

# Advanced Reciprocating Engine Systems (ARES)

## Overview

The U.S. Department of Energy Office of Distributed Energy (DE) is leading a national effort to design, develop, test and demonstrate a new generation of reciprocating engine systems for DE applications that are cleaner, more affordable, reliable and efficient than products that are commercially available today.

## ARES Goals

- High Efficiency** - A fuel-to-electricity efficiency of 50% LHV by 2010
- Environment** - Reduce NOx emissions to less than 0.1g/hp-hr with no increase in other pollutants
- Fuel Flexibility** - Multiple fuel capability
- Cost of Power** - 10% less than current state-of-the-art engine systems
- Availability, Reliability, and Maintainability** - Equivalent to current state-of-the-art systems



*Kohler 25 hp NG gen-set engine (left) & Cooper Bessemer large bore gas compression engine (below). Although very different, these engines exhibit similar combustion behavior.*



*The rotating arc spark plug (RASP) has a broader spark and a multiplicity of discharges which will improve the probability of combustion under ultra lean conditions.*



*The RASP makes use of a conventional spark plug and a magnet to generate a broad, rotating arc.*

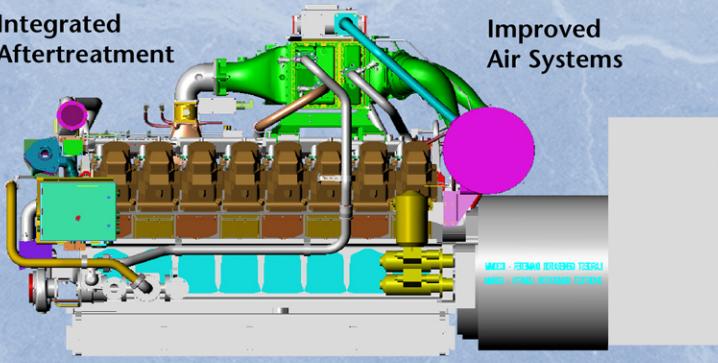


## Supporting Technologies

Enhanced Combustion

Integrated Aftertreatment

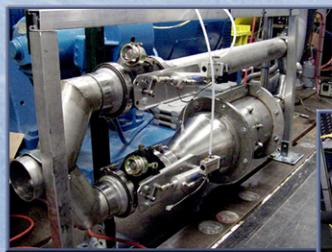
Improved Air Systems



Reduced Parasitics

Advanced Materials

Dedicated Control Systems



*A state-of-the-art lean engine is being used at ORNL to help develop and evaluate new aftertreatment options for lean natural gas exhaust – in this case, a Lean NOx Trap is being evaluated.*

