community Facilities	34,342,099
Eligible kWh's Total	123,656,603
Total kWh's Sold	404,998,916
% of Total kWhs Sold Eligible for PCE	30.53%

The Denali Commission:

A quote from the Denali Commission web site best describes the Commission: "The Denali Commission is an innovative federal-state partnership established by Congress in 1998 to provide critical utilities, infrastructure, and economic support throughout Alaska. Our focus encompasses five major categories of improvements: energy, health care facilities, training, intergovernmental coordination, and infrastructure (economic development, telecommunications, washeterias, and multi-use facilities)."

AEA-REG and AVEC receive the majority of their funding for rural energy programs from the Denali Commission.

AEA's Rural Energy Group (AEA-REG) and Alaska Village Electric Cooperative (AVEC) Programs:

AEA-REG and AVEC both have programs for upgrading rural bulk fuel storage facility (BFU's) and rural power system upgrades (RPSU's). The majority of the funding is provided by the Denali Commission.

- Funding Needs: Total funds required to upgrade the power plant utilities and the bulk fuel storage in the rural communities (estimated by AEA, Alaska Village Electric Cooperative, Inc. (AVEC), and the Denali Commission), is $644,000,000.

- RPSU Funding Needs: AEA made an assessment in 2000 of power plant facilities communities, of which AEA is responsible for 128 communities while AVEC is responsible for 51 communities. Funding required for the power plants and power distribution facilities construction and rehabilitation is $301,000,000 (AEA $207,000,000; AVEC $94,000,000). In terms of facility upgrades, AEA is approximately 10% complete with the initial scope of projects. Based upon current and projected funding, AEA anticipates completing the program of upgrading their respective project communities by 2015.

- BFU Funding Needs: AEA made an assessment in 2000 of Bulk Fuel Storage facilities in 171 communities. The result is that AEA is responsible for 141 projects while AVEC is responsible for 51 communities. AEA and AVEC have, in some cases, each constructed a facility in a community. Of AEA's 141 projects, nine have been completed by others. The balance of the 132 projects had a bulk capacity upgrade need of approximately 26,000,000 gallons. In a typical community project, AEA upgrades approximately 90% of the existing storage capacity. This average is anticipated to decline as AEA undertakes projects that are lower on the deficiency list and thus require less effort to upgrade. To date (including the 2003 construction season), AEA has upgraded 9,500,000 gallons of capacity and has projected that only 11,000,000 of capacity remain to be upgraded. Funds needed to complete the Bulk Fuel storage facilities total $343,000,000 (AEA $196,000,000; AVEC $147,000,000).

- AEA's BFU Progress: The projects AEA has undertaken are decreasing in cost from an average of $2,100,000 in 2001 to a projected cost of $1,700,000 in 2004. The average cost of upgrading since 2001 (including the 2003 construction season) is approximately $15.00 per gallon. In terms of Bulk Fuel storage capacity, AEA is approximately 48% complete with the initial scope of projects. Based upon current and projected funding, AEA anticipates completing the program of upgrading its respective project communities by 2010.

- AVEC's BFU's Progress: AVEC has completed 9 of 51 bulk fuel projects, about 17 %.

- Operations & Maintenance: A plan and funding for long-term operation and maintenance of bulk fuel storage facilities and generation plants are needed. General coordination of all rural utilities is needed (sewer, water, solid waste, power, and fuel). Many upgrades are funded by the Denali Commission (federal funds). The Denali Commission has introduced the concept of sustainability, which is still evolving. See attachments 1 and 2. The Denali Commission is coordinating a Rural Alaska Fuel System "Task Force." This task force is investigating the formation of a corporation to provide support to communities. Services may include operations, maintenance, and fuel purchases.

- Other Energy Sources: A scoping level geologic and economic assessment of alternate power generation options, including hydro, coal, methane, and coal-bed methane may be of value. While diesel has been proven to be the most cost-effective in most parts of Alaska, and the economic potential for wind-driven energy is improving, there may be site specific opportunities that economically justify hydro, coal, methane, and/or coal-bed methane driven power generation.

AEA's Alternative Energy and Energy Efficiency Program

This program provides grant funds for energy initiatives that are intended to reduce the cost of rural energy use. The following solicitation describes a recently advertised grant program:

AEA's Energy Cost Reduction Program Solicitation:

Goal

Provide grant and loan financing for project proposals that decrease the cost of power and heat in Alaskan communities.

Funding Request

$2.6 million ($2.5 million grant funding + $0.1 million overhead). Local cash and loan share is estimated at $3.3 million based on past results.

