

**AN OVERVIEW OF THE FEDERAL
RESEARCH AND DEVELOPMENT BUDGET
FOR FISCAL YEAR 2010**

HEARING
BEFORE THE
**COMMITTEE ON SCIENCE AND
TECHNOLOGY**
HOUSE OF REPRESENTATIVES
ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

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CONTENTS

May 14, 2009

Witness List	Page 2
Hearing Charter	3

Opening Statements

Statement by Representative Bart Gordon, Chairman, Committee on Science and Technology, U.S. House of Representatives	12
Written Statement	13
Statement by Representative Ralph M. Hall, Minority Ranking Member, Committee on Science and Technology, U.S. House of Representatives	13
Written Statement	15
Prepared Statement by Representative Jerry F. Costello, Member, Committee on Science and Technology, U.S. House of Representatives	16
Prepared Statement by Representative Eddie Bernice Johnson, Member, Committee on Science and Technology, U.S. House of Representatives	17
Prepared Statement by Representative Marcia L. Fudge, Member, Committee on Science and Technology, U.S. House of Representatives	18
Prepared Statement by Representative Harry E. Mitchell, Member, Committee on Science and Technology, U.S. House of Representatives	19

Witness:

Dr. John P. Holdren, Assistant to the President for Science and Technology; Director of the White House Office of Science and Technology Policy; Co-Chairman of the President's Council of Advisors on Science and Technology	
Oral Statement	20
Written Statement	22
Biography	29
Discussion	30

Appendix: Answers to Post-Hearing Questions

Dr. John P. Holdren, Assistant to the President for Science and Technology; Director of the White House Office of Science and Technology Policy; Co-Chairman of the President's Council of Advisors on Science and Technology	50
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**AN OVERVIEW OF THE FEDERAL RESEARCH
AND DEVELOPMENT BUDGET FOR FISCAL
YEAR 2010**

THURSDAY, MAY 14, 2009

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 2:24 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

BART GORDON, TENNESSEE
Chairman

RALPH ABRAHAM, TEXAS
Ranking Member

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

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Hearing on

An Overview of the Federal R&D Budget for FY 2010

Thursday, May 14, 2009
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building

Witness List

Dr. John Holdren
Director, Office of Science and Technology Policy (OSTP)

HEARING CHARTER

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

An Overview of the Federal
Research and Development Budget
for Fiscal Year 2010

THURSDAY, MAY 14, 2009
2:00 P.M.—4:00 P.M.

2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Thursday, May 14, 2009, the Committee on Science and Technology will hold a hearing to examine the Administration's proposed fiscal year (FY) 2010 funding for federal research, development, demonstration, and commercial application programs, in particular at agencies within the jurisdiction of the Committee, and to explore how the 2007 COMPETES Act programs within the jurisdiction of the Committee are treated in the budget.

2. Witness

Dr. John Holdren is the Assistant to the President for Science and Technology and Director of the Office of Science and Technology Policy (OSTP). He also serves as Co-Chairman of the President's Council of Advisors on Science and Technology. Dr. Holdren is on leave from Harvard, where he is the Teresa and John Heinz Professor of Environmental Policy at the Kennedy School of Government and Director of the Science, Technology, and Public Policy Program at the School's Belfer Center for Science and International Affairs.

3. Overview of FY 2010 R&D Budget Request

The President's FY 2010 budget proposes a total of \$147.6 billion for research and development (R&D) across all agencies, a \$555 million or 0.4 percent increase over the 2009 enacted level. This does not include any of the estimated \$21.5 billion¹ in R&D funding in the *American Recovery and Reinvestment Act*, which included \$10.4 billion for the National Institutes of Health (NIH); \$3.0 billion for the National Science Foundation (NSF); \$5.5 billion for Department of Energy (DOE); \$580 million for the National Institute of Standards and Technology (NIST); \$1.0 billion for the National Aeronautics and Space Administration (NASA); and \$830 million for the National Oceanographic and Atmospheric Administration (NOAA), all to be spent by the end of FY 2010.

The budget would decrease for the 'development' end of R&D (much of which occurs at the Department of Defense) and increase for basic and applied research by \$376 million, or 0.6 percent. This is after four years of decline in real terms for federal research investments. According to Administration documents, the 2010 Budget invests in four key R&D priorities:

1. Basic sciences at NSF, NIST and DOE's Office of Science—keeping those three agencies on a 10-year doubling path;
2. Clean energy R&D;
3. Biomedical and health research; and
4. Safety and Security R&D—including detection and response to natural and manmade threats, biodefense, and nuclear non-proliferation.

Funding for research, development, demonstration, commercial application and science, technology, engineering, and mathematics (STEM) education activities at

¹This is the total arrived at in the AAAS budget analysis (<http://www.aaas.org/spp/rd/stim09c.htm#tb>), for all federal agencies. The Administration budget roll-out documents report a Recovery Act R&D total of \$18.3 billion. The discrepancy is primarily due to how Recovery Act funding for DOE is counted.

agencies and offices under the Committee's jurisdiction totals approximately \$45 billion in FY 2010, not including Recovery Act funding.²

4. Summary of 2007 COMPETES Act

The *America COMPETES Act* (P.L. 110–69) was signed into law by President Bush on August 9, 2007. A response to the 2005 National Academies' report *Rising Above the Gathering Storm*, COMPETES seeks to ensure U.S. students, teachers, businesses, and workers are prepared to continue leading the world in innovation, research, and technology. The law implemented recommendations from the *Gathering Storm* report, and specifically:

- Authorizes \$33.6 billion over FY 2008–2010 for STEM research and education programs across the Federal Government.
- Keeps research programs at NSF, NIST and the DOE Office of Science on a near-term doubling path;
- Helps to prepare new teachers and provide current teachers with STEM content and teaching skills through NSF's Noyce Teacher Scholarship Program and Math and Science Partnerships Program;
- Expands programs at NSF to enhance the undergraduate education of the future science and engineering workforce, including at two-year colleges;
- Expands early career graduate-level grant programs and provides additional support for outstanding young investigators at NSF and DOE;
- Creates the Technology Innovation Program (TIP) at NIST (replacing the existing Advanced Technology Program or ATP) to fund high-risk, high-reward, pre-competitive technology development with high potential for public benefit;
- Puts the Manufacturing Extension Partnership (MEP), which provides cost-shared technical assistance to small manufacturers to modernize their operations, on a path to doubling over 10 years;
- Establishes an Advanced Research Projects Agency for Energy (ARPA-E), a nimble and semi-autonomous research agency at DOE to engage in high-risk, high reward energy research;
- Includes provisions throughout the bill to help broaden participation by women and minorities in science and engineering fields at all levels; and
- Strengthens interagency planning and coordination for research infrastructure and information technology (i.e., high-speed computing).

5. Descriptions of Agency R&D Budgets

National Science Foundation

The National Science Foundation budget request for FY 2010 totals \$7.045 billion, \$555 million or 8.5 percent more than FY 2009 funding, not including the \$3.0 billion included for NSF in the Recovery Act. The COMPETES Act authorized a total of \$8.1 billion for FY 2010. NSF provides approximately 22 percent of support for basic research at U.S. colleges and universities and is second only to NIH in support for all academic research. NSF research, education and infrastructure funding is divided into three main accounts: Research and Related Activities, Education and Human Resources, and Major Research Equipment and Facilities Construction.

Research and Related Activities (R&RA)

The Administration's budget would provide \$5.73 billion for R&RA in FY 2010, an increase of \$550 million or 10.6 percent over FY 2009 funding. Research and Related Activities is made up of six disciplinary directorates, in addition to three offices, and a handful of other functions. The largest relative increase (12.6 percent) went to the Geosciences Directorate (GEO), which funds atmospheric, Earth and ocean sciences. Most of NSF's climate change research is supported by GEO. The Biological Sciences Directorate (BIO) also saw a large (11.8 percent) increase. NSF accounts for two-thirds of all federal support for non-medical biological sciences research. The R&RA request stands in contrast to the previous Administration's American Competitiveness Initiative, which prioritized the physical sciences and engineering. The Social, Behavioral and Economic Sciences Directorate (SBE) saw the

²This is just a rough estimate across the agencies/offices under S&T (sole or joint) legislative jurisdiction and does not include all activities at all agencies to which we might have a claim in the case of legislation on those activities.

smallest (6.9 percent) increase. All six directorates were treated equally in the Recovery Act, which provided a total of \$2.5 billion for R&RA.

Education and Human Resources (EHR)

The Education and Human Resources Directorate, which funds education and broadening participation programs at all levels “from K to Gray,” would be funded at \$858 million in FY 2010, an increase of only \$12.5 million or 1.5 percent over FY 2009 funding. When asked at a budget briefing last week why EHR funding remains essentially flat for FY 2010, Dr. Cora Marrett, Acting Deputy Director of NSF, responded that funding for EHR alone represents an incomplete picture of the education and training programs distributed across NSF. For example, while the EHR contribution to Graduate Research Fellowships decreases by \$4.4 million, the R&RA contribution increases by \$11.4 million.

In the COMPETES Act, the Committee focused on the teacher training programs at NSF, including the Noyce Teacher Scholarship Program and the Math and Science Partnerships Program (MSP). In the FY 2010 budget, Noyce would be funded at \$55 million, the same level as in FY 2009, and MSP would be funded at \$58.2 million, a 4.6 percent decrease from the \$61 million provided in FY 2009. Both Noyce and MSP received considerable funding in the Recovery Act (\$60 million and \$25 million, respectively). In his testimony before the CJS Appropriations Subcommittee earlier this year, Chairman Gordon requested that Noyce be funded at \$70 million in FY 2010.

Another education program highlighted in the COMPETES Act for its effectiveness and importance is the Advanced Technological Education (ATE) program. The ATE program funds two-year institutions in partnership with local industry to build or improve upon STEM programs focused on training technicians for the high-tech jobs in that region. The request for ATE in the FY 2010 budget is \$64 million, the same level authorized in COMPETES and an increase of \$12.4 million or 24 percent over FY 2009 funding. Finally, NSF’s collection of programs to broaden participation in STEM fields would be funded at \$719 million in FY 2010, a \$48 million or 6.2 percent increase over FY 2009.

Major Research Equipment and Facilities Construction (MREFC)

The MREFC request for FY 2010 is \$117 million, a decrease of \$35 million from FY 2009 funding. The reason for this substantial decrease is the \$400 million provided to MREFC in the Recovery Act to initiate construction on three projects: The Alaska Region Research Vessel, the Advanced Technology Solar Telescope, and the Ocean Observatories Initiative. There are no additional MREFC new starts in the FY 2010 budget request. Funding will go toward ongoing construction projects.

National Institute of Standards and Technology

The Administration’s FY 2010 budget requests \$846.1 million for NIST, a \$27.1 million or 3.3 percent increase over FY 2009 funding. Specifically, the budget would provide \$534.6 million for NIST’s core scientific and technical research and services; \$117 million for construction of research facilities; \$124.7 million for the Manufacturing Extension Partnership (MEP); and \$69.9 million for the Technology Innovation Program (TIP). The Bush Administration spent years trying to eliminate both MEP and TIP.

Research and Facilities

COMPETES put the internal research laboratory account on a ten-year path to doubling, authorizing \$585 million in FY 2010. The current Administration, similar to the previous Administration, also intends to keep NIST research on a 10-year doubling path. The \$19 million increase in the construction budget would fund renovation work at the NIST campuses in both Gaithersburg and Boulder and expansion and reliability improvements at the NIST Center for Neutron Research. NIST also received \$580 million in Recovery Act funding: \$220 million for research and \$360 million for construction and maintenance.

Manufacturing Extension Partnership (MEP)

The MEP program is a public/private partnership in all 50 states and Puerto Rico that provides technical assistance for small manufacturers to modernize their operations and adapt to foreign competition. MEP Centers are supported by equal contributions from federal funds, State funds, and client fees. In FY 2006, MEP clients reported increased or retained sales of \$6.76 billion, cost savings of over \$1.1 billion, new client investment of over \$1.6 billion, and more than 51,000 jobs created or retained. The COMPETES Act put the MEP program on ten-year path to doubling,

authorizing \$132 million in FY 2010. The FY 2010 budget request represents a \$14.7 million or 13.4 percent increase over FY 2009 funding.

Technology Innovation Program (TIP)

The Technology Innovation Program was created in COMPETES to replace the Advanced Technology Program (ATP). TIP awards cost-shared grants to small companies and joint ventures for the development of high-risk, high-reward technologies that meet critical national needs. The FY 2010 budget request represents a \$5 million or \$75 million increase over FY 2009 funding.

Department of Energy

Office	FY09 Approps	Recovery Act (2-yr money)	FY10 Request	Change over FY09 Approps
ARPA-E	15	400	10	-33.3%
Office of Science	4757.6	1600	4941.7	3.9%
EERE	2178.5	16800	2318.6	6.4%
Fossil Energy	1110.2	3400	881.6	-20.6%
Nuclear Energy	1357.8	0	844.6	-37.8%
Electricity	137	4500	208	51.8%
TOTAL	9556.1	26700	9204.5	-3.7%

Advanced Research Projects Agency for Energy (ARPA-E)

The FY 2010 budget proposes \$10 million for the Energy Transformation Acceleration Fund to be used solely for the establishment of the Advanced Research Projects Agency for Energy, or "ARPA-E." ARPA-E is a new program authorized in the COMPETES Act designed to sponsor high-risk, high-payoff technology R&D projects with universities, the private sector, and National Labs. Modeled on the defense agency, DARPA, this new program will operate under a very flat organizational structure with limited overhead expenses and no research facilities of its own. Program Managers will report to the Director, who will report directly to the Secretary. The Department is in the process of recruiting a Director and the first round of Program Managers and support personnel.

The \$10 million requested for FY 2010 would be used for Program Direction expenses, and follows on \$15 million appropriated in the FY 2009 Omnibus, and \$400 million provided in Recovery Act. Program Direction typically includes expenses such as salaries, equipment, office leasing, travel, contractor services, legal and financial management, and technology transfer. When added to the existing \$415 million, this would allow for the initial start-up costs and approximately two years of full operations. ARPA-E has already issued a Funding Opportunity Announcement for \$150 million, with specific project funding packages ranging from \$500,000 to \$20 million.

Energy Innovation Hubs

In FY 2010 DOE proposes to fund eight Energy Innovation Hubs at a total of \$280 million to support cross-disciplinary R&D focused on the barriers to transforming new energy technologies into commercially deployable materials, devices, and systems. The aim of these Hubs will be to advance promising areas of energy science and technology identified by the Secretary from their early stages of research to the point that the risk level will be low enough for industry to deploy into the marketplace. Another goal is to create research environments similar to the industrial laboratories that existed decades ago, such as Bell Labs, where significant resources were dedicated to large teams solving specific problems for several years without the need to spend large portions of time applying for new funding. The budget for each will be \$30 million per year for five years, none of which may be spent on new buildings, and after which each will be either recompeted or termi-

nated. Each Office in DOE that supports ongoing energy R&D programs would steward at least one Hub.

Office of Science

The Office of Science (SC) request for FY 2010 is \$4.94 billion, an increase of \$184 million, or 3.9 percent over FY 2009 funding. SC supports large-scale research programs in materials science for energy applications, climate science, biofuels, carbon management, advanced computing, fusion energy, high-energy physics, and nuclear physics. It also oversees 10 National Labs and provides the U.S. research community with state-of-the-art user facilities. The request continues support for the 46 Energy Frontier Research Centers recently awarded to various university, Lab, and industry collaborations on advanced energy research topics. The budget of each of these Centers will be \$2–5 million per year. It also maintains support for the U.S. contribution to the ITER international fusion project. Two new Energy Innovation Hubs are proposed in FY 2010 focusing on new methods of electrical energy storage and the creation of fuels directly from sunlight without the use of plants or microbes. SC received an additional \$1.6 billion of funding in the Recovery Act, which will be used to support long-deferred lab infrastructure modernization and instrumentation upgrades, as well as better utilization of current facilities and a larger fraction of high-quality research proposals.

Office of Energy Efficiency and Renewable Energy (EERE)

The FY 2010 Energy Efficiency and Renewable Energy (EERE) request is \$2.32 billion, an increase of \$140 million, or 6.4 percent over the FY 2009 appropriation. EERE's activities promote the development and use of clean, reliable, and cost-effective energy efficiency and renewable energy technologies. Every program within EERE, except the Fuel Cell Technologies (formerly Hydrogen Technology) and the Water Power programs, received an increase in their programmatic funding. The EERE request also includes two Hubs for a total of \$70 million; one will focus on better integration of systems, materials and designs into buildings and the other will focus on discovering new concepts and materials needed for solar to electricity conversion. This portfolio of investments will build upon the initiatives funded by the Recovery Act, which provided \$2.5 billion for R&D in EERE.

EERE will also launch a new joint DOE-NSF STEM education and workforce initiative called RE-ENERGYSE, funded at \$115 million in FY 2010, to educate thousands of students at all levels in the fields contributing to the fundamental understanding of energy science and engineering systems.

