Overview of US Energy Policy

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12th Expert Working Group Meeting
on Energy and Environment
by
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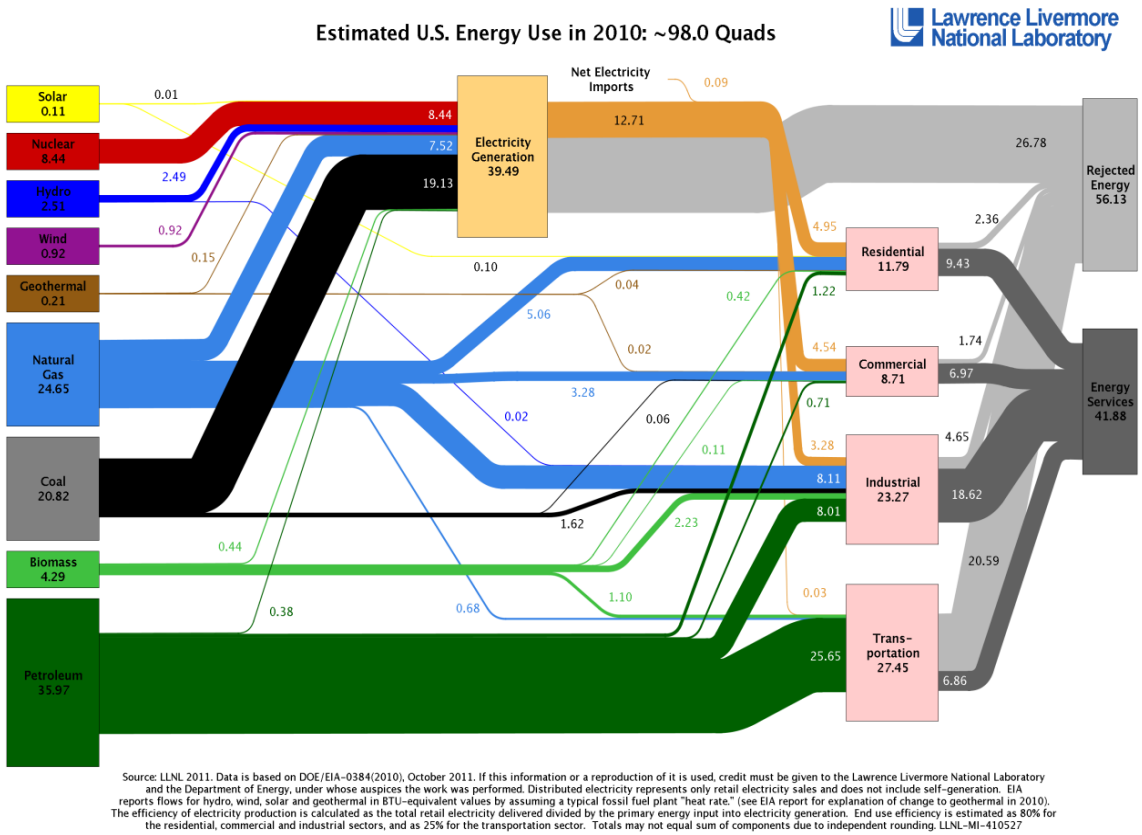
Today's US Energy Landscape

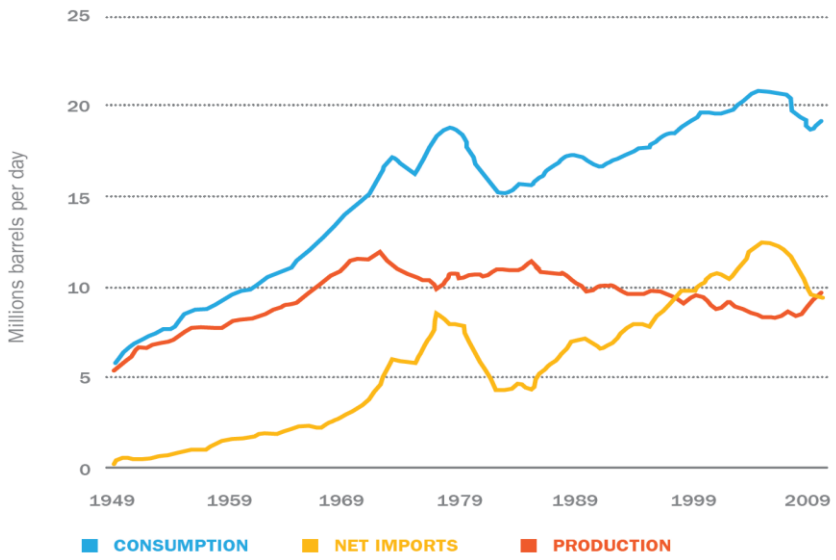
- 83% of primary energy in US derived from fossil fuels
- Less than 4% from renewables
- 93% of coal used for stationary power
- 72% of oil used for transport
- More than 90% of all transportation fueled by oil
- Natural gas provides flexibility across different sectors