Allocating Grant vs. Local Share

1. For eligible projects, normal savings are estimated for the first few years. The maximum amount of debt these savings could support over the life of the project (15-30 years depending on project type) is calculated at the current PPF interest rate (currently 5.45%). The local share is half of this amount, while the grant is the remaining project cost.
2. Local cost share is mandatory to demonstrate local "buy-in." Share can be in the form of loans from the PPF or other sources, cash contribution, and a combination of loans and cash.

Program Results

To date, 19 diesel efficiency, hydroelectric, line extension, and heat recovery projects have been included in two solicitations. Total project cost is $12.3 million, with Denali Commission providing $5.3 million and local entities providing $7.0 million. Total life-cycle savings are estimated at $23.5 million.

- Other examples of eligible projects include:

- Efficiency upgrades to diesel powerplants.
- Update energy audit for facility efficiency.
- System Performance Monitoring.
- Residential lighting and hot water retrofits.
- Heat recovery program.
- Wind energy monitoring and assessment and other alternative energy projects.

Proposed Coal Fired Regional Energy Systems:

Two coal fired regional energy systems have been proposed, as follows:

Northwest Alaska: Northwest Alaska has a huge deposit of Northwest Arctic Coal (see figures 11 and 12) five miles inland from the Chuckchi Sea that is stranded. Known as the Deadfall Syncline coal deposit, this deposit contains resources adequate to support a mining operation of one million tons per year for 20 years[13]. A Northwest Alaska Energy Plan should include a coal power plant to generate power and a transmission line to power the Red Dog Mine. Also, the plan should include a road to transport the mined Arctic coal to tidewater for export. This could also open up other resources in the NW area with inexpensive coal-fired power energy.

Southwest Alaska: The Calista Corporation has prepared an energy study that proposes a coal-fired power plant at Bethel, coal supplied by the Quinsam Mine in British Columbia, wind turbines along the coast, and region-wide transmission grid would provide low cost. The transmission line could also supply power to Donlin Creek exploration, if it is developed into a mine. Alaska coal could replace the British Columbia coal if it becomes commercially available at competitive rates.

Coalbed Methane Project:

The Holitna Energy Corporation (HEC) was formed in April 2003, for the purpose of developing an energy supply for the Donlin Creek exploration, nearby settlements and, potentially, the region. HEC has applied for a state of Alaska Shallow Gas Lease. This lease will allow HEC to do seismic work and drill for any gas accumulations that exist, at least partially, within 3,000 feet of the surface.

The Holitna basin is located approximately 50 miles from Donlin Creek. The basin is defined by a 1983 gravity survey. A 1998 magnetic survey provides added information on the basin, but no surface exposures of rocks of the basin are known and no drilling in the basin has taken place yet. The gravity survey suggests the sediments within the basin are up to 15,000 feet deep. The basin is developed along the Denali fault, a regional strike-slip fault that extends for over 900 miles. The deepest portion of the Holitna basin has a high potential for oil, natural gas, and coal.

RECOMMENDED TASK FORCE TOPICS:

- PCE Program: _____
- AEA's Rural Energy Group Programs (BFU's & RPSU's): _____
- Rural Energy Study Initiatives: _____
- AEA's Energy Cost Reduction Program: _____
- Northwest Alaska, Proposed Regional Energy System: _____
- Southwest Alaska, Proposed Regional Energy System: _____
- Power generation & transmission facilities for resource extraction: _____

[13] Aluaq Mine Study, November 1989 by Arctic Slope Consulting Group.

OVERALL RECOMMENDATIONS:

1. RAILBELT REGION

- The Healy Clean Coal Project: _____
- Usibelli's Proposed 200 MW Emma Creek Energy Project: _____
- Coordinating with the military's power needs study: _____
- Reduced Cook Inlet Gas Supplies: _____
- The North Slope natural gas pipeline: _____
- Long Term O&M of AEA's Alaska Intertie: _____
- The Southern Intertie (Anchorage to the Kenai Peninsula): _____
- Sutton-Glennallen Intertie: _____
- Donlin Creek Exploration & potential power needs: _____
- Multiple utilities/power pooling, competition, restructuring, expansion and growth: _____

2. COPPER VALLEY, KODIAK, and SOUTHEAST ALASKA REGION

- Swan Lake–Tyee Lake Intertie: _____
- Juneau-Greens Creek-Hoonah Intertie: _____
- Kake-Petersburg Intertie: _____
- Natural gas or propane to Southeast Alaska (piped distribution system): _____

3. RURAL ALASKA REGION

- PCE Program: _____
- AEA's Rural Energy Group Programs (BFU's & RPSU's): _____
- Rural Energy Study Initiatives: _____
- AEA's Energy Cost Reduction Program: _____
- Northwest Alaska, Proposed Regional Energy System: _____
- Southwest Alaska, Proposed Regional Energy System: _____
- Power generation & transmission facilities for resource extraction: _____

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