



West Coast Diesel Emissions Reduction Collaborative

Government Bio-diesel Fueling Facility for Puget Sound

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 Marine Sector Government Bio-diesel Fueling Facility in Puget Sound.

Project at a Glance

- Projected total emissions reductions of NO_x, PM_{2.5}, Sulfur, and/or GHG is 30 percent over the life of the project.
- Project will benefit entire airshed of greater Puget Sound region, with surrounding population of approximately 2 million.
- Project will ultimately reduce emissions from Navy and other diesel powered marine vessels operating in the waterways of greater Puget Sound.
- Projected direct fuel savings of 10 percent
- Bio-diesel may not be classified as a hazardous material resulting in storage and transportation requirements having additional cost savings.

Problem Statement

Sustainable operation of diesel powered marine vessels on Puget Sound waterways is essential to meeting the mission requirements of the U.S. Navy and other government and private maritime organizations. Increasingly, these organizations are turning to alternative fuels such as bio-diesel to operate with lower engine emissions of particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO₂), hydrocarbons (HC), and sulfur oxides (SO_x). Marine engines comprise some of the least regulated sources of diesel emissions in the U.S. Global trade and port activity are increasing, while controls on land-based air emissions are tightening, making the share of total air emissions represented by the marine industry a growing target for regulation.

Bio-diesel is the first and only alternative fuel to have a complete evaluation of emission results and potential health effects submitted to the U.S. Environmental Protection Agency (EPA) under the Clean Air Act Section 211(b). Bio-diesel is a nontoxic and biodegradable fuel made from organic fats and oils. Bio-diesel can serve as a replacement or enhancer for petroleum diesel. Bio-diesel can be blended with petroleum diesel when used in existing diesel engines with little or no modification to the engine. In blends as low as 20 percent volume (B20) bio-diesel has been shown to substantially reduce particulate and other emission pollutants and improves engine wear. Sulfur emissions are essentially eliminated with pure bio-diesel, which contains no sulfur.

Proposed Actions

Navy Region Northwest (NRNW) is initiating the use of bio-diesel in selected diesel engines. NRNW intends to evaluate bio-diesel in several applications including small watercraft (i.e. tug boats), power

generators, fire engines, construction equipment, and armored vehicles. The first of these systems to be evaluated is small watercraft. We expect that this evaluation will have positive results and will be used as the basis to allow the Navy and its customers fueling at the Navy's Manchester Fuel Facility to more extensively use B-20 and higher Bio-diesel fuel.

The application of a government bio-diesel fueling facility in Puget Sound with a feasibility study for fueling Navy and their current customers, including NOAA and the USCG, small watercraft at the Manchester deep water terminal facility. The mission of this facility is to provide military fuels including diesel fuel marine to ships, so this study will focus on what is required to modify current infrastructure to accommodate large scale bio-diesel fueling and capability to fuel B-20 to B100 using the current pier and fueling systems. Additionally, this study will produce a conceptual design with cost estimates for facility conversion. This first phase is anticipated be 4 months. The second phase will be facility design estimated to take 12 months and the final phase will be facility modification construction

A detailed test protocol for evaluating bio-diesel refueling will be developed. The goal is to reduce emissions during fueling and operating costs. The test protocol developed will document the performance requirements and testing methods to be used during the first year of operation. Lessons learned from this testing, and application will be provided in a final test report will be written and delivered to the Defense Energy Support Center, the US Navy and the Collaborative documenting assumptions, test methods, and test results.

This project will follow the international standard for project management embodied by the Project Management Institute and will be conducted by project managers formally trained in the associated methodologies of the Project Management Body of Knowledge (PMBOK). The information storage and analysis will be conducted within the rigor of Computer Maturity Model Integrated (CMMI) Level Three.

This project is anticipated to have a period of performance of 12-months plus construction and operation evaluation phase land be conducted in accordance with an approved Project Management Plan (PMP) with all associated reporting.

Anticipated Benefits

Several questions about bio-diesel emissions in larger engines, long-term storage issues, effects of increased fuel solvency in existing systems, on-site mixing requirements, effects of saltwater with bio-diesel, and watercraft performance characteristics have been unanswered to-date. It is anticipated that bio-diesel will reduce emissions by 30 percent of most pollutants, but that the emissions reductions will depend on the percent mixture of bio-diesel to neat diesel.

Estimated Costs

With the increasing cost of diesel fuel it is estimated that a potential savings of 10 percent or more per gallon will be possible if switching to bio-diesel mixtures over neat diesel. In addition to the direct cost savings, reduced air emissions of about 30 percent are expected. Funding of approximately \$1,000,000 is estimated for the entire project. The feasibility study phase at \$100,000 and design phase, \$250,000 will be 12-months. The construction phase will be determined during design followed by a 1-year evaluation phase.

Collaborative Partners

NRNW operates several bases in the Puget Sound with port operations at Naval Base Kitsap. The Defense Fuel Support Point Puget Sound (Manchester) provides fuel to Defense Energy Support Center

clients including all Navy vessels in Puget Sound, MSC ships NOAA vessels, USCG vessels, University research vessels, Army Logistics vessels, and appropriate foreign flagged vessels (example, Canadian Defense Forces). Concurrent Technologies Corporation (*CTC*) a non-profit organization is targeted to do the feasibility study and the third party testing and evaluation. The design and construction will competitively bid following Navy procedures and regulations.

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 5 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 bio-diesel in small watercraft, contact: Hayden Street, U.S. Navy Region NW, 360-396-5098, hayden.street@navy.mil, Gary Frogner, Concurrent Technologies Corporation, 360-782-5555.

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.