Vehicle Technologies Program

Overview of DOE Fuel Technologies R&D

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Vehicle Technologies Program

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Vehicle Technologies Program Mission
To develop more energy efficient and environmentally friendly highway transportation technologies that enable America to use less petroleum.

--EERE Strategic Plan, October 2002--
The Federal Role

- Undertake High-Risk Mid- to Long-Term Research
- Utilize Unique National Lab Expertise and Facilities
- Help Create a National Consensus
- Work Cooperatively with Industry
**Strategic Goal:** Reduce petroleum dependence by enabling the development and implementation of advanced combustion regime engines and promoting the use of non-petroleum fuels and fuel components that can directly displace petroleum-based fuels while causing minimal disruption to the existing fuel production, distribution, and retail infrastructure and vehicles.

**Primary Directions**
- Conduct basic research on fuel-related characteristics of combustion
- Apply basic research results to practical fuel/engines/vehicle-systems
- Conduct testing programs to determine impacts of fuel modification on vehicle performance and driveability, emissions, emission-control system durability, and materials compatibility
- Cooperate with industry to define approach
- Coordination with Engines R&D to enable clean, high-efficiency engines using hydrocarbon-based (petroleum and non-petroleum) fuels

**Performance Targets (shared with Engines Team)**

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<thead>
<tr>
<th></th>
<th>2010 (light-duty)</th>
<th>2017 (heavy-duty)</th>
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<tbody>
<tr>
<td>Engine brake thermal efficiency</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Powertrain cost</td>
<td>&lt; $30/kW</td>
<td></td>
</tr>
<tr>
<td>NOx &amp; PM emissions</td>
<td>Tier 2, Bin5</td>
<td>EPA Standards</td>
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</table>
• Advanced Petroleum Based Fuels: develop advanced fuels and lubricants that will decrease consumption of imported petroleum, maximize engine efficiency, and improve emissions of existing and future vehicles.

• Non-Petroleum Based Fuels: identify fuels and fuel-blending components suitable for advanced-combustion-regime engines, which have the potential to directly displace petroleum.
Advanced Petroleum-Based Fuels

- Identify fuel-property requirements to fully exploit post-2010 advanced IC engines
- Expand kinetic modeling of base-fuel properties that effect operation of advanced IC engines

Non-Petroleum Based Fuels

- Develop and optimize vehicle engines that take advantage of the fuel properties of high ethanol blends fuel blends, such as E85, to improve expected fuel economy and performance
- Develop database on the impacts of intermediate blends of ethanol (E15, E20) on current and legacy vehicles and non-road engines
**Basic Science R&D**
- SNL – Low Temperature Combustion
- PNNL – Unconventional hydrocarbon fuels
- ANL – Lifecycle analysis & International Agreements
- LLNL – Chemical kinetics models (LTC and emissions)
- Universities – Complementary research

**Basic-to-Applied Bridging R&D**
- NREL – Ignition quality of fuels, fuel quality for alternative fuels, ASTM standards development, intermediate ethanol blend testing
- ORNL – Experiments on fuel impacts on engines and emission control systems (bench-scale to fully integrated systems), Intermediate blend testing

**Competitively Awarded Cost-shared Industry R&D**
- Auto OEMS and Suppliers – ethanol-optimized engine development
<table>
<thead>
<tr>
<th>Major Activities</th>
<th>FY 2007 Appropriation</th>
<th>FY 2008 Appropriation</th>
<th>FY 2009 Appropriation</th>
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<tbody>
<tr>
<td>Fuels Technologies</td>
<td>18,413</td>
<td>17,836</td>
<td>20,122</td>
</tr>
<tr>
<td>Advanced Petroleum Based Fuels</td>
<td>6,511</td>
<td>6,451</td>
<td>5,808</td>
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<tr>
<td>Non-Petroleum Based Fuels</td>
<td>11,902</td>
<td>10,885</td>
<td>13,863</td>
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<tr>
<td>SBIR/STTR</td>
<td></td>
<td>500</td>
<td>451</td>
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(Thousands of Dollars)