

West Coast Diesel Emissions Reduction Collaborative

Alaska Biodiesel Project

Working with leaders from government, the private sector, and environmental groups the West Coast Diesel Emissions Reduction Collaborative (Collaborative) encourages projects that reduce diesel emissions. The Collaborative seeks to fund projects that are regional in scope, leverage other funds, result in real measurable reductions/results, and create momentum for future reductions. This document describes a potential Collaborative project in the construction and distributed generation sector: the Alaska Biodiesel Project.

Project at a Glance

- Converts fish oil, a by-product of the fishing industry, into locally produced and locally consumed biodiesel fuel.
- Develops a market for biodiesel in Alaska. Over 8 million gallons of fish oil are produced annually by Alaska's groundfish industry.
- Creates a low-cost source of ultra low sulfur diesel (ULSD) fuel, which will be required in 2006.
- Replaces 70,000 gallons of diesel fuel annually with biodiesel in Alaska-based National Park Service vehicles, boats and generators.
- Reduces emissions for Alaska residents and visitors, including the 300,000 people who visit Denali National Park each year.
- Demonstrates effectiveness of mobile, modular biodiesel processing plants for replication in other locations.
- Reduces damage to marine environment and enforcement actions resulting from disposing of fish waste products that can be processed into biodiesel fuel.
- Reduces diesel emissions and fuel costs for remote communities.
- Reduces environmental cleanup costs and damage if a spill occurs.

Problem Statement

Alaska fisheries produce large amounts of fish by-products. Due to concerns about environmental damage from disposing of fish waste products, some of this waste is now processed into fish oil and dried fish meal. The Alaska groundfish industry produces 8 million gallons of fish oil each year, and an unknown percentage of fishery by-products are discarded. Fish meal plants produce a large surplus of fish oil in the spring and summer. About 2.8 million gallons are shipped to markets outside Alaska and some is used as boiler fuel, but many processors end up with surplus oil and little or no net profit on the oil.

Remote Alaskan villages, accessible only by barge or plane, already have energy costs that are three to five times the national average and are in need of an affordable source of ULSD fuel to comply with new federal regulations. Fuel costs are high in these villages because fuel must be barged or flown in, and entire villages run off of diesel generators. Many of these villages have only a few trucks that will need ULSD. These villages use 28.5 million gallons of diesel fuel annually, mainly for heating. Locally produced biodiesel could reduce emissions and fuel costs, while providing ULSD fuel. (For more information on Alaska's plan to transition to ULSD, see: <http://www.state.ak.us/dec/air/anpms/as/ulsd/ulsdtranplan.htm>)

Alaska currently does not have an in-state facility for processing biodiesel fuel. Developing the infrastructure to produce biodiesel locally would create a more profitable market for fish waste products, reduce emissions by increasing the use of biodiesel, reduce environmental damage from disposal of fish

by-products, and create a local, affordable source of ULSD fuel for remote villages to comply with new regulations.

Proposed Actions

Project goal:

Develop resources and facilities for in-state production of biodiesel from fish oil and fish waste products, while moving toward increased investment by the private sector.

Near-term projects:

1. Demonstrate usability of biodiesel derived from fish oil. The University of Alaska Fairbanks' Arctic Energy Technology Development Laboratory is testing a batch of fish oil derived biodiesel in a generator in a laboratory setting. This test will be followed by a field test at Denali National Park during the summer of 2005. Diesel oxidative catalysts will be tested on generators as part of these studies. Alaska does not currently have a facility for processing biodiesel, so the Alaska Energy Authority (AEA), with assistance from Alaska's Department of Energy Conservation, purchased 12,000 gallons of fish oil and transported it to Hawaii where it was processed into biodiesel for these tests.
2. Analyze the economics of in-state biodiesel production. AEA is analyzing the costs and options for in-state production of biodiesel, and the Alaska market for biodiesel.
3. Research fish material available for use as biodiesel feedstock. An unknown percentage of fish waste products (guts, bones, skin) are simply ground up for disposal. This creates environmental problems and has resulted in enforcement actions. Researchers will estimate the additional amount of fish oil that can be produced from unused fish waste.

Longer-term project:

- Develop portable and or stationary biodiesel processing units. Depending on the outcome of the economic analysis (see near-term projects, number two, above), mobile, stationary, or both types of processing units will be used to process fish oil into biodiesel. Modular biodiesel processing units can be placed on barges that travel to where fish oil is available, process oil, and then move on to next source of fuel. These portable biodiesel processing units could serve as a model for replication in other locations. Stationary units may be an alternative or an addition to the mobile units; the location of a stationary unit would be based on the analysis of available fish waste and the economics of in-state biodiesel production. The project will move toward increasing investment from the private sector.
 - Sell locally produced biodiesel to Alaska-based customers. There are many potential markets for biodiesel in Alaska. The National Park Service wants to purchase biodiesel fuel for use in park vehicles, boats, and generators in Denali and Katmai National Parks; the Brooks Camp Area of Katmai National Park can operate its generators and mobile equipment on 100 percent biodiesel (B100). Remote communities have high energy costs and could benefit from locally produced biodiesel.
 - Market fish oil derived biodiesel as an additive for ultra low sulfur diesel (ULSD) fuel. Adding a small percentage of biodiesel increases the lubricity of ULSD fuel.

