# THE ADMINISTRATION'S FISCAL YEAR 2011 RESEARCH AND DEVELOPMENT BUDGET PROPOSAL

## HEARING

BEFORE THE

## COMMITTEE ON SCIENCE AND TECHNOLOGY
## HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

FEBRUARY 24, 2010

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**February 24, 2010**

# THE ADMINISTRATION'S FISCAL YEAR 2011 RESEARCH AND DEVELOPMENT BUDGET PROPOSAL

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**WEDNESDAY, FEBRUARY 24, 2010**

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

The Committee met, pursuant to call, at 9:30 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

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Hearing on

***The Administration's FY 2011 Research and Development Budget Proposal***

**Wednesday, February 24, 2010**
**9:30 a.m. – 11:30 a.m.**
**2318 Rayburn House Office Building**

**Witness List**

***Dr. John Holdren***
*Assistant to the President for Science and Technology*
*Director of the Office of Science and Technology Policy*
*Co-Chair of the President's Council of Advisors on Science and Technology*

HEARING CHARTER

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

# The Administration's FY 2011 Research and Development Budget Proposal

WEDNESDAY, FEBRUARY 24, 2010
9:30 A.M.–11:30 A.M.
2318 RAYBURN HOUSE OFFICE BUILDING

## 1. Purpose

On Wednesday, February 24, 2010, the Committee on Science and Technology will hold a hearing to examine the Administration's proposed fiscal year (FY) 2011 funding for Federal research, development, demonstration, and commercial application programs, in particular at agencies within the jurisdiction of the Committee. In addition, in preparation for a reauthorization of the 2007 America COMPETES Act, the Committee will examine the status of programs authorized in the 2007 Act, as reflected in the Administration's budget request.

## 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-Chair 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 2011 R&D Budget Request

The President's FY 2011 budget proposes a total of $147.7 billion for research and development (R&D) across all agencies, a $343 million or 0.2 percent increase over the FY 2010 enacted level.[1] The budget would decrease for defense-related R&D, and increase by $3.7 billion (5.9 percent) to $66 billion for nondefense R&D, most of which is categorized as "basic and applied research" ($61.6 billion). Funding for all research, development, demonstration, commercial application and science, technology, engineering and mathematics (STEM) education activities at agencies and offices under the Committee's jurisdiction totals approximately $44 billion in the FY 2011 request.[2]

The FY 2011 request would keep the three science agencies authorized in the COMPETES Act—the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), and the Department of Energy's (DOE) Office of Science on a 10-year doubling path initiated in theory in 2007 but not realized until 2009. The Administration is requesting a total of $13.3 billion for those three agencies to keep them on track for doubling by 2017. It maybe helpful to think of this growth path in terms of its annual rate of increase, which for 10 years equals ~7 percent. The COMPETES Act put those same three agencies on a seven-year doubling path (10 percent annual growth), reflecting a compromise between the House's proposal for 10 years and the Senate's proposal for five years.

The Administration's FY 2011 budget also places priority on STEM education across the agencies. The total federal funding for STEM at all levels would be $3.7 billion in FY 2011, including $1 billion, representing a 40 percent increase, for K–12 STEM education. Of that $1 billion, nearly half would be at the Department of Education: $300 million for the proposed Effective Teaching and Learning in STEM program, and $150 million through the Investing in Innovation (i3) program. The

[1] The FY 2010 enacted level does not include any carryover from the estimated $21.5 billion in R&D funding in the American Recovery and Reinvestment Act, which included $10.4 billion for NIH; $3.0 billion for the NSF; $5.5 billion for DOE; $580 million for the NIST; $1.0 billion for NASA; and $830 million for the NOAA, all to be spent by the end of FY 2010.

[2] This 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.

rest of the funding is spread across the Federal science agencies. Three STEM priorities of note are: RE-ENERGYSE (more on that below under the DOE summary), strong support for graduate research fellowships, and increased focus on research and evaluation.

**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,* COMPEIES 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 2008–10 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 semiautonomous 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**

DEPARTMENT OF ENERGY

The Department of Energy supports a wide range of basic and applied research activities and world-class research facilities within the Science and Technology Committee's jurisdiction.

***The Office of Science***

The total FY 2011 budget request for the Office of Science (SC) is $5.1 billion, a 4.4 percent increase ($217 million) over FY 2010 enacted level. SC's responsibilities are in three main areas: selection and management of research; operation of world-class, state-of-the-art scientific facilities; and design and construction of new facilities. SC supports basic research in the following areas: fundamental research in energy, matter, and the basic forces of nature; biological systems; climate change and the environmental consequences of energy production, development, and use; fundamental science that supports the foundations for new energy technologies and environmental mitigation; a knowledge base for fusion as a potential future energy source; and advanced computational and networking tools critical to research. The Office of Science also supports several ongoing interagency initiatives such as the U.S. Global Change Research Program ($191.2 million); the Climate Change Technology Program ($706.2 million); Networking and Information Technology Research and Development ($461.9 million); and the National Nanotechnology Initiative ($331.3 million).

***Advanced Research Projects Agency—Energy (ARPA–E)***

The Administration requests approximately $300 million for ARPA–E to support new projects and program direction. As envisioned by the *Gathering Storm report,* and authorized by the *America COMPETES Act,* the Advanced Research Projects Agency—Energy (ARPA–E) is responsible for funding specific high-risk, high-payoff, game-changing R&D projects to meet the Nation's long-term energy challenges. The mission of ARPA–E is to overcome the long-term and high-risk technological barriers in the development of energy technologies by sponsoring research and technology development that industry alone is unlikely to undertake.

The Omnibus Appropriations Act of 2009 provided $15.0 million to stand up the ARPA–E program, and the 2009 Recovery Act provided $400 million to carry out program activities through FY 2010. In FY 2009, ARPA–E released its first Funding Opportunity Announcement, and received 3700 responses. Ultimately 37 awardees were chosen. Proposals for the second round of funding were due in mid-January and despite the narrow technical scope the agency still received over 600 proposals. A third funding opportunity will be released in the spring of 2010.

***Nuclear Energy***

The Administration request for the Office of Nuclear Energy (NE) R&D is $503 million, an eight percent increase ($37 million) over the FY 2010 enacted level, with close to 80 percent of that request dedicated to the Fuel Cycle R&D and Reactor Concepts RD&D programs. The Administration has reorganized NE to focus primarily on closing the nuclear fuel cycle and developing advanced nuclear reactor technologies. These changes include, a zeroing out of the Nuclear Power 2010 program, moving the Generation IV Nuclear Energy Systems program into the newly created Reactor Concepts RD&D program, and the creation of the Nuclear Energy Enabling Technologies (NEET) program to develop cross-cutting technologies. In addition to the reorganization of NE's funding and programming, the President recently announced the formation of a Blue Ribbon Panel to examine alternative solutions to waste storage and issue a final report in two years.

***Energy Efficiency and Renewable Energy***

The Administration's proposal of $2.35 billion for the Office of Energy Efficiency and Renewable Energy (EERE) represents a 5 percent ($112 million) increase from the FY 2010 enacted level. The Administration proposes significant increases for investment in large-scale demonstrations in biopower, concentrating solar power, offshore wind, and advanced conventional water power. Vehicle technology research would also receive a significant increase, while hydrogen related research would fall. Energy efficiency activities would continue to support R&D for innovative new building technologies and a new focus on retrofitting existing buildings.

**Fossil Energy**

The Office of Fossil Energy's budget was reduced by $191 million, reflecting a commitment to carbon capture and sequestration (CCS) technology development and a shift in focus away from natural gas and oil R&D. Neither the Natural Gas Technologies program nor the Unconventional Fossil Energy Technologies program received funding and the gas hydrates initiative has been shifted over to the Office of Science.

**Energy Innovation Hubs**

The FY 2011 budget request proposes funding of $34 million for the establishment of a new Energy Innovation Hub to specialize in Batteries and Energy Storage. This is in addition to requests of $24 million each for three ongoing hubs initiated in FY 2010—Fuels from Sunlight; Energy Efficient Buildings; and Nuclear Modeling and Simulation. The new Batteries and Energy Storage Hub will be housed under the Office of Science—Basic Energy Sciences program.

Plans for eight Energy Innovation Hubs were announced in FY 2010 with proposed budgets of approximately $25 million each to support very large interdisciplinary teams focused on overcoming specific energy technology challenges. No federal funds for Hubs can be used for construction of permanent infrastructure, and all awardees must re-compete every five years.

***RE-ENERGYSE***

For the second year in a row the Administration is including a proposal to fund **RE-ENERGYSE** (Regaining our ENERGY and Science and Engineering Edge) with

a suggested appropriation of $55 million for FY 2011. This would support a broad range of workforce education and training activities at universities and community colleges for students interested in pursuing careers in energy. RE-ENERGYSE is intended to be a DOE-wide initiative. However, the majority of funding—$50 million—comes out of EERE, with an additional $5 million requested under the Nuclear Energy program. The National Science Foundation is proposing to contribute an additional $19 million through five existing NSF programs, although this $19 million approximates what NSF is already spending on energy specific proposals under those programs.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The FY 2011 budget request for NASA is $19.0 billion. The proposal represents an increase of 1.5 percent over the enacted FY 2010 appropriation of $18.7 billion for NASA. The President's FY 2011 request for NASA includes a projected increase in NASA's topline budget of $6 billion over five years as compared to the FY 2010 request runout. Specifically, the FY 2011 budget request proposes $19.45 billion for FY 2012, $19.96 billion for FY 2013, $20.6 billion for FY 2014, and $20.99 billion for FY 2015. Within the proposed FY 2011 budget for NASA, an additional $600 million in FY 2011 is provided to ensure the safe completion of the Space Shuttle manifest through the first quarter of FY 2011, if needed. The budget request also assumes extension of the operations and utilization of the International Space Station from 2016 to at least 2020. However, the Constellation Program, which includes the Ares 1 crew launch vehicle and the Orion crew exploration vehicle, would be cancelled under the proposed budget request. In so doing, the budget request does not support the goal of returning Americans to the Moon by 2020 that was articulated in the FY 2010 budget request. In its place, the Administration proposes three new technology initiatives that total $13.9 billion over five years that it describes as exploration-related and proposes to spend $6 billion over five years in the development of commercial human spaceflight vehicles. The budget also initiates an agency-wide space technology program that is incorporated into a new Aeronautics and Space Research and Technology account, and provides an increase of approximately $1.8 billion over four years for Earth observations and climate satellites and research, as compared to the FY 2010 request.

