

**U.S. HOUSE OF REPRESENTATIVES  
COMMITTEE ON SCIENCE AND TECHNOLOGY**

**SUBCOMMITTEE ON ENERGY AND ENVIRONMENT**

**HEARING CHARTER**

*Department of Energy Budget Request for Fiscal Year 2009*

Wednesday March 5, 2008  
10:00 a.m. – 12:00 p.m.  
2318 Rayburn House Office Building

**Purpose**

On Wednesday, March 5, 2008 the Energy and Environment Subcommittee of the House Science and Technology Committee will hold a hearing on the Department of Energy's (DOE) fiscal year 2009 (FY2009) Budget Request for research and development programs.

**Witnesses**

- **Dr. Raymond Orbach** is the Under Secretary for Science at DOE, where he directs the Office of Science, serves as the Secretary's science policy advisor for all departmental programs, and oversees DOE's 17 national laboratories and education activities. Prior to joining the Department, Dr. Orbach served as Chancellor of the University of California at Riverside.
- **Mr. C. H. "Bud" Albright Jr.** is the Under Secretary of Energy at DOE, where he oversees the Energy and Environment programs which include research and development efforts in the offices of Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, Electricity Delivery and Energy Reliability, among others. Prior to joining the Department in 2007 Mr. Albright served as the Republican Staff Director of the U.S. House Committee on Energy and Commerce.
- **Mr. Mark Gaffigan** is an Acting Director in the Government Accountability Office, Natural Resources and Environment Team, which is responsible for recently produced reports on DOE funding for advanced energy technologies, the hydrogen fuel initiative, oil production shortages, and the oil and natural gas research program.
- **Dr. Arthur Bienenstock** is the President of the American Physical Society, which tracks funding for basic research at DOE, among other agencies, and has also produced several reports on applied energy research in recent years. Dr. Bienenstock is also a Professor of Physics as well as the Special Assistant to the President for Federal Research Policy at Stanford University.

