U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Fuels & Lubricants R&D

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2011 DOE Hydrogen Program and Vehicle Technologies Program Annual Merit Review

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
- Reduce/Displace Petroleum Use

Fuel &Lubricants Mission

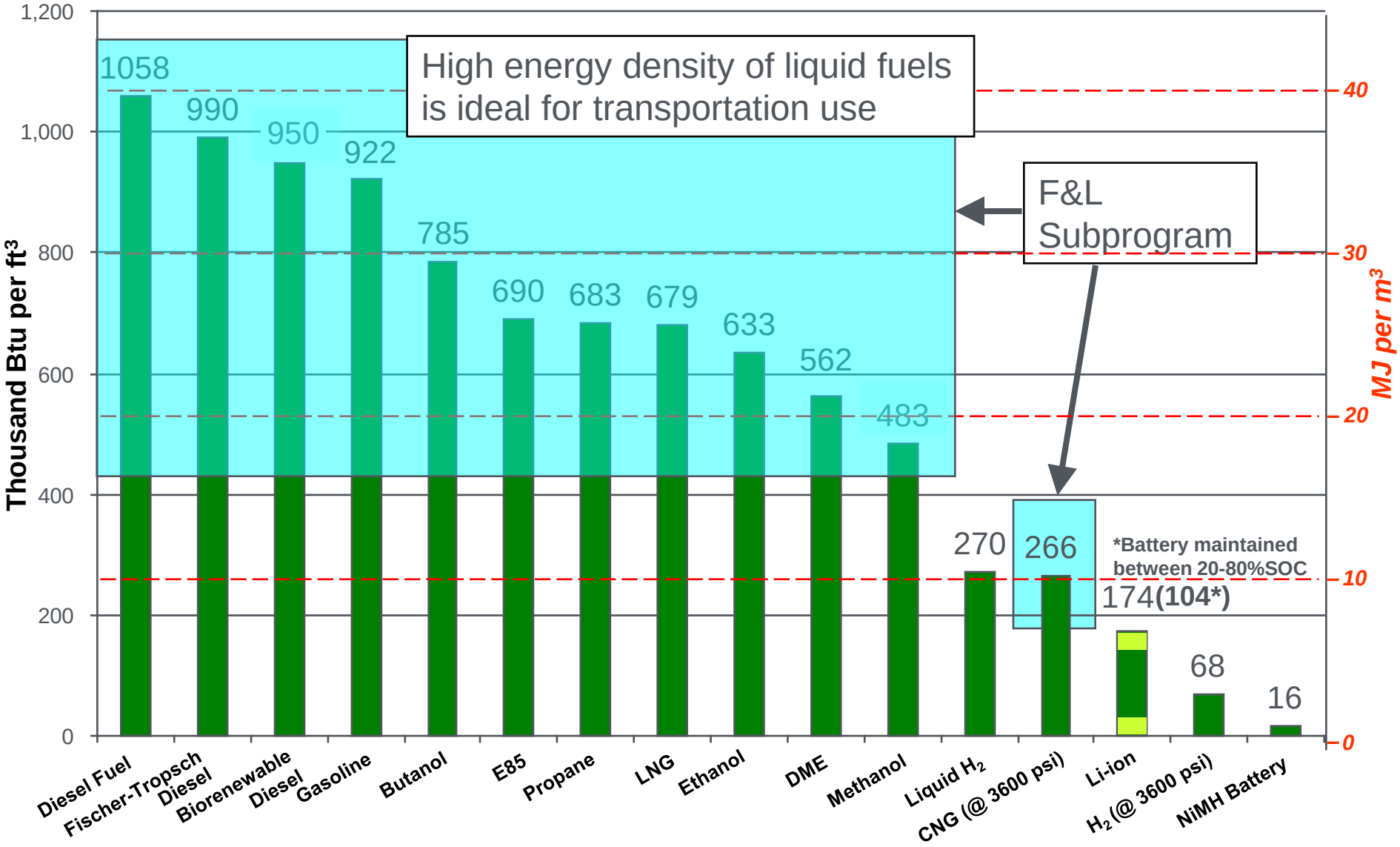
Why do we have a fuels and lubricants activity in VTP?

- Enable advanced combustion through elucidation of fuel effects in such regimes
- Evaluate suitability of new fuels and fuel components for use in developing and legacy engines, with particular emphasis on biofuels

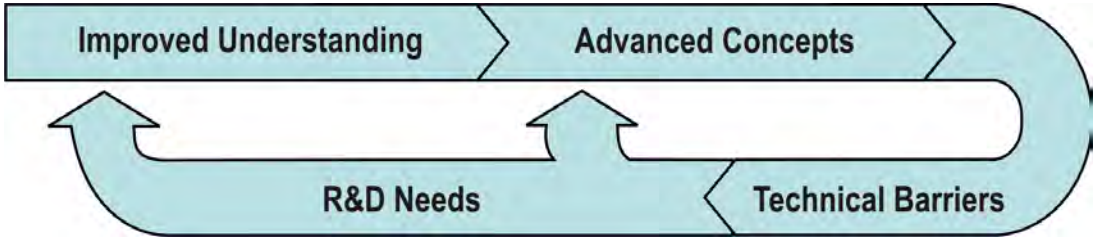
Who are our customers?

