Project Snapshot:

Diesel Fuel Additives — Use and Efficacy for Alaska’s Diesel Generators

Project Need

Rural Alaska communities remain dependent on diesel generators to provide electricity, at costs significantly higher than costs in grid-connected communities. Reducing those costs through improving engine efficiency and/or reducing engine maintenance, is a high priority for those responsible for these systems.

Many fuel additive suppliers have suggested that additional efficiency gains can be realized through the use of their products; however, substantiated performance data for these additives in diesel generators has not been available to allow rural energy producers to make informed decisions about their use.

Project Description

This project focused on an assessment of the current use of diesel fuel additives in the Alaska electric utility industry, with special focus on evaluating fuel additives for the possibility that they might improve fuel economy of rural diesel electric generators. Information was gathered about fuel sources and distribution networks, additives used by fuel suppliers, experiences of electric utility operators with additives, the performance of additives anticipated by additive suppliers, recommendations of diesel engine manufacturers, peer-reviewed journal articles, and other public sources including the Environmental Protection Agency.

Project Findings

Many products are available for treating diesel fuel, some of which claim to improve the efficiency of diesel engines by as much as 10% to 20%. Often these claims are supported by testimonials or reports that purport to verify these statements. However, a review of these claims raised concerns. For example, testimonials were based on very short-term experience, some reports appear to have been edited or altered after their creation, and signatures or certifications by the testing organizations were lacking. Often, links to patents or studies are missing, or no information is given at all. Complicating these claims is the fact that under normal operation, fuel consumption and power generation efficiencies vary due to factors not always accounted for, including load variation, changes in fuel properties, and maintenance history among other things.
Attempting to test products with sufficient rigor is a significant and costly undertaking, especially if long-term costs or benefits are to be experimentally evaluated. There is one testing program in the U.S. dedicated to evaluating efficiency additives and retrofit devices. The program was founded in 1971 and is run by the EPA.

No similar program has been identified for testing additives specifically designed for diesel engine fuels, but many additives and devices claim to provide benefits in both gasoline and diesel engines. None of the products currently marketed in Alaska have been identified as participating in the EPA testing program.

Some fuel additives, such as those identified for pour point depression and lubricity enhancement for ULSD fuels, are necessary for bringing fuels into ASTM D975 compliance. Other additives, such as biocides, might be useful for long-term storage of diesel fuels in damp climates. Some engines not operating at optimal performance may benefit from an injector or fuel system-cleaning additive. But in general, the engine manufacturer’s recommendation that no additives be used in diesel fuels appears to be sound advice.

Proper use requires good mixing of additives into the fuels, with increased attention the closer the point of introduction of the additive is to the utility. Adding additives to fuel tanks adjacent to the power plant requires attention to the physical mixing, temperatures of the fuel and the additive, and the mixing ratio. These conditions are often better controlled during delivery of the fuel to the region and are best controlled by the fuel producer or bulk distributor.

The researchers of this project found no credible information from any of their sources to support the claim that any product can improve the operating efficiency above that of a well-maintained diesel engine. We recommend bona fide testing of additives where controlled conditions can be ensured. Use of test facilities and rigorous protocols will increase the understanding of the efficacy of, and improve the credibility of, representations of additives. At this time, no candidate additive for improving fuel efficiency has been identified for such extensive laboratory testing. However, augmented testing of additives or add-on devices at utility sites by unbiased, third-party analysts could bring better understanding to the testing and help identify promising additives.