U.S. DEPARTMENT OF
ENERGY

DOE's Energy Technology Strategy

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Under Secretary for Science

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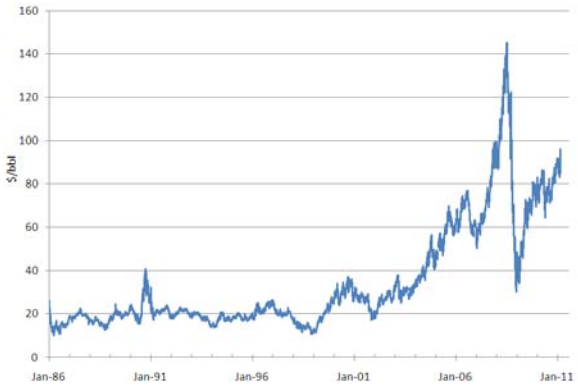
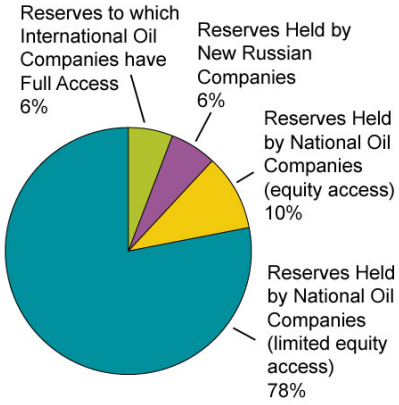
U.S. Energy Challenges