**Fiscal Year 2008 and 2009 for DOE non-defense R&D (in millions)**

| <b>Programs</b>                                                                       | <b>President's<br/>FY2008<br/>Request</b> | <b>FY2008<br/>Omnibus<br/>Approps</b> | <b>President's<br/>FY2009<br/>Request</b> | <b>Delta<br/>President<br/>FY09/<br/>Omnibus</b> | <b>%</b>    |
|---------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|--------------------------------------------------|-------------|
| <b>Office of Science</b>                                                              | <b>4397.9</b>                             | <b>4017.7</b>                         | <b>4722</b>                               | <b>704.3</b>                                     | <b>18%</b>  |
| <i>Basic Energy Sciences</i>                                                          | 1498.5                                    | 1269.9                                | 1568.2                                    | 298.3                                            | 23%         |
| <i>Advanced Scientific Computing Research</i>                                         | 340.2                                     | 351.1                                 | 368.8                                     | 17.7                                             | 5%          |
| <i>Biological and Environmental Research</i>                                          | 531.9                                     | 544.3                                 | 568.5                                     | 24.2                                             | 4%          |
| <i>High Energy Physics</i>                                                            | 782.2                                     | 688.3                                 | 805.0                                     | 116.7                                            | 17%         |
| <i>Nuclear Physics</i>                                                                | 471.3                                     | 432.7                                 | 510.1                                     | 77.4                                             | 18%         |
| <i>Fusion Energy Sciences</i>                                                         | 427.9                                     | 286.5                                 | 493.1                                     | 206.6                                            | 72%         |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Energy Efficiency and<br/>Renewable Energy</b>                                     | <b>1236.2</b>                             | <b>1722.4</b>                         | <b>1256.1</b>                             | <b>(466.3)</b>                                   | <b>-27%</b> |
| <i>Hydrogen</i>                                                                       | 213.0                                     | 211.1                                 | 146.2                                     | (64.9)                                           | -31%        |
| <i>Biomass and Biorefinery Systems</i>                                                | 179.2                                     | 198.2                                 | 225.0                                     | 26.8                                             | 14%         |
| <i>Solar Energy</i>                                                                   | 148.3                                     | 168.5                                 | 156.1                                     | (12.4)                                           | -7%         |
| <i>Wind Energy</i>                                                                    | 40.1                                      | 49.5                                  | 52.5                                      | 3.0                                              | 6%          |
| <i>Geothermal Energy</i>                                                              | 0.0                                       | 19.8                                  | 30.0                                      | 10.2                                             | 52%         |
| <i>Hydropower/Marine and Hydrokinetic</i>                                             | 0.0                                       | 9.9                                   | 3.0                                       | (6.9)                                            | -70%        |
| <i>Vehicle Technologies</i>                                                           | 176.1                                     | 213.0                                 | 221.1                                     | 8.1                                              | 4%          |
| <i>Building Technologies</i>                                                          | 86.5                                      | 109.0                                 | 123.8                                     | 14.8                                             | 14%         |
| <i>Industrial Technologies</i>                                                        | 46.0                                      | 64.4                                  | 62.1                                      | (2.3)                                            | -4%         |
| <i>Weatherization and Intergov. Activities</i>                                        | 204.9                                     | 222.8                                 | 58.5                                      | (164.3)                                          | -74%        |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Electricity Delivery and Energy<br/>Reliability</b>                                | <b>114.9</b>                              | <b>138.6</b>                          | <b>134.0</b>                              | <b>(4.6)</b>                                     | <b>-3%</b>  |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Fossil Energy Research and<br/>Development</b>                                     | <b>558.2</b>                              | <b>742.8</b>                          | <b>754</b>                                | <b>11.2</b>                                      | <b>2%</b>   |
| <i>Coal</i>                                                                           | 426.6                                     | 493.4                                 | 623.7                                     | 130.3                                            | 26%         |
| <i>Natural Gas Technologies</i>                                                       | 0.0                                       | 19.8                                  | 0.0                                       | (19.8)                                           | -100%       |
| <i>Oil Technology</i>                                                                 | 0.0                                       | 5.0                                   | 0.0                                       | (5.0)                                            | -100%       |
| <i>Plant and Capital Equipment</i>                                                    | 0.0                                       | 12.9                                  | 5.0                                       | (7.9)                                            | -61%        |
| <i>Fossil Energy Environmental Restoration</i>                                        | 9.6                                       | 9.5                                   | 9.7                                       | 0.2                                              | 2%          |
| <i>Advanced Metallurgical Research</i>                                                | 0.0                                       | 0.0                                   | 0.0                                       | 0.0                                              | 0%          |
| <i>Cooperative R&amp;D</i>                                                            | 0.0                                       | 5.0                                   | 0.0                                       | (5.0)                                            | -100%       |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Office of Nuclear Energy</b>                                                       | <b>801.7</b>                              | <b>961.6</b>                          | <b>853.6</b>                              | <b>(108.0)</b>                                   | <b>-11%</b> |
| <i>Research and Development</i>                                                       | 567.7                                     | 603.8                                 | 629.7                                     | 25.9                                             | 4%          |
| <i>Infrastructure</i>                                                                 | 157.7                                     | 239.3                                 | 143.4                                     | (95.9)                                           | -40%        |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Innovative Technology Loan<br/>Guarantee Program<br/>(Administrative Expenses)</b> | <b>8.4</b>                                | <b>5.5</b>                            | <b>19.9</b>                               | <b>14.4</b>                                      | <b>262%</b> |
|                                                                                       |                                           |                                       |                                           |                                                  |             |
| <b>Total</b>                                                                          | <b>7117.3</b>                             | <b>7588.6</b>                         | <b>7739.6</b>                             | <b>151.0</b>                                     | <b>2%</b>   |

The \$7.7 billion request for DOE civilian energy R&D funding in FY2009 is divided among five offices. The Office of Science (SC), represented in the hearing by Dr. Orbach, funds basic research at universities and 17 national laboratories, and is the single largest federal supporter of physical sciences research. The other four offices, represented by Mr. Albright, focus on applied research and technology development in the fields of Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, and Electricity Delivery and Energy Reliability.

## **OFFICE OF SCIENCE**

The FY2009 budget request for the DOE Office of Science is \$4.7 billion. This represents an increase of \$704 million, or 18 percent over the FY2008 enacted level of funding, and \$478 million or 9 percent below funding authorized in COMPETES. (Note: COMPETES includes only a topline authorization level for the DOE Office of Science; it is silent on funding for specific research program areas.)