Office of Fossil Energy (FE)

The FY 2010 funding request for fossil energy R&D in the Office of Fossil Energy (FE) is \$617.6 million, compared to \$876.3 million in FY 2009. In particular, the request for coal programs is \$404 million, which represents a \$288.5 reduction from FY 2009. The request maintains the FY 2009 funding level for fuels and power systems research; however, it does not provide any demonstration funds due to the \$3.4 billion provided in the Recovery Act for carbon capture and storage (CCS) demonstrations. The existing demonstration program, the Clean Coal Power Initiative (CCPI), will expand and extend its current Round III solicitation for CCS demonstrations using the \$800 million provided in the Recovery Act, and zero additional funds are requested. Funding for Carbon Sequestration would increase by \$30 million to \$180 million for additional site selection and characterization as well as related work on regulatory permits and community outreach for DOE's large-scale geologic carbon storage tests under the Regional Partnership Program. The FE request also includes a Hub for CCS that will focus on advancing new capture and separation approaches to dramatically reduce the energy penalty and costs associated with CO₂ capture.

Office of Nuclear Energy (NE)

The Office of Nuclear Energy (NE) is funded from two appropriations accounts: Nuclear Energy and Other Defense Activities. Within these two accounts, the President is requesting a total of \$844.6 million for NE activities in FY 2010, a decrease of \$513 million from FY 2009 funding. This decrease of 38 percent is due primarily to a shifting of the funding request for the mixed oxide fuel fabrication facility (funded at \$487 million in FY 2009) back to the National Nuclear Security Administration.

NE conducts R&D on nuclear energy generation, security, materials, systems, safety, and waste management technologies and tools. The FY 2010 request for NE R&D is \$403 million, a \$112 million decrease that reflects a cut in the Nuclear

Power 2010 program from \$177.5 million to \$20 million. The remaining funds in this account will be used to complete support of industry interactions with the Nuclear Regulatory Commission for development of licensing demonstration activities. Fuel cycle R&D, on the other hand, would increase \$47 million to \$192 while undergoing a significant shift away from near-term demonstration and toward longer-term, science-based transformational R&D focused on waste storage and disposal. This increase also includes the initiation of a Hub for Extreme Materials Research. A second Hub is proposed to focus on providing validated advanced modeling and simulation tools necessary to enable significant change in how the U.S. designs and licenses nuclear power and fuel cycle technologies, which may improve the performance and reduce the costs of new nuclear facilities. The NE budget also includes \$203 million for management of the Idaho National Lab and \$83 million for safeguards and security at the Lab.

Office of Electricity Delivery and Energy Reliability (OE)

The Office of Electricity Delivery and Energy Reliability (OE) is charged with managing programs to modernize the electric grid, enhance security and reliability of the energy infrastructure, and facilitate recovery from disruptions to our energy supply. The FY 2010 request includes \$208 million for these activities, a 52 percent increase from FY 2009 funding levels. This significant funding increase will enhance R&D efforts on energy storage, smart grid technologies, and cyber security needs. In particular, the Clean Energy Transmission and Reliability program, funded at \$42 million, will develop advanced real-time grid monitoring technologies and accelerate research on advanced cables and conductors. The FY 2010 request includes \$67 million for Smart Grid R&D and will establish a Grid Materials, Devices and Systems Hub. The FY 2010 request also includes \$15 million for R&D on energy storage materials and devices and \$50 million for Cyber Security for Energy Delivery Systems. This is in addition to \$4.5 billion provided to OE in the Recovery Act, which will be used to fund demonstration projects, development of inter-operability standards, and matching grants to deploy smart grid technologies.

National Aeronautics and Space Administration³

Overview

The FY 2010 budget request for NASA is \$18.686 billion. That represents a 5.1 percent increase over the FY 2009 appropriation. The Recovery Act includes an additional \$1.0 billion in funding for NASA. For the years FY 2011 through FY 2014: the budget would decline to \$18.6 billion in FY 2011 (a 0.3 percent decrease), decrease another 0.1 percent in FY 2012, and remain flat at that level until FY 2014 when it would receive a slight (1.3 percent) increase to \$18.9 billion. Including Recovery Act funding, the total funding that would be made available for NASA over the period FY 2009–14 is essentially the same as was projected in the Bush budget plan for that same period—the main difference is that the Obama budget cuts out-year funding for Exploration and shifts that money to Earth Science and to expenses related to Shuttle retirement and ISS crew and cargo resupply requirements. It also augments Exploration funding in FY 2009 and 2010 for Constellation-related work. The Bush Administration funding projections are relevant because they represent the latest OMB funding guidance that NASA was following in planning its programs prior to the release of the FY 2010 budget request.

The FY 2010 budget request appears to be responsive to the *NASA Authorization Act of 2008* (P.L. 110–422) in a number of key areas: augmentation of NASA’s Earth Science budget to make progress on Decadal Survey missions; augmentation of NASA’s aeronautics budget and initiation of work on “green aircraft” technologies as well as focus on NextGen R&D needs. The budget request adds funding for the Shuttle mission to deliver the Alpha Magnetic Spectrometer to the International Space Station (ISS) per the Authorization Act’s direction, and it anticipates completing all of the Shuttle flights to assemble the ISS, again per the direction of the Act. It should also be noted that \$30 million in funding is included in the DOE budget to restart the production of Plutonium 238 for NASA’s and other missions, which was another issue addressed in the *NASA Authorization Act*. However, the budget request’s treatment of NASA’s Exploration Systems programs—particularly in terms of the five-year budget plan for Exploration—is not consistent with the *NASA Authorization Act*’s direction to accelerate the Orion and Ares I projects and instead removes about \$3.1 billion from the out-year funding profile for Exploration

³The Full Committee will hold a separate hearing to review the NASA budget request on May 19.

Systems over the years FY 2009–2013. At the same time the budget request retains the goal of returning Americans to the Moon by 2020.

Human Space Flight Review

As part of the submission of its FY 2010 NASA budget request, OSTP Director Holdren announced that the Obama Administration was asking Mr. Norman Augustine to chair an independent review of NASA's planned human space flight activities. The stated goal of the review is "to ensure that the Nation is pursuing the best trajectory for the future of human space flight—one that is safe, innovative, affordable, and sustainable." The panel is to report its results by August of this year. According to Dr. Holdren's May 7th letter to NASA's Acting Administrator:

"The review should aim, specifically, to identify and characterize a range of options that spans the reasonable possibilities for continuation of U.S. human space flight activities beyond retirement of the Space Shuttle. Results and supporting analysis should be provided to involved Administration agencies and offices in sufficient time to support an August 2009 decision on the way forward. The identification and characterization of options should be cognizant of—and should address the implications for—the following objectives: (1) expediting a new U.S. capability to support utilization of the International Space Station; (2) supporting missions to the Moon and other destinations beyond low Earth orbit; (3) stimulating commercial space flight capabilities; and (4) fitting within the current budget profile for NASA exploration activities."

Environmental Protection Agency

The FY 2010 budget request for the Environmental Protection Agency (EPA) is \$10.5 billion, approximately \$2.9 billion more than the FY 2009 enacted budget of \$7.6 billion. The bulk of the increase is derived from additional funds for State and Tribal Assistance Grants, the account that funds maintenance and upgrading of wastewater treatment infrastructure across the Nation. The President's FY 2010 proposal for EPA's Science and Technology (S&T) programs is \$868.8 million. This includes \$842 million in the S&T program account and a transfer of \$26.8 million from the Superfund account to support Superfund-related research. This request reflects a six percent increase from the FY 2009 enacted level of \$816 million, which also included \$26 million for Superfund research. The increase in funding is spread across most EPA research areas including air quality, water quality, climate, human health and ecosystems, land protection, sustainability, toxics, and homeland security.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) provides daily weather forecasts, severe storm warnings, climate monitoring, coastal restoration, and various services that support marine commerce. NOAA uses research and advanced instrumentation to provide citizens, planners, emergency managers and other decision-makers with reliable information. The FY 2010 budget request includes almost \$4.5 billion in discretionary appropriations for the agency, an increase of \$110 million over FY 2009 funding levels. This will enable NOAA to make the investments required to improve forecasting, further our understanding of climate and weather patterns, and to better manage our coastal and ocean resources. Specifically, the National Weather Service and Oceanic and Atmospheric Research would be held essentially flat at \$964 million and \$405 million, respectively, but the National Environmental Satellite, Data, and Information Service would increase by \$250.6 million, to \$1.43 billion. In addition, NOAA received \$830 in Recovery Act funds, of which \$600 million will be invested in construction and repair of NOAA facilities, ships and equipment, to improve weather forecasting, to support satellite development and to support supercomputing capability and climate data record development—critical to improving climate modeling and to continuing research into ways to mitigate climate change.

Department of Homeland Security

Science and Technology Directorate

The FY 2010 funding request for the DHS Science and Technology Directorate is \$968.4 million, a \$35.8 million or 3.8 percent increase from FY 2009 funding. An increase of \$16.3 million for the Transition office will support the efforts of a First Responder Capstone Integrated Product Team (IPT). This new IPT was created to address the concerns of the first responder community about the direction of re-

search efforts and the resulting products. An increase of \$6.6 million in the Command, Control, and Inter-operability office is for research in cyber security. In general, the allocation of funds across the S&T Directorate is according to threat estimations that only consider the impact of a threat, not the likelihood. There is an ongoing call for a comprehensive risk assessment to be used to guide the allocation of funds.

Domestic Nuclear Detection Office

The FY 2010 funding request for DHS's Domestic Nuclear Detection Office (DNDO) is \$366.2 million, a \$148 million or 29 percent decrease from FY 2009 funding. This significant decrease is due to the elimination of funding for Systems Acquisition (\$153.5 million in FY 2009) as DNDO strives to spend down uncommitted funds from FY 2009 and transition to a different model for acquiring radiation detection equipment. Also cut are the funds for the acquisition and deployment of the Advanced Spectroscopic Portal (ASP) monitors until further testing can validate the technology. However, the DNDO research budget received a modest increase of \$3.3 million or one percent, to \$326.5 million.

Federal Aviation Administration: R&D and NextGen Activities

The Federal Aviation Administration (FAA) carries out a range of research, development, and demonstration programs, including those associated with the NextGen, a joint effort between FAA, NASA, and the Departments of Defense, Homeland Security and Commerce that will transform the entire national air transportation system. NextGen will gradually allow aircraft to safely fly more closely together on more direct routes, reducing delays, and providing benefits for the environment and the economy through reductions in carbon emissions, fuel consumption, and noise.

FAA is requesting \$180 million in FY 2010 for the Research, Engineering, and Development (RE&D) account, an increase of \$9 million over FY 2009 enacted. FAA's funding for NextGen-related programs in FY 2010 will be provided by three accounts, namely Facilities & Equipment (\$790 million), RE&D (\$65 million), and Operations (\$9 million) for a total of approximately \$865 million. This is an increase of almost \$170 million (24 percent) over that enacted for FY 2009. According to FAA, the requested budget allows NextGen to continue on schedule, enabling the agency to successfully develop NextGen capabilities and acquire NextGen transformational programs.

Department of Transportation

The President's FY 2010 budget request for the Research and Innovative Technology Administration (RITA) at the Department of Transportation is \$1 million above the FY 2009 request of \$40 million. The \$1 million increase is requested for the Bureau of Transportation Statistics, within RITA. The role of RITA is to coordinate research across DOT. In FY 2009, the Federal Highway Administration funded \$258 million in surface transportation research, development, technology transfer, and training and education, with an additional \$103 million for intelligent transportation systems, and \$73.9 million for university transportation centers. However, the Federal Highway Administration has not included proposed R&D funding in its FY 2010 request, stating that it is in the process of developing a comprehensive approach to surface transportation reauthorization.

6. Function of the Office of Science and Technology Policy

Congress created OSTP, including the position of its Director, within the Executive Office of the President (EOP) in 1976. The 1976 law (P.L. 94-282) states that "the Office shall serve as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government." More specifically, OSTP's responsibilities include:

- Advising the President and others within the EOP on the impacts of S&T on domestic and international affairs;
- Leading the interagency effort to develop and implement S&T policies and budgets;
- Coordinating with private sector to ensure that federal investments in S&T contribute to our economic prosperity, sustainability and national security;
- Building partnerships among Federal, State and local governments, other countries and the scientific community; and
- Evaluating the scale, quality and effectiveness of federal efforts in S&T;
- Managing the National Science and Technology Council (NSTC).

OSTP does not have any programmatic budget authority. Their FY 2010 budget request is only \$6 million—to fund staff and operations. Total OSTP staff peaked near 100 during the Clinton Administration: approximately 20 were career staff, another 10 political staff, and the remainder Agency detailees and fellows. The Bush OSTP total was never greater than 70.

Chairman GORDON. This hearing will come to order, and good afternoon and welcome to today's hearing to review the Administration's Fiscal Year 2010 Research and Development Budget, and I would like to begin today by congratulating Dr. Holdren on your new position, and thank you for the excellent work you have done in planning for aggressive new science and technology policies and budgets.

I also want to congratulate you on your strong leadership role on science integrity. It is very much welcomed.

We just received the budget a week ago, so we are still absorbing the details, but so far I am impressed that President Obama has committed the resources to back up his eloquent words about the importance of science to our society. Even before his inauguration the President called me, and the first thing he said was, "I am a science guy." And he clearly has affirmed that two weeks ago in his unprecedented speech before the National Academies and last week in his research and development budget proposal.

So far this year this committee has reported out legislation on STEM education, nanotechnology, information technology, water resources, electronics recycling, design of green buildings, and international cooperation. Every one of those bills is bipartisan and all but two have already passed the House.

What we share or what they share in common is that they address broad, multi-disciplinary, multi-sector issues that require resources, leadership, and planning across several and often a dozen or more of our federal agencies. President Obama said in his inaugural address that it is not about bigger or smaller government, it is about smarter government. The *American Recovery and Reinvestment Act* is providing funds to help us work smarter, but we are facing tough budget times, and we won't always have new money at hand. That is why we must make more efficient and effective use of the limited resources we have to tackle these difficult issues.

And that is where Dr. Holdren and OSTP come in. I know we have been putting a lot of responsibilities on you in our legislation, Dr. Holdren, but we will try to get you more resources so you and your able staff can carry out those duties.

But I also want to assure you and remind everyone else that the burden is not entirely on OSTP. These enormous tasks we will confront such as strengthening STEM education and improving management of our water resources, require leadership and willingness to cooperate, coordinate, and share information on the part of many federal agencies. A lot of opportunities to use science and technology to tackle our nation's greatest challenges were neglected or seem to have fallen between the cracks in the last several years.

So I know that Dr. Holdren and many other fine scientists and leaders that President Obama has appointed to senior positions in the Administration will take this task to heart, and I am optimistic that they will succeed in helping us to turn the tide on many of these challenges.

I look forward to a good discussion about the President's proposal for research and development funding in the next year's budget and how funding will be targeted to address the challenges we face.

And the Chairman now recognizes Mr. Hall for his opening statement.

[The prepared statement of Chairman Gordon follows:]

PREPARED STATEMENT OF CHAIRMAN BART GORDON

Good afternoon, and welcome to this hearing to review the Administration's fiscal year 2010 research and development budget.

I'd like to begin today by congratulating Dr. Holdren on your new position, and thank you for the excellent work you have done in planning for aggressive new science and technology policies and budgets. I also want to congratulate you on taking a strong leadership role on science integrity. You are setting a new and better tone regarding the role of science in policy-making. This country has a lot of catching up to do, and I know the task will not be easy.

As you all know, we just got the budget a week ago, so we are still absorbing the details. But so far I am impressed that President Obama has committed the resources to back up his eloquent words about the importance of science to our society.

Even before his inauguration, President Obama called me up and said, "I'm a science guy." And he clearly affirmed that two weeks ago in his unprecedented speech before the National Academies, and last week in his research and development budget proposal.

So far this year, this committee has reported out legislation on STEM education, nanotechnology, information technology, water resources, electronics recycling, design of green buildings, and international cooperation. Every one of those bills is bipartisan, and all but two have already passed the House. What they share in common is that they address broad, multi-disciplinary, multi-sector issues that require resources, leadership, and planning across several—and often a dozen or more—of our federal agencies.

President Obama said in his inaugural address that it's not about bigger or smaller government; it's about smarter government. The *American Recovery and Reinvestment Act* is providing funds to help us work smarter, but we are facing tough budget times and we won't always have new money at hand. That's why we must make more efficient and effective use of the limited resources we have to tackle these difficult issues.

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A lot of opportunities to use science and technology to tackle our nation's greatest challenges were neglected or just seemed to fall between the cracks in the last several years. I know that Dr. Holdren and the many other fine scientists and leaders that President Obama has appointed to senior positions in his Administration take this task to heart, and I am optimistic that they will succeed in helping us to turn the tide on many of these challenges.

I look forward to a good discussion about the President's proposal for research and development funding in next year's budget, and how that funding will be targeted to address the challenges we face.

Mr. HALL. I thank you, Mr. Chairman, as usual for calling this hearing to review the Administration's Fiscal Year 2010 research and development budget and related science and technology policy priorities. I think it is very important, and Dr. Holdren, I would like to welcome you here today and congratulate you. I think I congratulated you on your appointment as President Obama's Science Advisor and Director of OSTP.

As you probably know this committee has long had a close and productive working relationship with OSTP. I hope and expect that relationship to continue under your leadership in the new Administration, and I really look forward to working with you. I have heard good things about you, and I haven't listened to any bad things about you, and I hope I don't hear any bad things from you today.

Today's hearing obviously covers a great deal of ground. I will make just a few brief comments on the budget that the President

delivered to us last week, one positive, one negative, and one that is a big question mark.

First of all, the positive: Dr. Holdren, I want to commend you and President Obama for continuing the commitment initiated by President Bush and the Committee of the 109th Congress and enacted by the last Congress in the *America COMPETES Act* to double-funding in key areas of basic research, most important innovation and long-term economic competitiveness.