Oil

Daily Spot Price OK WTI

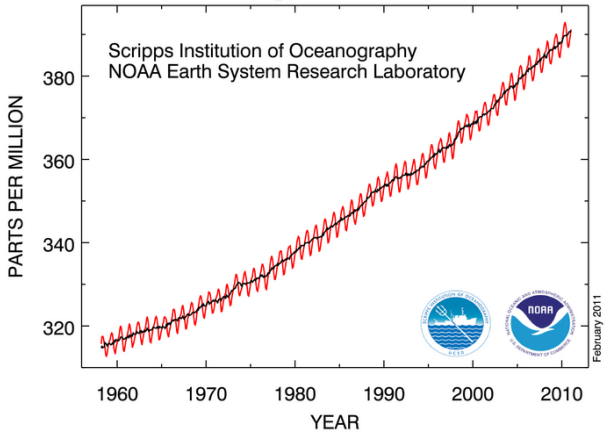


Share of Reserves Held by NOC/IOC

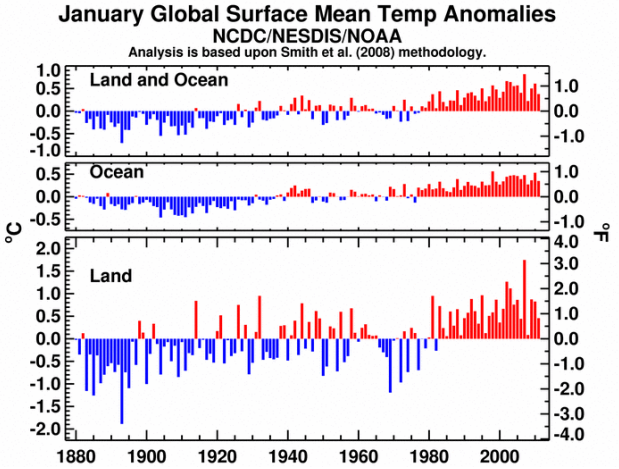


Environment

Atmospheric CO_2 at Mauna Loa Observatory

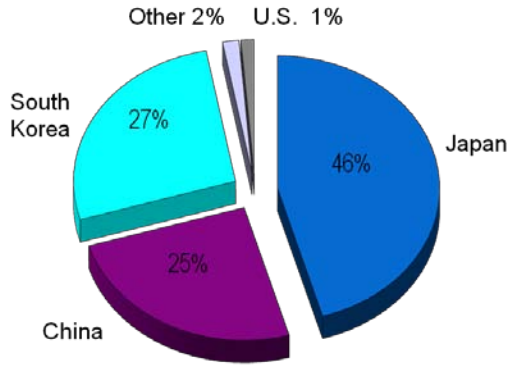


January Global Surface Mean Temp Anomalies

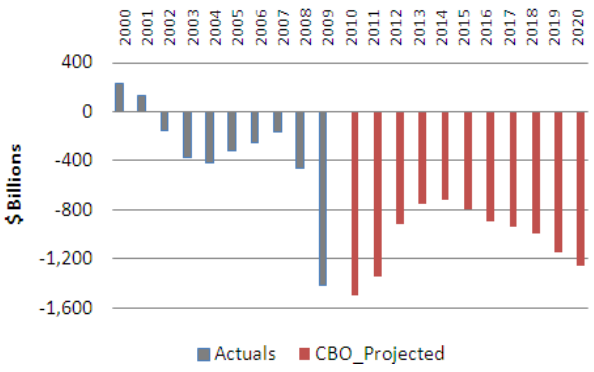


Competitiveness

Global Lithium-ion Battery Manufacturing (2009)



Federal Deficit



Administration Goals

- From a 2005 baseline, reduce energy-related greenhouse gas emissions by
  - 17% by 2020
  - 83% by 2050

- Reduce our daily petroleum consumption in 2020 by 3.5 million barrels, from a 19-million barrel baseline.

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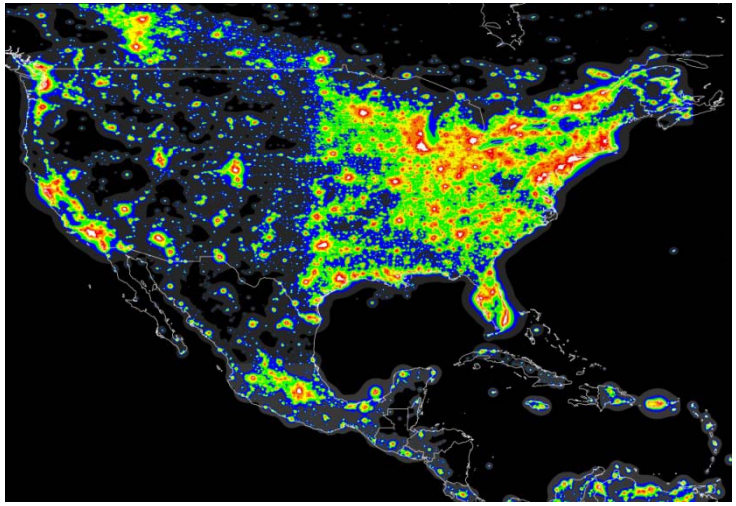
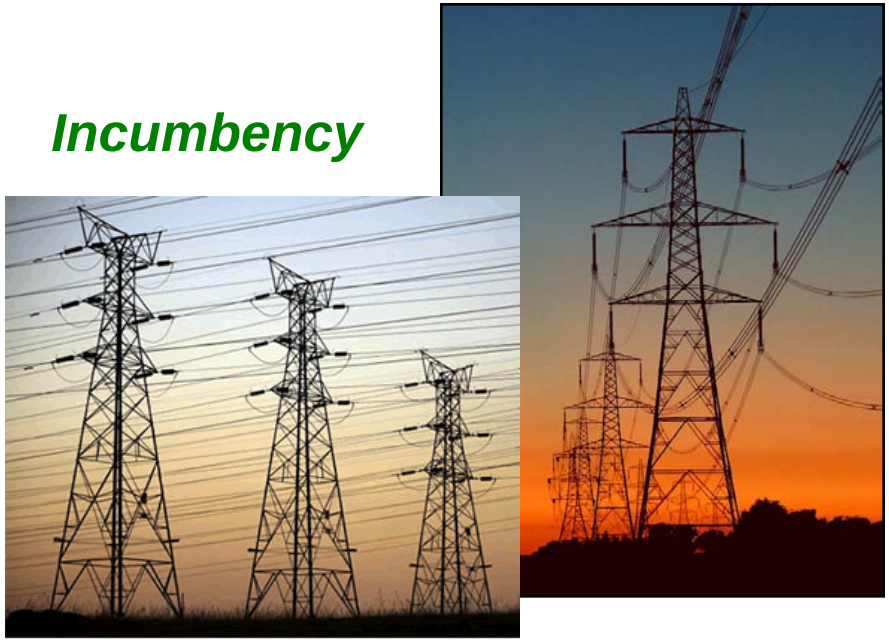
Barriers to Supply-Side Transformation