The FY 2011 budget request appears to be responsive to the NASA Authorization Act of 2008 [P.L. 110–422] in a number of areas, but diverges markedly from other areas of policy direction in the Act. Areas where the budget reflects direction and priorities established in the 2008 Act include: support for NASA's Earth Science Decadal Survey missions; support for aeronautics R&D on "green aviation"; support for extension of the operation and utilization of the International Space Station to at least 2020; and funding for exploration-related technology development activities. In addition, the request provides initial funding, in combination with funds requested for DOE, for restarting the domestic production of plutonium-238. The Administration's request for FY 2011 diverges from the 2008 Act in its proposed cancellation of the Constellation Program and in its investment in the development of commercial crew human spaceflight vehicles as the only potential direct U.S. access to the International Space Station, following the retirement of the Shuttle. The 2008 Act had made clear that the Congressional intent for a congressionally authorized commercial crew initiative *"not come at the expense of full funding of the amounts authorized . . . and for future fiscal years, for Orion Crew Exploration Vehicle development, Ares I Crew Launch Vehicle development, or International Space Station cargo delivery."* In addition, while the FY 2011 request for NASA focuses heavily on advanced technology development, the request does not propose funding for advanced technology development within the Science Mission Directorate, as directed in the 2008 Act.

NATIONAL SCIENCE FOUNDATION

The National Science Foundation budget request for FY 2011 totals $7.424 billion, $552 million or 8.0 percent more than FY 2010 funding (not including any 2010 carryover in the $3.0 billion included for NSF in the 2009 Recovery Act). However, when funding for U.S. Coast Guard Icebreakers ($54 million) is counted appropriately, the real growth is 7.2 percent.[3] This level of funding keeps NSF on a 10-

[3] In 2005, NSF signed an MOU with the US Coast Guard (USCG) in which NSF agreed to take over M&O budgetary authority for USCG Icebreakers operating in the Arctic and Antarctic. The rationale at the time was that 90+ percent of the USCG icebreakers time was dedicated to supporting NSF's science missions at the Poles. In FY 2010, the Appropriators required that budgetary authority be shifted back to USCG (P.L. 111–117). As a result, $54 million is

year doubling path. 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. The budget for NSF 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***

The Administration's budget would provide $6.02 billion for Research and Related Activities (R&RA) in FY 2011, an increase of $401 million or 7.1 percent over FY 2010 funding (NSF budget documents report 8.2 percent growth—see footnote on icebreakers). R&RA is made up primarily of six disciplinary directorates. The largest relative increases went to Engineering (+11 percent) and Computer and Information Science and Engineering (+10.6 percent). Geosciences, which funds atmospheric, earth and ocean sciences, including most of NSF's climate change research; and Biological Sciences, which funds 68 percent of all non-medical academic research in the life sciences, including environmental biology, also saw greater than 7 percent increases. Social, Behavioral and Economic Sciences received a 5.3 percent increase, and the Mathematical and Physical Sciences Directorate, the largest by far at NSF with a proposed $1.4 billion in FY 2011, received a 4.3 percent increase.

The Administration's R&RA priorities for FY 2011 included a significant increase in funding for three programs labeled by NSF as "innovation" programs, including Partnerships for Innovation ($19.2 million), Science and Engineering Beyond Moore's Law ($70.2 million), and NSF's Centers programs ($313.8 million across NSF). The cross-cutting area of research that received the most significant boost in the FY 2011 budget is climate change science. The Administration proposes $370 million for NSF's contribution to the U.S. Global Change Research Program.

**Education and Human Resources**

The Education and Human Resources (EHR) Directorate, which funds education and broadening participation programs at all levels "from K to gray," would be funded at $892 million in FY 2011, an increase of only $19.2 million or 2.2 percent over FY 2010 funding. The Administration continues to offer a mixed message regarding this treatment of EHR relative to the healthy increase for R&RA. On the one hand, they point out that funding for EHR alone represents an incomplete picture of the many education and training programs and activities distributed across NSF. On the other hand, they maintain that NSF is primarily a research agency and that the Department of Education (DoED) has a greater responsibility for education, especially at the K–12 level. Significant funding ($450 million) is requested for STEM education at DoED in the FY 2011 budget.

In the 2007 COMPETES Act, the Committee expanded teacher training programs at NSF, including the Noyce Teacher Scholarship Program and the Math and Science Partnerships Program (MSP). In the FY 2011 budget, Noyce would be funded at $55 million, the same level since FY 2009, and MSP would be funded at $58.2 million, the same level as in FY 2010 and a small decrease from FY 2009 funding. Both Noyce and MSP received significant funding in the Recovery Act ($60 million and $25 million, respectively).

Of particular note in the ERR budget is the proposed restructuring of programs to broaden participation in STEM at the undergraduate level. NSF is proposing a new comprehensive broadening participation program that builds on three existing programs: Historically Black Colleges and Universities Undergraduate Program (HBCU–UP), Louis Stokes Alliances for Minority Participation (LSAMP) and Tribal Colleges Undergraduate Program (TCUP), and newly invites proposals from Hispanic Serving Institutions, consistent with the mandate in Sec. 7033 of the COMPETES Act. Funding for this newly consolidated program would be $103 million in FY 2011, a $13 million or 14.4 percent increase from the total FY 2010 funding for HBCU–UP, LSAMP and TCUP.

***Major Research Equipment and Facilities Construction (MREFC)***

The MREFC request for FY 2011 is $165 million, an increase of $41 million from FY 2010. MREFC also received $400 million in the Recovery Act to initiate construction on three projects, two of which will continue to receive funding in FY 2011. The only new start in FY 2011 is the National Ecological Observatory Network (NEON), which passed final design review in November.

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excluded from the FY 2010 NSF budget total, thereby obscuring the true growth in funding for NSF's programs.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

The FY 2011 NIST Budget Request proposes a funding level of $918.9 million, a 7.3 percent increase over the FY 2010 enacted budget. The budget would provide $584.5 million for NIST's core Scientific and Technical Research and Services (STRS); $124.8 million for Construction of Research Facilities (CRF); $129.7 million for the Manufacturing Extension Partnership (MEP) program; and $79.9 million for the Technology Innovation Program (TIP). The NIST FY 2011 budget request reflects the Administration's overarching priorities to promote U.S. innovation and competitiveness in energy and green technology, manufacturing, healthcare, cybersecurity, and disaster resilient buildings and infrastructure.

***Research and Facilities***

The FY 2011 NIST budget requests $584.5 million for the agency's Scientific and Technical Research Services (STRS). The STRS increase of $69.4 million (13.5 percent) over FY 2010 encompasses a number of new initiatives to address the critical national priorities mentioned above. For instance, the request includes $10 million for a new Green Manufacturing and Construction initiative, focused on the development of accurate metrics to assess environmental sustainability in manufacturing, and on research and measurement data to better assess the energy performance of buildings. In healthcare, in addition to continuing work on Healthcare Information Technology standards, the budget also includes a $10 million initiative to support measurement science for the development of complex biologic drugs.

The FY 2011 budget request for CRF is $124.8 million, a 15.1 percent decrease from the FY 2010 enacted budget. Last year's budget included $47 million in Congressionally directed funding, which the agency did not request this year. The requested CRF funds would support completion of the Boulder lab renovations and address maintenance needs at the Gaithersburg Laboratories.

***Industrial Technology Services (ITS)***

The $129.7 million request for the MEP program is a four percent increase from FY 2010 enacted level. 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. The increase in the FY 2011 budget proposal would direct funds to innovation services for small and medium-sized manufacturers to accelerate technology adoption, promote environmentally sustainable practices, support market diversification, and improve workforce capabilities. The FY 2011 request for the Technology Innovation Program (TIP) is $79.9 million, a $10 million increase over FY 2010 enacted. 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.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The National Oceanic and Atmospheric Administration's (NOAA) budget request for FY 2011 is $5.55 billion, a 17 percent ($806 million) increase over the FY 2010 enacted level. The bulk of this increase is allotted for the National Environmental Satellite Data Information Systems (NESDIS) office, and more specifically for the Joint Polar Satellite System (formerly—National Polar-orbiting Operational Environmental Satellite System (NPOESS)). Specifically, NOAA is requesting an increase of $678.6 million to $1.061 billion for the new Joint Polar Satellite System. The increased funding will permit the agency to initiate work on its first satellite for mid-afternoon orbit coverage under the program. The balance of the funds permit NOAA to complete and launch the NPOESS Preparatory Project (NPP) satellite, which will now bridge the gap between NOAA's current satellites and the new generation. Additional detail on NPOESS restructuring is provided in Section 6 below.