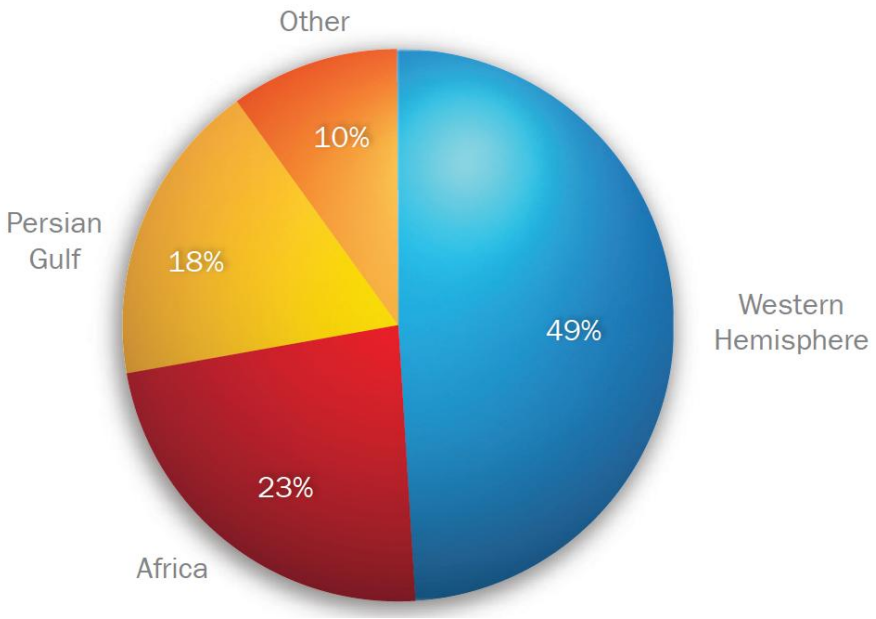
- High price, price volatility and energy security of liquid fuels provides motivation to change transportation sector
- Almost 60% of all primary energy is lost as waste heat – nearest term option for substantial change to energy mix