Ubiquity *Consider economic, political, and social dimensions*



Longevity *Stock of existing assets*

Incumbency



New technologies compete on cost

Scale

Large capital and access to existing infrastructure are required

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Energy Essentials

As a whole, energy is

- A big and expensive system
- In private hands
- Governed by economics, modulated by government policies

Demand

- Many distributed players, shorter-lived assets
- User benefit (economics, convenience, personal preference)
- Determined by price, standards, behavior
- Little attention to system optimization for stationary use

Supply

- Fewer, long-lived centralized facilities with distribution networks
- Change has required decades
- Power and fuels are commodities with thin margins
- Markets with government regulation and distortion
- Transport and Stationary are disjoint
- Transport is powered by oil
- Power
    - Requires boiling large amounts of water
    - Sized for extremes (storage is difficult)
    - Numerous sources with differing...
        - Capex and Opex
        - Emissions
        - Base/Peak/Intermittency

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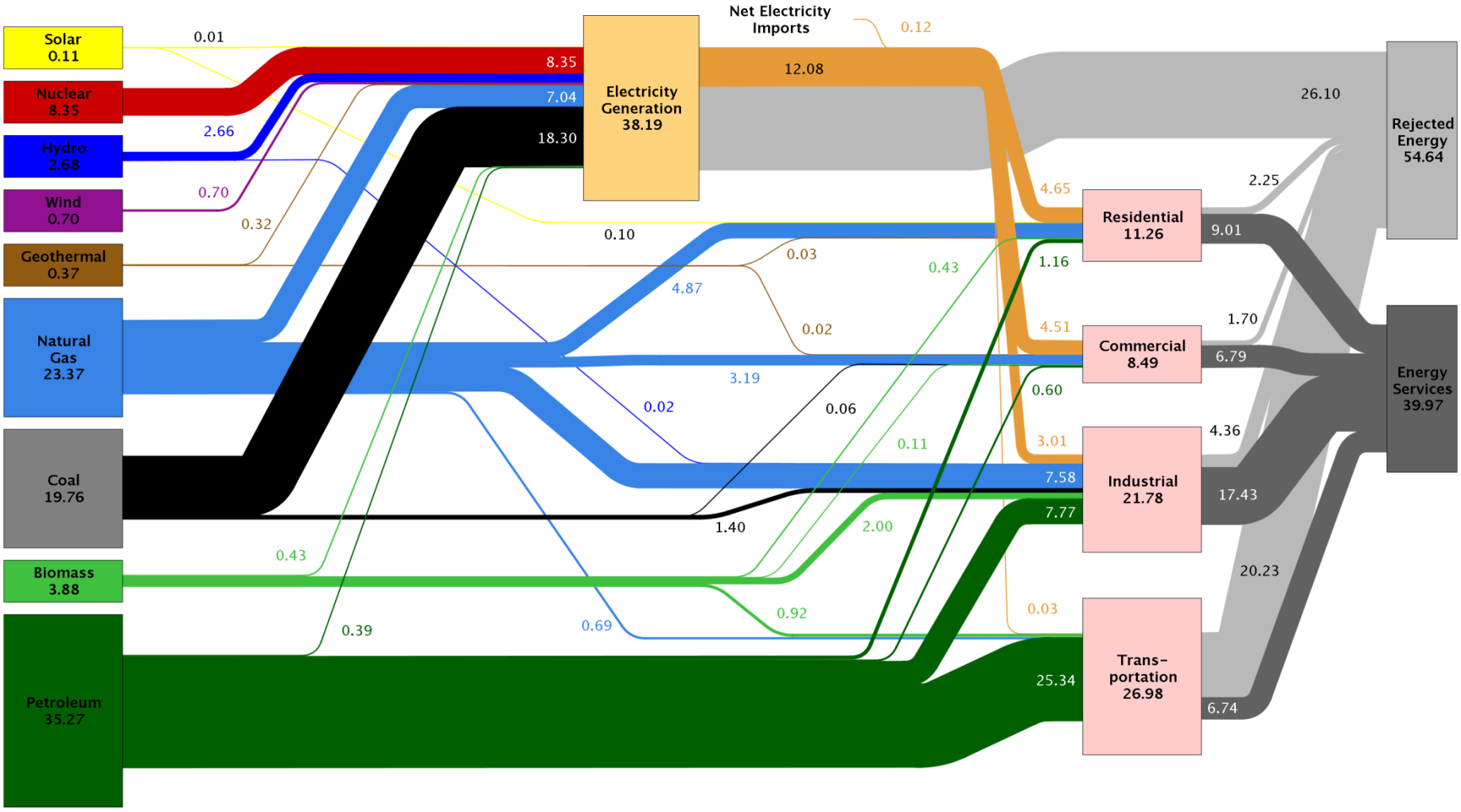
Estimated U.S. Energy Use in 2009: ~94.6 Quads