DEPARTMENT OF HOMELAND SECURITY

The FY 2011 budget for the Department of Homeland Security Science and Technology Directorate (DHS S&T) would increase by 0.5 percent from FY 2010 enacted. However, this increase includes the transfer of research programs from the DHS Domestic Nuclear Detection Office (DNDO) to DHS S&T. When not including the new radiological and nuclear research portfolio, the DHS S&T budget would decrease by 12 percent. Overall, research priorities remain similar to previous years and the budget cut is enacted uniformly across the divisions with one exception: the Infrastructure and Geophysical Division was cut by 50 percent, eliminating two Congressionally directed programs that supported local, community-based terrorism re-

sponse and mitigation research programs. The move of radiological and nuclear research from DNDO to S&T will consolidate all DHS basic research within S&T and increase the efficiency and effectiveness of the research.

Overall, the DHS DNDO budget decreased by 20 percent, with the majority of this budget cut coming from the transfer of radiological and nuclear research to S&T. Additionally, DNDO is shifting priorities away from the research, development and deployment of a few specific technologies to a focus on understanding capability gaps in all sectors of homeland security and law enforcement while increasing test and evaluation programs to identify potential solutions.

## 6. SELECTED INTERAGENCY PROGRAMS

Restructuring NOAA's Polar Satellite Program (NPOESS)

As part of a tri-agency effort with NASA and the Department of Defense (DOD), NOAA has invested for several years in the development of the National Polar-orbiting Operational Satellite System (NPOESS), which is the next generation of polar-orbiting weather satellites that serve both civilian and military weather forecasting and climatology needs. However, NPOESS has suffered a string of cost increases (from $6.9 billion at the Program's outset to the Government Accountability Office's (GAO) current estimate of $15 billion) and schedule delays (some five years for the first satellite launch) that now threaten the continuity of reliable high-quality weather and climate data.

Reviews of NPOESS have blamed the cost and schedule overruns on the program's organizational structure, which places direction and decision-making authority with an Executive Committee consisting of the three agencies, rather than with a single agency. In the FY 2011 budget, the Administration is proposing a significant reorganization of NPOESS. Instead of being combined in a single program, NOAA and NASA will separate from DOD. NOAA and NASA will be responsible for the satellites flying in "afternoon" orbits (i.e. passing over sunlit regions of the Earth at local afternoon) while DOD will take control of the spacecraft flying early morning orbits. The two groups will procure their satellites separately; for the civilian side, NASA will perform the acquisition management in much the same way it handles such tasks for NOAA's geostationary weather satellites. NOAA will now refer to its portion of NPOESS as the **Joint Polar Satellite System** (JPSS). The program will continue to rely on European satellites for coverage in a third orbit.

Global Climate Change Research Program (USGCRP)

The FY 2011 budget request proposes a $439 million increase (or 21 percent) over FY 2010 for a total of $2.56 billion in funding for integrated climate and global change research conducted under the U.S. Global Change Research Program (USGCRP) umbrella, bringing federal climate research funding to the highest level ever. Started in 1989, the USGCRP is an interagency effort comprised of 13 departments and agencies. Activities of the USGCRP are grouped under the following areas: improving knowledge of Earth's past and present climate variability and change; improving understanding of natural and human forces of climate change; improving capability to model and predict future conditions and impacts; assessing the Nation's vulnerability to current and anticipated impacts of climate change; and improving the Nation's ability to respond to climate change by providing climate information and decision support tools that are useful to policymakers and the general public.

National Nanotechnology Initiative (NNI)

The Science and Technology Committee was instrumental in the development and enactment of the 21st Century Nanotechnology Research and Development Act of 2003 (P.L. 108–153), which authorizes the National Nanotechnology Initiative (NNI). 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. There are currently 26 federal agencies that participate in the NNI, with 13 of those agencies reporting a nanotechnology R&D budget. A bill to reauthorize NNI (H.R. 554) is pending in the Senate.

The FY 2011 budget request proposes $1.8 billion for NNI, a $5 million decrease from FY 2010 enacted. The most significant decrease in funding (~20 percent, or $87 million) is at DOD, where the Administration did not request funding for Congressionally directed projects funded in FY 2010. But NSF's contribution to NNI also decreases some, while DOE's and Health and Human Services' contributions increase significantly. Overall, environmental, health and safety (EHS) research

would increase by 22 percent to $119 million and nanomanufacturing R&D would be a new focus at several agencies, with total funding of $87 million.

Networking and Information Technology R&D Program (NITRD)

Similarly, the S&T Committee was instrumental in the development of the multi-agency Networking and Information Technology Research and Development (NITRD) program through the High Performance Computing Act of 1991 (P.L. 102–194). The mission of the NITRD program is to accelerate progress in the advancement of computing and networking technologies and to support leading edge computational research in a range of science and engineering fields. Currently, 13 Federal agencies contribute funding to the NITRD program and additional agencies, such as DHS, participate in planning activities.

The Administration proposes $43 billion for NITRD in the FY 2011 budget, a decrease of $9 million from FY 2010 enacted. The key NITRD agencies, including NSF, DOE and HHS (because of health IT) increase their contributions to NITRD in FY 2011. DOD's funding is decreased by $171 million, again accounted for by Congressionally directed projects.

Chairman GORDON. This hearing will come to order.

Good morning and welcome to the Science and Technology Committee hearing on Research and Development in the President's fiscal year 2011 budget request. Recognizing that we are in a time of constrained budgets and have some very tough choices that have to be made, I was very happy to see strong increases for research and development in the President's budget.

Ironically, it is during these difficult economic times that we have both an imperative and an opportunity to invest in our future economic growth through science, technology and STEM education. It is an imperative because we must lay the foundation for future discoveries and transformative technologies such as the internet. That foundation involves investing in cutting-edge research, as well as in the mechanisms that facilitate technology transfer and innovation that translates into 21st century jobs and improved standard of living. It also requires investing in the education and training of a workforce prepared for those high-skills, high-paying jobs generated through innovation. So I am happy to see such a focus on STEM education in the President's budget.

But business as usual will not be enough to maintain our lead, and to keep our own and the world's best talent here in the United States, especially as other countries rapidly increase their own investments in science and technology. In 2007, we bucked business as usual and created ARPA–E as a whole new model of funding high-risk, but potentially transformative clean energy research. While I was hoping for more, I was pleased to see the strong support of ARPA–E in the President's budget.

And I want to thank Dr. Holdren for appearing before the Committee today to discuss how he can work, where we can work together to achieve these goals, and I am sure we will not be surprised, or he will not be surprised, by my colleagues and I having some questions and concerns about particular agencies and programs within the budget. So I look forward to a productive discussion about these issues.

And now I recognize Mr. Hall for an opening statement.

[The prepared statement of Chairman Gordon follows:]

PREPARED STATEMENT OF CHAIRMAN BART GORDON

Good morning and welcome to this Science and Technology Committee hearing on Research and Development in the President's fiscal year 2011 budget request. Recognizing that we are in a time of constrained budgets and some very tough choices had to be made, I was very happy to see strong increases for research and development in the President's budget.

Ironically, it is during these difficult economic times that we have both an imperative and an opportunity to invest in our future economic growth through science, technology and STEM education. It is an imperative because we must lay the foundation for future discoveries and transformative technologies such as the internet. That foundation involves investing in cutting edge research, as well as in the mechanisms that facilitate technology transfer and innovation that translates into 21st century jobs and improved standard of living. It also requires investing in the education and training of a workforce prepared for those high-skills, high-paying jobs generated through innovation. I am happy to see such a focus on STEM education in the President's budget.

But business as usual will not be enough to maintain our lead, and to keep our own and the world's best talent here in the U.S., especially as other countries rapidly increase their own investments in science and technology. In 2007, we bucked business as usual and created ARPA–E as a whole new model of funding high-risk, but potentially transformative clean energy research. While I was hoping for more,

I was pleased to see strong support for ARPA–E in the President's budget. These economic downturns present us with an opportunity to take a step back and think about how to innovate throughout our science and technology enterprise.

I want to thank Dr. Holdren for appearing before the Committee today to discuss how we can work together to achieve these goals. And I'm sure you will not be surprised that my colleagues and I also have some questions and concerns about particular agencies and programs within the budget. I look forward to a productive discussion about these issues.

Mr. HALL. Mr. Chairman, thank you. I had some words I wanted to say about Dr. Ehlers, but he stepped out and he is my age. I guess he has gone to the bathroom. I will kind of wait and cut in later. I sat up all night writing it.

I thank you, Chairman Gordon, good chairman, for calling this hearing, and Dr. Holdren, I think I want to welcome you here today and thank you for your service as Director of the Office of Science and Technology Policy. I am going to try to be firm but polite. Today's hearing obviously covers a great deal of ground, so I will still try to be brief. At the same time, there are some specific points that I would like to address before we hear from you.

First of all, none of us here dispute the magnitude and importance that a robust federal research and development enterprise has on our economy, our National security and our ability to be globally competitive. As you know, doubling the funding in key areas of basic research is the most important innovation in long-term economic competitiveness, and that has long been a priority of this committee. The President continues his commitment in the fiscal year 2011 budget but we also need to recognize that we are in a very difficult economy, a much more difficult economy than we were in when we originally set down this path with the *America COMPETES Act*. While being supportive of strong funding for basic research, I am concerned with where this budget is taking us and the way the Administration is choosing to direct the American taxpayers' research dollars.

Let us start with NASA. I have never been more concerned for the future of America's human spaceflight program. The Administration's own Augustine panel recommended that a human spaceflight program worthy of a great Nation would require a clear direction and adequate funding. Unfortunately, this Administration proposes to eliminate billions of dollars from human spaceflight at a critical and precarious time by shifting funding to other areas of NASA. On the eve of the completion of the International Space Station and the retirement of the space shuttle, I cannot understand how the Administration can propose such radical policy changes without a clear defined plan forward with measurable goals. This is a dangerous path that not only threatens our leadership and our highly skilled workforce but also threatens the very existence of America's human spaceflight efforts and the utilization of the International Space Station. I hope someone has a better substitute, but I doubt it.

