DOE Quadrennial Technology Review

Building and Industrial Efficiency Workshop

Pittsburgh, PA

17 May 2011

Welcome and Logistics

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FACA Guidelines

- Participants attending this Workshop are not members of a Federal Advisory Committee, nor do we intend to use this group as a Federal Advisory Committee.
- We are not seeking a group decision or consensus view with respect to the issues before you, or as to any action the Federal government should take.
- We welcome your individual recommendations and advice, and are looking forward to a productive workshop.

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Transparency and Outreach

PCAST Recommendation: *"The [process] needs strong external input from many sources, including other levels of government, large and small businesses, academia, national laboratories, Congress, nongovernmental organizations, consumers, and other Federal agencies. …"*

We are committed to engaging our stakeholders consistent with the President's commitment to transparency, public participation, and collaboration. To meet these goals, the DOE will pursue a variety of mechanisms, including:

- A publicly accessible web site
- Release of ex parte communications
- Request For Information (RFI) and Framing Document (published mid-March)
- Public comment
- Focus groups & workshops through mid June

Notes and attendee list from this workshop will be published on the project webpage. Individuals' names will be redacted from comments.

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Outreach: Workshops

TRANSPORT

- Alternative Fuels
  - April 26
  - Chicago, IL
- Vehicles Efficiency and Electrification
  - May 4
  - Knoxville, TN

STATIONARY

- Stationary Efficiency
  - May 17
  - Pittsburgh, PA
- Grid
  - May 24
  - Tempe, AZ
- Clean Electricity
  - June 7
  - Denver, CO

Capstone

June 21 in Washington, DC

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Agenda and Logistics

8:30-9:00 AM	**Welcome and framing remarks**
	Dr. Steven E. Koonin, Under Secretary for Science
9:00-9:30 AM	**Panel discussion of cross-cutting questions**
	Scott Johnstone, Efficiency Vermont
	Joe Almaguer, Dow
	Pete Roberts, Emerging Technology Applications Center
9:30-10:00 AM	**Full-workshop open discussion with the panel on cross-cutting questions**
10:00-10:15 AM	**Break**
10:15-11:30 AM	**Breakout sessions on the cross-cutting questions**
11:30-1:00 PM	**Lunch (non-working)**
1:00-2:00 PM	**Technology roadmaps presentations from QTR Technology Team**
	Tony Bouza, Phil Farese, Isaac Chan, and Joe Cresko
2:00-3:00 PM	**Technology-specific breakout sessions**
3:00-3:15 PM	**Break**
3:15-3:45 PM	**Report-back session I from technology breakout followed by brief discussion**
3:45- 4:00 PM	**Report-back session II from the morning's cross-cutting breakout sessions**
4:00-4:45 PM	**Full group discussion on cross-cutting questions**
4:45-5:00 PM	**Closing Remarks**
	Dr. Steven E. Koonin, Under Secretary for Science

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DOE Quadrennial Technology Review

Steven E. Koonin

Under Secretary for Science

U.S. Department of Energy

17 May 2011

Scope

- The DOE-QTR will provide a context and robust framework for the Department's energy programs, as well as principles by which to establish multiyear programs plans and budgets. It will also offer high-level views of the technical status and potential of various energy technologies.

- The primary focus of the DOE-QTR process and document will be on the following:
  - Framing the energy challenges
  - A discussion of the roles of government, industry, national laboratories, and universities in energy system transformation
  - Summary roadmaps for advancing key energy technologies, systems, and sectors
  - Principles by which the Department can judge the priority of various technology efforts
  - A discussion of support for demonstration projects
  - The connections of energy technology innovation to energy policy