Now, this has long been a priority of mine and of many of us here and certainly of our good Chairman, as well as others on the Committee. So for you to pick up where the last Administration left off truly cements this, I think, as an issue with deep bipartisan support, and that is what I think the President is looking for. This will undoubtedly make our goal of achieving the doubling significantly easier.

Now, second, the negative: I am very concerned about the direction of our Human Space Flight Program at NASA. While NASA has made tremendous progress over the last five years, it still is on a path to retire the Space Shuttle without having developed its replacement vehicle and launch capabilities. Further, the budget reduces the out-year funding for the constellation system by more than \$3 billion, and even though we are more than 100 days into this Administration, the President has still not appointed a head of NASA.

I am sure he has his reasons for that, but it seems to me that we need someone to start working with and to start trying to see if we can't have a bipartisan thrust.

Dr. Holdren, I recognize and appreciate that you have ordered a review of human space flight plans, and I commend you for tapping Norm Augustine. My gosh, what a terrific American and how you got him to do that, and I think you pleased everybody that knows anything about him. And you got him to head that review.

But I have to register my strong concern with both the budget gap and the leadership gap at NASA, and I hope you will work to close both as soon as possible.

Third, the question mark: As we all know just two weeks ago President Obama announced a great—to great fanfare a goal to devote, “more than three percent of our gross domestic product to research and development.” This is an aggressive goal that warrants full consideration by this committee and others.

Unfortunately, though, the budget and testimony before us today includes no mention of it whatsoever. So I hope to learn from Dr. Holdren, from you, the details regarding how and when the Administration plans to achieve this goal, especially since the President's R&D budget request for next year is essentially flat.

Last, I want to take the opportunity to reiterate my concerns with the direction the President is taking us on energy policy, which, of course, includes a significant S&T component with which this committee is involved. And the Chairman and I are both on committees that are heavy on energy with Science, Space, and Technology and the Energy and Commerce Committee.

From actively opposing expanded energy exploration and production to cutting funding for fossil fuels R&D to aggressively pursuing increased taxes through a cap-and-trade regime, the costs of

which are massive and certain, while the benefits are minimal and highly uncertain. I am afraid the new Administration has come out of the gate with its energy policy on backwards.

Dr. Holdren, I know you are going to be a key player at the White House and foreman in advancing this policy as we go forward. So I am eager to work closely with you to identify some areas where we can work together. I don't know any other way than to be plain with you, and maybe I can even help to change your mind on a few things. I hope so.

Mr. Chairman, I thank you for holding this hearing, I think. I believe I do, and I look forward to a productive discussion. Yield back.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Thank you Chairman Gordon for calling this hearing to review the Administration's FY 2010 Research and Development (R&D) Budget and related science and technology policy priorities.

Dr. Holdren, I would like to welcome you here today and congratulate you on your appointment as President Obama's Science Advisor and Director of OSTP. As you probably know, this committee has long had a close and productive working relationship with OSTP. I hope and expect that relationship to continue under your leadership in the new Administration, and I look forward to working with you.

Today's hearing obviously covers a great deal of ground, so I will make just a few brief comments on the budget that the President delivered to us last week—one positive, one negative, and one that is a big question mark.

First of all, the positive: Dr. Holdren, I want to commend you and President Obama for continuing the commitment initiated by President Bush and this Committee in the 109th Congress—and enacted by the last Congress in the *America COMPETES Act*—to double funding in key areas of basic research most important to innovation and long-term economic competitiveness. This has long been a priority of mine and Chairman Gordon as well as others on this committee, so for you to pick up where the last Administration left off truly cements this as an issue with deep bipartisan support. This will undoubtedly make our goal of achieving the doubling significantly easier.

Second, the negative: I am very concerned about the direction of our human space flight program at NASA. While NASA has made tremendous progress over the past five years, it is still on a path to retire the Space Shuttle without having developed its replacement vehicle and launch capabilities. Further, this budget reduces the out-year funding for the Constellation system by more than \$3 billion, and even though we are more than a hundred days into the Administration, the President has still not appointed a head of NASA. Dr. Holdren, I recognize and appreciate that you have ordered a review of human space flight plans, and I commend you for tapping Norm Augustine to head that review, but I have to register my strong concern with both the budget gap and the leadership gap at NASA, and I hope you will work to close both as soon as possible.

Third, the question mark: As we all know, just two weeks ago, President Obama announced to great fanfare a goal to devote “more than three percent of our gross domestic product to research and development.” This is an aggressive goal that warrants full consideration by this committee and others. Unfortunately though, the budget and testimony before us today include no mention of it whatsoever, so I hope to learn from Dr. Holdren the details regarding how and when the Administration plans to achieve the goal, especially since the President's R&D budget request for next year is essentially flat.

Last, I want to take the opportunity to reiterate my concerns with the direction the President is taking us on energy policy, which of course includes a significant S&T component with which this committee is involved. From actively opposing expanded energy exploration and production, to cutting funding for fossil fuels R&D, to aggressively pursuing increased taxes through a “cap-and-trade” regime—the costs of which are massive and certain while the benefits are minimal and highly uncertain—I am afraid the new Administration has come out of the gate with its energy policy on backwards. Dr. Holdren, I know you will be a key player in the White House in forming and advancing this policy as we go forward, so I am eager

to work closely with you to identify some areas where we can work together. And maybe I can even help to change your mind on some things.

Thank you again, Mr. Chairman, for holding this hearing. I look forward to a productive discussion.

Chairman GORDON. Thank you, Mr. Hall. I have found you very persuasive.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good Morning. Thank you, Mr. Chairman, for holding today's hearing on Federal Research and Development Budget for Fiscal Year 2010.

The President's budget calls for \$147.6 billion for research and development, which combined with the \$10.4 billion appropriated under the *American Recovery and Reinvestment Act* will go to fund an array of research and development projects in nearly every agency in the Federal Government.

I am pleased to see that the President's budget continues to invest in initiatives under the COMPETES Act, which I and my colleagues on this committee continue to actively support. These initiatives invest in all ranges of research from basic sciences to high-risk, high-reward research. Keeping these research programs on track to double their funding will ensure that our students and researchers will remain on the cutting edge of science and engineering for years to come. In particular, I applaud the continued funding of Science, Technology, Engineering, and Mathematics (STEM) Education initiatives. Improving access to and quality of STEM programs will ensure that young Americans grow into the engineers and researchers of tomorrow. I was, however, disappointed the Noyce Teacher Scholarship Program and the Math and Science Partnerships did not receive additional funding. We should invest now in the future of our R&D programs by ensuring that STEM classrooms have highly-trained teachers and students have access to the best possible science and math education.

I also support the increase in funding for two key workforce development and worker training programs: the Advanced Technology Education (ATE) Program and the Manufacturing Extension Partnership (MEP). ATE helps community colleges and other two-year institutions improve and develop training programs for high-skilled, high-wage jobs. In my District, these programs are especially important to prepare students and workers for the new "green-collar" workforce. MEP is perhaps the single best way to prepare our manufacturers for changes in technology. Both of these programs will see increased funding in FY 2010, and I am pleased to see the Administration's support for these vital programs. However, the increased investment still does not provide full funding for these programs. In these difficult economic times, more funding is necessary to help keep American workers and American manufacturers competitive. This committee should take the lead in calling for more investment in these cost-effective and efficient programs that help our businesses and our workers remain competitive.

I also have concerns about program cuts in the Fiscal Year 2010 budget. In particular, I am concerned about cuts to research into fossil fuel programs. For the State of Illinois, and many other parts of the country, coal is the most important and reliable energy source, and with a 250-year supply coal will remain the major energy source for generations. As Congress considers climate change legislation that will make major changes in our nation's energy portfolio, we need to ensure that our domestic sources of energy, including coal, remain an affordable and abundant energy sources. The *American Recovery and Reinvestment Act* made substantial investments in fossil fuel research, including Carbon Capture and Storage technology. However, these are long-term projects that will require continued research and development to be commercially viable. I would like to hear from Dr. Holdren if he anticipates the Administration making any additional investments in fossil fuel research, particularly in light of climate change legislation.

Finally, as Chairman of the Aviation Subcommittee, I strongly support the increased funding for Federal Aviation Administration (FAA) R&D programs, especially the NextGen program. NextGen, which will modernize our National Airspace System through 2025, will receive \$865 million, a 24 percent increase in funding. This investment will keep NextGen on schedule and continue to transform how aircraft carry passengers and cargo around the country, improving our economy and the environment.

I welcome Dr. Holdren here today, and I thank him for his hard work to promote science and research across the Federal Government.

Thank you again, Mr. Chairman.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Welcome, Dr. Holdren. It is a delight for us to see you at today's Committee hearing on the federal research and development budget.

Strong, sustained investment in federal R&D is among my highest priorities. I believe that a competitive, educated workforce is well-positioned to take advantage of research grant opportunities made available by the Federal Government. The President's overall budget for Research and Related Activities at the National Science Foundation contains \$5.73 billion in FY 2010, an increase of 10.6 percent over FY 2009 funding. Considering inflation and the tough economic times that we are experiencing, I commend that choice. It demonstrates the President's commitment to research, as he has so often stated.

However, in reviewing the budget items for the education-related activities, I am disappointed. During discussions and passage of the *America COMPETES Act*, the Noyce Teacher training program was a focal piece. Noyce received considerable funding in the Recovery Act: \$60 million. That is great news, but the support was not sustained in next year's budget. In the FY 2010 budget, Noyce would receive \$55 million, which is flat funding, relative to FY 2009. This amount will not keep up with inflation and will actually represent a decrease in support.

In his testimony before the CJS Appropriations Subcommittee earlier this year, Chairman Gordon requested that Noyce be funded at \$70 million in FY 2010. Furthermore, eighteen members of the Diversity and Innovation Caucus wrote to the Budget Committee leaders, requesting \$140.5 million for Noyce. That letter was shared with your office. I am curious to know about the review process for such advocacy by Congress, and how budgetary decisions are made. When we support education programs that train talented teachers and get students in high-need schools interested in science, we build up our domestic workforce.

You may be aware that the Noyce Teacher Training Program has demonstrated success. Institutional grants are awarded to universities to train math, science, and engineering majors to become teachers. For every year a student receives a Noyce scholarship, she must serve two years in a high-need school district in order to not be required to repay the award. My colleagues on this committee and I fought hard to design and strengthen this program. We watch funding levels closely and notice when support is not there.

Broadening Participation programs at the National Science Foundation are slated to receive modest increases only. I would prefer a much greater emphasis on these types of programs than is currently given. Several of my colleagues on this committee are members of the Diversity and Innovation Caucus. They have advocated for minority-serving institutions by offering amendments during Committee mark-ups. There is stronger support to broaden participation in science, technology, engineering, and math (also called STEM) than ever before.

Several National Science Foundation programs are valuable for decreasing racial disparities in our STEM workforce.

They include:

- Minority Post-Docs,
- The ADVANCE Women's Program,
- Broadening Participation in Computing,
- Partnerships for Access to Laboratory Science—Sec 7026 of COMPETES Act,
- Graduate Research Fellowships—Women in Engineering and Computer Science,
- Robert Noyce Scholarship Program,
- Faculty Early Career Development (CAREER) Program,
- Science, Technology, Engineering and Math Talent Expansion Program (STEP),
- Hispanic-serving Institutions Undergraduate Program—Sec 7033 of COMPETES Act,
- Advanced Technology Education (ATE), and
- Informal Science Education (ISE)

Furthermore, programs at the Department of Energy are important for broadening participation in STEM careers. They are:

- Early Career Awards for Science, Engineering, and Mathematics Researchers,
- Summer Institutes,

- Experiential-based Learning Opportunities,
- National Laboratories Centers of Excellence in Science, Technology, Engineering, and Mathematics Education,

At NASA, they include:

- The NASA Minority University Research and Education Programs (MUREP).

Dr. Holdren, I am happy to again share this document, supported by so many of my colleagues on the Diversity and Innovation Caucus that advocates for much stronger support of these programs. It is my hope that your office will take a more formal approach to analyzing and watching over federally-funded Broadening Participation programs across the agencies.

A National Academies report on minorities and science, technology, engineering, and math is due out this fall. This committee is anxious to see the recommendations for it. Currently, there exists no coordinating activity for all of these programs across the agencies. Such an activity would enable agency program directors to manage programs better and share best practices with one another on implementing these programs. Furthermore, I would like to see measurable outcomes and stronger accountability for every federally-funded program of this nature. Then we can determine which programs for which to advocate, and which to modify or discontinue.

Dr. Holdren, a huge opportunity stands before you. In 2006, two percent of employed doctoral engineers were black. That same year, 2.7 percent were Hispanic. Eighty-one percent were white or Asian. I would like to see this number change during your tenure as the President's science advisor. I have high hope that you can achieve this objective and am willing to partner with you to lessen these disparities.

Thank you, and I yield back my time.

[The prepared statement of Ms. Fudge follows:]

PREPARED STATEMENT OF REPRESENTATIVE MARCIA L. FUDGE

Good Morning. Thank you, Mr. Chairman, for holding today's hearing on the Federal Research and Development Budget for Fiscal Year 2010. Thank you, Dr. Holdren, for being here.

Given the current budget deficit situation, it will be more important than ever to prioritize spending. The President has committed to making science a foundation for development of wise policy and legislative choices and decisions. This makes investment in scientific research and development all the more vital. Science spending should be a priority to accomplish these goals. I applaud the commitment that has been made by this Administration to double the investment in key science agencies.

Over the years, many within the academic and scientific communities have called on the Federal Government to increase its investment in the construction of academic research facilities and centers. In response to these concerns, Congress appropriated significant amounts of money in the *American Recovery and Reinvestment Act* for the construction of academic research facilities, including \$200 million for the NSF's Academic Research Infrastructure program. I believe that we should plan on continuing to invest or support programs like NSF's Academic Research Infrastructure program.

The government-university partnership that grew out of World War II between the Federal Government and U.S. research universities has been a fundamental reason for American leadership in science and technology. Some within the academic community, however, are concerned that recent developments threaten this unique partnership, undermining universities' ability to conduct important research on behalf of the Federal Government and the American people. These include increasing federal regulations and associated compliance costs, arbitrary restrictions on reimbursement to universities for the costs of conducting federal research, and growing restrictions on communication of, and access to, scientific results. Steps should be taken to strengthen and revitalize the historic partnership between the Federal Government and research universities to keep this country at the cutting edge of scientific discovery. This will help prepare the next generation of scientists, engineers, and scientifically literate citizens.

The President and Congress have challenged our nation's research establishment to provide solutions to a range of today's national and global challenges. Recovery Act funding for research has been very generous, yet in some research accounts the Administration and Congress are not providing the steady and stable increases that will allow long-term investments in science—and the people to perform research—that will yield these answers. Preparation needs to be made for the drop-off, what some have called the cliff, in research funding support once Recovery Act spending is completed in FY10.

When we think of federal agencies that support energy research, we often think of the U.S. Department of Energy. In fact, many agencies are involved in some very innovative research, from research being conducted by the Department of Defense to improve fuel efficiency and make lighter batteries for use by our troops in the field, to basic research related to energy that is being conducted by the National Science Foundation. Despite all the good work that is going on in energy research, there is little coordinated energy research being funded across the federal agencies. In fact, it has come to my attention that we do not have a handle on the total funding being dedicated to energy research government wide. OSTP must work to better coordinate energy research efforts across the federal agencies, and to identify various roles for key federal research agencies in the energy arena. OSTP may want to conduct an agency budget crosscut to identify which agencies are involved in energy research. The results might identify some untapped opportunities for advancement in energy research.

President Obama said he intends to invest \$150 billion over ten years to advance the next generation of biofuels and fuel infrastructure, accelerate the commercialization of plug-in hybrids, promote development of commercial scale renewable energy, invest in low emissions coal plants, and begin transition to a new digital electricity grid. To support such an investment, however, it will be critical to have a pipeline of skilled scientist and engineers that can support this effort. A human infrastructure program of STEM education at universities and federal laboratories must be built to underpin this effort. Federal agencies, such as the Department of Energy and National Science Foundation, must ensure that students are trained in fields critical to successfully addressing our nation's future.

Thank you again, and I yield back my time.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Today we will examine the Administration's proposed FY2010 funding for federal research development, demonstration, and commercial application programs. We will also discuss the funding for the *America COMPETES Act*.

I'm very proud of the *America COMPETES Act*, this committee's bipartisan legislation that got signed into law in August of 2007. This law ensures that our students, teachers, businesses, and workers are prepared to lead in science and technology.

As a former teacher, I know first-hand how important it is to expose our children to STEM education. The future of American competitiveness in science and technology is heavily dependent on ensuring the involvement of future generations.

However, the *America COMPETES Act* can only be successful if it's funded adequately.

The Administration's proposal includes level funding or modest increases in funding for programs included in the *America COMPETES Act*. When coupled with the substantial investments in the *American Recovery and Reinvestment Act*, these initiatives will receive significant funding.

However, I also wish to express that I strongly believe that we must ensure that these programs consistently receive adequate funding on an annual basis and not just as a part of the stimulus package.

I yield back.

Chairman GORDON. Now, Dr. Holdren must have a very large hat rack because he is the Assistant to the President for Science and Technology, he is the Director of the White House Office of Science and Technology Policy, and he is the Co-Chairman of the President's Council of Advisors on Science and Technology. So we welcome you here. Typically we have our witnesses speak for about five minutes. You are the only witness, so we want to—we are here for you. You take the time that is necessary, and you can—we will have your written testimony made a part of the record.