Next, the Administration's nonchalant response to the leaked e-mails from the climate research unit at the University of East Anglia. It contradicts your commitment to scientific integrity. It was my hope that your concern would rise to the level of mine. The continued assertion that the e-mails do nothing to undermine the veracity of the science presented by the IPCC gives us further

pause of the ability of the objective in these matters. A long time ago, scientific consensus found the world to be flat but challenging that consensus provided us with the truth.

The Administration has also changed course in several other key areas, the direction of which places significant sums of taxpayer money in jeopardy. Your office announced the dissolution of the National Polar-orbiting Operational Environmental Satellite System, or NPOESS program. The tri-agency project structure including NASA, NOAA and DOD spent the last 16 years developing the next generation of weather satellites at a cost of more than $14 billion dollars, although the way that this program was structured almost doomed it to fail. We are about a year away from finally launching the first satellite. Now the Office of Science and Technology Policy decides to change program parameters by splitting the program with over $14 billion dollars of taxpayer funding already invested. The shift in program structure comes with no analysis or explanation as to whether it will be cost-effective, lower the inherent risk and deliver this project on time.

Similarly, the Administration announced a desire to formally withdraw with prejudice a license application for Yucca Mountain, effectively eliminating Yucca Mountain as an option for the permanent storage of nuclear waste. After 25 years of scientific and engineering analysis and at a cost of $10 billion dollars, the Administration provided no details as to the rationale, whether scientific, economic or other, for killing this option. With no alternative proposal provided, the Administration asked that we wait an additional two years for the results of the blue ribbon panel just announced.

All of these examples illustrate a troubling pattern in the Administration's science policy decisions. These decisions should not only be based on sound science and sound economics but should also consider the long-term ramifications. I fear that the current decisions being made do not reflect these considerations. As the President's principal scientific advisor, your task is to ensure scientific integrity and prudent investment so as to provide sound science that is good for the entire Nation, not just this Administration.

Dr. Holdren, we remain committed to assisting you as we move forward but hope you will take the message back to the President that we have significant concerns with the present course, and I thank you again for being with us and I do look forward to your testimony.

If I might have another just a minute or so say a word about Dr. Ehlers. He is back. Good. Mr. Chairman, before we proceed together anymore today, I know you share in my feelings and I will take a moment to recognize someone that I believe that we have found to be a tremendous asset not only to this committee but also to his constituents, the scientific community and the entire Nation. Vern Ehlers, or the Professor, as I call him, announced last week that he is ready to leave Washington and return to his beloved Michigan at the end of the Congress. As I am sure you will agree, it is unlikely that anyone will be able to fill his shoes. I just wanted to take this opportunity to tell him what a valuable contribution he has made to this committee. We will hear today about the President's plan for STEM education. No one in the history of this body

has worked more tirelessly or effectively on this issue, and we all owe him a debt of gratitude. He embodies qualities of a true statesman, a man of integrity and tenacious in his beliefs yet willing to compromise when in the best interests of the country. He is a gentle fighter.

Fortunately, he isn't going anywhere for a while so I suggest all of us on both sides of the aisle and you too, Dr. Holdren, glean every ounce of intelligence from him while we can. There is much to be learned from this gentleman, and I am not just referring to science. I yield back my time.

[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 2011 Research and Development (R&D) Budget and related science and technology policy priorities.

Dr. Holdren, I would like to welcome you here today and thank you for your service as Director of the Office of Science and Technology Policy. Today's hearing obviously covers a great deal of ground, so I will try to be brief. At the same time, there are some specific points that I would like to address before we hear from you.

First of all, none of us here dispute the magnitude of importance that a robust federal research and development enterprise has on our economy, our national security, and our ability to be globally competitive. As you know, doubling the funding in key areas of basic research most important to innovation and long-term economic competitiveness has long been a priority of this Committee. The President continues this commitment in the FY 2011 budget, but we also need to recognize that we are in a very different economy than we were when we originally set down this path with the *America COMPETES Act.* While being supportive of strong funding for basic research, I am concerned with where this budget is taking us and the ways the Administration is choosing to direct the American taxpayer's research dollars.

Let's start with NASA. I have never been more concerned for the future of America's human space flight program. The Administration's own Augustine panel recommended that a human space flight program worthy of a great nation would require a clear direction and adequate funding. Unfortunately, this Administration proposes to eliminate billions of dollars from human space flight at a critical and precarious time by shifting funding to other areas of NASA. On the eve of the completion of the International Space Station and the retirement of the Space Shuttle, I cannot understand how the Administration can propose such radical policy changes without a clearly defined plan forward with measurable goals. This is a dangerous path that not only threatens our leadership and our highly skilled workforce, but also threatens the very existence of America's human space flight efforts, and the utilization of the International Space Station.

Next, the Administration's nonchalant response to the leaked e-mails from the Climate Research Unit at the University of East Anglia contradicts your commitment to scientific integrity. It was my hope that your concern would rise to the level of mine. The continued assertion that the e-mails do nothing to undermine the veracity of the science presented by the IPCC give us further pause as to the ability to be objective in these matters. A long time ago scientific consensus found the world to be flat, but challenging that consensus provided us with the truth.

The Administration also has changed course in several other key areas, the direction of which places significant sums of taxpayer money in jeopardy. Your office announced the dissolution of the National Polar-orbiting Operational Environmental Satellite System or NPOESS (*N pose*) program. This tri-agency project structure, including NASA, NOAA, and DOD, spent the last 16 years developing the next generation of weather satellites at a cost of more than 14 billion dollars. Although the way that the program was structured almost doomed it to fail, we are about a year away from finally launching the first satellite. Now OSTP decides to change the program parameters by splitting the program. With over 14 billion dollars of taxpayer funding already invested, this shift in program structure comes with no analysis or explanation as to whether it will be cost effective, lower the inherent risks, and deliver the project on time.

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of scientific and engineering analysis and at a cost of 10 billion dollars, the Administration provided no details as to the rationale, whether scientific, economic or other, for killing this option. With no alternative proposal provided, the Administration asks that we wait an additional two years for the results of a Blue-Ribbon panel just announced.

All of these examples illustrate a troubling pattern in the Administration's science policy decisions. These decisions should not only be based on sound science and sound economics, but should also consider the long term ramifications. I fear that the current decisions being made do not reflect these considerations. As the President's principal scientific advisor, your task is to ensure scientific integrity and prudent investment so as to provide sound science that is good for the entire Nation, not just this Administration.

Dr. Holdren, we remain committed to assisting you as we move forward, but hope you will take the message back to the President that we have significant concerns with the present course.

Thank you again, for being with us, and I look forward to your testimony.

[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 the Administration's Fiscal Year (FY) 2011 budget request for research and development (R&D) programs across the federal government.

The President's budget calls for $147.7 billion for research and development, which will fund an array of R&D projects in nearly every agency in the federal government. This investment represents a $343 million increase in R&D from FY 2010 and keeps three science agencies—the National Science Foundation, the National Institute of Standards and Technology, and the Department of Energy Office of Science—on a 10-year track for doubling funding.

I am pleased to see that the President's budget continues to invest in the America COMPETES Act programs in Science, Technology, Engineering, and Mathematics (STEM) Education. In particular, I was pleased to see the $1 billion investment in K–12 STEM education, a 40 percent increase from FY 2010. I strongly support this funding to attract students to STEM at a young age and improve STEM achievement. The Committee will consider the reauthorization of COMPETES this year. I would like to hear from Dr. Holdren on the impact these investments in STEM education have had on our students, especially in increasing the number of students pursuing STEM through higher education at community colleges, universities, and graduate programs.

I support the increase in funding for two key workforce development and worker training programs: RE–ENERGYSE the Manufacturing Extension Partnership (MEP). First, RE–ENERGYSE provides training and education to prepare our students at community colleges and universities for careers in energy. This important program would receive $55 million through budget, combined with an additional $19 million from the National Science Foundation. Second, MEP is perhaps the single best way to prepare our manufacturers for changes in technology. The budget increases funding for MEP by four percent, requesting $129.7 million, and I am pleased to see the administration's support for this vital program. The Committee must continue to support this program and, through the reauthorization of COMPETES this year, to expand its efforts to promote innovation by small and medium-sized American manufacturers.

I was also pleased to see the Administration's $545 million investment in carbon capture and storage (CCS) R&D, of which I have been a strong supporter. This investment is complimented by $2.4 billion in funding for Renewable Energy and Energy Efficiency R&D, including biofuels and biomass. Together, these investments will allow us to increase our energy independence while continuing to use reliable domestic energy sources, such as clean coal.

Finally, the National Aeronautics and Space Administration (NASA) budget represents a general departure from the NASA Authorization Act of 2008 passed by Congress and signed into law. This departure is seen in the termination of the Constellation program and the $6 billion investment over five years in the development of commercial human spaceflight vehicles. I would like to hear from Dr. Holdren how the Administration plans to work with NASA and this Committee to enact these changes.

I welcome Dr. Holdren, and I look forward to his testimony. 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.

Now is the time to act boldly to produce a more diverse, well-educated workforce in science, technology, engineering, and mathematics (STEM). Federal research agencies can have a major impact on our nation's future competitiveness in these areas. Investments in research and education programs with demonstrated success represent wise stewardship of our nation's resources.

Specifically, we must invest in segments of our population that are not pursuing these areas in order to foster a climate of diversity, creativity and competitiveness. We must also support policies that target gaps in the STEM workforce pipeline—such as the early-career faculty period—where we are losing precious human capital.

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 suggests $7.4 billion for the National Science Foundation, an 8 percent increase over the 2010 enacted level. I recommend more robust funding for NSF Rather than focusing on infrastructure support, I recommend that the Foundation be given robust increases for extramural research and education activities. NSF "Broadening Participation" programs are particularly effective in encouraging women and under-represented minorities to pursue STEM careers.