Lawrence Livermore National Laboratory



Source: LLNL 2010. Data is based on DOE/EIA-0384(2009), August 2010. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 80% for the residential, commercial and industrial sectors, and as 25% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

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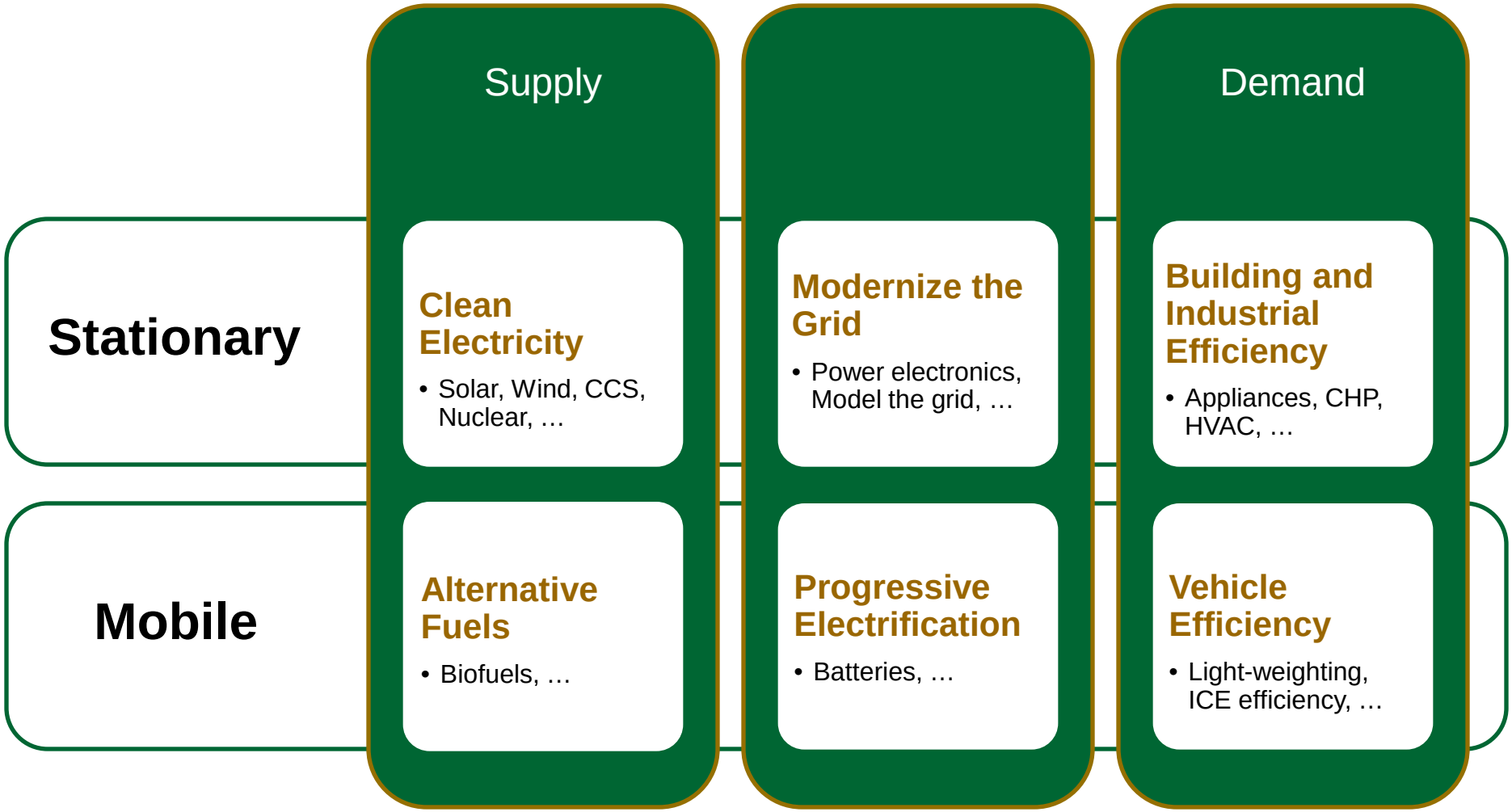
Six Strategies



