



U.S. Department of Energy
**Energy Efficiency
and Renewable Energy**

Bringing you a prosperous future where energy
is clean, abundant, reliable, and affordable

Vehicle Technologies Program

Overview of DOE Fuel Technologies R&D

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Presented at the
*2009 DOE Hydrogen Program and Vehicle
Technologies Program Annual Merit Review*
Arlington, VA
May 2009

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--



- ❑ 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)

	2010 (light-duty)	2017 (heavy-duty)
Engine brake thermal efficiency	45%	55%
Powertrain cost	< \$30/kW	
NOx & PM emissions	Tier 2, Bin5	EPA Standards



- **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



Fuels Technologies R&D

Industry

Fundamental Research

Applied Research

Technology Maturation
& Deployment

Basic Science R&D

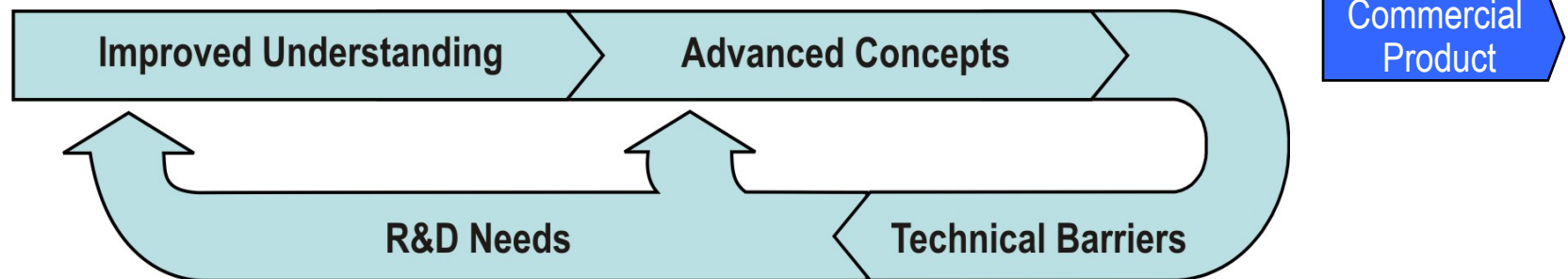
- SNL – Low Temperature Combustion
- PNNL – Unconventional hydrocarbon fuels
- ANL – Lifecycle analysis & International Agreements
- LLNL – Chemical kinetics models (LTC and emissions)
- Universities – Complementary research

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





Fuel Technologies R&D Budget by Activity

Major Activities	FY 2007 Appropriation	FY 2008 Appropriation	FY 2009 Appropriation
Fuels Technologies	18,413	17,836	20,122
Advanced Petroleum Based Fuels	6,511	6,451	5,808
Non-Petroleum Based Fuels	11,902	10,885	13,863
SBIR/STTR		500	451

(Thousands of Dollars)