TECHNOLOGY DEVELOPMENT PROJECT FACT SHEET

FF009: 11kW Lister Petter Genset Mixed Fuel Demo

An unmodified Lister Petter engine genset was tested using propane-hydrogen fuel mixtures in order to evaluate lean burn operation with low nitrogen-oxide (NOx) emissions while maintaining acceptable levels of total hydrocarbon (HC) emissions.

Lean burn combustion emissions were measured over a range of propane-hydrogen mixtures from 100% propane and 0% hydrogen to 0% propane and 100% hydrogen. A significant reduction in NOx and HC emissions, without requiring significant engine modifications, was finally reached with a propane-hydrogen fuel mixture of 50/50 by volume. Hydrogen concentrations of less than 50% had minimal impact on reducing emissions or improving the lean burn engine performance. The engine was able to operate without problems up to a fuel mixture of 10% propane with 90% hydrogen. With these mixtures a low emission rate of 15 ppm NOx were maintained in this lean burn demonstration as compared with 500 ppm with 100% propane. At 100% hydrogen, the engine had backfire explosions and poor performance. The highest engine efficiency was observed at a hydrogen fraction range between 70% to 80%. This lean burn mixed fuel engine demonstration has shown that a standard propane genset can be successfully operated efficiently and cleanly with low NOx emissions of 15ppm. The engine modifications necessary to operate at over 95% hydrogen fuel mixture is the subject of another Fact Sheet.

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