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 markups.

There is stronger support to broaden participation in science, technology, engineering, and math (also called STEM) than ever before.

I support the President's initial FY 2011 budget request contained language specifying funds to expand the Department of Energy Office of Science to $5.1 billion. The America COMPETES Act of 2007 did authorize funds for several vital education and research programs. These programs should receive funding.

In addition, net metering and smart grid technology investments, as well as ARPA–E, will empower individuals to use energy more wisely. We must boldly move energy efficiency to a personal level with stronger incentives. Some states are excelling at this effort, and greater federal engagement is needed.

I also support funding increases for the Manufacturing Extension Partnership and the Technology Innovation Program within the National Institute of Standards and Technology.

Funding for OSTP has been neglected so severely over the past decade that the administration's team of STEM advisors has dwindled by two thirds. OSTP must be restored to the strong, science-based, consultative body that is needed to coordinate cross-agency science programmatic activities and to liaison with the legislative branch.

Dr. Holdren, 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.

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 partner with you to see this number change.

A National Academies report on minorities and science, technology, engineering, and math is long overdue.

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.

Thank you, and I yield back my time.

Chairman GORDON. Thank you, Mr. Hall. We could spend the rest of the day concurring with you. And Dr. Ehlers, let me say both in the majority and in the minority and on all occasions you have been a leader for this committee, a leader and a champion for

science and technology, and we thank you, and you will be missed from this committee and from this Congress but I am sure your voice won't be silent, so we want you to stay involved in public policy.

Now at this time I want to introduce our witness. Dr. John Holdren is Assistant to the President for the Science and Technology, Director of the White House Office of Science and Technology Policy, and Co-chair of the President's Council of Advisors on Science and Technology, or PCAST. Prior to joining the Obama Administration, Dr. Holdren was the Teresa and John Heinz Professor of Environment Policy and Director of the Program on Science and Technology and Public Policy at the Kennedy School of Government. As our witness knows, his written testimony will be a part of the record. Each Member then will have the opportunity to ask questions for five minutes. I am hoping—as you know, we are all a little bit behind because of the snow. Dr. Holdren was supposed to have testified, I guess it was last week. He made a special effort because we thought it was important to get him up here early to be here today, but he is going to have to leave at 11:30. That is the reason that we started at 9:30 so that we want everybody to have an opportunity to discuss with him. So I am asking people to try to be crisp with their questions because I want everybody to have a chance to get those questions in today.

Dr. Holdren, I will tell you that as we got ready to start the hearing, with Mr. Broun with a big smile on his face, Mr. Hall looked at me and said, "Does he bruise easily?" I told him no, that you had a tough skin. So we are glad to hear from you.

**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. Thank you for that vote of confidence, Mr. Chairman, about bruising.

Chairman Gordon, Ranking Member Hall, members of the Committee, it is a privilege to be here today to testify about the Administration's research and development and science, technology, engineering and math education budget proposals for fiscal year 2011.

I do want to say that I myself have known and worked with Dr. Ehlers on a variety of issues for many years and I would second everything that Ranking Member Hall said about his wonderful qualities. Vern, you will certainly be missed in the Congress. But I, for one, will try to continue to tap your wisdom.

Let me start by saying that the Obama Administration is working hard to keep the Nation on a path out of recession through recovery and into a new era of revitalized economic growth. That means obviously sparking job creation to get millions of Americans back to work, and it means building a new foundation for long-term prosperity that will reach every American family. A crucial element of that effort is the targeted investments that we are making in science, technology and innovation that will lead to new products and services, new businesses and industries, increased American competitiveness and high-quality sustainable jobs.

That strategy includes investments in fundamental and applied research and development that will lead to better technologies and the jobs that go with them for advanced manufacturing, for clean energy, for health care, for environmental protection and remediation, and for national and homeland security. It includes increased use of public-private partnerships to speed up innovation and get the results more rapidly into the marketplace.

It calls for exploration and discovery from the depths of the oceans to the frontiers of space, expanding our knowledge of our world and our universe while igniting the curiosity and ambitions of our young people. And it includes a focus on STEM education—science, technology, engineering and math education—that will support and sustain rather than stifling that curiosity so that we can cultivate the next generation of innovators along with a technology-savvy workforce that competitiveness in the 21st century requires.

Obviously, we need the continued support of the Congress and this committee to get it done, but if there is one message that I want to convey in my comments today, it is that the investments outlined in the President's R&D budget are at the very core of this country's future strength. So I do look forward to working with all of you to make sure, at this very important time in our history when competition abroad is growing and the stakes are increasing, that we keep America on a path that keeps this Nation great for our children and our grandchildren, a path that is built on scientific evidence, on technical progress and prowess, and on a nation of people who are inventors, innovators and makers, not just consumers.

Let me turn to a brief birds-eye view of the fiscal year 2011 R&D budget and then elaborate on just a few highlights. The President's 2011 budget proposes a record $61.6 billion investment in civilian research and development, not including facilities and equipment. That is an increase of $3.7 billion, or 6.4 percent, over the 2010 funding level. Those increases are counterbalanced by some reductions in defense development funding such that the combined defense and non-defense R&D budget would be $147.7 billion. That is just two-tenths of a percent above the enacted 2010 level. Taking inflation into account, it would be a decline of about nine-tenths of a percent in real terms. I think this is a smart R&D budget, one that is fiscally responsible overall with some important targeted increases where investments today can do the most good tomorrow.

Among the highlights, let me first note that this budget does reflect the President's commitment to double the budgets of the National Science Foundation, the DOE's Office of Science and the National Institute of Standards and Technology Laboratories. The President's plan for science and innovation and the *America COMPETES Act* identified those three agencies as key to the fundamental research that underpins our Nation's prosperity and which the private sector won't do enough of because the risks seem too high or the returns too far in the future.

Last year, this Congress and this Administration worked together to put those agencies back on a doubling trajectory that had faltered in the previous Administration, and the 2011 budget main-

tains that trajectory with a 6.6 percent increase for the combined budgets of those agencies.

I also want to highlight the Department of Energy R&D portfolio, which totals $11.2 billion, an increase of 3.8 percent in real terms. It includes $300 million for the Advanced Research Projects Agency for Energy, ARPA–E, that was authorized in the *America COMPETES Act* to fund high-risk, high-reward research that can yield revolutionary changes in how we produce, distribute and use energy. ARPA–E announced its first set of grants last October and in 2010 will make additional awards with Recovery Act funds. The 2011 budget will allow that groundbreaking program to make additional awards next year.

Separately, investments in DOE's Clean Energy R&D Program will help reduce dependence on foreign oil and accelerate America's transition to a low-carbon economy, with funding increases for solar energy, geothermal technology, energy conservation, building technology and nuclear energy.

Let me highlight as well some of our goals within the National Oceanic and Atmospheric Administration, NOAA, which as you know, plays a vital role supporting research on the earth's oceans, atmosphere and marine habitats. The NOAA budget of $5.6 billion is an increase of $806 million over the 2010 enacted level. That will allow NOAA to improve weather and climate services that protect life and property, invest more heavily in restoring our oceans and coasts, and ensure continuity of crucial satellite observations of weather and climate.

I want to emphasize recent progress in this latter area. The large increase in the NOAA budget reflects in part a new architecture for the National Polar-orbiting Operational Environmental Satellite System, NPOESS, which as Ranking Member Hall already mentioned, has been a tri-agency—that is NOAA, DOD and NASA—program that has had a troubled history. Since last August, OSTP has led an Executive Office of the President task force that, in close cooperation with the three partner agencies, has been investigating various options for how to place the NPOESS program on a pathway to success. Earlier this month, the three agencies announced a plan to restructure the program, not to cancel it, not to do away with but to restructure it. That plan is reflected in the 2011 budget. There will be a division of settlement acquisition, but the three agencies will continue to partner in areas that have been successfully shared up until now, including the program's ground and data systems. And I want to assure the Committee that OSTP will remain actively engaged in overseeing the transition to a new structure for this program, which we regard as crucial, as I know you do.

There are many other items in the R&D budget that are worth highlighting, including support for activities in the Next Generation Air Transportation System, NextGen, the added $1 billion dollars for the National Institutes of Health to speed the discovery of new treatments and cures for cancer and other scourges, the added support for the Defense Advanced Research Projects Agency, DARPA, for research in high-priority areas such as night vision, cybersecurity, enhanced GPS and force protection. The more than 25 percent increase in funding for environmental, health and safety

studies under the National Nanotechnology Initiative, and the significant increase in support for the multi-agency U.S. Global Change Research Program mandated by Congress to improve understanding of climate science, expand global observing systems and develop science-based resources to support policymaking and resource management.

But I want to focus on two other areas before my time is up. The first of these is NASA. Our U.S. space program represents not just a grand and inspiring adventure of exploration and discovery but also an indispensable platform for observing what is happening on the earth below, a crucial element of our communications infrastructure and geopositioning capability, and a source of new products, services, businesses and jobs whose potential is barely beginning to be tapped.

The fiscal year 2011 NASA budget proposes a science and technology-centered restructuring of this country's space exploration program that will invest in American ingenuity to enable us to do things in space that are more useful, more exciting and more affordable than returning astronauts to the moon's surface 50 years after we did it the first time, using the last century's technology.

The new approach, which adds $6 billion over the next five years to NASA's budget, includes a vigorous technology development and test program that will begin to reverse decades of underinvestment at NASA in new ideas. By extending the life of the International Space Station, likely to 2020 or beyond, it increases the number of U.S. astronauts who will be working in space over the next decade. By supporting the development of private sector capabilities to lift astronauts into low earth orbit, it will shorten the duration of our reliance solely on Russian launchers for that purpose. And by investing in new game-changing technologies, it gives promise of getting our astronauts to deep space destinations sooner, faster, safer and cheaper than what could realistically have been achieved under the old approach.