And so Dr. Holdren, you are now able to begin.

STATEMENT OF DR. JOHN P. HOLDREN, ASSISTANT TO THE PRESIDENT FOR SCIENCE AND TECHNOLOGY, DIRECTOR OF THE WHITE HOUSE OFFICE OF SCIENCE AND TECHNOLOGY POLICY; CO-CHAIR OF THE PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY

Dr. HOLDREN. Well, thank you, Chairman Gordon, Ranking Member Hall, Members of the Committee. It is a pleasure to be here today to talk with you about the President's budget for research and development for the 2010 fiscal year, and certainly I appreciate those opening remarks both by the Chairman and the Ranking Member.

Before I get to some details of the budget proposals for R&D for this year, I want to mention the wider array of initiatives in the domain of science, technology, and innovation that this Administration has gotten underway in its first few months in office. Those initiatives all stem from the President's conviction, which I know the Members of this committee share, that nourishing and fully utilizing this country's world-leading capabilities in science, technology, and innovation is going to be key to mastering practically every major challenge that we face, from creating new and better jobs for economic recovery and growth, to providing improved health care for all Americans at lower cost, to reducing dependence on energy imports, while also reducing the carbon pollution that is affecting Earth's climate, to ensuring that we always have the defense, homeland security, and national intelligence technologies that we need to protect our troops, our citizens, and our national interests.

The President has been clear from the beginning of his campaign for the office about his understanding of the importance of science, technology, and innovation for meeting these national challenges, and he has been clear about his commitment to providing the resources, the incentives, and the ground rules that science, technology, and innovation will need in order to realize that potential.

The initiatives that the Administration is already taking based on that insight to advance science, technology, and innovation in this country are much broader than the increases in R&D budgets to which I am shortly going to turn. Those initiatives include the executive order and associated pending guidelines on federally-funded stem cell research, the executive order and associated pending recommendations on scientific integrity in government.

They include making permanent the research and experimentation tax credit, a range of energy science and technology initiatives that are aimed at building a clean energy economy that creates green jobs, shrinks our dependence on foreign oil, and reduces the impact of climate change. They include an equally-wide range of science, technology, engineering, and mathematics education activities, including the use of the Clean Energy Challenge as a way to inspire interest in science and technology among young people in much the same way as the space race did in the 1960s.

They include increased coordination of interagency efforts on Earth observing satellites, climate change science, and climate services, and they include a major effort in support of the President's executive memorandum on open government. All of these initiatives and some more are elaborated in my written statement.

Now, I would like to offer some thoughts on the science, technology, and innovation components of the President's fiscal year 2010 budget proposal; the details of which were released as the Chairman mentioned just under a week ago.

The new budget proposes \$147.6 billion for the total federal investment in research and development in fiscal year 2010, which under OMB's assumed 1.1 percent inflation rate from 2009 to 2010, would mean a drop of about seven-tenths of a percent below the 2009 Omnibus in real spending power.

But two elaborations are important here. One is that all of the real decrease and more is accounted for by a drop in the development part of defense R&D involving termination of some programs Secretary Gates has concluded have poor prospects or low utility.

The second and more important elaboration is that the real magnitude of federal R&D budgets for fiscal year 2009 and fiscal year 2010 can only be judged with the inclusion of the *American Recovery and Reinvestment Act* funding, and that funding added an estimated \$18.3 billion for R&D in fiscal year 2009 dollars, to be spent mostly over those two years, nearly all of it on the non-defense side.

There is no year-by-year allocation of those funds currently available, but it is clear that their addition to the approved regular budget for 2009, and the proposed one for fiscal year 2010, would give those two years the two largest federal investments in R&D in United States history.

The fiscal year 2009 and 2010 budgets give particularly good attention to research as contrasted with development, with the aims of bolstering the fundamental understandings that are at the root of all innovation and fostering significantly new and potentially transformative technologies.

As with R&D as a whole, if the President's budget is enacted, the two years 2009 and 2010, will provide the largest federal investments in research in U.S. history. In achieving all of that the President's 2010 budget and what came before in the Omnibus Bill and the Recovery Act would fulfill a number of the important visions established by Congress in the *America COMPETES Act*, which the Ranking Member mentioned. That, of course, could not have become law without this committee's strong leadership. With passage of the 2010 budget, the combined 2009, 2010, and Recovery Act appropriations will, in fact, meet the 2009 and 2010 *America COMPETES Act* authorizations for NSF, DOE Science, and NIST.

Now, as you know, the *America COMPETES Act* authorizations extend to 2011, and we certainly look forward in OSTP to working with Congress next year on reauthorizations for these important science agencies.

My written testimony elaborates on the research and development and science, technology, engineering, and math education budgets for NSF, NIH, NASA, NIST, NOAA, DOE, EPA, the U.S. Geological Survey, Department of Homeland Security, Department of Transportation, and Department of Defense, as well as on the budget of OSTP. It also discusses the funding and focus of inter-agency initiatives on networking and information technology R&D, the National Nanotechnology Initiative, and the Climate Change Science Program.

Without trying to summarize that material now, though, let me move to my conclusion. While the Nation faces immense challenges in the economy, health, energy, the environment, national and homeland security among other domains, it is clear that science, technology, and innovation can help turn many of those challenges into opportunities. The President understands this thoroughly and his fiscal year 2010 budget reflects that understanding in proposing a robust investment in science, technology, and STEM education today to produce the new knowledge, the new technologies, and the scientists, engineers, mathematicians, and science and technology-literate citizens that our country will need in the future to meet the challenges and seize the opportunities.

I look forward to working with this committee to make the vision of the President's fiscal year 2010 budget proposal into a reality, and I will be pleased to answer any questions the Members may have.

Thank you very much.

[The prepared statement of Dr. Holdren follows:]

PREPARED STATEMENT OF JOHN P. HOLDREN

Chairman Gordon, Ranking Member Hall, and Members of the Committee, I am pleased to be with you today to discuss the President's Budget for research and development (R&D) for the 2010 fiscal year.

Administration Initiatives in Science, Technology, and Innovation

Before I get to the details of the R&D budgets, I'd like to set the stage with a few comments on the array of initiatives in the domain of science, technology, and innovation (STI) that this Administration has gotten underway in its first few months in office. These initiatives all stem from the President's conviction, which I know the Members of this Committee share, that nourishing and fully utilizing this country's world-leading capabilities in STI will be key to mastering practically every major challenge we face, from creating new and better jobs for economic recovery and growth, to providing improved health care for all Americans at lower cost, to reducing dependence on energy imports while also reducing the carbon pollution that is changing Earth's climate, to ensuring that we always have the defense, homeland security, and national intelligence technologies needed to protect our troops, our citizens, and our national interests.

The President has been clear, from the beginning of his campaign for the office, about his understanding of the importance of STI for meeting these national challenges and about his commitment to providing the resources, incentives, and ground rules that science, technology, and innovation need in order to realize their potential. He was clear about this in his inauguration speech, in his speech to the Joint Session of Congress on February 24, and most extensively and emphatically of all in his ground-breaking speech to the Annual Meeting of the National Academy of Sciences on April 27.

Of course, he and all of us are aware that the economic crisis compounds the difficulty of doing all that should be done to support and facilitate the realization of STI's full potential to help address the challenges we face. But this is no time to say it cannot be done. Here is what the President said about that in his speech to the National Academy:

"At such a difficult moment, there are those who say we cannot afford to invest in science—that support for research is somehow a luxury at moments defined by necessities. I fundamentally disagree. Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before."

The initiatives that the Administration is already taking, based on this insight, to advance STI in this country are much broader than the increases in R&D budgets to which I will shortly turn. Let me mention a few of the most important that we in the White House Office of Science and Technology Policy (OSTP) have been focused on in collaboration with others in the Executive Office of the President:

Stem cell research: As you know, the President’s March 9 Executive Order on stem cell research and the draft guidelines produced under that order by the National Institutes of Health are moving policy on federal funding for potentially life-saving and life-enhancing biomedical research in this domain toward a stance that will allow faster progress while observing responsible boundaries and actually providing greater oversight than before.

Scientific integrity: In an Executive Memorandum also issued on March 9, the President asked OSTP to produce recommendations “to ensure that public policy is informed by the best possible science, and that political officials should not suppress or alter scientific or technological findings and conclusions.” OSTP is well along in this process and has received input about existing guidelines and practices as well as about prospective improvements from across the Executive Branch departments and agencies with science missions and from other stakeholders.

Science, technology, engineering and mathematics (STEM) education: In his speech at the National Academy of Sciences, President Obama pledged that his Administration will help American students “move from the middle to the top of the pack in science and math education over the next decade.” OSTP is working with the White House Domestic Policy Council, the Department of Education, and a number of the main science and technology agencies to identify and promote concrete actions to help meet this ambitious goal.

Preparing the next generation of clean-energy innovators: One of President Obama’s top priorities is to build a clean-energy economy that creates green jobs, shrinks our dependence on foreign oil, and reduces the impact of climate change. OSTP is working with the National Science Foundation and the Department of Energy on a new initiative in clean-energy education. With investments from grade school to grad school, this program will inspire today’s students to tackle this challenge in the same way that the “space race” motivated many students in the 1950s and 1960s to become scientists and engineers.

High-risk, high-return research: The National Academy of Sciences, the American Academy of Arts and Sciences, and others have concluded in recent reviews that the Federal Government is under-investing in high-risk, high-return research. OSTP has been working with a number of the science agencies to address this problem. The National Institutes of Health, for example, have agreed to use their funds under the *American Recovery and Reinvestment Act (ARRA)* to increase the number of New Innovator Awards they are supporting. This program supports unusually creative new investigators with highly innovative research ideas at an early stage of their career when they may lack the preliminary data required for a typical NIH award.

Nanotechnology: The President noted in his campaign that nanotechnology has enormous potential to lead to revolutionary advances—in electronics, low-cost solar cells, next-generation energy storage, and smart anti-cancer therapeutics that deliver drugs only to tumors, among other fields of application, but that this potential must be pursued with due attention to minimizing possible side effects. Consistent with this stance, OSTP has supported a substantial increase in the Federal Government’s investment in research related to the environment, health, and safety dimensions of nanotechnology.

International cooperation in science and technology: International cooperation in science and technology can accelerate the pace of progress by sharing insights, costs, and risks among the cooperating countries; can improve knowledge of and access to foreign technology markets by U.S. firms; can promote widespread adoption of solutions to problems that are global in nature (such as climate change, oil-import vulnerabilities, ocean pollution, and proliferation of nuclear weapons); and can contribute to improving relations with countries where such improvements can bring broad benefits. With the President’s encouragement, OSTP is working to reduce unwarranted barriers to international exchanges in science and technology fields and to take advantage of the opportunities many other countries are eager to offer for collaborative efforts that are clearly in the U.S. interest.

Open Government: One of the first actions taken by the President following inauguration was to issue an Executive Memorandum on transparency in government, energizing a wide-ranging effort to use technology to help make government more open, collaborative, and participatory. An early manifestation of this effort is the recent launch of an interactive blog on science integrity on the OSTP website—the first such web feature ever set up to take public comments within the Executive Of-

vice of the President—that is allowing Americans from all across the country to weigh in with their thoughts on this topic.

Now I'd like to offer some thoughts on the STI components of the President's FY 2010 Budget proposal, the details of which were released just under a week ago.

Overall STI Budget

The new Budget proposes \$147.6 billion current dollars for the total federal investment in research and development (R&D) in FY 2010, which under OMB's assumed 1.1 percent inflation rate from FY 2009 to FY 2010 would mean a drop of about 0.7 percent below the 2009 Omnibus in real spending power. But two elaborations are important here. One is that all of the real decrease and more is accounted for by a drop in the development part of defense R&D. Defense R&D in total would drop 3.0 percent in real terms from FY 2009 to FY 2010 under the President's proposal, while non-defense R&D would increase by 2.5 percent in real terms.

The second elaboration is that the real magnitude of the federal R&D budgets for FY 2009 and FY 2010 can only be judged with the inclusion of the ARRA funding, which added an estimated \$18.3 billion for R&D in FY 2009 dollars to be spent mostly over those two years, nearly all of it on the non-defense side. While no year-by-year allocation of these funds is currently available, it is clear that their addition to the approved regular budget for FY 2009 and the proposed one for FY 2010 would give these two years the two largest federal investments in R&D in U.S. history.

The FY 2009 and FY 2010 budgets give particularly good treatment to research, both basic and applied (as contrasted with development), with the aims of bolstering the fundamental understandings that are at the root of all innovation and fostering significantly new and potentially transformative technologies. Without the ARRA funding, and expressed in constant FY 2009 dollars, the FY 2009 and proposed FY 2010 figures are about equal at circa \$58.5 billion, more than three percent above the FY 2008 figure in real terms. With the estimated \$13.3 billion in FY 2009 dollars added by ARRA to the research funding for FY 2009 and FY 2010, and with Congressional approval of the President's proposal for the latter, these two years will provide the largest federal investments in research in U.S. history. This follows four years of real decline in this category from FY 2004 to FY 2008.

Budgets of Science Agencies

The new Budget sustains the President's commitment to double the budgets for three key basic research agencies over a decade: the National Science Foundation, the National Institute of Standards and Technology (NIST) laboratories, and the Department of Energy's Office of Science. The President's Plan for Science and Innovation and the *America COMPETES Act* have identified these three agencies as key to our nation's future prosperity and to preserving America's place as the world leader in science and technology. Although the previous Administration supported an effort to double these agencies' budgets between 2006 and 2016, these efforts fell short in 2007 and 2008. But in 2009, this Congress and this Administration worked together to finally put these agencies on a doubling trajectory.

In his April 27 speech at the National Academy of Sciences, the President announced that his 2010 Budget would provide \$12.6 billion total for NSF, DOE Science, and the NIST labs, an increase of five percent in real terms above the 2009 enacted total. In addition, the Recovery Act provided \$5.2 billion in FY 2009 dollars for the three agencies, to be spent mainly in FY 2009 and FY 2010. The overall increases keep these agencies on track for the fourth year of a doubling trajectory, and the 2010 Budget establishes a clear path toward completing the doubling effort in 2016.

The President's FY 2010 Budget also fulfills the important visions established by Congress in the *America COMPETES Act*, which could not have become law without this committee's strong leadership. Combined, the *Omnibus Appropriations Act*, the Recovery Act and the 2010 Budget meet the 2009 and 2010 *America COMPETES Act* authorizations for NSF, DOE Science, and NIST. *America COMPETES Act* authorizations extend to 2011; we look forward to working with Congress next year on reauthorizations for these important agencies.

Some further comments on the FY 2010 Budget for individual agencies follow.

National Science Foundation (NSF)

The National Science Foundation (NSF) is the primary source of support for academic research for most non-biomedical disciplines, funding basic research across the entire spectrum of the sciences and engineering. It is well regarded for funding nearly all of its research through a competitive, peer-reviewed process. The 2010

Budget requests \$7.0 billion for NSF, an increase of 7.4 percent in real terms above the FY 2009 enacted level. This keeps NSF on track to double its budget over a decade as promised in the President's Plan for Science and Innovation. In addition, the Recovery Act provided \$3.0 billion for NSF.

Basic research funding is important not only because it leads to new knowledge but also because it trains the researchers and the technical workforce of the future. In recognition of this dual benefit to society and of NSF's special contribution, on April 27 the President announced that the 2010 Budget fulfills the President's commitment, made in his first weekly radio address, to triple the number of NSF's Graduate Research Fellowships to 3,000 by 2013. The 2010 Budget also requests an increase to \$64 million, the full authorized funding level, for the Advanced Technological Education (ATE) program to promote partnerships between higher education institutions and employers to educate technicians for the high-technology fields that drive our nation's economy.

NSF will also be collaborating with the Department of Energy (DOE) on the RE-ENERGYSE (Regaining our ENERGY Science and Engineering Edge) program to inspire tens of thousands of American students to pursue STEM careers, particularly in clean energy. I believe NSF is poised to play a vital part in this collaboration through programs such as Integrative Graduate Education Research Traineeship (IGERT) opportunities in clean energy, Research Experiences for Undergraduates (REU) in energy, and clean-energy ATE projects.

National Aeronautics and Space Administration (NASA)

The 2010 Budget requests \$18.7 billion for NASA, nearly \$1 billion more than the 2009 enacted level, in addition to the \$1 billion provided in the Recovery Act. These boosts reflect the Administration's commitment to a balanced and robust space program. Maintaining and expanding our capabilities in space is sometimes regarded as a luxury we should do less of in the face of more pressing Earth-bound concerns, but that would be a false economy. Space is crucial to our national defense; to civil as well as military communications and geo-positioning; to weather forecasting and storm monitoring; to observation and study of the condition of our home planet; and to study and exploration that is increasing our understanding of the physical universe and our place in it. The 2010 Budget and the Recovery Act add money that will be needed to keep vital satellite missions for gathering climate data on track, to sustain a full schedule of Space Shuttle flights, to complete assembly of the International Space Station, to restore funding for aeronautics research, and to develop the next generation of human spacecraft.

As President Obama has emphasized on a number of occasions, he remains committed to U.S. participation in human as well as robotic space exploration, including sending astronauts beyond low-Earth orbit. Reconciling these aspirations with NASA's other missions in an era of budget constraint remains a great challenge, however, and to help with it as we contemplate the budgets looking forward from FY 2010 to the "out years," the Administration is establishing a blue-ribbon team of experts who will work closely with NASA to re-examine human space flight activities beyond the scheduled retirement of the Space Shuttle at the end of calendar 2010. The goal for the review, which will report to me and the NASA Administrator, is to be sure that all of the options for achieving as many of our human space flight goals as possible in this crucial period, consistent with also fulfilling NASA's other missions, have been identified and carefully analyzed.