Sources of Liquid Fuels

Trends in US Consumption, Production, and Import of Liquid Fuels



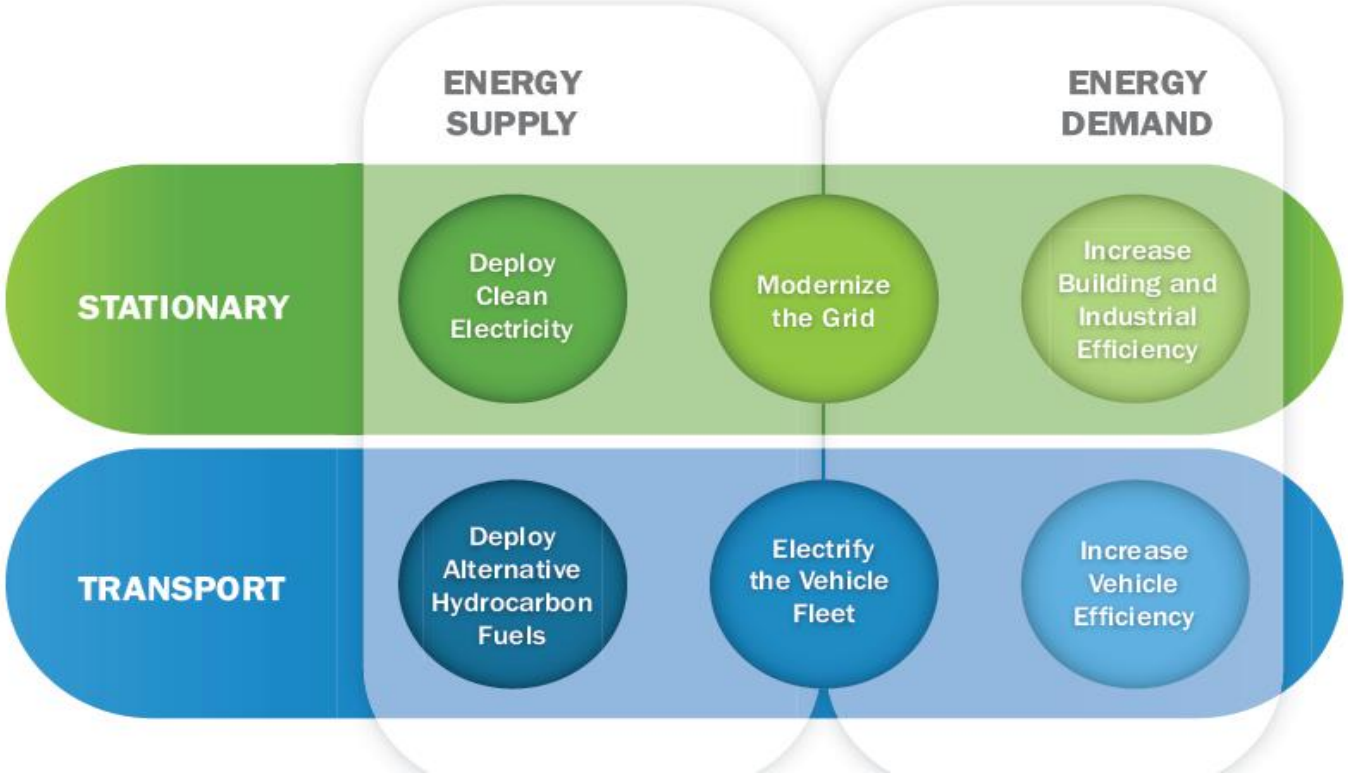
Sources of US Petroleum, 2010



- 50% of liquid fuels in US are imported - lowest in past 15 year
- Import of liquid fuels responsible for 70% of national trade deficit (~$1 billion per day)
- Only 20% of oil from Persian gulf but has large impact on costs

From 2011 DOE QTR

US DOE Focus Areas



- Transportation strategies intended to materially reduce oil consumption using technologies compatible with today's infrastructure
- Various stationary strategies expected to contribute nearly equally to reducing fossil fuel use

From 2011 DOE QTR

Comparison of Transport and Stationary Energy Sectors

- **Transport is dominated by a single energy** source while stationary has numerous primary sources that compete. New technologies in either sector must leverage or compete against existing infrastructure
- **Oil for transport is priced on world market** while domestic prices for stationary fuels are not. Greater concern about price volatility and supply disruptions in transport
- **Vehicle fleets turn over faster than buildings** easing new technology penetration
- **Transport is nationally uniform and regulated**, stationary more subject to state and local regulations making planning more difficult
- **Transport dominated by limited set of technologies** compared to stationary easing program focus, target setting, and progress tracking
- Retail consumers arguably more aware of transportation fuel costs raising impact of advances
- **Transport is almost 60% of end-use** but only 33% of energy-related CO2 emissions

Principles for Department Investment

Maturity	Technologies that have significant technical headroom, yet could be demonstrated at commercial scale within a decade.
Materiality	Technologies that could have a consequential impact on meeting national energy goals in two decades. We define "consequential" as roughly 1% per year of primary energy.
Market Potential	Technologies that could be expected to be adopted by the relevant markets, understanding that these markets are driven by economics but shaped by public policy.

From 2011 DOE QTR

Criteria for US DOE Activities

- **TRANSPORTATION SECTOR**
  - Focus on activities with the greatest potential to reduce oil consumption and promote the use of alternative sources for transportation energy
  - Preferentially support transportation technologies that can integrate smoothly with existing infrastructure
  - Pursue only transport technologies that also reduce environmental impact
- **STATIONARY SECTOR**
  - Pursue only technologies that reduce environmental impact
  - Preferentially support technologies that can enhance reliability and security
  - Give priority to technologies that enable electricity management
  - Strive to improve the quantity, quality and accessibility of information related to energy generation, delivery, and use.

Some Specific Administration Goals

Transport

- Reduce oil imports by 1/3 by 2025.
- Put 1 million electric vehicles on the road by 2015.