The request for **Basic Energy Sciences (BES)** is \$1.6 billion, an increase of \$298 million or 23 percent over enacted FY2008 funding. As the largest program within the Office of Science, BES conducts research primarily in the cross-cutting areas of materials and chemical sciences, and based on a series of recent workshops, plans to focus more on specific research areas for energy applications.

The budget would provide \$369 million for **Advanced Scientific Computing Research (ASCR)**, an increase of \$18 million or 5 percent over enacted FY2008 funding. This includes funds to continue upgrading the Leadership Class Facilities at Oak Ridge National Laboratory and Argonne National Laboratory.

**Biological and Environmental Research (BER)** would receive \$569 million under the President's budget, which is \$24 million over current year funding. In addition to the role of BER in areas such as genomics, climate change research, medical applications, and environmental remediation, the FY2009 request supports continued funding for three bioenergy centers established in FY2008.

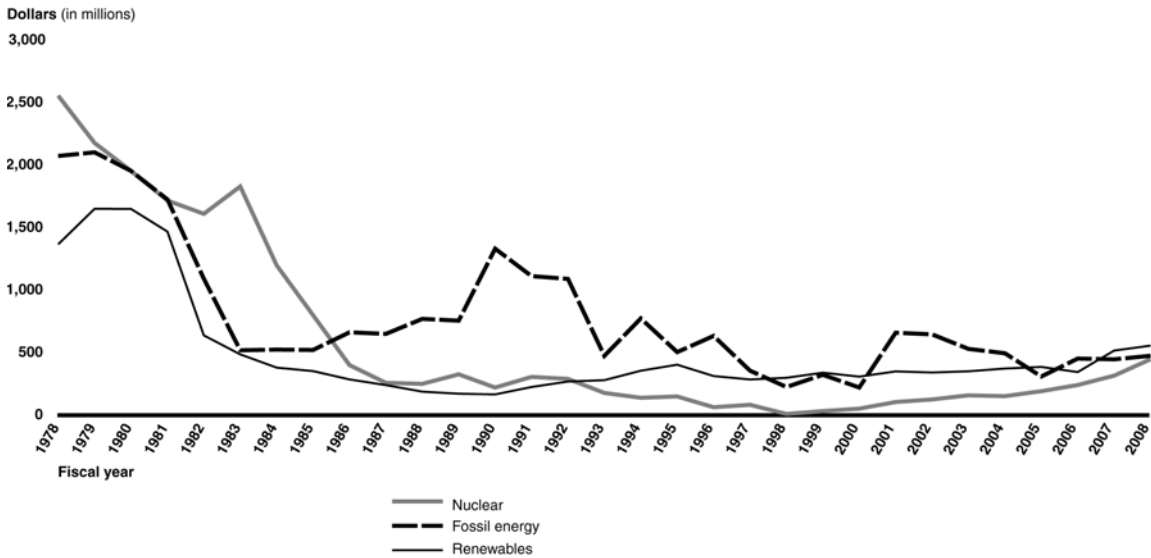
The FY2009 funding request for **High Energy Physics (HEP)** is \$805 million, which is \$117 million or 17 percent more than the enacted FY2008 level. This program conducts fundamental research in elementary particle physics and accelerator science and technology. Funding for the NOvA neutrino physics experiment and research in preparation for the International Linear Collider at the Fermi National Accelerator Laboratory and Stanford Linear Accelerator Laboratory are restored in this request.

**Fusion Energy Sciences (FES)** receives \$493 million, an increase of \$207 million or 72 percent over enacted FY2008 funding. Of this amount, \$214 million is dedicated to restoring funding for the U.S. role in the International Thermonuclear Experimental Reactor (ITER). Finally, **Nuclear Physics (NP)** would receive \$510 million, an increase of \$77 million (18 percent) over FY2008 funding.

## **APPLIED ENERGY TECHNOLOGY PROGRAMS**

While the total budget for energy R&D has risen in recent years it is still a fraction of the robust levels seen when the nation responded to the energy crisis of the late 1970's. According to the U.S. Government Accountability Office the Department of Energy's budget authority for energy R&D fell 85 percent from 1978 to 2005 (inflation adjusted). Within the applied programs funding has varied greatly over the years according to shifting Administration and Congressional priorities, as the chart below indicates.