Department of Commerce National Institute of Standards and Technology (NIST)

The National Institute of Standards and Technology (NIST) invests in technological innovation through research, advanced measurement, and standards development. NIST's intramural laboratories receive \$652 million in the FY 2010 Budget to keep these important basic-science programs on track to double over a period of a decade. The 2010 Budget will improve NIST's capabilities by supporting high-performance laboratory research and facilities for a diverse portfolio of basic research. For NIST's extramural programs, the 2010 Budget requests \$125 million for the Hollings Manufacturing Extension Partnership (MEP), a \$15 million increase over the 2009 enacted level, as part of a separate commitment to double MEP funding between 2008 and 2015. The 2010 Budget also requests \$70 million for the Technology Innovation Program (TIP).

Department of Commerce National Oceanic and Atmospheric Administration (NOAA)

The National Oceanic and Atmospheric Administration (NOAA) plays a vital role in research on the Earth's ocean, atmosphere, and marine habitats. The NOAA Budget of \$4.5 billion is an increase of about 1.3 percent in real terms over the 2009

enacted level. More important than this modest overall gain is that NOAA satellite systems, which are essential to our understanding of weather and climate, are a top priority in the 2010 Budget with over \$1.3 billion, intended to cover increases for the Geostationary Operational Environmental Satellite R-series (GOES-R) and National Polar-orbiting Operational Environmental Satellite System (NPOESS) projects. These resources are designed to ensure continuity of satellite coverage needed for weather forecasting and climate data records that are important for the Administration's initiatives to understand and respond to climate change. Data from these satellites will be utilized by NOAA's climate research programs, which total \$295 million in the FY 2010 Budget, as well as by researchers funded by other agencies.

I share this committee's concern about past schedule delays and cost increases in the NPOESS program. NOAA is using Recovery Act funds to restore climate sensors to NPOESS, which is a welcome step, and I can assure the Committee that OSTP is actively engaged in overseeing the progress of this program, including convening the responsible NOAA, NASA, and DOD staff to work more effectively together to stabilize this joint program.

Department of Energy (DOE)

The Department of Energy (DOE) R&D portfolio (which does not include non-R&D cleanup, weapons, and energy-demonstration programs), totals \$10.7 billion in the 2010 Budget, about the same as in FY 2009 in real terms. That figure is seven percent above the FY 2008 enacted figure. In addition, DOE received \$2.4 billion in preliminary allocations of Recovery Act funds for R&D activities, which will be spent primarily in 2009 and 2010, and these additions boost the DOE R&D spending level for FY 2009 and FY 2010 to the range of 20 percent above the FY 2008 level.

DOE is investing in science to achieve transformational discoveries through novel approaches. For example, the 2010 Budget launches Energy Innovation Hubs with \$280 million spread over eight centers to support cross-disciplinary R&D on the barriers to transforming advances in energy science into commercially deployable materials, devices, and systems. The 2010 Budget will also continue to support the 46 Energy Frontier Research Center (EFRC) grants announced on April 27 to address the fundamental scientific roadblocks to clean energy and energy security through collaborations among universities, national labs, industry, and nonprofit organizations. It will also continue to support the Advanced Research Projects Agency-Energy (ARPA-E), authorized in the *America COMPETES Act* and first funded in the Recovery Act. ARPA-E, modeled on DOD's Defense Advanced Research Projects Agency (DARPA), will fund high-risk, high-reward research to yield revolutionary changes in how we produce, distribute, and use energy.

DOE's Office of Science (DOE SC) supports grants and infrastructure for a wide range of basic research impacting economically significant areas such as nanotechnology, high-end computing, energy, and climate change. The FY 2010 Budget of \$4.9 billion for this office increases funding for both research and cutting-edge facilities, and will be augmented by the 2010 share of the \$1.6 billion for DOE SC in the Recovery Act. These funds will improve our understanding of climate science, continue the U.S. commitment to international science and energy experiments, and add to the expansion of federal support at the frontiers of energy research.

The President's 2010 Budget also invests in DOE's clean-energy R&D programs to reduce dependence on foreign oil and to accelerate the transition to a low-carbon economy. It provides \$320 million for solar energy R&D, nearly double the 2009 enacted level of \$175 million, and \$238 million for energy conservation building technologies, also nearly double the 2009 enacted level of \$140 million.

Environmental Protection Agency (EPA)

EPA's R&D investment is managed by the Office of Research and Development (ORD), with the majority residing in the Science and Technology (S&T) account, which receives an Agency-wide total of \$842 million in the 2010 Budget, 5.4 percent above the 2009 enacted level. R&D priorities in the 2010 Budget include green infrastructure research for water quality; climate-change research consistent with directions outlined in a recent National Academy of Sciences review of the government's efforts in this domain; and continuing efforts in computational toxicology research. EPA's nanotechnology research program continues to fund research designed to support and inform health and environmental nanotechnology safety decisions. EPA is also proposing to increase its efforts to inventory greenhouse gas emissions.

United States Geological Survey (USGS)

The total USGS Budget of \$1.1 billion is a \$54 million increase over the 2009 enacted level. I am pleased that the highest budget priorities are increases in the areas of climate change, renewable energy, and education and training programs. The 2010 USGS Budget expands climate-change science activities, requesting \$58 million for the Global Change program—a real increase of over 40 percent from the 2009 enacted level. These funds include \$22 million for climate-change impacts. The increases will fund a National Climate Change and Wildlife Science Center to develop regional collaborative research hubs, support carbon sequestration research, and develop an Interior Climate Effects Network.

Department of Homeland Security (DHS)

Department of Homeland Security (DHS) R&D increases to \$1.125 billion in the 2010 Budget, an increase of about 1.5 percent in real terms from 2009 enacted level. DHS's Science and Technology Directorate is responsible for most of this R&D investment. Within that directorate's 2010 Budget of \$968 million, I call your attention particularly to the \$44 million request for the cross-cutting Innovation portfolio focused on work that could lead to revolutionary technology breakthroughs, which is \$11 million increase over the 2009 enacted funding level.

Department of Transportation / Federal Aviation Administration (FAA)

Department of Transportation (DOT) R&D programs receive \$939 million in the 2010 Budget, an increase of about 1.7 percent in real terms over the 2009 enacted level. Central to DOT's R&D activities is the Federal Aviation Administration's (FAA) Research, Engineering, and Development program. The 2010 Budget for that program requests \$180 million, up from the \$171 million 2009 enacted funding level. I am pleased that the request includes funding for several R&D activities in the Next Generation Air Transportation System (NextGen) as well as the Joint Planning and Development Office which coordinates this important, high priority inter-agency effort with NASA.

National Institutes of Health (NIH)

Federal R&D investments in health result in knowledge and technologies that are vital for promoting longer, healthier lives for all Americans and have the potential for doing so at lower costs. The Administration is committed to funding biomedical and health research and to policies that increase the impact of these investments on health outcomes. The 2010 Budget proposes \$30.8 billion for the National Institutes of Health (NIH), a modest 0.4 percent in real terms above the enacted FY 2009 figure but 3.4 percent above FY 2008. In addition, NIH received \$10.4 billion in Recovery Act funding, mainly to be spent in 2009 and 2010. As a result, this year and next year NIH will make the two largest investments in biomedical research in history in real terms. I note also that the FY 2010 Budget includes over \$6 billion to support cancer research, as part of the President's multi-year plan to double NIH-wide funding for cancer research while also maintaining growth for non-cancer research.

Department of Defense (DOD)

The new Budget proposes \$79.7 billion for DOD R&D, down 3.4 percent in real terms from the FY 2009 enacted figure and 3.0 percent below FY 2008, due primarily to proposed cuts in lower-priority weapons development programs. The Budget contains an increase of about three percent in real terms for the Defense Advanced Research Projects Agency (DARPA), which focuses on longer-term, breakthrough research; and it keeps support for basic research across the Department about the same in as in FY 2009, at a level some 11 percent higher in real terms than the FY 2008 enacted figure.

White House Office of Science and Technology Policy (OSTP)

The White House Office of Science and Technology Policy has primary responsibility in the White House, in partnership with OMB, for shaping R&D priorities across the agencies with significant portfolios in this domain, and OSTP also has the primary responsibility, with the help of the National Science and Technology Council (NSTC) that is administered out of our office, for coordinating interagency research initiatives. The FY 2010 Budget's request for OSTP's operations is \$6.2 million, about a 15 percent increase in real terms from the FY 2009 enacted figure.

The increase is in recognition of OSTP's responsibilities have been significantly increased by virtue of the President's determination to elevate the role of S&T in

the Executive Branch generally and the White House particularly. We are returning to the four Senate-confirmed Associate Directors authorized by statute (only two of which positions were filled in the last Administration); and one of the four—the Associate Director for Technology—also will hold the new position of Chief Technology Officer for the Nation and Assistant to the President, with expanded duties including guiding and resourcing the President’s Open Government Initiative. We are also reinvigorating the President’s Council of Advisors on Science and Technology (PCAST), ramping up the activities of the NSTC, and coordinating the nation-wide effort to enhance scientific integrity in the policy-making process.

Interagency Initiatives

A number of priority interagency S&T initiatives are highlighted in the new Budget. All of these are coordinated through the NSTC, which as noted above is administered by OSTP.

Networking and Information Technology R&D

The multi-agency Networking and Information Technology Research and Development (NITRD) Program plans and coordinates agency research efforts in cyber security, high-end computing systems, advanced networking, software development, high-confidence systems, information management, and other information technologies. The FY 2010 Budget provides \$3.9 billion for NITRD. NITRD programs are also receiving about \$0.7 billion in Recovery Act funding, based on preliminary agency allocations, spread across 2009 and 2010. The FY 2010 Budget for NITRD retains the important focus on investment in high-end computing research for both national security and large-scale scientific applications, particularly in advanced scalable simulations. The new Budget also emphasizes foundations for assured computing and secure hardware, software, and network design and engineering to address the goal of making Internet communications more secure and reliable.

National Nanotechnology Initiative

The FY 2010 Budget provides \$1.6 billion for the multi-agency National Nanotechnology Initiative (NNI), a slight cut of \$17 million from the enacted 2009 level excluding Recovery Act funds. But NNI programs are receiving \$140 million in Recovery Act funding spread across 2009 and 2010, based on preliminary agency allocations. The NNI focuses on R&D that creates materials, devices, and systems that exploit the fundamentally distinct properties of matter as it is manipulated at the nanoscale (roughly one to 100 nanometers). The results of NNI-supported R&D are enabling breakthroughs in biomedical detection and treatment, manufacturing at or near the nanoscale, environmental monitoring and protection, energy conversion and storage, and novel electronic devices, among many others.

Guided by the NNI Strategic Plan, participating agencies will continue to support nanoscience and nanotechnology development through investigator-led research; multi-disciplinary centers of excellence; education and training; and infrastructure and standards development, including user facilities and networks that are broadly available to support research and innovation. In addition, consistent with the NNI Strategy for Nanotechnology-Related Environmental Health, and Safety (EHS) Research, agencies continue to maintain a focus on developing nanotechnology responsibly, with attention to the human and environmental health impacts, as well as ethical, legal, and other societal issues. I know that these issues are of special interest to this committee, so I’m pleased to say that the 2010 Budget increases the priority of nano EHS research with a request of \$88 million for nano EHS research, more than 20 percent above the 2009 level in real terms. There is an additional \$36 million for nano educational and societal dimensions research, which is a seven percent increase over the 2009 level in real terms.

Climate Change Science Program

The U.S. Climate Change Science Program (CCSP) coordinates climate research among 13 participating departments and agencies. The FY 2010 Budget provides \$2.0 billion for CCSP programs, which is only about 1.2 percent above the regular FY 2009 Budget in real terms. But CCSP programs also received \$461 million in Recovery Act funding spread across 2009 and 2010, based on preliminary agency allocations, including \$237 million for NASA climate activities. Research activities to be supported by these funds include the development of an integrated Earth-system analysis capability; creation of a high-quality record of the state of the atmosphere and ocean since 1979; development of an end-to-end hydrologic projection and application capability; enhanced carbon-cycle research on high latitude systems; quantification of climate forcing and feedbacks by aerosols, non-carbon dioxide green-

house gases, water vapor, and clouds; assessment of possibilities for abrupt change in a warming climate; examination of the feasibility of development an abrupt-change early warning system; understanding climate change impacts on ecosystem functions; and refining ecological forecasting.

Science, Technology, Engineering, and Mathematics (STEM) Education

OSTP shares this committee's longstanding interest in a coordinated interagency effort on federal STEM education activities. A study by the Academic Competitiveness Council found that federal STEM programs are contained in 10 cabinet departments and four independent agencies, making effective coordination a necessity. The 2010 Budget proposes \$3.7 billion for these STEM programs, an increase of about 1.6 percent in real terms above the enacted FY 2009 level. There is another \$276 million for these programs in the Recovery Act according to preliminary assessments. OSTP will be working with this committee and the relevant federal agencies to improve interagency planning and coordination for these STEM education activities.

Conclusion

While the Nation faces immense challenges in the economy, health, energy, the environment, and national and homeland security, among other domains, it is clear that science and technology can help turn many of these challenges into opportunities. The President understands this thoroughly, and his FY 2010 Budget reflects that understanding, proposing a robust investment in science, technology, and STEM education today to produce the new knowledge, the new technologies, and the scientists, engineers, mathematicians, and S&T-literate citizens of the future that our country will need to meet the challenges and seize the opportunities.

I look forward to working with the Committee to make the vision of the President's FY 2010 Budget proposal into a reality. I will be pleased to try to answer any questions the Members may have.

BIOGRAPHY FOR JOHN P. HOLDREN

DR. JOHN P. HOLDREN is Assistant to the President for Science and Technology and Director of the Office of Science and Technology in the Executive Office of the President of the United States. Prior to joining the Obama Administration, he was the Teresa and John Heinz Professor of Environmental Policy and Director of the Program on Science, Technology, and Public Policy at the Kennedy School of Government, and Professor of Environmental Science and Policy in the Department of Earth and Planetary Sciences, at Harvard University. Concurrently, from 2005, he served as Director of the Woods Hole Research Center and, from 2002, as Co-Chairman of the independent, bipartisan National Commission on Energy Policy. Dr. Holdren holds degrees in aerospace engineering and theoretical plasma physics from MIT and Stanford and is the author of some 350 publications on global environmental change, energy technology and policy, nuclear arms control and nonproliferation, and science and technology policy. He is a member of the National Academy of Sciences, the National Academy of Engineering, the American Academy of Arts and Sciences, and the Council on Foreign relations. He is also a former President of the American Association for the Advancement of Science; former Chairman of the Federation of American Scientists; and one of the first recipients, in 1981, of a MacArthur Foundation Prize Fellowship. In 1995 he gave the Nobel Peace Prize acceptance lecture on behalf of the Pugwash Conferences on Science and World Affairs, an international arms-control and scientific-cooperation organization in which he held leadership positions from 1982 to 1997. From 1994 to 2001, Dr. Holdren served as a member of President Clinton's Council of Advisors on Science and Technology (PCAST); from 1994 through 2004 he chaired the Committee on International Security and Arms Control of the National Academy of Sciences; and from 1991 to 2005 he was a member of the Board of Directors of the John D. and Catherine T. MacArthur Foundation. At the beginning of his career he held positions at the Lockheed Missiles and Space Company, the Lawrence Livermore National Laboratory, and the Environmental Quality Laboratory and Division of Humanities and Social Sciences at the California Institute of Technology, and from 1973 until 1996 he was the founding core faculty member and Co-Director of the campus-wide, interdisciplinary, graduate-degree-granting Energy and Resources Group at the University of California, Berkeley. He has been married for 43 years to Dr. Cheryl E. Holdren, a biologist; they have two grown children and five grandchildren ages 3 to 18. Holdren was born in Sewickley, Pennsylvania, and grew up in San Mateo, Cali-

fornia, where he attended public schools: Beresford Elementary, Borel Junior High, and Hillsdale High School.

DISCUSSION

Chairman GORDON. Thank you, Dr. Holdren, and thank you particularly, you and the President for your commitment to America COMPETES. We do think it is good legislation.

Let me give sort of a game plan for everyone here if you feel comfortable with it. In about probably 40 or 45 minutes we are going to have the final votes of the day. There will probably be a series of at least two, could be more, and so I think we will conclude at that time. I know people have flights they want to catch. We will also give an open invitation to Dr. Holdren to come back, and we are sure we will see him later.

And to move forward, I am going to waive my questions. I might reserve a little follow up on somebody's later, and so Mr. Baird, you are recognized for five minutes.

Mr. BAIRD. I thank the Chairman very much. Dr. Holdren, congratulations. Welcome. We are delighted by your appointment and your presence here today, and I appreciate your acknowledgement of America COMPETES. Chairman Gordon worked so hard on that, and we all appreciate his leadership on that.

Two quick issues I would just like your input on. One is the role of oceans as you see it in our research portfolio and as we look at the effects of overheating of the planet and acidification. Sixty-eight percent of the world's surface is oceans, and they are under assault, as you know, from invasive species, over-fishing, et cetera. So comments on that.

Secondly, what do you see as the role of social science in the research portfolio? My perspective as a former social scientist is if we look at energy, health care, national security, and a host of other measures, behavior change may be as important to solving some of those riddles as the technological innovation.