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Timeline

Nov 2010

PCAST made recommendations for DOE to do QER

3/14 – 4/15

Public comment period for DOE-QTR Framing Document

4/20

First batch of public comments released on project website

Through mid-June

Hold workshops and discussions of each of the Six Strategies

End July/Aug

Submit DOE-QTR to White House for approval

Before Dec 2011

Release DOE-QTR

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DOE-QTR Logic Flow

Energy context
- Supply/demand
- Energy essentials

Energy challenges
- Oil security
- US Competitiveness
- Environmental Impact

Six strategies

Players and Roles
- Private/Gov't
- Within gov't
- Econ/Policy/Tech
- Acad/Lab/Private

Technology Assessments
- History
- Status
- Potential

Technology Roadmaps
- Milestones
- Cost
- Schedule
- Performers

DOE portfolio principles

DOE priorities and portfolio
Balanced within and across strategies

Program plans and budgets

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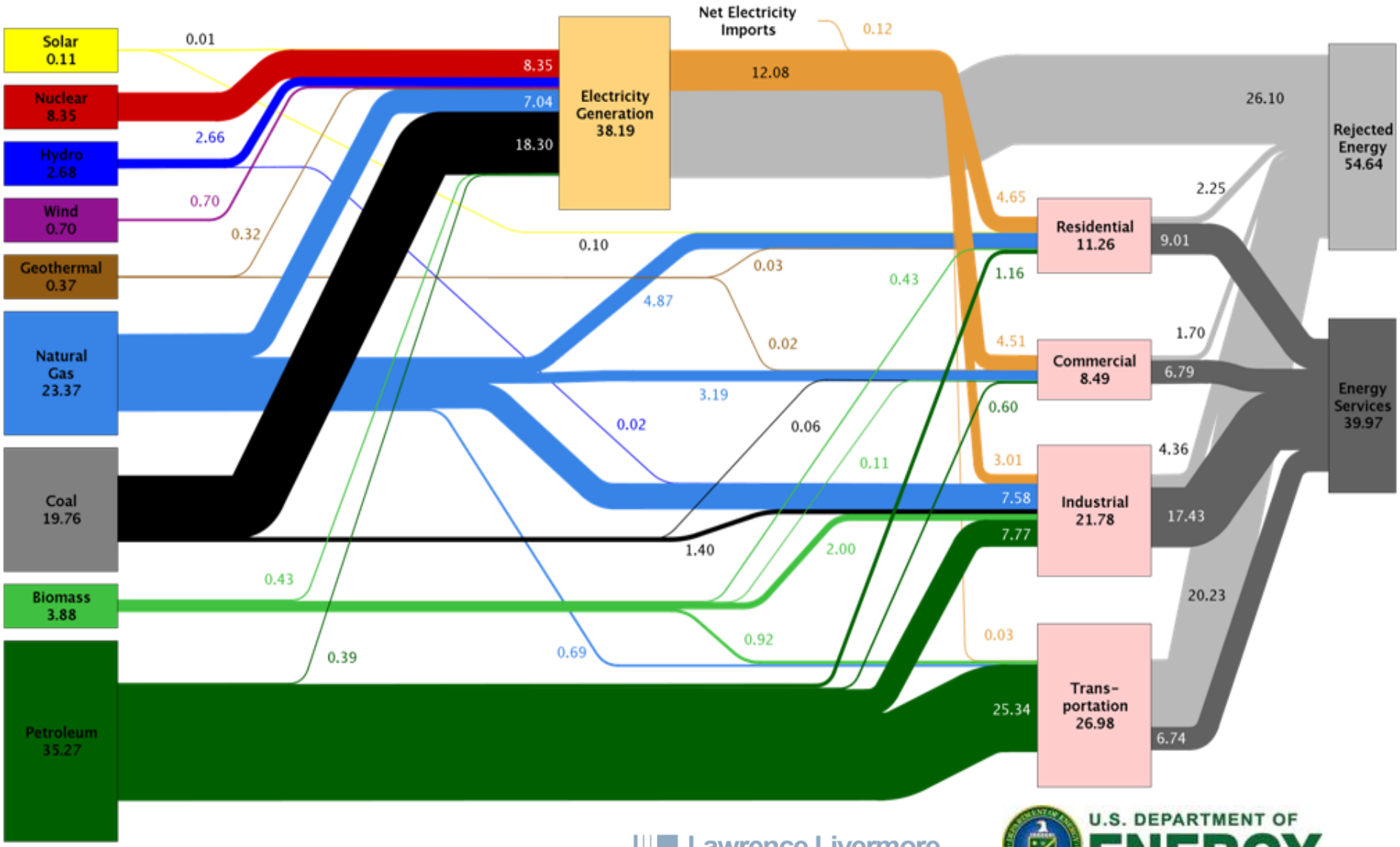
Estimated U.S. Energy Use in 2009: ~94.6 Quads