- Internal: Advanced Combustion Engine Team, Biomass Office
- External: Engine companies, autos, suppliers, energy companies (traditional and alternative), additive companies, academic research community

Fuels Purview



Overall R&D Approach: Pre-FY 11



Products, Standards, data to support policy

Primary Technical Targets

2015 Fuel Target: Expand operational range of low-temperature combustion to 75% of Federal Test Procedure

2015 Lubricant Target: Demonstrate cost effective lubricant with 2% fuel economy improvement

Subprogram Activities

Fuel Effects:

- Correlate chemical/physical properties to bulk fuel properties, combustion characteristics
- Supply open-source/public, reliable data on fuels and fuel effects on combustion
- Develop information to enable design of advanced combustion engines

Renewables and Synthetics:

- Evaluate advanced biofuels and other alternatives to petroleum
- Supply feedback on end-use suitability of new fuel/lubricant candidates to producers
- Allows fuel producers to make fit-for-service fuels

Analysis:

- Objective analyses of transportation energy pathways
- Help set R&D priorities

Subprogram Activities
Increased Emphasis

Natural Gas:

- U.S. reserves increased dramatically
- Currently far cheaper than petroleum
- Reserves suggest it will remain cheap for a long time

What to do with all this natural gas?

- Transportation – one of several potential uses; displace petroleum

Lubricants:

- 2-3% potential fuel economy improvement
- Retrofittable to legacy fleet in near-term
- Advanced engines may require different lubes

How to influence huge industry with small investment?

- Precompetitive research – advanced additives and base oils; reduce petroleum

Budget & Accomplishments 2002-2011

Years: 1998-2003

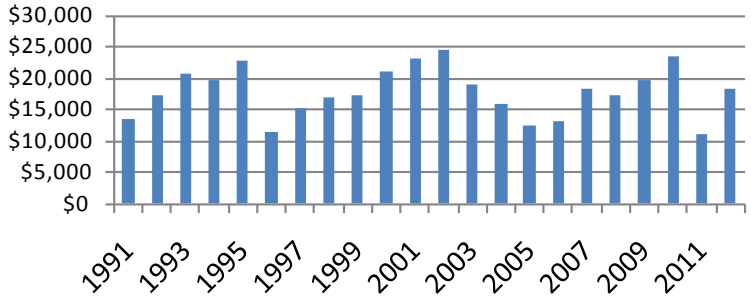
Diesel fuel sulfur effects on exhaust emission control testing program – resulted in diesel sulfur reduction to 15PPM – **enables diesel engines to meet current emissions regulation**

Years: 2008-2010

Critical research led to improved biodiesel ASTM standards – **enables B20 approved engines**

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
$24,650	$19,164	$15,887	$12,419	$13,356	$18,413	$17,376	$19,560	$23,421	$11,000	$18,503 Request

Fuels Budget at a Glance



Years: 2007-2011

Developed and implemented DOE Intermediate Ethanol Blends Test Program – E15 approved for use in 2001 and newer vehicles – **enables additional 7 bgy of ethanol potential (displace 3% of light-duty petroleum use)**

Fuel Technologies R&D Budget by Activity

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Major Activities	FY 2010 Appropriation	FY 2011 Appropriation	FY 2012 Request
Fuels Technologies	**24,095**	**11,000**	**18,503**
Advanced Petroleum Based Fuels	6,451	0	0
Non-Petroleum Based Fuels	16,641	10,692	17,985
SBIR/STTR	674	308	518

(Thousands of Dollars)

FY 11 is a year of reconfiguration of the Fuels & Lubricants area

FY 11 Request : $11,000K in Renewable & Synthetic Fuels R&D

- Zeroed-out the Advanced Petroleum Based Fuels line
- Substantially reduced Non-petroleum Based Fuels/Renewables & Synthetics

Continuity . . .

- Fuels research as enabler of advanced combustion engines
- Retain and sharpen focus on renewables for GHG reduction
- Evaluate suitability of potential alternative fuels (e.g., OBP collaborations)

Changes . . .

- Prepare for new budget line in FY 12 – explicitly includes lubricants in addition to fuels
  - One of very few efficiency retrofit opportunities
- Incorporates the most-critical fuel science from old APBF line
- Expand study of next-generation biofuels; reduce ethanol and biodiesel work