So let me put that out there and hear your response. Again, thank you, Mr. Chairman.

Dr. HOLDREN. Well, thank you.

First of all, on the oceans I think one can already see something about this Administration's commitment on the importance of the oceans in the appointment of one of the world's leading marine biologists, Dr. Jane Lubchenco as the new Administrator of NOAA. And I suspect that Dr. Lubchenco has already been heard from before this committee or otherwise will be soon. I have talked with her extensively about the importance of the oceans. I agree with it.

In my Presidential address to the American Association of the Advancement of Science a couple of years ago I listed the oceans as one of the five major priorities in science and technology that we absolutely have to get right. It is important to everything. You mentioned the role of the oceans in climate change, the acidification of the oceans. These are huge challenges. The country has got to address them in an integrated and unified and coherent way, and I believe that between OSTP, NOAA, and the many other agencies that deal in various ways with ocean issues, we are going to start to get it right.

With respect to social science, I also agree with your point. I think the social, behavioral, and economic sciences are crucial across the whole range of challenges I mentioned, and when I say the word "science," I don't just mean physics, chemistry, biology, and so on. I include the social sciences.

That effort in terms of research, of course, is extensively funded in the National Science Foundation, but there are also social, behavioral, and economic science research activities underway in a huge range of departments, even including the Department of Defense but also Homeland Security, Department of Energy, precisely because you are correct in saying that these science domains are going to be critical to finding solutions to these problems.

Mr. BAIRD. One other quick note. Our committee has done a fair bit of work on the issue of science diplomacy. Mr. Lipinski chairs the Subcommittee which I formerly chaired, and we are working with the Foreign Affairs Committee on—we have already passed with the Chairman's support legislation to promote scientific diplomacy within Department of State and NSTC, but I wonder if you could comment briefly on the role of—as you see—science in our diplomatic efforts.

Dr. HOLDREN. I have been involved myself in international science diplomacy since the beginning of the 1970s. I think it is extremely important. I think it provides important avenues of communication even when other aspects of relations are challenging. I think it contributes to U.S. national interests in a wide variety of ways and certainly we need to be nourishing it and expanding it.

Since the time I was confirmed on March 20, which was the moment I became able to meet with representatives of other countries, I have had the chief science advisors, the heads of state of governments to about 11 countries come through my office talking about things that we could do together to improve science and technology cooperation between the United States and these other countries.

I have had the Ambassadors of at least six countries in my office since being confirmed, and I am spending a lot of time down at the State Department working with the folks there on how to advance this agenda.

Mr. BAIRD. Excellent. With that I thank the Chairman and would yield back in the interest of my colleagues.

Chairman GORDON. Thank you, Mr. Baird. You have about a minute left, so let me just as a follow up to that. What do you see the relationship between OSTP and the State Department in this area?

Dr. HOLDREN. Well, I think it is the responsibility of OSTP to work with all of the other departments in the Executive Branch, as well as, of course, as working with the Congress on every area in which science and technology play a role. And certainly science and technology—

Chairman GORDON. I am talking about international cooperation—

Dr. HOLDREN.—play a big role.

Chairman GORDON.—with the State Department having a specific, you know, desk for that now, I guess you would say. What do you see the relationship between the OSTP and that desk in the State Department?

Dr. HOLDREN. Well, the way that is working is we are meeting regularly down there and at OSTP. Folks from State Department are coming to OSTP, I am going down there with my colleagues. We are talking together—

Chairman GORDON. What should they—

Dr. HOLDREN.—about how to get it done.

Chairman GORDON.—do, and what should you do?

Dr. HOLDREN. The State Department has the responsibility for orchestrating our international interactions, and in that sense what OSTP is, is a provider of insight about the science and technology content of those interactions and as a facilitator because we have many contacts of our own that we make the State Department aware of so that they can decide how best to orchestrate the overall interaction. The orchestration is their responsibility. Contributing to it in the science and technology domain is ours.

Chairman GORDON. Good. Thank you. Mr. Hall, you are recognized for five minutes.

Mr. HALL. Mr. Chairman, Mr. Rohrabacher has I think two other committees he is supposed to be attending now. I want to let him go ahead, and then I will stand in his position to speak.

Chairman GORDON. Without objection. Thank you.

Mr. ROHRABACHER. Thank you very much, and welcome aboard, and we look forward to working with you.

When you are talking about international cooperation, just one note. Those of us who have been around here a long time realize that one area that we can, that we have had cooperation internationally and an area that can be expanded upon deals with cooperation in space technology and space endeavors.

We have challenges that have not been addressed internationally, although I have spoken to the leaders of various space agencies in Europe and in Russia and various parts of the world, Japan, and they are very cognizant of the fact that we do not have a strategy right now to either clear space debris or deal with near-Earth objects that may at some time be identified as a threat to the planet.

So I might note that I am looking forward to working with you and the Administration to see how we can set up better cooperation internationally on these two vital areas that just really need some work.

Another area I would like to point out to you is that while you are focused on science and technology issues, there are some legal issues that go directly to America's competitiveness and our ability to remain a technological leader in the world. And one is the patent issue, which does not go through this committee, but there will be a patent bill on the Floor within the next few months, and let me just note this bill like the many bills that have been before it in the last 10 years, is a bill that has been put together by very powerful, special interests in this society, namely some 15 mega corporations or international corporations, who are trying to destroy the patent system. They no longer want to pay royalties to the little guy, and these people have—these co-corporations have been continually brought to court as infringers, and they are just trying to change the whole structure so the little guy can't enforce his pat-

ents. And that is a very important segment of America's success is the strong patent protection that we have had.

One last issue is, again, back to space. The Chinese now, and I understand this Administration is leaning in that direction, are trying to break into the space launch market. If you want to deal a death blow to America's high-tech industry in terms of aerospace and especially the space rockets and missiles, let the Chinese get involved in taking the technology they stole from us 10 years ago and using it against us as competitors in the world market.

Those are just three things that I thought I would throw in your direction. If you have any comment, go right ahead.

Dr. HOLDREN. Thank you very much. I will make brief comments on each of those points.

First of all, I very much agree with you that both space debris and near-Earth objects are important issues that are not being fully attended to at the moment, and we need to get organized to do that. We do propose to stand up to Space Council again and have it address some of these tough questions. We have got some people on the President's Council of Advisors on Science and Technology who are experienced in space and interested in those issues. And I have spoken with the acting NASA Administrator, Chris Scolese, who is also interested in getting better organized to address those particular problems, and I am sure the new NASA Administrator whom we hope to name soon will share those concerns.

On the patent issues, intellectual property is clearly a big issue that cuts across the science and technology domain, innovation, the economic domain. We have a new Chief Technology Officer, Aneesh Chopra, who is Assistant to the President and CTO but also will, we trust, be confirmed by the Senate as the Associate Director for Technology in OSTP. He is deeply knowledgeable about those issues and interested in them. I think there is going to be an appointment, another appointment in the White House in this area.

Mr. ROHRABACHER. If you and he could take a very close look at that bill and figure out who is behind it, and we have stopped them 10 years now, but these are very powerful interests.

Dr. HOLDREN. We will certainly be taking a look at that. This is not my personal domain. That is I cannot claim any expertise in patent law, but we do have folks on board who do, and we are going to be working across the agencies, including with the NEC—

Mr. ROHRABACHER. Thank you.

Dr. HOLDREN.—to try to get that right.

On the China issue and China being in the launch business, I think it would probably be an overstatement to say the Administration is leaning in the direction of facilitating that. In one interview I said with respect to the gap in launch capability that we ought to look at China. I think looking at China is a long way from leaning towards doing any particular thing. I am well aware, as is the rest of the Administration, that there are some downsides and big obstacles to working with China in that domain, but there are also some benefits even to looking at China in terms of the situation we are in terms of a gap and our complete dependence on the Russians during that gap. It is a little unsettling as well.

Chairman GORDON. Thank you, Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you very much.

Chairman GORDON. And Mr. Miller is recognized for five minutes.

Mr. MILLER. Thank you. Dr. Holdren, I know, I am sure you know that this committee has been concerned with scientific integrity issues for some time, and I applaud the statement of principles on scientific integrity that the Administration has already issued. You all had said all the right things, and I am confident that you will do all the right things as well.

But a lot of times the same conduct may either support scientific integrity or attack it, depending on what the motive is, why you are doing it. There may be perfectly good reasons to have someone sit in on a meeting between someone from the press and the scientists. It is not always a political minder there to intimidate.

So I am sure if you set as your purpose and today throughout government that you want to support scientific integrity, that by itself will do a world of good.

One of the abuses of science has actually taken the form of a claim for a need to do more. We need to have more science, and you will never find a scientist who will say we don't need to do any more research, but that has been used as a pretext for inaction. And that is particularly through OIRA, the Office of Information and Regulatory Affairs, at OMB, has been probably the agency that has done more to suppress scientific integrity or attack scientific integrity than any others.

And frequently it is by claim the need better and better science before acting at all. Formaldehyde. There is—I am sure you know—the Integrated Risk Information System, the IRIS System under EPA, there was an initial listing—that is now such an exacting process that with 700 new chemicals entering widespread commercial use every year, the IRIS System is producing two new listings a year.

But they are very carefully considered listings. Formaldehyde was first listed in the '70s, it has been under review since the late '80s. EPA was preparing to revise their listing to say that we should look at Formaldehyde exposure with much more alarm than what our '70s review suggested, and that was subjected to a review by the National Cancer Institute, and there has been talk of now needing a review by the National Academy of Sciences of the National—of the NCI's review.

Have you talked with Professor Sunstein about his view of science and the role of science and the need at some point to act on science without waiting for the answer to end all answers?

Dr. HOLDREN. Thank you. I guess I could be brief and say yes on all accounts, but I will answer in a little more detail.

First of all, on the scientific integrity issue generally, I agree with you in the implication that it is complicated terrain, and sometimes in the name of science integrity one could do things that were not helpful. One could imagine situations in which you suppose that science integrity means that science is the whole answer to everything, and that there is no proper place for values, politics, and other considerations. None of us in the Administration believe that. We understand that science is an input to policy-making, but that other factors are always going to matter, and science integrity

doesn't mean that science has to be the determiner of all results and all circumstances.

We are doing a very careful job of trying to construct recommendations in response to the President's Executive Order that have started with soliciting input from all of the departments, agencies, and offices about what their current practices are, about what they think about what is working and what isn't, what their concerns are in respect to balancing the different considerations that have to enter into procedures and practices and guidelines. And we are going to shortly open that process up for public comment as well, and I believe in the end that we will have a set of recommendations for the President on science integrity that will be both helpful and suitably balanced.

With respect to OIRA, the answer is, yes, I have talked to Professor Sunstein, who I think will prove to have a balanced position on this. We have actually exchanged a number of our writings. He is well aware of the need to act on imperfect information, because as we all know, information is never perfect. We never know as much as we would like. People in politics, of course, understand that you are making decisions every day on the basis of incomplete information about the problems you nonetheless have to decide on.

People who say we don't have enough information to decide should understand that not to act is also to decide, to make a decision in favor of the status quo. I think we are going to get that right. I think Cass Sunstein is a very smart and very reasonable person, and whatever OIRA's shortcomings in the past have been I would have confidence that he will move to fix them.

Mr. MILLER. I know my time is close to having expired, but the need for more scientific exactness was—yes, there is obviously always a need for that, but that was frequently used by OIRA as a pretext for inaction. They wanted not to act, and they used a lack of scientific exactness, the need for more precision as a pretext for not acting. So it is, again, a lot depends upon what you are trying to do, what your motive is.

Dr. HOLDREN. I agree, sir, that that has been a problem, and my point is not to deny that that is a real problem. It has been a real problem, but I believe we are going to move to fix it because this Administration is not interested in using uncertainty as a pretext for inaction.

Chairman GORDON. Thank you, Mr. Miller, and thank you for your leadership on the Investigations and Oversight Subcommittee.

Mr. Hall is recognized for five minutes.

Mr. HALL. I thank you.

Dr. Holdren, in my opening statement I alluded to President Obama's announcing the goal to, "devote more than three percent of our gross domestic product to research and development," and I stated we don't have any further information on how the Administration plans to meet this goal. And I also stated that budget documents released by your office do not even mention it. That may not have been completely fair with you, so let me write you a letter to that effect and give you a chance to look at your records and give me an answer on that.

I want to ask you something else while I have the time here, though. In DOE's fossil fuel, fossil energy R&D budget, the Admin-

istration has zeroed out the Oil Petroleum Technologies Program and recommended the Ultra Deep Water. Are you familiar with that, the Ultra Deep Water Provision? It is a provision I have tried to pass for 10 years, and I got it passed once, it died in the Senate. Like a year and a half ago we put it in the Energy Bill, I rode west with the President, he signed it there with me watching him, and since then he has tried to—he tried to zero it out, too.

But I want to talk to you about that, because I really want you to look at that very closely, and I am giving you my reasons now. In a hearing back in March of this committee, Secretary Chu stated in response to a question that I asked him, “the type of research that you just described, for example, improving our ability to recover oil from reservoirs, I think it is appropriate for the Department of Energy to be funding things like that.” How do you explain this discrepancy?

And we are talking about five million for the Oil Technologies Program and while the Ultra Deep Budget is 50 million a year, that amount of money, according to statute, comes from funds generated from federal lease royalties and rents and bonuses paid by oil and gas companies and not from taxpayers.

That is what I want—I hope you will understand. It is not just a technology nor an energy bill. It is both technology and industry because we sought the aid of several universities, and it is, I think, a little bit interesting that two of the universities that we sought aid from and are receiving aid from and are working with and are paying for aid, were Stanford and MIT, where you have an aeronautics engineering and theoretical plasma physics degree from MIT or Stanford or both. So you know something about that and have probably been involved with it.

I hope you have, because I think you are a fair guy, and I think you know that if something where we have a provision where we pay to get technology to get energy up out of the basement, and we can't get it to the top but we buy technology that helps us get it to the top, and we pay for that technology out of the energy we get, and we don't get that energy if we don't get that technology, we have got the technology, and we need to get the energy at no cost to taxpayers.

And President Bush turned his back on it because he was getting some heat on thinking that they would help the big majors. The majors don't find stuff like that. They have—they buy it from little people that look for it and find it. This doesn't cost the taxpayers anything. We get energy that we wouldn't get if we didn't have that technology from, not just Stanford and MIT, but Penn State, University of South Carolina, University of Texas at Austin, Ohio State, and others. There is, I think, 15 or 20 that are working with us and are providing that technology that we need.

Please look at that very closely because it is going to come across your desk sooner or later to try to take a shot at that. President Bush took a shot at it, we turned him down on the Floor, and I think most everybody on this committee here, Republicans and Democrats, voted against curtailing a facility like that that will help us get rid of our obligation to the Arab states and make us less dependent upon them, and it doesn't cost our taxpayers anything.

I just don't see how anybody can turn their back on that. I implore upon you to look closely at it. I don't even ask you to comment on it now.

Dr. HOLDREN. Congressman Hall, I will. I first have to say that as the Chairman said, you are a persuasive man. This is not something that has been in my area of focus. I don't know the details of the history of it, and I wouldn't presume to answer for Secretary Chu, but I will, as you suggest, take a look at it and become better informed about it so that when it comes across my plate, I will have something constructive to say.

I do also want to say just a word about the three percent target. We were not deliberately avoiding that issue—

Mr. HALL. I didn't think you were.

Dr. HOLDREN.—in my testimony. The current level of R&D in the United States is a fraction of GDP. It is about 2.6 percent. Three percent would be above the peak of almost 2.9 that was reached at the height of the space race.

Currently, of the 2.6 percent or so that is going to R&D of GDP, about one-third of that is coming from government, from the Federal Government and about two-thirds is coming from the private sector mostly and other smaller entities.

If you ask how do you get to three percent, there are two parts to that problem. One is how and where do you boost the federal contribution, and the other is how do you create the incentives to boost the private contribution. We think we are already creating a good part of the incentive for the private contribution by making the research and experimentation tax credit permanent. If the President's commitment to spend \$150 billion over 10 years on clean energy technology is made a reality, that would actually be a very large down payment on getting the government's contribution up to the level it would need to be to make that target.

But I am happy to respond in more detail if you would like.

Mr. HALL. And I thank you.

Chairman GORDON. Thank you, Mr. Hall.

Ms. Dahlkemper is recognized for five minutes.

Ms. DAHLKEMPER. Thank you, Mr. Chairman. Dr. Holdren, welcome.

I come from an ag industry. I am from an ag district, and I am on the Ag Committee, and so my question is regarding biomass. The EPA recently released a draft rule on the Renewable Fuel Standards Program. At the same time the President established a Biofuels Interagency Working Group, which will work with the National Science and Technology Council.

What kind of role will NSTC play in developing and dealing with environmental sustainability of biofuels, and will NSTC be monitoring the science around emissions of indirect land use, which I know there is a lot of concern about which, you know, referring to the potential affects of the cultivation of biomass and greenhouse gases.

Dr. HOLDREN. Very good question. First of all, the NSTC, which, of course, is the body managed by OSTP that tries to coordinate all the interagency science and technology issues that arise, certainly will be deeply involved in this one. That means that the Department of Agriculture will be represented, along with EPA, OSTP,

DOE, and the other relevant agencies. I have already had some conversations with all of them about this particular issue. It is an important one. It is a complicated one. Indirect land use is certainly part of it.

