

Comparisons of Biofuels in High Speed Turbine Locomotives: Emissions, Energy Use and Cost

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This paper compares the performance of a 4000 HP (2984 kw) gas turbine powered passenger locomotive fueled with selected biofuels with that of the same locomotive fueled with diesel #2. The process of selecting the fuel from a detailed evaluation of thirteen readily available biofuels is explored and then a simulation of operation in a real high speed corridor is used to develop exhaust emission values in terms of tons (tonnes) per year for a complete service and then in terms of pounds (grams) per trip of primary smog producing pollutants. Energy use and costs per trip are developed from the same simulation. All of these values are compared with diesel #2 values developed in previous work. Biofuel use with respect to turbine maintenance costs are discussed.

The implications of carrying and delivering the fuel on a locomotive are also explored in terms of projected range with a given fuel tank size and minimum fuel tank size required to serve a typical corridor.