21st Century Truck Partnership Overview

Jud Virden
Director of Energy Programs
Pacific Northwest National Laboratory

This presentation does not contain any proprietary or confidential information
Introduction

- The 21st Century Truck Partnership (21CTP) brings together government agencies (DOE, EPA, DOT,DOD) and heavy-duty industry members
- Common goals of making trucks and buses safer, cleaner, and more efficient
- In existence since 2000: major revision of vision, mission, and goals in 2003
- VISION: Our nation's trucks and buses will safely and cost-effectively move larger volumes of freight and greater numbers of passengers and emit little or no pollution while dramatically reducing the dependency on foreign oil.
Partnership Industry Members

Allison Transmission
Detroit Diesel Corporation
Mack
BAE Systems
Eaton
Novabus
Caterpillar
Freightliner LLC
Oshkosh
Honeywell
PACCAR
Cummins
International
Volvo
Partnership Deliverables

- Partnership outcomes
  - Public data on technologies provided in annual reports
  - Public demonstrations of technologies
  - Transfer of intellectual property to product development

- Benefits of partnership forum
  - Information on industry and government technology trends
  - One forum for approaching entire industry with issues
  - Information sharing on pre-competitive R&D among partners
  - Coordination of activities leverages available funding and avoids duplication of effort
Pictorial representation of a Class 8 truck energy audit
80,000# GVW at a steady 65 mph

Total Energy Used Per Hour
Base 400 kWh (6.6mpg)

- Rolling Resistance
  Base 51 kWh
  -20% RR -> -6% fuel

- Drivetrain
  Base 9 kWh

- Auxiliary loads
  Base 15 kWh

- Aerodynamic Losses
  Base 85 kWh
  -20% Aero -> -11% fuel

- Engine losses
  Base 240 kWh
  -20% Engine -> -20% fuel

Engine Efficiency 40%

Technology goals focus on five key areas for heavy duty vehicles

- Engine Systems
- Heavy-Duty Hybrids
- Parasitic Losses
- Idle Reduction
- Safety

Support Research, Development and Demonstration
Partnership Accomplishments: Engines

Improve Efficiency of Engine Systems

- Light duty diesel engine technology
  - Tier 2 Bin 3 demonstrated (exceeded Bin 5 goal)
  - Recent product announcement
- 2007 emissions compliant engines with
  - no/minimal fuel penalty
- 45-50% system efficiency demonstration @ 2010 emissions
- HCCI combustion at commercial engine power density
- Program was a critical enabler for ultra low sulfur fuel
- Future Goal: 55% thermal efficiency technology demonstration
Partnership Accomplishments: Parasitic Losses

Reduce Parasitic Losses to Regain Horsepower in Class 8 Trucks

Aerodynamic Drag

- Consortium of Industry, National Laboratories and Universities
- Proven devices that exceeded 25% drag reduction
  - Wind tunnel, track, and road testing
  - Simulations
- Concepts developed/tested (15+ concepts evaluated)
  - Determine effectiveness and usability
- Engaged industry
  - Annual meetings, workshops
- Real-world aerodynamic development (TMA)
  - Wind tunnel and real world testing of aerodynamic devices
  - Demonstrated fuel efficiency improvements of up to 8% in SAE fuel economy testing
Partnership Accomplishments: Idle Reduction

Reduce Idling Fuel Use and Emissions by 85%

EPA and DOE funded measurements of emissions from idling truck and idle reduction equipment at DOD Aberdeen Proving Grounds:

- Confirmed that IR equipment reduced emissions and fuel use
- Preliminary measurements of 2007 truck idling emissions show 95%+ PM emission reductions.

DOE – More Electric Truck (Caterpillar, Kenworth, Emerson, SCRDrives EMP developed More Electric Truck: Caterpillar – International - Cox Transfer fleet tests)

- Fuel savings were up to 2% on road plus 6% at idle
- HVAC unit can be driven by APU (0.2 gal/hr of fuel) during rest periods
- The truck can plug into shore-power electrical service, eliminating fuel consumption
Emission Reduction Accomplishments

[Image of various logos and graphs showing emission reduction progress]
21st Century Truck Partnership has enabled

- A forum for government agencies and U.S. Industry to address important issues facing the Heavy Truck industry
- Industry input on prioritization and coordination of R&D investments for new technology development
- Information sharing on pre-competitive R&D among partners
- Provides industry the opportunity to evaluate and demonstrate higher risk technologies
21st Century Truck Partnership Contacts

Kenneth Howden
Vehicle Technologies Program, U.S. Department of Energy
kenneth.howden@ee.doe.gov

Heather McKee
heather.mckee@us.army.mil

Timothy Johnson
Crash Avoidance and Heavy Truck Research Division
National Highway Traffic Safety Administration
U.S. Department of Transportation
Tim.Johnson@dot.gov

Cheryl Bynum
National Vehicle & Fuel Emissions Laboratory
U.S. Environmental Protection Agency
bynum.cheryl@epa.gov