Anticipated Benefits

Replacing conventional diesel fuel with biodiesel reduces emissions of particulate matter, carbon dioxide, sulfur oxides, and unburned hydrocarbons. Specific emissions reductions depend on the source of biodiesel and the engine type used. The University of Alaska Fairbanks' Arctic Energy Technology Development Laboratory is testing a batch of fish oil derived biodiesel; the study will provide emission reduction estimates for the fuel in specific engine types.

This project will convert fish waste products into emission reducing fuel. The Alaska groundfish industry produces 8 million gallons of fish oil from fish waste products annually. Some fish waste products are not used for oil production and disposal damages the marine environment. The capacity to locally process fish oil into profitable biodiesel will reduce environmental damage and resulting enforcement actions. Local production will also reduce the cost of biodiesel in Alaska, making it a more viable fuel for customers. The project will also demonstrate the effectiveness of modular biodiesel processing units for replication elsewhere. Preliminary data indicate that locally produced fish oil biodiesel should cost approximately \$3 per gallon – a price that is equal or less than the current retail price for on-road diesel in Alaska.

Around 200 remote villages, only accessible by barge or plane, use diesel generators as their power source. These communities have high energy costs, and do not have a readily available source of ULSD fuel. Locally produced fuel could reduce emissions, costs, and the potential for damage from fuel spills, while increasing economic development.

National Park Service operations in Denali National Park and Brooks Camp in Katmai National Park use around 70,000 gallons of diesel fuel annually. Transporting and storing conventional diesel fuels in rugged, pristine environments is difficult and can result in damaging and costly fossil fuel spills. Replacing this fuel with locally produced biodiesel will result in greatly reduced emissions, and reduced concerns about fuel spills. If spilled, biodiesel is less costly to clean up and less damaging to the environment. The 300,000 people who visit Denali National Park each year will benefit from reduced emissions and reduced damage from spills.

Estimated Costs

The near-term projects (see above, numbered one through three) will cost \$102,000. Of that amount \$67,000 is already funded. Approximately \$35,000 will be needed to complete these projects. Completion of the near-term projects will include an assessment of the total costs and benefits of the long-term goals of the project.

If the economic analysis highlights a good business case for a local biodiesel processing facility, the project would be looking for an additional \$100,000 in funding to pay for part of the costs of a prototype processing plant through a competitive solicitation.

An initial estimate of the cost of one mobile biodiesel processing unit on a barge, including transportation of the unit to Alaska, is \$500,000.

Collaborative Partners

The Alaska Energy Authority and Alaska Department of Environmental Conservation are working with the University of Alaska Fairbanks Arctic Energy Technology Development Laboratory to test biodiesel derived from fish oil in laboratory and field settings. The National Park Service is testing the biodiesel fuel, and is interested in using biodiesel in park equipment. Pacific Biodiesel of Honolulu, Hawaii, processed fish oil for initial tests. American Presidential Lines (APL) defrayed cost of transporting fish oil to Hawaii, and transporting fish oil biodiesel back to Alaska. The Navy Facilities Engineering Service Center helped develop and test the modular biodiesel processing facility. Many stakeholders have already expressed their interest in the program through these commitments and contributions, and additional partners are being developed. Investment in this program will leverage expanding partnerships, private sector investments, and private sector partners.

More Information on the Collaborative and Contacts

The West Coast Diesel Emissions Reduction Collaborative is made up of federal government agencies from the U.S., Canada and Mexico, and state and local governments and non-profit and private sector partners from California, Oregon, Washington, Alaska and British Columbia. The Collaborative's purpose is to support voluntary diesel emissions reductions, create a forum for information sharing among diesel emissions reductions advocates, and leverage significant new resources to expand voluntary diesel emissions reductions efforts.

The goal of the Collaborative is to leverage over \$100 million in new federal funds for diesel emissions reductions projects per year for five years to reduce emissions from the most polluting diesel sources in the most impacted communities and significantly improve air quality and public health. By targeting the higher polluting engines with the most cost effective strategies, we estimate that the benefits of this investment will significantly outweigh the costs.

For more information on the Alaska Biodiesel Project, contact: Peter Crimp, Alaska Energy Authority, (907) 269-4631, pcrimp@aidea.org. For more information on National Park Service biodiesel usage, contact Tim Hudson, National Park Service, (907) 644-3381, tim_hudson@nps.gov.

For more information on the Collaborative in general, go to www.epa.gov/air/westcoastdiesel or contact Peter Murchie, murchie.peter@epa.gov or Michelle Roos, roos.michelle@epa.gov.