

# PACCAR/Hi-Z Thermoelectric Generator Project

DEER Meeting, August 2002

# **PACCAR** Inc

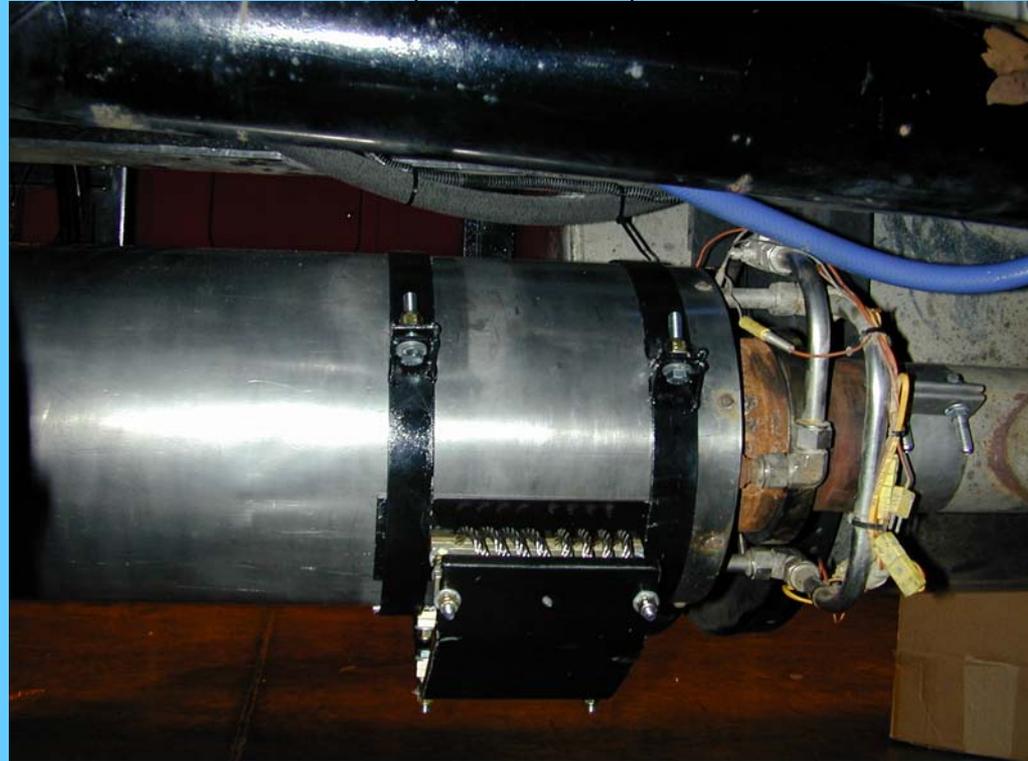
- Based in Bellevue, Washington
- Founded 1905
- 2001 Sales of \$6.1 billion
- Profitable for 62 consecutive years
- Maker of Kenworth, Peterbilt, DAF, and Foden trucks, and supporting services
- Factories in 7 countries on 3 continents
- History of technology leadership



# Efficiency Research Areas

- Aerodynamic drag & modeling
- High-strength weight reduction materials
- Telematics
- Drivetrain components
- Higher voltage and “more electric” systems
- Hybrids
- Idle reduction & auxiliary power
  - Diesel
  - Fuel cells
  - Thermoelectrics

