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Assistant Secretary
Office of Policy and International Affairs
Transportation sector depends on oil

U.S. Transportation Fuel Share (2009)

- Petroleum: 94%
- Natural Gas: 3%
- Biomass: 3%
Oil dependence puts our economy at risk

Five of the last five economic downturns have been preceded by oil prices increases

US is the world’s largest oil importer

U.S. became a net oil importer in the 1950s

US imports around half of its oil

Source: Energy Information Administration (top), CIA World Factbook (bottom)

2009 Oil Imports (in bbl/day)

US
China
South Korea
India
Germany
China has a rapidly growing car market

 Millions passenger vehicles and trucks

China
75m
The President’s Plan for Transportation
New Fuel Standards

Projected to reduce oil consumption by about 1.8 billion barrels over the lifetime of vehicles sold in next 5 years.

new combined standard
35.5 mpg by 2016

54.5 mpg by 2025
Recovery Act - Battery and Electric Drive Award Distribution

Labels indicate state of prime awardee

- EnerG2, Inc
  - Albany, OR

- Remy, Inc
  - Fargo, ND

- KD AGF, LLC
  - Midland, MI

- Magna E-Car
  - Holly, MI

- UQM
  - Littleton, CO

- Johnson Controls, Inc
  - Lebanon, OR

- Chemetall Foote, Corp
  - Silver Peak, NV

- Enerdel, Inc
  - Indianapolis, IN

- Honeywell Int Inc
  - Metropolis, IL

- FutureFuel Chemical Co
  - Batesville, AR

- Delphi
  - Kokomo, IN

- Exide Technologies
  - Bristol, TN

- Remy, Inc
  - Anderson, IN
  - Marion, IN
  - Greenfield, IN

- General Motors
  - Brownstown, MI
  - Sterling Heights, MI

- General Motors
  - Wixom, MI

- Compact Power Inc
  - (LO Chem)
  - St. Clair, MI
  - Pontiac, MI

- A123 Systems
  - Brownstown, MI

- JCI
  - Dearborn, MI

- TOXCO
  - Lancaster, OH

- BASF Catalysts, Inc
  - Elyria, OH

- Allison Trans, Inc
  - Indianapolis, IN

- Novolyte Tech, Inc
  - Zachary, LA

- Toda America, Inc
  - Goose Creek, SC

- Pyrotek, Inc
  - Sanborn, NY

- General Motors
  - Sanborn, NY
  - Pontiac, MI
  - Holland, MI

- Honeywell Int Inc
  - Buffalo, NY

- BAE Systems
  - Barre, VT

- H&T Waterbury
  - Waterbury, CT

- Powerex, Inc
  - Youngwood, PA

- East Penn Manu
  - Lyon Station, PA

- BASF Catalysts, Inc
  - White Marsh, MD

- Chemetall Foote, Corp
  - Kings MT, NC

- Celgard, LLC
  - Charlotte, NC

- KEMET Corp
  - Smithsville, SC

- Saft America, Inc
  - Jacksonville, FL
DOE’s Vehicle Technologies Program

- **Advanced Combustion Engines, Emission Controls, and Waste Energy Recovery**
  - Current Efficiency 28% → >45% cars, >55% trucks%

- **Electric and Hybrid Electric Vehicle Systems**
  - Gasoline Hybrid - +40 % Better MPG
  - Diesel Hybrid – Double MPG
  - Plug-In Hybrid – 3 to 4 Times Better MPC
  - Electric Vehicles – Battery Energy Storage

- **Biofuels/Fuel Blends**
  - Displaces Oil: 1 Gallon Ethanol Replaces 0.7 gal of Gasoline

- **Advanced Materials**
  - Lightweighting – 6% to 8% better MPG per 10% Reduction in Weight (Up to 50%)
Just released by Secretary Chu

• Rigorous analysis of energy technology

• Recommends priorities in DOE’s energy-technology programs

www.energy.gov/qtr
“There is significant headroom for DOE to work on increasing conventional vehicle efficiency by improving the internal combustion engine, by lightweighting, and by improving the aerodynamics of heavy-duty vehicles.”
“The performance, low cost, and fuel flexibility of ICEs makes it likely that they will continue to dominate the vehicle fleet for at least the next several decades. ICE improvements can also be applied to both hybrid electric vehicles (HEVs) and vehicles that use alternative hydrocarbon fuels.

Within the vehicle efficiency portfolio, ICE improvements will receive the greatest emphasis, both because it contributes to light-duty and heavy-duty vehicle sectors and because DOE’s capabilities are well-aligned with the field’s technical needs.”
Opportunity for Increased Internal Combustion Engine Efficiency

Increasing the efficiency of internal combustion engines (ICEs) is one of the most promising and cost-effective approaches to improving the fuel economy of the U.S. vehicle fleet in the near- to mid-term.

- “…The internal combustion engine will be the dominant prime mover for light-duty vehicles for many years, probably decades …” NRC Report¹

- Advanced engines in conventional, hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) will maintain significant market share for several decades

- Medium-duty and heavy-duty commercial vehicles account for a quarter of the fuel used (mostly diesel fuel)
  - No obvious alternative to ICE for over-the road trucks in the foreseeable future

¹ Review of the Research Program of the FreedomCAR and Fuel Partnership: Third Report, NRC, 2010
It has taken about 15 years for a technology to prove itself and reach 40 to 50% of production, and another 15 years to maximum market penetration.

• DOE R&D improved thermal efficiency of over-the-road heavy-duty diesel engines by over 4.5%.

• Benefits from heavy-duty vehicles alone (1995 – 2007) represent an over 60:1 return on investment (ROI) of government funds for heavy-duty combustion engine R&D - total savings of over $70B.

Progress In Heavy-Duty Diesel Engine Efficiency and Emissions

“We have been working with DOE on clean engine technology for the past 20 years. In fact, many of the technologies used in our engines today were developed in partnership with the DOE, our national labs, universities and other research institutions.”

– Tim Solso
Cummins Chairman and CEO
June 2010
Government funded research

Internet

Teflon

Velcro