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Goal: Catalyze timely, material, and efficient transformation of nation's energy system and secure U.S. leadership in clean energy technologies

		Selected Targeted Outcomes
Deploy the Technologies We Have	**Drive energy efficiency** to reduce demand growth Demonstrate and deploy clean energy technologies Modernize the electric grid	Establish > 6 appliance **standards**/year 2010: make **loan commitments** for 2 nuclear reactors 2012: support 2x renewable energy generation 2012: **assess materials degradation** issues for light water reactor plants operating beyond 60 yrs 2013: retrofit 1 million homes 2015: support **battery manufacturing** capacity for 500,000 PHEVs
Discover the New Solutions We Need	Accelerate energy innovation through **precompetitive R&D** Facilitate **tech transfer** to industry and **leverage partnerships** to expand impact Establish **technology test beds** and demonstrations	2011: establish Phase III **SBIR Commercialization Program** 2012: establish new contracts to **lower commercialization barriers** 2012: demo advanced irradiated **fuel inspection techniques** 2014: validate >2 new CCS geologic reservoirs and exploration techniques 2015: enable **energy-related simulations** 2015: complete > 2 new national **tech user facilities** **Small modular reactor:** 2016 (design cert) , 2019 (demo) 2016: facilitate >5 commercial-scale **CCS demos**
Lead National Conversation on Energy	Provide **sound information** on energy systems and their evolution Promote **energy literacy** Make federal government **a leader in sustainability**	2020: **reduce DOE emissions** by 28%

DOE Quadrennial Technology Review

- Scope
  - Reflect many items PCAST suggested
  - Provide context and robust framework for Department's energy programs
  - Outline principles for establishing program plans with five-year horizons
  - Offer high-level views of technical status and potential of various energy technologies
- Process
- Outreach and Transparency
  - DOE is committed to engaging stakeholders – consistent with the President's commitment to transparency, public participation, and collaboration
  - A publicly accessible website
  - Release of ex parte communications
  - Request For Information (RFI) and framing document
  - Public comment
  - Focus groups
  - Workshops

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A Technology Discussion Includes….

- Why this technology is included
- Headroom
- Resource
- Current industry
- Actors and their roles
- Roadmap
- DOE history and accomplishments
- Policy context
- Barriers
- Tech-specific items needed for prioritization
- More?

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Questions or Comments?

DOE Strategic Plan for Fiscal Years 2011-2016

- http://www.energy.gov/about/budget.htm
- http://www.energy.gov/media/DOE_Strategic Plan_Draft.pdf

DOE-QTR

- http://www.federalregister.gov/

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