There is a range of opinions about the state of science regarding indirect land use impacts of growing biofuels. It is under what circumstances would a U.S. choice to devote more of its agricultural land to biofuels create changes in land use elsewhere that themselves would have greenhouse gas implications.

That is something we will be looking at very closely. We will be looking at the sustainability of biofuels as a general matter, very closely. Again, it is one of those complicated issues in which we are going to have to exercise ourselves to get it right, but I believe we will ultimately get it right. I would not venture to predict a particular set of outcomes at this point, but it is on the table. It is going to be looked at in an interagency way.

I have spoken with Secretary Vilsack about it as well as with Administrator Jackson, and I think we will succeed in working together to figure it out.

Ms. DAHLKEMPER. I guess part of my question is as we look at the Energy Bill in front of us, you know, soon, some time, where do you think that research is currently in terms of using it as we go forward with that initiative?

Dr. HOLDREN. To answer that I think would be prejudging a bit what the—what we will be asking the appropriate subcommittee and the NSTC to figure out.

Ms. DAHLKEMPER. Okay. Thank you. My other question, I will stay on the subject of biomass, in January of this year the National Science and Technology Council Committee on Science released a report which includes a five-year plan for the National Plant Genome Initiative. And over the last several years biomass for energy production has become an area of focus for many plant genome initiatives.

We have also heard that some of the research is too focused on energy and not other characteristics of plants such as drought resistance. Do you think there is enough research on the multiple beneficial characteristics of plants?

Dr. HOLDREN. My general impression is that we need to be doing more there. I myself have given talks about adaptation to climate change would stress the importance of developing crops that are heat resistant, that are drought resistant, that are salt resistant. Again, without claiming deep expertise in that domain, my impression is that we need to be doing more.

Ms. DAHLKEMPER. Okay. Thank you. I yield back.

Chairman GORDON. Mr. Olson is recognized.

Mr. OLSON. Thank you very much, Mr. Chairman, and Dr. Holdren, welcome to the Committee. I appreciate your testimony today. All of my questions are going to focus on NASA and the future of our Human Space Flight Program.

As a Member of Congress who is fortunate to represent the Johnson Spacecraft Center, the home of our Human Space Flight Program, I can tell you there is a lot of consternation and concern over its future, getting an administrator appointed.

And in your written testimony you listed eight of the most important scientific issues facing the Administration. The future of American human space flight and the challenges NASA is facing was not among them. We are now nearly four months into the Administration, and a NASA administrator is yet to be named, much less nominated and confirmed. The Administration has recently announced a Blue Ribbon Task Force to review our Human Space Flight Program without any indication as to what concerns the President has about our Human Space Flight Program that he feels warrant an independent review.

The GAO listed retirement of the Space Shuttle as one of the top ten issues facing this Administration. That was Administration wide, not just within OSTP.

Now more than ever NASA needs leadership and administration that is committed to our goal of reaching the Moon by 2020, as a national priority.

My question to you is where does the Administration prioritize human space flight, and where do you see the role of your office in giving priority of NASA's and our nation's Human Space Flight Program?

Dr. HOLDREN. Thank you, Congressman. Let me start by saying that the positioning of NASA in the testimony was not in those items briefly listed at the beginning which are initiatives that we already have well under way, but there is a big treatment of NASA in the middle in which we talk about, among other things, the President's emphatic commitment to continuation of the Human Space Flight Program and its importance.

I might mention that the President has demonstrated his interest in that program in a number of ways. We had a terrific event when in the previous Shuttle flight our astronauts were on the International Space Station, and we orchestrated a video link from the Roosevelt Room in the west wing of the White House. The President, surrounded by middle school science students and a number of Members of Congress with close links to the Space Program, talking with the astronauts. When the astronauts came back, by the way, I was able to introduce them to the President in the Oval Office. This was just about a week ago. He is absolutely enthusiastic about space and about the manned space flight, the human space flight component of that. He lights up every time space is on the agenda.

As you know, we have some challenges. Those include budget challenges. We are in a time of budget stringency. We are not able to do everything that we would like to do across the domains, even the high priority ones, but the reason that we are standing up this Blue Ribbon Panel, chaired by Norm Augustine, is to take a fresh look at what options we have to maximize our capacity to do the things we need and want to do in the Human Space Flight Program in the face of the budget challenges that we confront.

That panel under Norm Augustine is being tasked with looking at what we can do to minimize the gap in the capacity to put Americans in space on American launchers. They are being tasked to look at the workforce issues and the maintenance of capability between the end of the Shuttle Program and the beginning of the successor program. They are being tasked to look at the Inter-

national Space Station and what we can do to extract more of the value from what we have already invested there.

These are all issues that are important to the President, and the jobs issues that I know are of concern to all of the Members of Congress who have Districts and states in which there are major space flight activities. Those are very important to the President as well. This President is not interested in losing jobs in this country at this point. He is interested in maintaining them and expanding them, and one of the challenges to the Augustine panel is to try to help us figure out how to better do that under the constraints that we face.

Mr. OLSON. Yes, sir, and jobs are certainly important, but it is critical that the United States maintains its leadership as the human space flight country. We have had it for over 50 years. We shouldn't give it up to any other country in the world.

About the Blue Ribbon Panel, it sounds like then everything is on the table. They are going to be able to look at budget, architecture, and overall direction of the program. Is that a fair statement?

Dr. HOLDREN. Well, it is close to a fair statement. The current guidelines for the review are to examine options that can be carried out within the budget trajectory laid out by the OMB and the fiscal year 2010 request. If Norm Augustine and his panel conclude that something needs to be said about the implications of that constraint, I expect it will be hard to keep them from saying it.

Mr. OLSON. I see that I am out of time, and I appreciate your answers. Thank you, sir.

Ms. EDWARDS. [Presiding] Thank you, Mr. Olson.

Ms. Kosmas. Go ahead.

Ms. KOSMAS. Thank you, Mr. Chairman. Thank you, Dr. Holdren, for being here today, and thank you for the opportunity to be on the conference call with you earlier.

I come from central Florida, and Kennedy Space Center happens to be in my district, so I am echoing many of the comments said by Congressman Olson and express my deep concern for the potential job losses there.

Having said that, we are happy to hear you reiterate that the President is, as he told me, a space guy and that he is very interested and enthusiastic about the Manned Space Program. Your comments say that you are fully aware that nourishing and fully utilizing the country's world-leading capabilities in science, technology, and innovation are what makes us a great country, and you also referred to the '60s space race. And I assume that I can put those together and suggest that you and the Administration do want to see us continue to be the number one country in manned space exploration.

Having said that, again, I register some of the concerns earlier mentioned and wanted to ask a couple of questions specific, again, to space exploration. Recent documents show that we might not be able to meet the goal of returning to the Moon by 2020, and Acting Administrator Scolese has stated that the review board will be examining the post-2014 goals, including plans for going to the Moon and to Mars.

Can you tell us what the vision is for the goals of human space exploration and its importance to this Administration? Do you know what the vision is at this point?

Dr. HOLDREN. Well, I can answer part of that question. First of all, the vision is in agreement with your comments and the previous ones that U.S. leadership in space is critical and that we need to maintain it.

The second part of the vision is we need a balanced program in space, has to include the human space flight component, robotic exploration in space is important, too, but we need both. And, in fact, we need a larger balance within NASA that includes space exploration, Earth observation, fundamental science, aeronautics, and more.

And one of the difficulties that we face, is that in the last Administration there was a grand vision for human exploration of space, but the budget was never provided to achieve that vision. And the absence of the budget to achieve the vision led, indeed, to raiding a number of the other budgets within NASA to try to get on that trajectory, still not successfully, because there wasn't enough money to be raided in those other pots to really get us on the trajectory to achieve the vision that President Bush had articulated.

And so we are starting where we are, unfortunately, in terms of the gap between our aspirations and our means, and what that Blue Ribbon Panel headed by Norm Augustine has as its primary challenge is figuring out how to reduce the gap between our aspiration and our means. I can't prejudge what they will find in terms of what our options are for reducing that gap, but I can assure you, being myself an old friend and colleague of Norm Augustine's, that if anybody can figure out the best approaches available to us, it will be that panel. And we will be, I think, announcing the names of the other panelists shortly. They are in vetting now, but it is going to be a very impressive group.

Ms. KOSMAS. Thank you for that answer. I think there are many of us who are acutely aware of the fact that the budget to go with the vision never matched in the past and that that has to some degree put us in the situation where the potential for a gap is huge and could be very devastating in terms of job retention.

Having said that, the recent announcement that the Russians intend to charge us now \$51 million per seat, which is significantly greater over the last couple of years than what we originally anticipated, do you perceive that there might be some change in our position on being reliant on the Russians for manned space flight to the International Space Station?

Dr. HOLDREN. I know there have been very recent negotiations with the Russians about the terms of our access, and I am not aware of anything up until now that indicates that we are looking at fundamentally changing that relationship. It does, when the price goes up very rapidly, indicate the perils of monopoly, and again, I think at least starting to think about other options could have some benefits in that domain, but we certainly have no plans at the moment to go in a different direction.

Ms. KOSMAS. Thank you. I think the suggestion that we would be paying the Russians to fly our astronauts there at this time of critical economic crisis within our own country is hard for many

people to swallow and the potential also to lose our professional workforce during that five-year gap is also a very serious problem in my district. And so I hope that we will take a very close look at what our options are there.

Ms. EDWARDS. Ms. Kosmas.

Ms. KOSMAS. Yes.

Ms. EDWARDS. I am going to interrupt you just a bit because we are going to be called for votes, and Members are welcome to submit their additional questions for the record, and I want to go ahead to Mr. Lipinski.

Ms. KOSMAS. Thank you.

Ms. EDWARDS. Thank you.

Ms. KOSMAS. Thank you, Dr. Holdren.

Mr. LIPINSKI. Thank you. I will try to keep this short, but it is great to have you here, Dr. Holdren. Congratulations. Look forward to working with you, especially as Chairman of the Research and Science Education Subcommittee. There are a lot of good things that I know we will be doing in the next few years, especially looking forward to working on NSF reauthorization.

I wanted to ask you about the Energy Innovation Hubs. I am very happy about the President's commitment to transformative energy technologies. It is great to see that commitment there, that enthusiasm.

My understanding is the Energy Innovation Hubs are inspired by—for the successful legacy of industrial labs like Bell Labs. Unfortunately, we don't see those anymore, but I want to ask, do you see any of these Hubs being located in industrial, academic, or National Lab settings? And the second part is what culture do you think would be best for technology transfer, which is always a critical issue that we are facing?

Dr. HOLDREN. Thank you for those questions. They are good ones. I think, first of all, the Energy Innovation Hubs notion is not to build entirely new institutions, not more bricks and mortar, but to use existing institutions in innovative ways to promote energy innovation. In my judgment they will probably be located in a couple of different kinds of settings. Some may be academic, some National Lab, maybe some industrial.

I think the most important thing is that they involve partnerships among all of those sectors. We should be using the resources, the insights, and the perspectives of the academic community, the private sector, the National Laboratories together. And when you talk about technology transfer, that underlines the importance of having the private sector intimately engaged, because it is the private sector that has the best understanding of the markets in which these technologies ultimately have to work if they are going to succeed.

So I believe that as a historical matter we have under-utilized the potential of partnerships of these sorts, and I think the innovation hubs definitely have an opportunity to begin to rectify that.

Mr. LIPINSKI. I certainly agree with you that the—working in the partnerships and encouraging the partnerships is really critical, and that is something I look forward to working with you on, doing what we can to do more to encourage that.

One other question I wanted to ask you. Well, first of all, I wanted to say as a former social scientist, I received a political science dissertation improvement grant when I was in grad school. I was a little disappointed that the Directorate for Social, Behavioral, and Economic Sciences had recommended in the budget the smallest increase, and I know that all six of the directorates were equally funded, equally treated I should say, in the Recovery Act.

But what I am more concerned about right now, it is great to see all this funding going into NSF in the Recovery Act. My concern is what happens next after that funding is gone and you rightfully said we have to consider not just what is budgeted right now but also what was in the Recovery Act. But what happens next? What happens when we get to 2011?

Dr. HOLDREN. Well, first of all, we share your concern about the potential boom and bust characteristics of funding research. If you have a big infusion like the Recovery Act and then it goes away and what do you do? So there are a couple approaches to that, and we are trying to work them all.

One is to get the baseline budgets up so that when the recovery money runs out, you don't have a big plunge in the money that is available. The second thing is to have some of that Recovery Act money go into multi-year grants where it doesn't all have to be spent in the two years in question. It has to go out the door in the sense of commitment. But the money in terms of the research that is done can be extended over a longer time.

Another aspect of it is putting some of that money into facilities and equipment that don't lose their utility and their value at the end of the Recovery Act period. All three of those strategies are being employed to try to minimize any boom and bust characteristic.

Ultimately we remain committed to the President's goal of doubling the NSF budget over a fairly short period of time, and we think that that ramping up will take care of an important part of this problem.

Mr. LIPINSKI. I also look forward to working with you. Thank you.

Dr. HOLDREN. Thank you.

Ms. EDWARDS. Thank you, Mr. Lipinski.

And I recognize Dr. Ehlers for five minutes.

Mr. EHLERS. Thank you, Madam Chairman, and I congratulate you on your rapid ascension to the Chairman of this committee. I have been here 15 years, and I still haven't made it, and you did it in 15 months or less.

Dr. Holdren, good to see you again. Congratulations on your appointment. I was overjoyed when you received the appointment from the President. You have done a lot of good work for this country in various tasks that you have been—that have been placed in your lap, and I am sure you will do very well in this job, too. So accept that in the spirit in which it is offered. You may not receive very many compliments as things go along. You know how that goes.

I just wanted to raise an issue about the National Science Foundation. The overall budget going up, I believe, something like 8.5

percent, which we are all delighted about. I have personally worked very, very hard to get NSF increased over the years.

My concern is this EHR, Education and Human Resources, which has the lowest increase, about 1.5 percent. I spent a good share of my life, both before the Congress and in the Congress, trying to improve math and science education in this country. We are making substantial progress.

The NSF budget under the previous Administration at a certain point someone in OMB apparently decided that since we had started the math and science program in the Education Department that NSF no longer needed any money. So they zeroed out that portion of the NSF budget. We fought very hard to get it back in. We got some increase, but it took quite a jolt that year, and it has never recovered.

I was hoping that under this Administration that would be changed and that the Education and Human Resources would get an increase comparable to the total overall increase in NSF's budget, and I would appreciate your comments on that or your explanation.

Dr. HOLDREN. Well, Congressman Ehlers, first of all, thank you for your kind remarks at the beginning. I am going to bottle those and save them for the grimmer moments. I have sometimes said that this job that I have taken on is mostly like a drink from a fire hose except when it is a drink from a flame-thrower, and I do expect to experience a good deal of the latter as well as the former.

On the NSF EHR funding recommendations, one of the things I would say about that is that in recent years the pattern of how education gets supported at NSF has changed in the sense that across virtually all of the directorates education is explicitly a part of the mandate. So it is not just concentrated in EHR anymore. All across the agency grantees are being asked to develop education components of whatever it is they are working on.

It makes it harder to determine easily exactly how much money and effort is going into education at NSF, but my sense of things is that the NSF leadership as well as the Administration are very strongly committed to advancing the STEM education, the science, technology, engineering, and math education through that agency and others. We are committed to tripling the number of NSF graduate fellowships over a period of three or four years. We are advancing STEM initiatives through the Department of Education, which you mentioned, as well as in other dimensions.

So I am basically optimistic. We have a big challenge there as you very well know in terms of how far we have to go in lifting the quality of science, technology, engineering, and math education from preschool to graduate school, but we are committed to doing it. I think we are going to get it done with the help of folks like you and the rest of this committee.

Mr. EHLERS. Well, I appreciate the comments and the reassurance, and I was aware that, in fact, it is expanding across the various agencies and departments within NSF, but to have the overall drop 1.5 percent, there still needs to be a lot of direction from the—central direction to this issue, and I can say that having spent so many years in it. It means a lot of different things to a lot of different people, and I would worry about not having adequate direc-

tion, centralized direction as to what the various departments or groups or agencies or what have you will do.

I am also very concerned about working with the Department of Education. That was sort of an add-on in the last few years of the Bush Administration, and I very much appreciate what was done there, but I don't think they really had the time and the personnel to devote to that effort that it really needs. And you are the logical one to bring that altogether and make sure that the Department of Education is on the right track vis-à-vis NSF.

And also I would hope you can assist in getting additional money for EHR. I am not that worried about the graduate fellowship part. I am worried about the K-12 educational part, which is where we really are failing as a nation.

And I have many more ideas on this, and I would be delighted to meet with you later and discuss them as to what we can do, what we should be doing, not just in NSF but since you have a very broad portfolio, I am sure you can have an impact in many areas on that topic.

Ms. EDWARDS. Thank you, Dr. Ehlers.

I am next in order actually in this list and so I am going to pretend that I am down the line. I just will only use the time to just share with you that I represent a district that also services Goddard Space Flight Center and worked at the Space Program for a time, and I have to tell you my concern when looking both at the budget and the goals is that the budget doesn't quite match the goals, especially in the out years for the Space Program, and so I am looking forward to hearing more from you about how you see where manned space flight, human space flight fits into NASA's long-term goals, how we meet the goal of getting to the Moon in 2020, given the budget.

I am also concerned, Dr. Holdren, that there is—it seems that we see an increase in the budget for the fiscal year 2010, then a slight decrease, and then, you know, essentially kind of flat line but increased responsibilities. And so I look forward to a review that enables us to have a budget for NASA that really matches the goals rather than expectations for the agency that it can't possibly meet given the budget.

