

Spawning Technological Breakthroughs and Entrepreneurship

The need to meet growing U.S. demand for energy; assure access to stable, affordable supply; and achieve economic, environmental and national security present a set of unparalleled challenges. The time scale, magnitude and complexity of a U.S. energy transformation will require investment and accomplishment at the frontiers of science and discovery. America's unrivaled businesses, academic institutions and national laboratories have the capacity to tackle these grand, large-scale energy and sustainability challenges and in turn create new industries and global business opportunities.

Discover the Future and Break the Technology Barriers

The Council Recommends that:

- Congress support ten commercial-scale carbon capture demonstrations to be completed by 2020 and three to five at-scale demonstrations of energy storage technologies.
- Congress support three to five demonstrations of new nuclear reactors by 2018.
- The U.S. Department of Energy (DOE) create the 21st “Century Clean Energy Leadership Initiative” funded at \$250 million to create regionally-based R&D test-beds and large-scale commercial pilots.

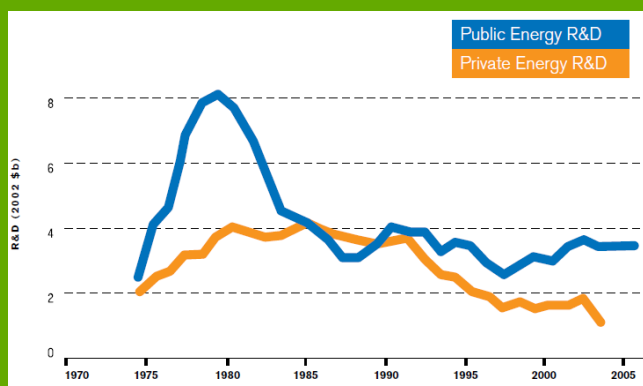
There are a myriad of technologies that will drive and accelerate the solution pathways to a low-carbon energy future and U.S. economic competitiveness. These include: low- or no-carbon fuels and conversion/production processes, advanced energy storage technologies, carbon capture and storage (CCS), integrated real-time energy information and management systems and practical and affordable alternative-fueled vehicles.

Within the next ten years, we need to have cracked the codes to achieve transformative technological innovations across the entire energy system. Moreover, we need to support efforts along the whole innovation chain to achieve success. If we do not begin now, the environmental and economic consequences are likely to be catastrophic.

Three “enabling” technologies present great opportunities to unlock immense energy resources: 1) energy storage will benefit intermittent renewable technologies, 2) CCS will enable to United States to fully exploit its vast coal reserves in a carbon constrained world, and 3) the future use and expansion of advanced nuclear technology in the United States will provide abundant low-carbon energy. However, each technology must overcome significant technological and policy challenges before achieving its potential.

Many of the energy technologies that we use today started with public and/or private research several decades ago—often done in partnership among the sectors. This

U.S. Energy R&D Investment by Both Public and Private Sectors Has Declined Significantly Since the 1980's



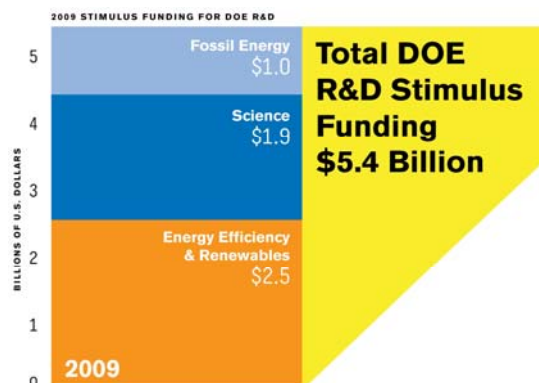
- Between 1991 and 2003, U.S. private sector investments in energy R&D fell by 50 percent.¹
- Energy R&D as a percentage of total U.S. R&D fell from 10 percent to 2 percent between 1980 and 2005.²
- Federal funding for energy R&D received just 2 percent of total federal R&D funds in 2009, compared with 21 percent dedicated to health R&D.³

research has historically produced dramatic successes, such as the energy efficiency program at the U.S. Department of Energy that produced net economic benefits of \$30 billion (in 1999 dollars) from an expenditure of \$7 billion over the period of 1978-1999.⁴

The flow of federal research dollars has fluctuated dramatically with changes in administrations. In real terms, not including the recently enacted stimulus legislation, it has declined dramatically. While the stimulus research funds are commendable and recently there has been an increase in both energy companies and venture capital firms investing in clean technology, the R&D component must be increased and maintained at an appropriate level if we are to transform the energy system to a sustainable, secure competitive future.

Nearly Half of U.S. Stimulus Spending on Energy R&D Will Go Toward Energy Efficiency and Renewables

Source: *Drive*, Council on Competitiveness (2009)



Note: Graph represents analysis of data from the American Association for the Advancement of Science.

In Drive: A Comprehensive Roadmap to Achieve Energy Security, Sustainability and Competitiveness (September 2009) and Prioritize: A 100-Day Energy Action Plan for the 44th President of the United States (September 2008), the Council detailed actions to be taken by the federal government in six critical “pillars” as necessary for true breakthroughs in U.S. energy production and use to be achieved. Below are additional recommendations from Pillar 5: Spawning Technological Breakthroughs and Entrepreneurship.

Additional Recommendation:

- Congress allocate 30 percent of annual revenue from carbon pricing to new technology solutions.
- The director of the White House Office of Science and Technology Policy launch a cross-sector, clean energy research consortia to solve critical technical challenges.
- Congress expand the Small Business Innovation and Research Program to provide “Phase II” mezzanine financing for clean energy start-up businesses.
- Congress create a Small Business Administration “Clean Energy Entrepreneurs Initiative” to support small- and medium-sized businesses.
- Congress allocate at least 10 percent of existing agency funding for pre-commercialization programs to accelerate development and deployment of mature clean energy technologies.
- The U.S. Government triple current investment in basic and applied energy R&D.
- DOE establish a web-based “Clean Energy Resource Center” to serve as a one-stop clearinghouse for information on federally-funded energy programs and RD&D.

For More Information: Visit our website at Compete.org to find the full reports or contact Susan Rochford, Senior Vice President, at 202 969 3384 or SRochford@compete.org.

¹ Kammen, Daniel M. and Gregory F. Nemet. “Reversing the Incredible Shrinking Energy R&D Budget,” Real Numbers, 2005.

² Ibid.

³ “Major Functional Categories of R&D,” American Association for the Advancement of Science, 21 March 2008.

⁴ National Research Council, *Energy Research at DOE: Was it Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000*, Washington D.C.: National Research Council. 2001.