

# Fishing Vessel Energy Audit Project

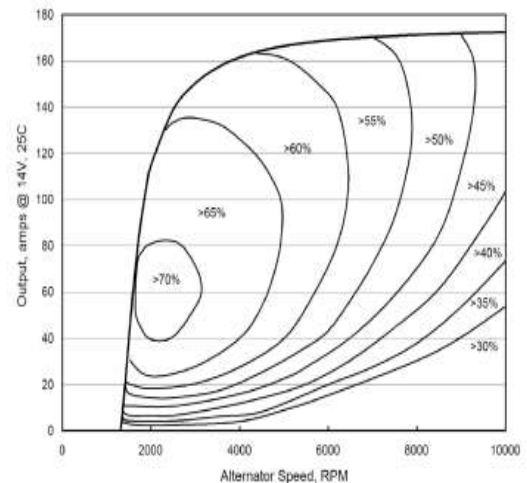
To provide vessel owners with practical measures to save fuel, the Alaska Fisheries Development Foundation (AFDF) partnered with Alaska Longline Fishermen's Association (ALFA), Alaska SeaGrant, Nunatak Energetics, and Navis Energy Management Solutions to conduct energy audits and collect data from Alaskan fishing vessels between 2012 and 2017. The information below is provided to help vessel owners identify operational and equipment solutions to improve fuel efficiency and empower owners to further customize the tools' recommendations to meet their specific needs.

## Improving AC & DC Electrical System Performance

The efficiency of the AC & DC electrical systems on a vessel depend on the efficiency of the alternator in generating electrical power, and the efficiency of the lights and equipment that use the electrical power. The following are some practical operational and equipment-related strategies to improve system performance and save fuel.

### Equipment

DC power on a fishing vessel typically comes from one or more DC alternators driven by a belt from the main engine. AC power can come from a dedicated AC genset, or from an inverter drawing DC power from the batteries. As with propulsion power, the efficiency of the engine powering the alternator or generator will depend on the type of engine and the total load on the engine at the time. Lightly loaded engines are significantly less efficient than properly loaded engines. Additionally, the DC alternators or AC generators used to produce the electrical power are most efficient when properly loaded and turning at design speed. Under lightly loaded conditions, alternator efficiency can be reduced by up to 50%. An inverter can eliminate the need to run a diesel generator for light AC loads.



Source: Improving Alternator Efficiency Measurably Reduces Fuel Cost: Mike Bradfield, MSME, Remy Inc.

The fuel used to generate AC or DC electricity on a vessel represents 95% of the life-cycle costs of electric motors and lighting equipment. Old technology electric motors are only about 50-70% efficient at lower horsepower ratings, compared to 80-95% for premium efficiency IE3 grade motors. Over time a premium efficiency motor can save about 20% in energy costs. For lighting, LED lights are up to 10 times more efficient than incandescent or sodium lights.

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## **Operating practices**

Generating electrical power on a fishing vessel, whether through a DC alternator or a dedicated AC genset, typically costs two to four times as much as shore power. When in port, it is most cost effective to plug into shore power and turn the vessel's engines off. An inverter powered from a battery bank with a battery charger can eliminate the need to run a diesel generator for light AC loads.

### **Simple steps to save fuel:**

- **Belt tension**—Improperly adjusted alternator belts reduce efficiency and increase alternator wear.
- **Switch to LED lighting**—LED lighting is up to 10 times more efficient than incandescent lights and about twice as efficient as compact fluorescents.
- **“Right-size” alternator--**. Select an alternator with a peak efficiency that matches your average load and engine speed.
- **Use premium efficiency motors (IE3)**— A premium efficiency motor can save 20% on energy costs.
- **Use an inverter**— Consider using an inverter for light loads instead of running a genset. A true sine wave inverter is more efficient than a modified sine wave inverter.
- **Heating alternatives**—Consider installing a heat pump or heat exchanger powered by engine coolant instead of electric resistance heating for cabin spaces.

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