Buildings and Manufacturing

- Make non-residential buildings 20 percent more energy-efficient by 2020.

Clean Generation

- By 2035, generate 80 percent of electricity from a diverse set of clean energy sources.

Environmental

- Cut GHG emissions in the range of 17 percent below 2005 levels by 2020, and 83 percent by 2050.

Security:

- Advance domestic energy resources.
- Diverse supplies.

Environment:

- Achieve 80 percent reduction in Greenhouse Gas Emissions.
- Improve water and air quality (indoor and outdoor).

Economy:

- Low cost energy services.
- Competitiveness.
- Clean energy business opportunities.
- Clean energy jobs.

EERE Feb 2012

Going from Goals to Technology Selection

Volume II of the Report on the first QTR includes technology assessments of 17 key energy technologies, systems, and sectors.

Vehicle Efficiency:

- Internal Combustion Engine
- Lightweighting and Aerodynamics

Vehicle Electrification:

- Vehicle Electrification

Alternative Hydrocarbon Fuels:

- Alternative Hydrocarbon Fuels

Stationary Efficiency:

- Building Efficiency
- Industrial Efficiency

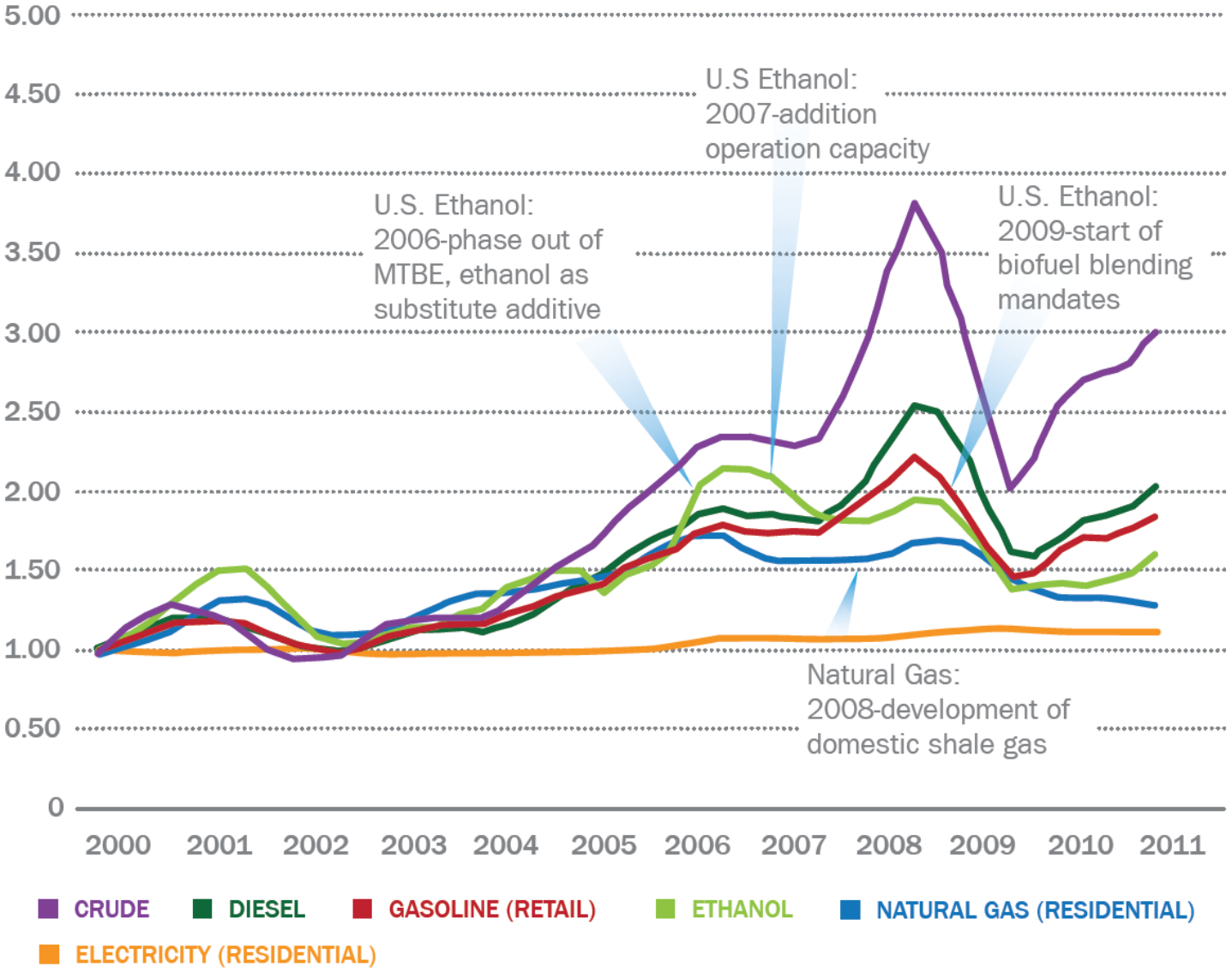
Grid Modernization:

- Measuring, Modeling, and Control
- Infrastructure
- Storage

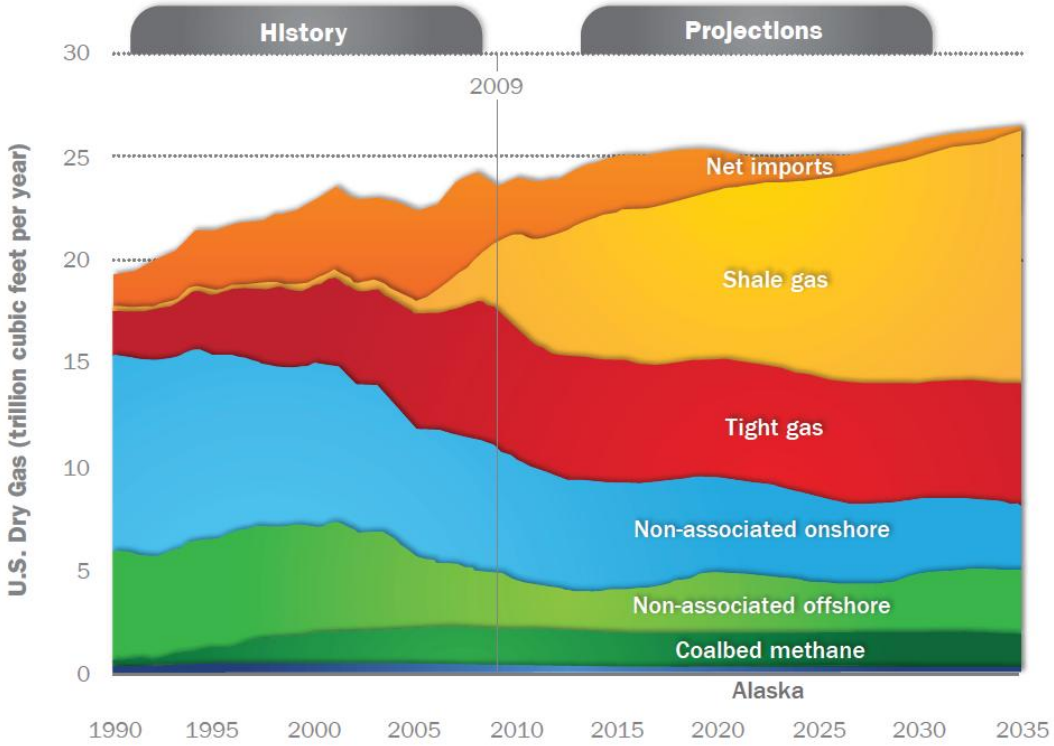
Clean Power:

- Carbon Capture and Storage
- Concentrating Solar Power
- Fuel Cells for Distributed Generation
- Geothermal Power
- Nuclear Power
- Solar Photovoltaic Power
- Water Power
- Wind Power