# Hi-Z Thermoelectric Generator (TEG)



# TEG Progress

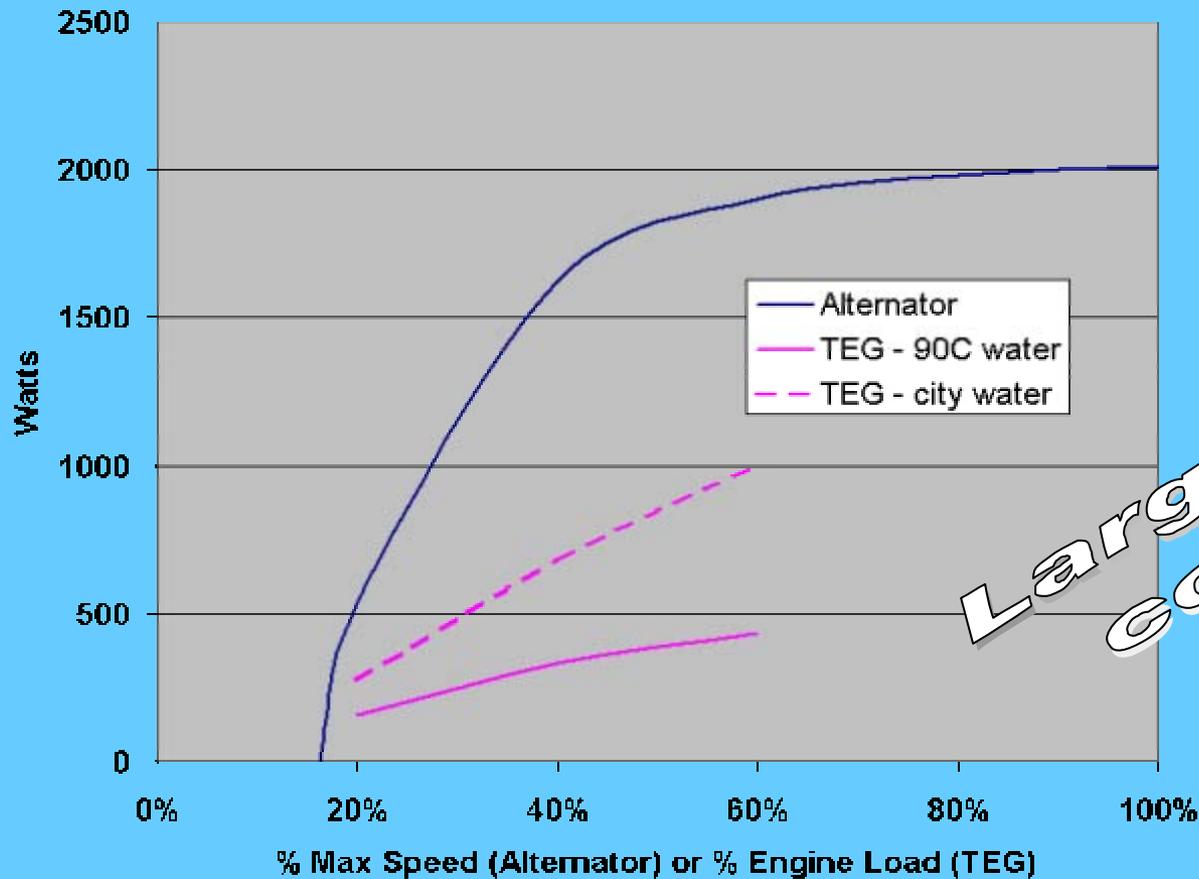
- TEG designed and fabricated
- System integrated into test trucks
  - Mechanical, including shock protection
  - Electrical, interface to charging circuit
  - Thermal, heat exchanger in engine cooling loop
  - Instrumentation, for both TEG & engine



# Test Results

- ~ 1 kW generated in test cell
- >520 W generated in over-the-road test
- Durability test to 190,000 equivalent miles
- TEG performance vs. engine parameters measured

# More Development To Do



Larger TEG  
coming!

# Development Needs

- Increased output
  - Quantum well production
  - Improved cooling system
- Support for low load/anti-idle (burner?)
- Final supplier involvement
  - Integration with other components (e.g. muffler)
  - Design for volume production

# Self-powered Components

- Emissions equipment
  - Self-regenerating particulate traps
  - Low thermal plasma
  - Hydrogen injection
- Engine preheater
- Self-powered cab & coolant heater