

Diesel Efficiency and Alternative Energy Program**FY2003 Request: \$500,000****Reference No: 32591****AP/AL:** Appropriation**Project Type:** Construction**Category:** Health/Human Services**Location:** Statewide**Contact:** Robert Poe, Jr.**House District:** Statewide (HD 1-40)**Contact Phone:** (907)269-3000**Estimated Project Dates:** 07/01/2002 - 06/30/2004**Brief Summary and Statement of Need:**

This appropriation is requested for expected federal funds and state match for alternative energy projects (Fuel Efficiency Improvements, Conservation, Wind, Biomass).

Funding:	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	Total
G/F Match	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$3,000,000
Total:	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$3,000,000

<input type="checkbox"/> State Match Required	<input type="checkbox"/> One-Time Project	<input type="checkbox"/> Phased - new	<input type="checkbox"/> Phased - underway	<input checked="" type="checkbox"/> On-Going
0% = Minimum State Match % Required		<input type="checkbox"/> Amendment	<input type="checkbox"/> Mental Health Bill	

Operating & Maintenance Costs:

	<u>Amount</u>	<u>Staff</u>
Project Development:	0	0
Ongoing Operating:	0	0
One-Time Startup:	0	0
Totals:	0	0

Additional Information / Prior Funding History:

Federal funding was received as part of a larger federal energy program appropriation, which contained several programs. Prior funding history for this larger appropriation: FY 96 1,000.0; FY 97 10,000.0; FY 98 30,000.0; FY 99 0.0; FY 00 0.0 FY 01 30,450.0. In FY 02 the project received its own appropriation of \$5,487.0

Project Description/Justification:

The diesel efficiency and alternative energy program seeks to lower the cost of power and heat by developing alternatives to diesel-based energy systems as well as enhancements to diesel-based technology. Most of the program focus is in rural areas where average energy costs are highest and cost reduction alternatives are most needed. AEA requests \$500,000 in State capital funds to finance the following initiatives:

- Construction of new "waste heat" recovery and distribution systems in connection with conventional diesel power plants in rural villages.
- Battery storage demonstration projects.
- Identification and installation of energy conservation measures in rural schools and other large buildings.
- Further development and testing of wind energy projects.
- Operational testing and air permitting of fish oil and diesel blends
- Development of an ethanol manufacturing plant using wood waste as feedstock.

Proposed activities are in line with the results of the *Screening Report for the Alaska Rural Energy Plan*, prepared in 2001 for AEA and its co-sponsors – the Denali Commission and the U.S. Department of Agriculture – Rural Development. The Report concludes that diesel efficiency improvements, end use conservation, wind energy, and waste heat recovery hold the most promise for energy cost reduction in rural communities. Additional proposals in these areas are expected to emerge from detailed follow-up work to the screening report in early 2002. The Denali Commission has clearly expressed its interest in contributing federal grant funds to the most cost-effective efficiency and alternative energy projects that emerge from this process.

Fuel Efficiency Improvements

- *“Waste Heat” Recovery from Diesel Generators.* Currently there are at least 51 systems in rural communities that recover jacket water heat from diesel generators and distribute it to nearby schools, water treatment plants, and other facilities. Over the last decade, upgrade and replacement of diesel power plants in rural villages have created new opportunities for heat recovery as many of these projects have been designed for easy connection to a waste heat system. This includes the diesel power plant upgrades that AEA is now developing under its RPSU (Rural Power System Upgrade) program. Additional capital funds would support the installation of these systems, where possible in conjunction with the installation of new diesel power plants.
- *Energy Storage System Demonstration.* A pilot diesel battery-photovoltaic hybrid energy system was initiated at Lime Village in 2001 through an AEA partnership with BP Exploration Alaska, USDOE/Sandia National Laboratories, and McGrath Light and Power. Diesel-battery hybrid systems offer potential fuel savings, reduced maintenance, and improved reliability over multiple diesel configurations in a number of rural applications. The energy storage and conversion systems can replace spinning reserve, reduce engine start-stop cycles, and allow use of a smaller, less costly diesel generator. Further demonstration of the value of energy storage, and energy conversion systems is needed as an option for small communities with wide variations in load, and with difficulty balancing the load throughout the distribution system.