Domestic Natural Gas Costs 'Independent' of Liquid Fuels



Natural Gas Expected to Impact Energy Security



Historical and Projected Domestic Production of Natural Gas

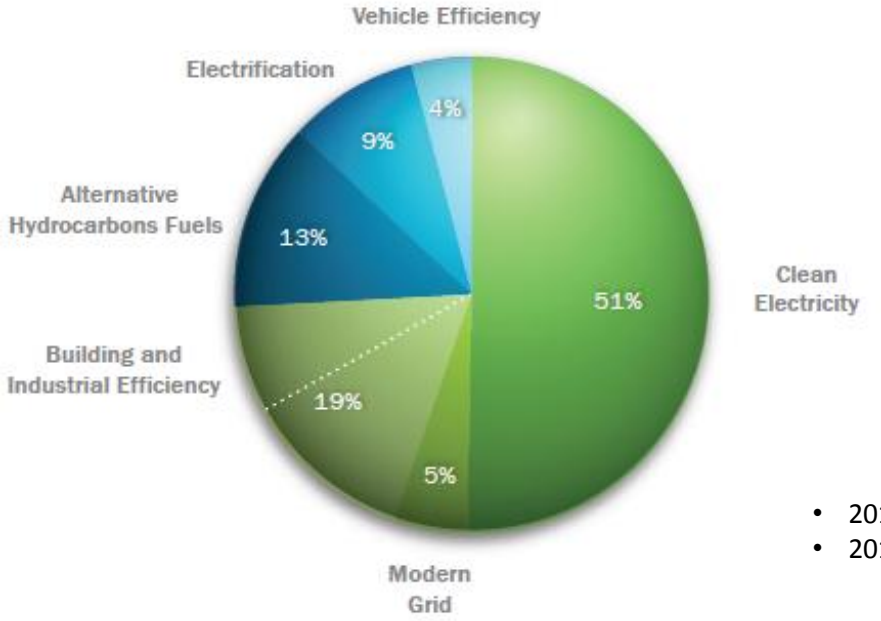
Drilling at the Jonah Field and Pinedale Anticline, Wyoming

A Look at DOE's 2013 Budget Request

Department of Energy Budget by Organization

(discretionary dollars in thousands)

	FY 2011 Current	FY 2012 Enacted [1]	FY 2013 Request	FY 2013 vs. FY 2012 $	FY 2013 vs. FY 2012 %
Energy and Environment					
Energy Efficiency and Renewable Energy	1,771,721	1,809,638	2,337,000	+527,362	+29.1%
Electricity Delivery and Energy Reliability	138,170	139,103	143,015	+3,912	+2.8%
Fossil Energy	572,525	564,435	650,792	+86,357	+15.3%
Nuclear Energy	805,996	858,741	770,445	-88,296	-10.3%
Total, Energy	*3,288,412*	*3,371,917*	*3,901,252*	**+529,335**	**+15.7%**
Advanced Research Projects - Energy	179,640	275,000	350,000	+75,000	+27.3%



DOE FY2011 Energy Technology Budget by Strategy

Does not include ARPA-E, Loan Guarantee, or EIA, Lab infrastructure

- 2013 data from Feb 2012 DOE Budget Summary
- 2011 by Strategy from DOE QTR

DOE EERE 2013 Budget Request-

some winners and losers

Programs	FY 2011 Current	FY 2012 Enacted	FY 2013 Request	FY13 vs FY12	
		(Dollars in Thousands)			
Renewable Energy				$ Change	% Change
Biomass and Biorefinery R&D	179,979	199,276	270,000	70,724	35.49%
Geothermal Technology	36,992	37,862	65,000	27,138	71.68%
Hydrogen and Fuel Cell Technologies	95,847	103,624	80,000	(23,624)	-22.80%
Solar Energy	259,556	288,951	310,000	21,049	7.28%
Water Power	29,201	58,787	20,000	(38,787)	-65.98%
Wind Energy	78,834	93,254	95,000	1,746	1.87%
Energy Efficiency					
Advanced Manufacturing	105,899	115,580	290,000	174,420	150.91%
Building Technologies	207,310	219,204	310,000	90,796	41.42%
Federal Energy Management Program	30,402	29,891	32,000	2,109	7.06%
Vehicle Technologies	293,151	328,807	420,000	91,193	27.73%
Weatherization & Intergovernmental	231,300	128,000	195,000	67,000	52.34%
Corporate					
Facilities and Infrastructure	51,000	26,311	26,400	89	0.34%
Program Direction	170,000	165,000	164,700	(300)	-0.18%
Strategic Programs	32,000	25,000	58,900	33,900	135.60%
Subtotal, EERE	1,801,471	1,819,547	2,337,000		

From Feb 2012 presentation by Henry Kellly, Acting Asst. Sec, EERE

President's Message

"… I will not walk away from the promise of clean energy. I will not walk away from workers … I will not cede the wind or solar or battery industry … It's time … to double down on a clean energy industry that has never been more promising."

- President Obama, State of the Union, 24 January 2012