### **DOE'S Budget Authority for Renewables, Fossil, and Nuclear Energy R&D for Fiscal Years 1978-2008**



*Note: Budget authority is in real terms, adjusted to fiscal year 2008 dollars to account for inflation. The budget data focuses on development of advanced energy technologies and excludes such R&D areas as Vehicle Technologies because its focus is improving the energy efficiency of vehicles.*

The Energy Information Administration (EIA) projects that U.S. electricity generation will grow from 3,900 billion kilowatt-hours in 2005 to 5,500 billion kilowatt hours in 2030. With continued high natural gas prices and sizeable barriers to deployment of renewable and nuclear power technologies, coal will likely make up the largest percentage of this growth and continue to provide the largest part of U.S. electricity generation for the foreseeable future (roughly 50%). Despite heavy investments in wind, solar and geothermal energy R&D, the bulk of the nation's renewable energy portfolio comes from hydropower and still comprises only 7% of total electricity generation. There are currently 104 operating nuclear power reactors in the U.S., with several new reactors in various stages of planning. However, it is expected that, short of very aggressive investment in nuclear capacity, new nuclear plants will only serve to replace aging existing plants in terms of overall electricity market share in the near-to-medium term. For the foreseeable future oil will fuel the nation's transportation sector, though recent Administration and Congressional biofuels initiatives aim to drastically decrease its 97 percent market share.

## **Energy Efficiency and Renewable Energy (EERE)**

The President's proposal of \$1.26 billion for the Energy Efficiency and Renewable Energy program at DOE represents a 27 percent cut from FY2008 congressional appropriations, with the elimination of the **Weatherization Assistance** program, a key component of the nation's energy efficiency strategy, bearing a large brunt of the decrease.

**Biomass and Biorefinery Systems** would receive \$225 million, a 14% increase over FY2008 funding. This program seeks to make ethanol from cellulosic sources cost-competitive through advancing the technologies and practices to make the entire ethanol supply chain more efficient. The largest share of the increase (\$36.4 million) goes to work with industry for demonstration of biorefineries at both the commercial-scale and at smaller scale for higher risk technologies.

The FY2009 request of \$221 million for **Vehicle Technologies** is an increase of \$8 million over the FY2008 appropriations, while funding for the Hydrogen Technology program decreased by \$64 million, or over 30 percent. The large decrease in funding for the **Hydrogen Technology** marks the end of the Administration's 5 year commitment to hydrogen R&D, and a shift of program priorities to wider applications of advanced vehicle technologies, especially for plug-in electric vehicle platforms. The FY2009 budget proposes a transfer of \$31 million from the Hydrogen Technologies program to the Vehicle Technologies Program largely for increases in the hybrid electric systems and technology integration initiatives. The hybrid electric systems program funds R&D to reduce the cost of battery systems. The technology integration program aims to accelerate the adoption and use of alternative fuel and advanced technology vehicles through demonstrations and education initiatives.

The proposed funding for the **Solar Energy** program would be decreased by \$12.4 million, a 7 percent reduction, to a total of \$156.1 million in FY2009, which is also \$93.9 million below the level authorized in EPACT 2005. **Wind energy** is slated for \$53 million, essentially even with FY08 levels.

The **Geothermal Technology Program** would receive an increase of \$10 million to a total of \$30 million in FY2009. This is a reversal from last year's budget which proposed eliminating this program, but is still far short of the \$95 million authorized in the Energy Independence and Security Act of 2007.

The budget request provides \$3 million for both conventional **hydropower and marine and hydrokinetic energy research**, a 70 percent reduction, despite explicit authorization in the Energy Independence and Security Act of 2007 for R&D in marine and hydrokinetic technologies at the level of \$50 million in FY2009. It is expected that a significantly higher level of Federal effort is required to take advantage of this underdeveloped renewable resource in an environmentally friendly manner.

The Administration's request for **Industrial Technologies Program (ITP)** of \$62 million is a 3 percent decrease from FY2008 appropriated levels, and \$128 million less than the amount authorized in the Energy Independence and Security Act of 2007. Heavy industry accounts for approximately one-third of energy use in the U.S, and the ITP has maintained a long and successful history of developing technologies and deploying them in industry, despite being funded at one-third of the levels from as recently as FY2000 (\$175 million).

### **Office of Nuclear Energy**

The Administration request for Nuclear Energy (NE) is \$629.7 for research and development, with nearly half of that request dedicated to the **Advanced Fuel Cycle Initiative** which is focused on implementing the Global Nuclear Energy Partnership (GNEP). For NE's Research and Development programs, this represents approximately \$191.7 million above the FY2008 enacted funding level (\$438 million).