Among the priorities included in this year's and outyear budgets for NASA are technologies to reduce the cost and expand the capabilities of future exploration activities including in-orbit fuel storage and refueling, R&D on new launch systems and advanced deep space propulsion, robotic precursor missions to scout human exploration targets, reflying the Orbiting Carbon Observatory, accelerating the development of other satellites, and continuing to increase our understanding of the cosmos through such projects as the follow-on on to the Hubble space telescope.

Finally, just a few words about STEM education. The President has been emphatic about his commitment, which I share, to increase the participation and the performance of American students in science, technology, engineering and mathematics, aiming to improve our performance in competition with other nations from the middle of the pack to the top of the pack over the next decade. The 2011 budget would invest $3.7 billion in STEM education programs across the Federal Government, including an historic $1 billion investment in improving math and science education among K–12 students. That is an increase of over 40 percent in that category. The impact of these investments will be magnified by "Educate to Innovate", a campaign launched by the President last year to moti-

vate and inspire young people to excel in STEM education. That campaign has already mobilized over $500 million in financial and in-kind support from companies, universities, foundations and nonprofits. In addition to those investments, the 2011 budget would provide an additional $1.35 billion in funding for Race to the Top, which provides a competitive advantage to states that commit to a comprehensive strategy to improve STEM education.

The investments in R&D and STEM education proposed in the President's fiscal year 2011 budget reflect his clear understanding of the critical importance of science, technology and innovation in addressing the most compelling challenges our Nation faces, while at the same time respecting the need for overall budgetary restraint under difficult economic conditions. It is a budget intended to keep this country on a path to revitalized economic growth, real energy security, intelligent environmental stewardship, better health outcomes for more Americans at lower cost, strengthened national and homeland security, and continuing American leadership in science and in space.

I look forward to working with this committee to make this vision, the vision of the President's 2011 budget proposal, into a reality, and of course, I will be pleased to try to answer any questions that the members 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, It is my distinct privilege to be here with you today to discuss the R&D and STEM-education components of the President's FY 2011 Budget.

**Administration Initiatives in Science, Technology, and Innovation**

The Obama Administration is working hard to keep the Nation on the path out of recession through recovery and into a new era of revitalized growth. This means sparking job creation to get millions of Americans back to work, and it means building a new foundation for long-term prosperity that will reach every American family. A crucial element of this effort is the targeted investments we're making in science, technology, and innovation (STI) that will lead to new products and services, new businesses and industries, and high-quality, sustainable jobs.

Our STI strategy includes investments in applied research and development that will lead to better technologies—and the jobs that will go with them—for advanced manufacturing, for clean energy, for health care, for environmental protection and remediation, and for national and homeland security. It includes increased use of public-private partnerships to speed up innovation and get the results more rapidly into the marketplace. And it includes investments in the *foundations* of national strength in STI:

- fundamental research and the facilities and equipment needed to do it;
- domains of exploration and discovery from the depths of the oceans to the frontiers of space, expanding our knowledge of our world and our universe while igniting the curiosity and ambitions of our young people; and
- science, technology, engineering, and math (STEM) education that will build on rather than stifle that curiosity and will enable those ambitions, giving us a bigger and better prepared next generation of innovators, along with the tech-savvy workforce that competitiveness in the 21st century requires.

Because President Obama understands the crucial connections linking STI and STEM education to our ability to meet the great challenges before us, his 2011 Budget provides strong and strategic investments in these domains despite the overall budget austerity that the country's fiscal circumstances require. At a difficult time in the nation's history, the President's 2011 Budget proposes to invest in science, technology, and innovation today to meet the challenges of tomorrow. Obviously, we need the continued support of the Congress to get it done. In the remain-

der of this testimony, I elaborate on the reasons the President and I are most hopeful you'll provide that support.

**The Federal R&D Budget**

The President's 2011 Budget proposes a record $61.6 billion investment in civilian research and development, an increase of $3.7 billion or 6.4 percent over the 2010 funding level, reflecting the Administration's firm belief that investment in innovation is the key to building the American economy of the future. This Budget builds on the 2009 and 2010 appropriations approved by Congress, and if passed as proposed would mark the third year in a row of real increases for Federal nondefense R&D and Federal research, following four years of real decline between 2004 and 2008.

These important R&D investments aim to bolster the fundamental understanding of matter, energy, and biology that are at the root of all innovation and to foster significantly new and potentially transformative technologies. While reducing some development funding and scaling back on R&D facilities and equipment, all told, the total (defense and nondefense) R&D budget would be $147.7 billion, just $343 million or 0.2 percent above the 2010 enacted level, or a 0.9 percent cut after adjusting for projected inflation.

Science is also fundamental to ensuring that Americans are safe and secure. That is why the Defense Department budget also devotes $2 billion to basic research, considerably higher than in. 2010, while reducing the Department's overall R&D budget by some $3.5 billion-a reduction in spending achieved in large part by cutting lower-priority weapons-development programs.

**Budgets of Science Agencies**

The 2011 Budget also reflects the President's commitment to double the budgets of the National Science Foundation, a primary source of funding for basic academic research; the DOE's Office of Science, which leads fundamental research for energy and builds and operates accelerators, colliders, supercomputers, and facilities for making nano-materials; and the National Institute of Standards and Technology laboratories, which support a wide range of pursuits from accelerating standards development for health information technology and "smart grid" technologies to conducting measurement science research to enable net-zero energy buildings and advanced manufacturing processes.

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 last year, this Congress and this Administration worked together to finally put these agencies on a doubling trajectory, and the FY 20I I budget maintains that trajectory with a 6.6 percent increase for their combined budgets, totaling $13.3 billion.

I now turn to the budgets of individual agencies in a bit more detail.

*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 2011 Budget requests $7.4 billion for NSF, an increase of 6.9 percent in real terms above the 2010 funding level (8.0 percent in current dollars). This keeps NSF on track to double its budget as promised in the President's Plan for Science and Innovation. In addition, last year the Recovery Act provided $3.0 billion for NSF.

Basic research funding is important not only because it leads to new knowledge and new applications 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, the 2011 Budget continues the President's commitment to triple the number of new NSF Graduate Research Fellowships to 3,000 a year by 2013. The 2011 Budget also requests $64 million 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 also proposes to increase research funding to promote discoveries that can guide societal actions leading to environmental and economic sustainability. The Science, Engineering, and Education for Sustainability portfolio will increase to

$766 million in the 2011 Budget for integrated activities involving climate, environment, and energy. NSF is also committed to enhancing U.S. economic competitiveness with Science-and Engineering Beyond Moore's law, a multidisciplinary research program designed to meet some of today's most daunting computational challenges.

NSF will also be collaborating with the Department of Energy (DOE) on the RE–ENERGYSE (Regaining our ENERGY Science and Engineering Edge) program to attract and educate future American scientists in the clean energy field. NSF's proposed contribution is $19 million and DOE's is $55 million in 2011.

*National Aeronautics and Space Administration (NASA)*

Our U.S. space program represents not just a grand and inspiring adventure of exploration and discovery looking outward at our universe, but also an indispensable platform for observing what is happening on the Earth below, a crucial element of our communications infrastructure and geopositioning capability; and a source of new products, services, businesses, and jobs whose potential is barely beginning to be tapped.

The FY 2011 NASA budget launches a bold new space initiative that invests in American ingenuity to enable us to do things in space that are more useful, more affordable, and more exciting than returning astronauts to the Moon's surface 50 years after we did it the first time, using the last century's technology. The new approach—which adds $6 billion over the next five years for NASA—includes a vigorous technology development and test program that will begin to reverse decades of under-investment in new ideas. By extending the life of the International Space Station, it increases the number of U.S. astronauts who will be working in space over the next decade; by supporting the development of private-sector capabilities to lift astronauts into low Earth orbit it will shorten the duration of our reliance solely on Russian launchers for this purpose; and by investing in new, game-changing technologies it gives promise of getting our astronauts to deep space destinations sooner, faster, safer, and cheaper than what could realistically have been achieved under the old approach.

Let me provide some budget detail. The President's Budget supports the extension and enhanced utilization of the Space Station with a full complement of international crew and laboratories: it provides $2.8 billion in 2011, $463 million more than in 2010, to extend operations of the Space Station past its previously planned retirement of 2016, likely to 2020 or beyond. It funds a technology-demonstration program at $7.8 billion over five years to support the development and demonstration of technologies to reduce the cost and expand the capabilities of future exploration activities, including in-orbit refueling and storage. There will be $3.1 billion over five years for heavy-lift and propulsion R&D on new launch systems, propellants, materials, and combustion processes. And the Budget anticipates an investment of $3.0 billion over five years to fund robotic precursor missions to scout exploration targets.

The Budget proposes $5.0 billion in 2011 for the NASA's Science portfolio, an increase of more than $500 million compared to 2010. This increase allows for numerous exciting scientific opportunities in space: re-flying the Orbiting Carbon Observatory (OCO), which is crucial to our understanding of the Earth's carbon cycle and its effect on climate change; accelerating the development of other satellites to enhance observations of the climate and other Earth systems; and continuing to increase our understanding of the cosmos through such projects as the follow-on to the Hubble Space Telescope.

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

The National Institute of Standards and Technology (NIST) laboratories advance technological innovation through advanced measurement science research and standards development. The 2011 Budget of $709 million for NIST's intramural laboratories, a 6.9 percent increase over the 2010 enacted level, will improve NIST's research capabilities by providing high-performance laboratory research and facilities for a diverse portfolio of research in areas such as advanced manufacturing, health information technology, cybersecurity, interoperable smart grid, and advanced solar energy technology. For NIST's extramural programs, the 2011 Budget requests $130 million for the Hollings Manufacturing Extension Partnership (MEP), a $5 million increase over the 2010 enacted level. The 2011 Budget also requests $80 million for the Technology Innovation Program (TIP), a $10 million increase over 2010. All of these NIST programs are important components of *A Framework for American Manufacturing,* a comprehensive strategy for supporting American manufacturers announced in December.