This project proposes to demonstrate the cost effectiveness of a modular energy storage and conversion system that will be demonstrated in a number of combinations, such as diesel-hydro, diesel-wind, direct current wind, and straight diesel. AEA will work with USDOE/Sandia National Laboratories, the University of Alaska, and local utilities to assess demonstration project economics and fuel savings using a computer model being developed for this purpose. The proposed system will be modularized so that energy storage can be tested in several different locations, operating conditions, and hybrid combinations. After the demonstration period the unit will be installed permanently in a suitable location. The energy storage, conversion and control system will provide flexible platform to demonstrate various hybrid diesel-battery configurations and will be configured to receive wind, solar, hydro, or other sources of intermittent electrical (AC or DC) energy. State participation is considered necessary to succeed in the competition for these federal grants.

Conservation

The Rebuild America program provides federal funds primarily to conduct energy audits of commercial and institutional buildings. Energy “auditors” examine these larger buildings, analyze energy use, recommend cost-effective energy conservation measures, and provide training of facility operators. The Rebuild America program requires a 1:1 match of federal and state dollars.

To date, AEA has conducted energy audits in 110 rural communities. The largest 3 structures, including the school, are examined in each community. An additional 25 communities will be covered by the program during FY02, leaving approximately 50 rural communities for which this service has not been provided. The audits have identified conservation measures that would save schools and other rural facilities over \$1.6 million per year at a capital cost of \$2.8 million. These are very cost effective investments – typical measures include retrofitting to efficient lamps and ballasts, installing setback thermostats and occupancy sensors, controlling boiler water temperature based on outdoor temperature, tuning and upgrading heating systems, installing energy efficient motors, and improving building envelope and insulation.

Wind

- *Medium Penetration Wind Systems for Western Alaska Demonstration.* Recent experience with wind energy systems in Kotzebue and Wales has demonstrated the viability of wind-diesel energy systems as a supplement to diesel fuel for a large number of rural communities. These wind projects have clarified many cost and technology issues related to the effective use and optimization of wind energy. Proposed by AVEC, the project will incorporate wind turbines into the design of a new village energy system in conjunction with the construction of a new diesel power plant. Building on the experiences of the Wales and Kotzebue projects, this system will form the basis for broader application of wind diesel technology.

The estimated project cost of the 150 to 250 kW wind energy component is \$680,000. Candidate communities in Western Alaska include Shishmaref, Brevig Mission, Gambell, Savoonga, and Scammon Bay. AVEC has indicated that it will contribute \$200,000 to the project.

- *Wind Resource Assessment and Database Preparation.* Although there are many promising locations for wind energy throughout Alaska, detailed analyses of wind resources must be conducted to determine the financial feasibility of individual projects. Funds will be used purchase and install monitoring equipment; collect, evaluate and correlate wind resource information with ground measurements. Monitoring equipment and technical assistance will typically be provided on a cost shared basis. Funding will pay for basic assessments at 50 villages or site-specific investigations at 2 to 10 sites, depending on the level of detail required. Potential candidate sites are numerous, however special attention will focus on larger communities and locations that are representative of larger geographic regions, e.g. Dillingham, Naknek, Bethel, Hooper Bay, Emmonak, and Wainwright,

Biomass

There are two project areas for which USDOE funding will be sought :

- Currently AEA is working with Alaska Science and Technology Foundation, BF Goodrich, and USDOE to assist UniSea Inc. in testing air emissions and performance of fish oil and diesel blends as fuel in a Fairbanks-Morse generator. UniSea and other processors in Dutch Harbor produce approximately 3.5 million gallons of fish oil per year from pollock processing operations. Additional oil is produced in other locations. Although some of the fish oil is used as a boiler fuel locally, most is sold to customers outside of Alaska for aquaculture and other purposes. Due to remoteness, difficult shipping logistics, and other factors fish oil net revenue is often poor. Results of using fish oil and diesel blends for power generation are positive and suggest that fish oil "biodiesel" may provide an inexpensive fuel for western Alaska and an attractive alternative product for fish processors.

State capital funds would be used to cost share with USDOE, ASTF, UniSea and other firms to expand testing to other types of generators, such as Caterpillar and John Deere.

- Southeast Alaska Ethanol Development. To date, \$4,386,600 has been committed to a technology assessment, feasibility analysis, and preliminary design of a facility planned for Ketchikan that will convert wood residues to fuel grade ethanol. An additional \$2,000,000 was appropriated to USDOE for the project in November, 2001. State funds would be used to cost-share with USDOE, Sealaska, and other project participants to move the project forward to a planned 2 million gallon per year start-up facility.