https://flowcharts.llnl.gov/

Lawrence Livermore National Laboratory

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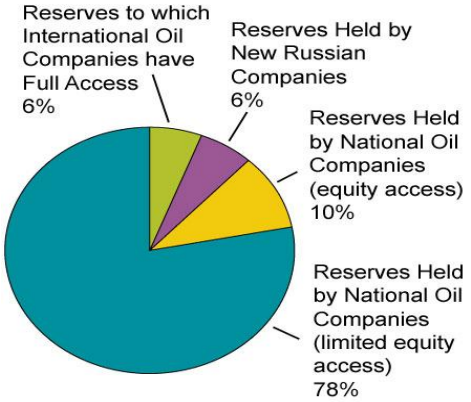
U.S. Energy Challenges

Energy Security

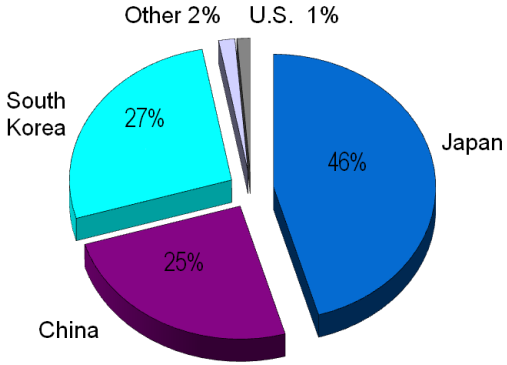
Daily Spot Price OK WTI

Share of Reserves Held by NOC/IOC

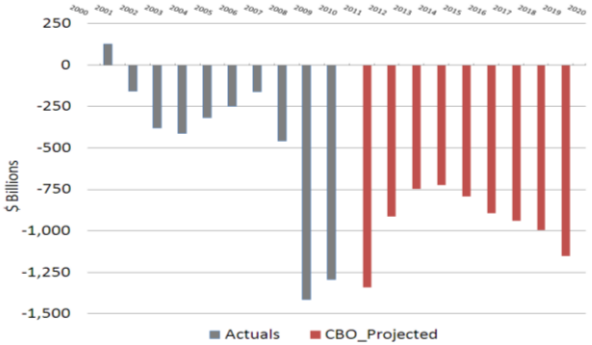


Competitiveness

Global Lithium-ion Battery Manufacturing (2009)