*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 oceans, atmosphere, and marine habitats. The NOAA budget of $5.6 billion is an increase of $806 million over the 2010 enacted level. This will allow NOAA to strengthen the scientific basis for environmental decision-making, improve weather and climate services that protect life and property, invest more heavily in restoring our oceans and coasts, and ensure satellite continuity.

NOAA satellite systems, which are essential to our understanding of weather and climate, are a top priority in the 2011 Budget. The large increase in the NOAA budget reflects a new architecture for the National Polar-orbiting Operational Environmental Satellite System (NPOESS). This tri-agency (NOAA, DOD Air Force, and NASA) program has had a long and troubled history. Since last August, OSTP has led an Executive Office of the President Task Force that, in close cooperation with the partner agencies, has been investigating various options for how to place the NPOESS program on a pathway to success. Last week, the three agencies announced a plan to restructure the program—a plan reflected in the President's 2011 Budget. NOAA and the Air Force will no longer jointly procure NPOESS; rather, NOAA and NASA will take primary responsibility for procuring satellites for the afternoon orbit and DOD will take primary responsibility for the morning orbit. The three agencies will continue to partner in areas that have been successfully shared in the past, such as the program's ground system. Although NOAA's 2011 Budget proposes a substantial increase to support NOAA's expanded NPOESS responsibilities under the restructuring, we intend to make full use of the NPOESS investments and work done to date by all the NPOESS parties. I can assure the committee that OSTP remains actively engaged in overseeing the transition to a new direction for this program and committed to ensuring continuity of satellite coverage needed for weather forecasting and storm tracking, as well as for climate data records.

*Depaitinent of Energy (DOE)*

The Department of Energy (DOE) R&D portfolio totals $11.2 billion in the 2011 Budget. This represents an increase of 3.8 percent in real terms, and does not include non-R&D cleanup, weapons, and energy-demonstration programs. The 2011 Budget includes support for four Energy Innovation Hubs to accelerate cross-disciplinary R&D for transforming advances in energy science into commercially deployable materials, devices, and systems: three appropriated by Congress last year to advance fuels from sunlight, modeling and simulation for nuclear reactors, and energy efficient building systems design; and one new Hub to conduct R&D on batteries and energy storage. The existing 46 Energy Frontier Research Center (EFRC) grants to address scientific roadblocks to clean energy and energy security through collaborative research receive continued support in the President's 2011 Budget, and funding for a new solicitation for additional EFRCs to capture emerging opportunities in new materials and basic research is included as well. The 2011 Budget proposes $300 million for the Advanced Research Projects Agency-Energy (ARPA–E) that is authorized in the America COMPETES Act. ARPA–E will fund high-risk, high-reward research to yield revolutionary changes. in how we produce, distribute, and use energy. ARPA–E announced its first set of grants last October, and in 2010 will make additional awards with Recovery Act funds. The 2011 Budget will allow ARPA–E to make additional awards next year.

The Department of Energy's Office of Science pursues discoveries and scientific tools in economically significant areas such as nanotechnology, high-end computing, energy, and climate change. The 2011 Budget of $5.1 billion, 3.5 percent more than the 2010 enacted level in real terms (4.6 percent in current dollars), increases funding for facilities and cutting-edge research

Investments in DOE's clean-energy R&D programs will help reduce dependence on foreign oil and accelerate the transition to a low-carbon economy. The President's 2011 Budget proposes R&D funding increases for solar energy, geothermal technology, energy-conservation building technologies, and nuclear energy. DOE also proposes an investment of $144 million in R&D to improve the reliability, efficiency, flexibility, and security of electricity transmission and distribution networks, $19 million more than the 2010 level.

*Environmental Protection Agency (EPA)*

The Science and Technology (S&T) program of the Environmental Protection Agency (EPA) is $847 million in the 2011 Budget, just slightly above the 2010 enacted level. This amount includes computational toxicology research and the Science

to Achieve Results (STAR) program that awards competitive extramural research grants in areas such as endocrine disruptors, green infrastructure, and air quality.

*United States Geological Survey (USGS)*

The total United States Geological Survey (USGS) budget of $1.1 billion is a $22 million increase over the 2010 enacted level, with substantial increases in the areas of climate change, renewable energy, and environmental satellite systems. Specifically, the 2011 USGS budget requests $72 million for the Global Change program, an increase of $14 million over the 2010 funding level. This includes funding for the National Climate Change and Wildlife Science Center and carbon sequestration research. There is also a $13 million increase to support new ground-system capabilities for the Landsat Data Continuity Mission.

*Department of Homeland Security (DHS)*

Department of Homeland Security (DHS) R&D totals $1.0 billion in the 2011 Budget, a reduction from the 2010 enacted level. The President's 2011 Budget proposes $109 million for the Domestic Nuclear Detection Office's Transfoxinational and Applied Research (TAR) portfolio and transfers it to the S&T Directorate in order to consolidate R&D activities department-wide.

*Department of Transportation (DOT)/Federal Aviation Administration (FAA)*

Department of Transportation (DOT) R&D programs receive $1.0 billion in the 2011 Budget, a slight cut in real terms compared to the 2010 funding level. Central to DOT's R&D activities is the Federal Aviation Administration's Research, Engineering, and Development program. The 2011 Budget for that program is $190 million, roughly the same as the 2010 enacted funding level. The Budget 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 that coordinates this important effort with NASA and other participating agencies.

*National Institutes of Health (NIH)*

The National Institutes of Health (NIH) supports the discovery of knowledge and therapies that will lead to better health outcomes for all Americans through a robust program of intramural and extramural research, education, and training conducted or sponsored by 27 Institutes and Centers—The 2011 Budget provides $32.1 billion for NIH, an increase of $1.0 billion, or 3.2 percent above the 2010 enacted level. Investments will focus on five strategic priorities with great promise: applying genomics and other high-throughput technologies; translating basic science discoveries into new and better treatments and diagnostics; using science to enable health care reform; global health; and reinvigorating and empowering the biomedical research community. NIH will also continue to award and oversee the $10.4 billion provided in the Recovery Act.

*Department of Defense (DOD)*

The 2011 Budget proposes $77.5 billion for Department of Defense (DOD) R&D. This $3.5 billion reduction from the 2010 enacted figure primarily reflects proposed cuts in lower priority weapons development programs. The Defense Advanced Research Projects Agency (DARPA) would receive $3.1 billion for longer-term breakthrough research, an increase of 2.6 percent in real terms. The 2011 Budget sustains DOD's basic research ("6.1") with a record commitment of $2.0 billion, and provides increases for research in high priority areas such as night vision, cybersecurity, enhanced GPS, deployable force protection; nano-manufacturing, and advanced distributed learning.

*White House Office of Science and Technology Policy (OSTP)*

The White House Office of Science and Technology Policy (OSTP) works with OMB to ensure that the President's S&T priorities are reflected in the budgets of all of the Executive Branch departments and agencies with S&T and S″1'EM-education missions. OSTP also provides science and technology advice and analysis in support of the activities of the other offices in the Executive Office of the President and supports me in my role as the Assistant to the President for Science and Technology, with the responsibility to provide the President with such information about science and technology issues as he may request in connection with the policy matters before him. In addition, OSTP coordinates interagency research initiatives through administration of the National Science and Technology Council (NSTC),

serves as the lead White House office in a range of bilateral and multilateral S&T activities internationally, and provides administrative and technical support for the very active 21-member President's Council of Advisers on Science and Technology (PCAST).

OSTP personnel in addition to the Director include a Senate-confirmed Associate Director for Technology, who is also the Nation's Chief Technology Officer; three further Senate-confirmed Associate Directors (for Science, Environment, and National Security and International Affairs): and a further 40 technical professionals plus supporting administrative staff The 2011 Budget requests $6.990 million for OSTP's operations, slightly below the 2010 enacted funding level. This support for OSTP reflects the President's continuing recognition of the importance and diversity of OSTP's functions in keeping "science in its rightful place" in his Administration, as he pledged in his Inaugural Address.

**Interagency Initiatives**

A number of priority interagency S&T initiatives are highlighted in the President's 2011 Budget. These initiatives 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 2011 Budget provides $4.3 billion for NITRD.

Networking and computing capabilities are more critical than ever for national- and homeland security, reforming the health care system, understanding and responding to environmental stresses, increasing energy efficiencies and developing renewable energy sources, strengthening the security of our critical infrastructures including cyberspace, and revitalizing our educational system for the jobs of tomorrow. The 2011 Budget retains an important focus on investment in high-end computing research for both national security and large-scale scientific applications, particularly in advanced scalable simulations. The 2011 Budget also continues to emphasize 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 2011 Budget provides $1.8 billion for the multi-agency National Nanotechnology Initiative (NNI), a reduction of $19.5 million from the enacted 2010 level. Research and Development in the NNI focuses on the development of materials, devices, and systems that exploit the fundamentally distinct properties of matter at the nanoscale. NNI-supported R&D is 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. The 2011 Budget proposes $35 million for nano educational and societal dimensions research and $101 million across several agencies for nanomanufacturing.

Consistent with the NNI Strategy for Nanotechnology-Related Environmental Health and Safety (EHS) Research, agencies maintain a focus on developing nanotechnology responsibly, with attention to the human health and environmental impacts as well as ethical, legal, and other societal issues. In recognition of the special importance of these issues, the 2011 Budget increases the priority of nano EHS research with a request of $117 million, more than 27 percent above the 2010 level.

