



Highlights of [GAO-07-106](#), a report to congressional requesters

Why GAO Did This Study

Despite periodic price shocks and related energy crises, the United States is even more dependent on crude oil and natural gas than it was almost 30 years ago. And, without dramatic change, the nation will become ever more reliant on imported oil and natural gas with attendant threats to national security. The nation has also become concerned about global warming, which has been linked to carbon dioxide emissions from burning coal and oil. To address these concerns, the Department of Energy (DOE) has funded research and development (R&D) on advanced renewable, fossil, and nuclear energy technologies. GAO examined the (1) R&D funding trends and strategies for developing advanced energy technologies, (2) key barriers to developing and deploying advanced energy technologies, and (3) efforts of the states and six selected countries to develop and deploy advanced energy technologies. GAO reviewed DOE R&D budget data and strategic plans and interviewed DOE officials and scientists, U.S. industry executives, independent experts, and state and foreign government officials.

What GAO Recommends

GAO suggests that the Congress consider further stimulating the development and deployment of a diversified energy portfolio by focusing R&D funding on advanced energy technologies. DOE had no comment on this recommendation.

www.gao.gov/cgi-bin/getrpt?GAO-07-106.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells at 202-512-3841 or wellsj@gao.gov.

DEPARTMENT OF ENERGY

Key Challenges Remain for Developing and Deploying Advanced Energy Technologies to Meet Future Needs

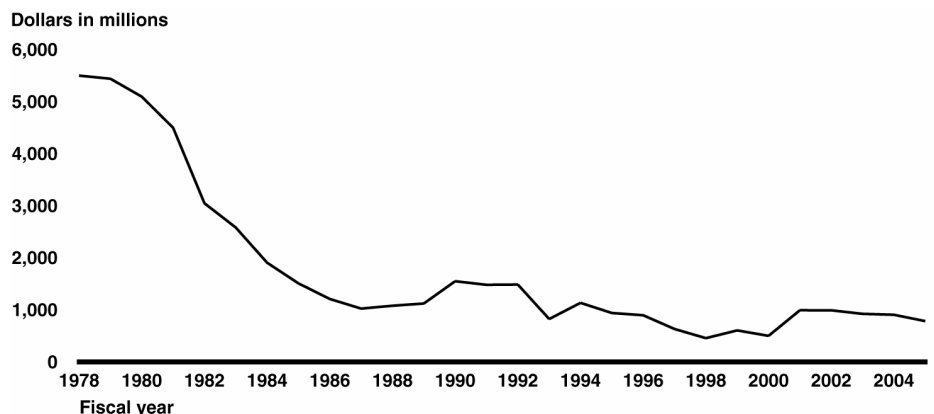
What GAO Found

DOE's total budget authority for energy R&D dropped by over 85 percent (in real terms) from 1978 to 2005, peaking in the late 1970s but falling sharply when oil prices returned to lower levels in the mid-1980s (see table). DOE's R&D efforts have resulted in steady incremental progress in reducing costs for renewable energy technologies, reducing harmful emissions of coal-fired power plants, and improving safety and efficiency for nuclear power plants.

Further development and deployment of advanced renewable, fossil, and nuclear energy technologies face several key challenges. Challenges for renewable technologies include developing (1) cost-effective technologies to produce ethanol using agricultural residues and other biomass materials as well as the infrastructure for distributing ethanol, (2) new wind technologies to expand into low wind and offshore locations, and (3) improved solar technologies that can better compete with conventional technologies. Challenges for fossil technologies are primarily associated with developing advanced coal gasification technologies to further reduce harmful emissions and reducing their high capital costs. Challenges for advanced nuclear technologies include uncertainty about the Nuclear Regulatory Commission's revised licensing process, investor concerns about high capital costs, and the disposal of a legacy of spent nuclear fuel.

Many states have successfully stimulated the deployment of renewable energy technologies by using standards, mandates, and financial incentives that require, for example, power companies to provide small producers with access to the power transmission grid and purchase their excess energy. Each of the six countries GAO reviewed has used mandates and/or financial incentives to deploy advanced energy technologies that are providing, or are expected in the future to provide, significant amounts of energy.

Budget Authority for Renewable, Fossil, and Nuclear R&D, Fiscal Years 1978-2005



Source: GAO analysis of DOE data.

Note: Budget authority is in real terms, adjusted to fiscal year 2005 dollars to account for inflation.