And I will express another concern and allow you an opportunity to respond to it, but it is that we are, you know, you are in the process of a review being conducted for—on human space flight, but we don't have an administrator, and that review is due by August, and so I hope that it will be conducted with the kind of leadership that we need to make sure that we are operating off of results that really match the future needs of the agency.

And we have just been called for a vote but—

Chairman GORDON. [Presiding] Ms. Edwards, if you would yield just a moment. I think we have at least 10 minutes, and so let us try to continue. I would like, as you know, let us try to allow everybody to have a chance to speak.

Ms. EDWARDS. Absolutely, and Mr. Chairman, come on back down and take your seat.

Dr. HOLDREN. May I just say that, number one, I think it is the perception that there is a mismatch between budget and goals, which is one of the drivers of calling for this review and saying, you

know, how are we going to deal with this? And I am certainly looking forward to the results of that review as much as anybody.

I also have some reason for optimism that the President will be nominating a permanent administrator for NASA very shortly and that that will put at least that concern to rest, because I think it will be an outstanding person. The President's concern has been to get the right person for that job. The fact that we don't have one until now is not for lack of effort.

Chairman GORDON. Ms. Edwards, do you have any other follow-up?

Ms. EDWARDS. Thank you. I will yield, Mr. Chairman.

Chairman GORDON. Thank you, Ms. Edwards, and Mr. Tonko is recognized for five minutes.

Mr. TONKO. Thank you, Mr. Chairman. Dr. Holdren, your announcement, your appointment was tremendously positive news, and I thank you for your willingness to serve.

My question is on green buildings, and as you know, last October when the National Science and Tech Council issued its report on net zero energy and high performance buildings, there was a lot of R&D that they focused on. Obviously our buildings are our major concern out there as it relates to energy policy but also a major bit of solution.

So just how do you see the coordination with DOE and other agencies including where you sit, how all of that is going to come together and how we are going to invest in getting to that green building goal?

Dr. HOLDREN. A couple of points, Congressman Tonko. First of all, I agree with you about the importance of the building sector. There is tremendous opportunity there for big improvements in energy efficiency and big gains there for both in terms of energy supply and environmental impacts.

And I come from a long background in the energy field where I started the Interdisciplinary Energy Program at UC-Berkeley in 1973, at the same time that Art Rosenfeld was starting the Building Energy Program at the Lawrence Berkeley Lab adjacent to the campus. And I mention that because Art Rosenfeld is now an energy commissioner in the State of California, remains one of the leading experts on how you get this stuff done in the building sector, and he has been pursuing a number of innovative approaches including a white roofs approach that both reduces the energy use in the building in the summer by reflecting more of the sunlight that would otherwise be heating the building, overheating the building, and also addressing in the process some of the global climate change issues. We have big opportunities there.

The other asset I would mention is Dr. Steve Chu, the new Secretary of Energy, who is deeply knowledgeable having been the director of the Lawrence Berkeley Lab among other things, deeply knowledgeable about the potential of technology in this area and also a good friend of mine. We probably speak five or six times a week, so I am not particularly worried about our ability to coordinate approaches to these challenges in the energy domain between OSTP, the Department of Energy, and I should mention that Secretary Donovan in Housing and Urban Development is also much seized with the importance of this issue and is himself meeting reg-

ularly with Secretary Chu and with me and with others to figure out how to get this done in an interagency way.

Chairman GORDON. Mr. Tonko, if you don't have just a really burning question, could—or if you need to follow up, do that and then let us try to have maybe one question a piece for those that are left.

Mr. TONKO. I will just make mention that at NYSERDA where I was just before this stop, people were thrilled with your work, and we are looking forward with anticipation.

Thank you, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Tonko.

Mr. Luján for one question if that is okay.

Mr. LUJÁN. Thank you, Mr. Chairman. If I may, as opposed to asking a question, if I could just make a couple of quick points.

Dr. Holdren, really happy to be working with you, sir. A few concerns. One areas is in the reduction in the area of cleanup of waste from weapons production. Recognizing that I was very supportive of the increase associated and contained in the Recovery Act, but we do have a certain responsibility not only in and around our laboratories but also in some of the areas where some mining did take place, i.e., the Navajo Nation in the State of New Mexico.

Mr. Chairman, Dr. Holdren, I want to encourage you that as we look to utilize some of the investment that we are going to be making in energy supply and conservation, specifically in the area of energy storage, that we look to some of our Energy Frontier Research Centers, one of which is Los Alamos National Laboratories, where we are going to be taking seriously our responsibility in the area of storage and would encourage you to continue to work with our National Laboratories to be able to identify solutions to our nation's problems.

Thank you very much, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Luján, and I will remind everybody that you can also submit questions to—so, Mr. Peters.

Mr. PETERS. Thank you, Mr. Chairman. Dr. Holdren, just a quick question. I am from Michigan, and of course, manufacturing is under a great deal of stress right now, particularly our small manufacturers, and I want to ask a question regarding the Manufacturing Extension Partnership which you are overseeing.

Currently in order to pay for these centers one-third of the cost comes from the state, a third from the Federal Government, and a third from manufacturers, but given the significant financial difficulties both of the small manufacturers in the area as well as the budget shortfalls of the State of Michigan as well, would the Administration be open to revising some of these cost structures with the MEP? As you know, it provides a very, very valuable function and is essential for us to maintain our competitiveness in the manufacturing sector. But given the financial melt-down that is occurring in Michigan with the auto industry, it is critical we maintain that, but it also is putting a stress both on the small manufacturers as well as the state.

What would—how would you respond, please?

Dr. HOLDREN. Well, I would say, first of all, I agree with you that the MEP is valuable and important, and I am not an expert on the details of what might or might not be possible in terms of renegoti-

ating the terms, but I will certainly take that point back and bring it up with others in the Executive Office of the President who have those responsibilities and see what we can do.

Mr. PETERS. I appreciate that. Thank you.

Chairman GORDON. Thank you, Mr. Peters. I will quickly note that this committee has had strong bipartisan support for the MEP, and we will continue to do that, and we want to work with you as we authorize again.

Ms. Giffords to close us out.

Ms. GIFFORDS. Thank you, Mr. Chairman. Last but hopefully not least, those of us that have been on the Committee for a long time know that I sound like a broken record. I talk about solar energy a lot. Come from Arizona where we have an abundance of sunshine.

I was pleased to see the President's proposed budget for solar at \$320 million, which was a significant increase, but when I look at the potential, not just for the southwest but for the country, even for the planet, it seems to me that if we are really going to transition to renewable energies, that is—that needs to be reflected in the budget.

So, Secretary, if you could please just address how we can possibly continue to improve funding for solar and other types of renewable energies in light of the other discussions that are happening around budget issues here.

Dr. HOLDREN. Well, again, I would note that the President is committed to a large increase, this \$150 billion over 10 years for clean energy technology. Certainly a substantial chunk of that when it materializes and I hope that will be soon, will go to solar energy. There is, as you say, enormous potential there. It is one of the technologies where we really have the capacity to become leaders in the deployment and the development of advanced ways to harness sunlight, and I trust it is going to happen. We are going to have a substantial solar component in that much bigger clean energy research, development, and demonstration budget that is going to be coming down the road.

Ms. GIFFORDS. Thank you, Mr. Secretary. I look forward to working with you on that.

Chairman GORDON. Well, Dr. Holdren, I am sorry we had to have an abbreviated hearing today. You have much to bring us. We are very interested in working with you, and we will continue our conversation, and I will say now that the record will remain open for two weeks for additional statements from Members and for answers to all the follow-up questions that the Committee may ask the witness, and this witness is excused, and this hearing is adjourned. Thank you.

[Whereupon, at 3:43 p.m., the Committee was adjourned.]

Appendix:

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by John P. Holdren, Assistant to the President for Science and Technology; Director of the White House Office of Science and Technology Policy; Co-Chairman of the President's Council of Advisors on Science and Technology

Questions submitted by Representative Ralph M. Hall

Q1. Please provide the Committee with additional information on the President's goal to "devote more than three percent of our gross domestic product to research and development." What is the timetable for achievement of the goal? Do you anticipate that the public and private sector contributions to this goal will increase consistent with their current proportions, or are federal investments expected to increase substantially more than private investment (or vice versa)? What if any policy tools will be pursued to influence increases in private R&D investment? How will the President's proposal to increase corporate taxes through various means (including auctioning of energy emissions permits) impact private sector R&D investment?

A1. In his speech at the National Academy of Sciences on April 27, President Obama set an ambitious goal of lifting national spending on R&D to three percent of GDP. He did not specify a timetable. Currently, about two thirds of the U.S. R&D investment is funded by industrial firms, just under 30 percent is funded by the Federal Government, and the remainder is funded by State and local governments, non-profits, and universities and colleges. Increasing the percentage of GDP devoted to R&D from the current 2.6 percent up to three percent would entail increases from all of the contributing sectors. The proposals in the 2010 Budget to make the Research and Experimentation Tax Credit permanent and to eliminate capital gains taxation on small businesses will be a major step toward encouraging private firms to increase their R&D investments, and we look forward to working with the Committee and others to find other policy tools to further incentivize private sector R&D investments. The Administration's proposals for limiting greenhouse gas emissions will create new incentives for private sector R&D investments in clean-energy technologies, and part of the revenues from auctioning emissions permits will fund new government investments in clean-energy R&D.

Q2. While the role of government in funding high-risk basic research is well understood and agreed upon, there is a longstanding debate over government's support of companies pursuing later stage development and commercialization activities and whether this kind of support catalyzes further private activity or is counter-productive and displaces or disrupts private capital investment, thereby slowing innovation.

Q2a. What is the Administration's and your overall philosophy and approach to this question, and how will that philosophy result in changes to the way various R&D programs are structured?

A2a. Government support of later-stage development and commercialization activities can be appropriate in areas of high national priority where market failures and other barriers result in under-investment or non-investment by the private sector. For decades, of course, the Federal Government has funded these activities in the defense and aerospace sector where government is the primary customer, and has also funded these activities for biodefense countermeasures, treatments for rare diseases, clean coal technologies, and other areas where relying on private investments alone tends to result in inadequate innovation. Carefully selected government support of pre-competitive R&D and demonstrations can catalyze further private activity and address private sector challenges of under-investment in the innovation process.

Q2b. Relatedly, President Obama's proposed to invest \$150 billion expected to be generated from cap-and-trade revenues into a "clean technologies venture capital" fund. What is your response to concerns that such an activity represents an inappropriate government role and that government-run venture capital operations would inappropriately interfere in private markets, picking "winners and losers" while introducing market uncertainties that significantly reduce private investment? How will this program be structured to guard against such concerns, as well as inappropriate conflicts of interest?

A2b. President Obama has proposed to invest \$150 billion over 10 years from cap-and-trade revenues on clean energy technologies through a broad portfolio of research, early-stage technology development and demonstrations, and other appro-

private government policies rather than exclusively or even primarily on a venture capital fund. A government venture capital fund could be a potential tool to address the early stages of technology development where there is under-investment by the private sector. Use of government funds in this way could catalyze investments in technology areas where private venture firms are unwilling to invest sufficiently but where the potential for contributing to meeting national goals is high. The Administration is focused on investing only in projects in which there are market failures or other barriers that result in under-investment or non-investment by private firms. As in clean-energy projects already funded in the Recovery Act, we are committed to funding projects through competitive, merit-reviewed processes that are transparent and that avoid conflicts of interest and the appearance of political interference in allocation decisions.

Q3. Please describe the specific responsibilities that OSTP's Associate Director for Technology and Chief Technology Officer will undertake, including how such responsibilities may differ from the historical role of the Associate Director for Technology position.

A3. The President has called for elevating the importance of technology in addressing the Nation's most pressing challenges. To that end, he has appointed Anesh Chopra to serve as our nation's first Chief Technology Officer and OSTP Associate Director for Technology. His responsibilities will include:

- 1) **Facilitating Transformation of the Economy through Technology-Based Innovation:** This responsibility builds on the traditional duties of the Associate Director for Technology in convening interagency working groups and working with OSTP, PCAST, and the wider science, technology, and innovation communities on strategies to promote economic growth.
- 2) **Addressing Presidential Priorities Through Innovation Platforms:** This responsibility likewise builds on the historical role of the OSTP Associate Director for Technology in advancing key technology-based initiatives, which in this Administration can be expected to include health IT, smart grid technology, and education technology, with a focus on "game-changing" ideas.
- 3) **Driving Reliable, Resilient Trustworthy Next-Generation Digital Infrastructure:** This responsibility elevates the traditional role of Associate Director for Technology to one serving in a leadership capacity developing the President's Broadband plan and approach to cyber security.
- 4) **Instilling a Culture of Open and Innovative Government:** The President called for the CTO on his first full day in office to collaborate with the Director of OMB and GSA Administrator in the development of an Open Government directive ensuring Federal Government agencies operate in a more transparent, participatory, and collaborative manner.

These specific responsibilities build upon the strong tradition within OSTP of serving as the lead policy advisor on the promise and potential of technology to advance Presidential priorities and national interests.

Q4. The FY09 Omnibus directed NSF to transfer funds to the Coast Guard for ice-breaking activities. However, the FY10 budget request includes language that says NSF "shall only reimburse the Coast Guard for such sums as are agreed to according to the existing memorandum of agreement."

Q4a. What is the current status of ice-breaking services and why the change in the budget language from the Omnibus language?

A4a. As directed by Congress, NSF and USCG have been reviewing the existing Memorandum of Agreement (MOA) that provides guidance for NSF reimbursement to USCG for maintenance and operation of the polar icebreakers. In addition, these agencies continue to work together to address the implementation issues associated with maintenance and training requirements for the POLAR SEA and HEALY. As of 2009, POLAR STAR no longer falls under the MOA and USCG will begin refurbishing this ship with the separate funding it received for 2009. The 2010 Request retains budget authority for operation and maintenance of POLAR SEA and HEALY with NSF because scientific research is still the critical and principal use for these vessels.

Q4b. Does the Administration intend to assess all U.S. ice-breaking needs, including national security and scientific research?

A4b. The Administration is assessing the overarching issues facing us in the Arctic, including those associated with impacts of climate change, increased human activity, new or additional information needs, and conservation of Arctic resources. This

approach will necessarily include identifying any implementation issues associated with the Arctic policy defined by the previous Administration. Additionally, the Coast Guard will soon report out the findings of their 2009 High Latitude Study. These assessments and inputs will enable the Administration to better understand the role of icebreakers in the Arctic and to address specific operational issues in 2011.

Q5. You testify that funding for the Environment, Health and Safety (EHS) and Education and Societal Dimensions (ESD) program component areas (PCA) of the National Nanotechnology Initiative are getting significant increases in FY 2010. How do these increases impact funding for the other, and equally important, six PCAs?

A5. The funding by PCA reported by the agencies reflects the collective areas of relevant emphasis at the agency level. Funding level changes in one PCA do not necessarily imply zero-sum changes in one or more of the others. The increases for nanotechnology-related environmental, health, and safety research as well as education and societal dimensions support essential components of the overall National Nanotechnology Initiative. The balance of funding across PCAs supports synergistic and integrated R&D to most effectively advance nanotechnology innovation. For example, the funding requested for FY 2010 for programs whose primary purpose is to understand and address potential risks to health and to the environment posed by nanotechnology is up nearly 30 percent over 2008 actual expenditures. (These funding figures do not include substantial research on instrumentation and metrology and on fundamental interactions of nanomaterials with biological systems represented in other PCAs.) Research under these PCAs is also critical for conducting and informing toxicological research. Such consistent and integrated support for research is essential for achieving the economic and societal benefits of applied nanotechnology.

Questions submitted by Representative Vernon J. Ehlers

Q1. In the hearing, you mentioned that education was being funded throughout NSF and not just in the Education and Human Resources Directorate. However, the rate of requested funding within EHR is substantially lower when compared with the rest of the agency (1.5 percent vs. 8.5 percent). Could you please detail how the disproportionate increase will be reconciled by education funding in the other directorates? Also, OSTP-prepared tables indicate that total STEM education funding across the federal agencies will only increase by 2.7 percent in FY 2010. This sends a message inconsistent with the Administration's strong language about support for STEM Education. Could you please help me understand why STEM Education receives only an inflationary increase in funding?

A1. NSF is committed to integrating education into its full range of activities. There are substantial increases in science and math education programs across NSF; the increase for programs included in the Foundation's agency-wide "learning" strategic plan goal is 7.3 percent, to \$962 million. The 1.5 percent increase mentioned in the question is only for NSF's Education and Human Resources Directorate budget. NSF has also allocated an additional \$262 million in Recovery Act funding to NSF's "learning" programs. This Recovery Act funding alone represents a 31 percent increase over 2008 levels.

Q2. The NSF budget detail shows that "K-12 Education Programs" will drop 4.7 percent compared to FY09 enacted. I am very concerned this reflects a focus on exclusively graduate education. Please explain why K-12 programs at NSF will receive sufficient funding in FY10 while suffering an almost five percent decrease.

A2. OSTP believes that NSF K-12 programs are sufficiently funded in the 2010 Budget at \$57 million. Although there is an apparent decrease of 4.7 percent in the 2010 Budget compared to 2009 Enacted, these programs also received \$25 million in the Recovery Act, an infusion of funds exceeding 50 percent of 2008 funding. We also note that the \$57 million for K-12 programs in the 2010 Budget is 21 percent greater than the 2008 funding level.