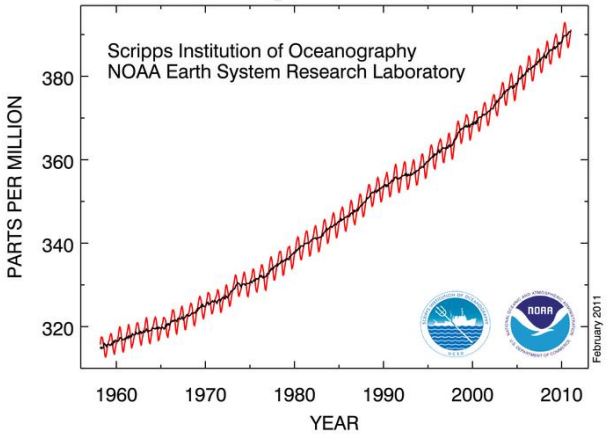


Federal Deficit



Environment

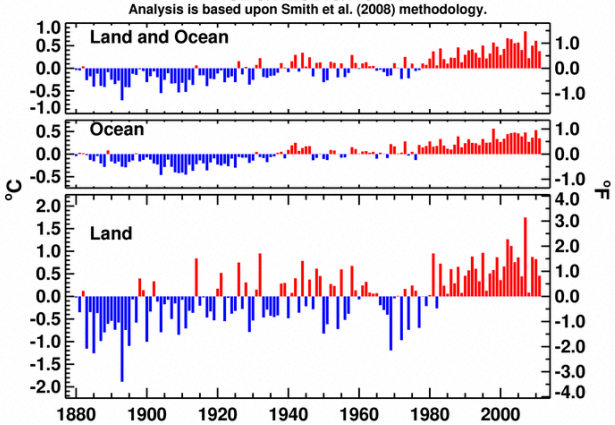
Atmospheric CO_2 at Mauna Loa Observatory



January Global Surface Mean Temp Anomalies

NCDC/NESDIS/NOAA

Analysis is based upon Smith et al. (2008) methodology.



Six Strategies

	Supply		Demand
Stationary	Deploy Clean Electricity	Modernize the Grid	Increase Building and Industrial Efficiency
Transport	Deploy Alternative Fuels	Progressively Electrify the Fleet	Increase Vehicle Efficiency

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A QTR 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

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DOE-QTR Logic Flow

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We will require input on:

- Roles of government, industry, national laboratories, and universities in energy system transformation
- Principles by which the Department can evaluate and prioritize various technology efforts
- Connections of energy technology innovation to energy policy

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A Few Comment Excerpts Specific to Building and Industrial Efficiency

Organization	Comments Specific to Building and Industrial Efficiency in QTR Framing Document (quotes)
ACEEE	"[W]e recommend that DOE work on developing reduced cost strategies for monitoring large numbers of buildings of all important types." "[N]earer-term [industrial efficiency] activities should be complemented with longer-term activities that will develop the new processes, materials and products that will enable the continuous modernization of U.S. manufacturing. These activities should be undertaken in coordination with other research efforts at NIST and DoD."
ASHRAE	"ASHRAE encourages DOE to invest substantial resources into research and development to better understand the energy flows of buildings to stimulate the development and deployment of lower-cost building and equipment monitoring technologies."
Council of the North American Insulation Manufacturers Association	"In addition to direct utility funding of large-scale residential retrofit projects, DOE should also encourage affected utilities to pursue more effective incentives to encourage higher levels of residential energy efficiency."
Johns Manville	"[O]ne of DOE's top priorities should be to work with the private sector to identify and seek changes in any non-technical barriers that are limiting the successful deployment of private sector capital in utility-scale energy efficiency projects. Such projects could include both large-scale retrofits of the millions of American homes and buildings that are underinsulated as well as new construction beyond current and anticipated future energy codes."
OLED Association	"The DOE [OLED] program has been very successful and instrumental in fostering U.S. leadership in this area, and to ensure that we benefit from new clean jobs and energy savings, DOE must continue to invest in this area"

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Comments can be found at: http://energy.gov/qtr/10091.htm

Cross Cutting Questions

- There are many pathways to reduce energy use in buildings or industry. How should DOE balance:
  - Technological R&D vs. addressing non-technical barriers?
  - Different timescales of impact?
  - Depth vs. breadth of investment?
  - Widgets vs. systems?
- What value does DOE provide to you? Where have you seen the benefit of DOE involvement in your work?
- How should DOE balance effort across the boxes in the Six Strategies, particularly between generation, the grid, and efficiency? Where are there synergies or conflicts that DOE needs to take into account? Is efficiency always a win?
- What should be the rules for entry, allocation and exit in DOE's efficiency R&D portfolio? As a technology becomes more mature, how should DOE's posture change?
- How should DOE integrate (or not integrate) its efficiency deployment-focused activities with its R&D?
- What polices are needed to incentivize increases in turnover rates for the replacement of inefficient equipment/processes with more efficient alternatives? What's the right role for DOE here?