The United States has been conducting research on the reprocessing of spent nuclear fuel since 2002 under the Advanced Fuel Cycle Initiative (AFCI). In 2006, the Administration announced a change in this program when it unveiled GNEP as its plan forward to develop advanced, proliferation-resistant nuclear fuel cycle technologies that would maximize the energy extracted from nuclear fuels and minimize nuclear waste. GNEP has drawn criticism based on the substantial costs estimated for implementing the program and the technical challenges associated with developing, demonstrating and deploying advanced technologies for recycling spent nuclear fuel that do not separate plutonium. Last fall, the National Academies issued a report expressing similar concerns. The FY2009 request is \$301.5 million, substantially higher than the FY2008 enacted funding for GNEP of \$181 million. GNEP aside, general research activities on a closed nuclear fuel cycle are more widely considered to be worthwhile.

The FY2009 budget request eliminates funding for the University Reactor Infrastructure and Education Assistance program. However, it also includes directions to Nuclear Energy, through its Energy Research Initiative process, to designate at least 20 percent of the R&D appropriated funds for purposes of supporting R&D activities at university research institutions through competitive awards focused on advancing nuclear energy technology.

### **Office of Electricity Delivery and Energy Reliability**

The Office of Electricity is requesting \$134 million for FY2009, a \$4.5 million reduction from FY2008 appropriations. Of the total for this office the Administration proposes \$100.2 million for R&D, a \$9.3 million decrease from FY2008 appropriations. However, the request does include \$13.4 million for Energy Storage and Power Electronics which doubles the FY2008 appropriation for that program. Advancing energy storage systems

is critical for modernizing the electric grid and expanding the use of renewable energy sources for power generation.

### **Innovative Technology Loan Guarantee Program (LGP)**

The FY2009 budget proposes \$19.9 million to administer the Innovative Technology Loan Guarantee Program established under Title XVII of the Energy Policy Act of 2005 (P.L. 109-58). The FY2008 omnibus appropriations bill included \$38.5 billion for loan obligation authority for FY2008 and FY2009. Within that authority, \$18.5 billion was designated for nuclear power facilities, \$6 billion for coal-based power generation and industrial gasification facilities, \$2 billion for advanced coal gasification projects, \$10 billion for renewable and efficiency projects and \$2 billion for front end advanced nuclear facilities. The Administration's FY2009 request does not seek additional loan obligation authority, but requests an extension for the loan authority until 2011 for nuclear facilities and a 2010 extension for all other projects.

### **Fossil Energy R&D**

Fossil Energy R&D would receive \$754 million in FY2009, an increase of \$11.2 million compared to FY2008 appropriations. The funding increase would go to coal R&D, including the **Clean Coal Power Initiative (CCPI)** which will focus on validating carbon capture and storage in power generation applications in Round III of the program this year. CCPI funding is available to support projects on both existing power plants and new power plants. The **FutureGen program** would see a substantial increase to \$156 million which more than doubles the FY2008 appropriations of \$74.3 million. The Administration has proposed a major revision of the FutureGen program which will now place an emphasis on early validation of clean coal technologies through multiple demonstrations of CCS technologies at commercially operated electric generating plants. This proposal is intended to capitalize on industry's investment in clean coal power plants by providing the funds for the CCS component of the advanced power plants and is a significant restructuring of the original program, which was promoted as a near-zero-emissions power plant that would combine electricity and hydrogen production. The **Fuels and Power Systems program**, which includes R&D on advanced coal technologies to reduce emissions of carbon dioxide (CO<sub>2</sub>) at pulverized coal plants and continues R&D on promising technologies for capture, separation and compression of CO<sub>2</sub>, would receive an increase of \$33 million to \$382.7 million in FY2009. With the momentum to develop a national greenhouse gas reduction program growing, it is critical to have an appropriate investment in RD&D to cost effectively reduce CO<sub>2</sub> emissions from the use of coal, and sequester CO<sub>2</sub> on a commercial scale.

The FY2009 budget once again proposes to eliminate all oil and gas R&D, including \$50 million in direct spending (mandated in the Energy Policy Act of 2005) for unconventional onshore and ultradeepwater offshore natural gas exploration technologies that would go largely to smaller independent oil and gas producers.