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Panel Discussion

- Scott Johnstone, VEIC/Efficiency Vermont
- Ammi Amarnath, EPRI
- Pete Roberts, Emerging Technology Applications Center

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Breakout: Cross-cutting questions

- Groups have been assigned

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Technology Roadmaps Presentation

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Breakout: Technology-specific

- Groups have not been assigned – you are free to choose

  1) The building as a system

  2) Appliances and equipment

  3) Technology Deployment and Market Activities

  4) Manufacturing and Materials R&D

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Full Group Discussion:

Cross-cutting Questions

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THANK YOU!

Project Website

http://www.energy.gov/qtr

Questions/Feedback

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Official (Public) Comments

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Proposed Mission Statement for DOE Energy Research

To facilitate the invention, refinement, and early deployment of meaningful technologies that enable options for scaling by the private sector toward national energy goals.

The words in this statement are carefully chosen:

- to facilitate – we convene and fund various entities – as well as support the basic research that underpins invention and refinement
- invention, refinement – we work on both revolutionary and evolutionary technologies
- early deployment – we support some activities beyond first commercial demonstration
- meaningful technologies – we pursue technologies that could have a material impact when deployed; accordingly, scale, economics, and timeliness are important criteria
- enable options – we do not pick commercial winners and losers; the markets make those choices
- scaling by the private sector – we support commercialization as an essential part of what we do
- toward national energy goals – we cannot and will not pursue all technologies; only those that enhance energy and national security, reduce environmental impacts, and increase U.S. competitiveness

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Questions

- **Mission**: What do you think of the following mission statement for DOE energy research?
- **Clean Energy Leadership**: How can DOE activities best support U.S. leadership in clean energy innovation? In clean energy manufacturing? In clean energy deployment? How do we balance international competitiveness against international cooperation?
- **Program Definition and Management**: What principles should the Department follow for allocating resources among technologies of disparate maturity and potential time to impact?

  a) What should be the criteria for including a technology in the DOE portfolio? What should be the criteria for removing a technology from the DOE portfolio? How should programs be structured and managed to accommodate entry and exit of technologies within the DOE portfolio?

  b) How do we balance the diversity of technology options the Department could provide for the private sector against timeliness, scale, and cost-effectiveness?

  c) How can DOE be more effective at each stage of the innovation chain?

  d) What are useful metrics to guide DOE technology activities?

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Questions

- **Private Sector Partnership**: What are the optimal roles for the private sector, government laboratories, citizens and academia in accelerating technology innovation?

  a) How can DOE best coordinate activities between and among these types of organizations (including the wide variety of institutions within each class)? How should we gauge the effectiveness of this coordination? How can the basic-applied coupling be optimized? Are there examples in other sectors or other countries that can serve as models?

  b) What are the design principles for an effective 'technology user facility'?

  c) How can the Department best gather technology market information? How can information on private sector innovation be captured without compromising competitive advantage?

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Questions

- **Technology Demonstrations**: What are principles and best practices in performing large-scale demonstration projects?

  a) How close to commercial viability does a demonstration have to be? What are the optimal cost sharing arrangements? How might demonstrations be coordinated with DOE financing activities?

  b) How can demonstration projects better benefit all stakeholders beyond the immediate participants? How are lessons-learned best captured and promoted, and how is intellectual property best handled?

  c) How should DOE determine whether demonstrations adequately address technical and operation risks?

  d) What defines failure or success in the demonstration phase?

- **Non-technical Barriers**: A number of non-technical barriers—including federal, state, and local regulations, market failures, and non-technical risks—impact the rate of deployment of energy technologies. What, if any, role should the Department have in addressing these barriers?
- **Six Strategies**: Have we correctly identified and structured these six strategies?
- **Technology discussion**: Current selection of technologies and sources? Suggestions of alternate technologies and sources? Updated technology, cost, or forecast data, particularly in rapidly-moving fields?

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