*U.S. Global Change Research Program*

The Budget includes an expanded commitment to global change research. Investments in climate science over the past several decades have contributed to an improved understanding of global climate. These additional investments will be a critical part of the President's overall strategy to mitigate U.S. greenhouse gas emissions and move toward a clean energy economy. To continue to assist the government and society to understand, predict, project, mitigate, and adapt to climate change, the 2011 Budget provides $2.6 billion for the multi-agency U.S. Global Change Research Program (USGCRP), an increase of 21 percent or $439 million over the 2010 enacted level.

The USGCRP was mandated by Congress in the Global Change Research Act of 1990 (Pi. 101–606) to improve understanding of uncertainties in climate science, expand global observing systems, develop science-based resources to support policymaking and resource management, and communicate findings broadly among scientific and stakeholder communities. Thirteen departments and agencies participate in the USGCRP. OSTP and the Office of Management and Budget (OMB) work closely with the USGCRP to establish research priorities and funding plans to ensure the program is aligned with the Administration's priorities and reflects agency planning.

In addition to enhancing research and modeling of the physical climate system, the 2011 USGCRP Budget will also allow for a comprehensive, coordinated focus on four areas of particular need: Earth observations, adaptation research, integrated assessment, and climate services.

**Innovation, Entrepreneurship, and Job Creation**

The President believes that we must harness the power and potential of technology, data, and innovation to transform the nation's economy and to improve the lives of all Americans. The President's 2011 Budget targets strategic investments in technology to spur innovation in the public and private sectors and does so in a manner that changes the way Washington works. Let me share with you a few key highlights.

As articulated in the President's *Strategy for Innovation* released last year, the Budget proposes a permanent extension of the research and experimentation (R&E) tax credit to spur private investment in research and development (R&D) by providing certainty that the credit will be available for the duration of the R&D investment.

The Budget also promotes the commercialization of promising technologies through smart, strategic investments. The Budget proposes $12 million for the National Science Foundation (NSF) to support a new Innovation Ecosystem where universities will partner with other institutions to increase the impact of the most promising innovations through commercialization, industry alliances, and start-up formation. The Budget proposes an additional $10 million in National Institute of Standards and Technology (NIST) programs to foster innovation in manufacturing with an emphasis on sustainable nanomanufacturing.

The President's Budget is also focused on entrepreneurs and small businesses as engines of innovation, and has targeted policies and investments to help entrepreneurs and small businesses build new and vibrant enterprises that lead to new jobs and economic growth. Given the difficulties in this recession for many small businesses to access the capital they need to operate, grow, and create new jobs, the Budget provides $165 million in subsidy costs to support $17.5 billion in Small Business Administration 7(a) loan guarantees that will help small businesses operate and expand. It also proposes to increase the maximum 7(a) loan size from $2 million to $5 million and to provides incentives for the private sector to invest by extending an additional year of the 50 percent deduction of qualifying investments. The Budget provides a one-year extension for small businesses to immediately write off up to $250,000 of qualified investment and it proposes to permanently eliminate small-business capital gains for investors who hold their investments for five years.

The Administration also recognizes that competitive, high-performing regional economies are the building blocks of national growth, and that we must expand and accelerate our efforts to cultivate regional economic clusters across the country. The Budget provides at least $75 million in regional planning and matching grants within the Economic Development Administration (EDA) to support the creation of regional innovation clusters that leverage regions' competitive strengths to boost job creation and economic growth.

What I have given you is only a brief snapshot. As you know, there is important work being done in broadband, spectrum policy, patent reform, standards and measurements for emerging technologies, support for the development and adoption of health information technology, and export promotion. These efforts and investments will help build the foundation for sustainable recovery, by fostering the new jobs and industries that will arise from the innovative and entrepreneurial talents of the American people.

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

The President has been emphatic about his commitment, which I share, to increase the participation and the performance of American students in science, technology, engineering, and mathematics, aiming to improve our performance in comparison with other nations from the middle of the pack to the top of the pack over

the next decade. Over the past year, OSTP has been working with the White House Domestic Policy Council, the Department of Education, and a number of science and technology agencies to identify and promote concrete actions to help meet this ambitious goal.

The 2011 Budget invests $3.7 billion in STEM education programs across the Federal Government, including a historic $1 billion commitment to improve math and science achievement among K–12 students, that latter figure an increase of over 40 percent. The impact of these investments will be magnified by "Educate to Innovate", a campaign launched by the President to motivate and inspire young people to excel in STEM education. This campaign has already mobilized over $500 million in financial and in-kind support from companies, foundations, philanthropists, universities, non-profit organizations, and grassroots volunteers.

In addition to these investments, the Administration has made great strides in integrating STEM education into broader education programs. For example, the $4.35 billion Race to the Top fund in the Recovery Act provides a competitive advantage to states that commit to a comprehensive strategy to improve STEM education. The 2011 Budget, by providing an additional $1.35 billion in funding for Race to the Top, builds on these historic investments to create state capacity, focus on student achievement, and help prepare America's students to graduate ready for college and careers.

This Administration is committed to investing in and scaling what works, and to improving the coordination of Federal STEM education programs. The Department of Education and the National Science Foundation (NSF) are leading an effort, with active OSTP participation, to increase the impact of the Federal STEM investments I've outlined above by (1) developing an aligned strategy that emphasizes key agency capacities; (2) clarifying evidence standards used to assess program impact; and (3) identifying the most promising STEM efforts for further validation, testing, and suitability for scale-up. OSTP looks forward to working with this Committee on our common vision of improving STEM education for all of America's students.

**Conclusion**

The investments in R&D and S1EM education proposed in the President's FY 2011 Budget reflect his clear understanding of the critical importance of science, technology, and innovation in addressing the most compelling changes our Nation faces. While respecting the need for overall budgetary restraint under difficult economic conditions, the President is recommending an array of investments in R&D and STEM education that will keep this country on a path to revitalized economic growth, real energy security, intelligent environmental stewardship, better health outcomes for more Americans at lower costs, strengthened national and homeland security, and continuing leadership in science and in space. I look forward to working with this Committee to make the vision of the President's FY 2011 Budget proposal into a reality. I will be pleased to try to answer any questions the Members may have.

Chairman GORDON. Thank you, Dr. Holdren. At this point we will begin our first round of questions. The Chair recognizes himself for five minutes.

Dr. Holdren, I think in your preface to your statement, you summed up very well the importance of R&D as well as STEM education to our future quality of life, standard of living and national security. That is why I think you have one of the most important and toughest jobs probably in the world, and so we want to see you succeed. I was pleased that in your statement, or the written statement, you had linked innovation, entrepreneurship and job creation and you highlighted the National Science Foundation's Innovation Ecosystem program and the EDA's efforts supporting Regional Innovation Clusters. In addition, DOE is supporting the creation of innovation hubs and clusters, and could you please explain how these initiatives complement each other and how they are being coordinated? And also, could you summarize the primary goals of the Administration's innovative initiatives and the metrics used to measure their success?

Dr. HOLDREN. Sure, I will give that one a try. Those initiatives are linked. One of the things that is in the new budget proposal in the Regional Innovation Cluster domain is something called E–RIC, Energy Regional Innovation Clusters. Seven agencies are involved in that, building innovation clusters around the energy innovation hubs that the Department of Energy has already initiated. NSF is involved with that, along with DOE and five other agencies. The first one of those is going to be focused on efficient building energy systems. In the way of metrics, this is a longstanding and difficult challenge, figuring how to measure real progress in these domains, but we think we will be able to see that progress in the rate of job creation in these areas where these innovation centers are being set up. We think we will be able to see it in the rate of actual science and technological innovation reflected in publications and patents. We think we will see it ultimately in terms of economic indicators.

Chairman GORDON. And what is the time frame on getting these clusters and hubs set up?

Dr. HOLDREN. Well, they are already—the hubs are already being set up and moving forward into the 2011 budget with support for these activities. I think we will see rapid progress on this. I think the players are ready to go. We are getting tremendous enthusiasm, I have to tell you, Mr. Chairman, from industry, from the private sector for the Administration's commitment to increasing public-private partnerships in all these domains.

Chairman GORDON. Well, we have seen that in a variety of areas. Obviously with STEM education, the private sector dollars are coming in because they understand the importance. In ARPA–E, there is matching funds there, and we discovered that the private sector put up even more money than was required because I think there is a thirst for this R&D and a need.

So with that, I now yield to my friend from Texas, Mr. Hall.

Mr. HALL. Mr. Chairman, thank you, and Dr. Holdren, my question will probably be longer than your answer, but I will read it the best I can. The Congress has seen a number of game-changing proposals over the years that you know about including several technology development and commercially inspired ideas. NASA pursued the X–33 Venture Star Orbital Space Plane, a crew return vehicle, X–37, as well as technology development programs such as the Space Launch Initiative, and I have an old pattern I follow in almost everything I have done all my life, and I got it from an old broke storekeeper. He said, "I ignore the impossible and cooperate with the inevitable," and I want to try to cooperate with you because I know you are sincere, I hope you are correct, and I agree with you. I don't care to go to the moon until our people can go to the grocery store. It is not the time to do that.

But we do have to look at hard, cold facts before we make such changes as you recommended. These efforts that I spoke of a moment ago, spending billions of dollars without anything really significant to show for it. The Constellation program was born out of the Columbia accident. Its vision was rooted in key recommendations of the Columbia accident investigation board including, and I quote, "attempts at developing breakthrough space transportation systems have proved illusory." The board believes that the country

should plan for future space transportation capabilities without making them dependent on technological breakthroughs. Furthermore, the board said the design of the system should give overriding priority to crew safety rather than trade safety against other performance criteria such as low cost and reusability. The Obama Administration's proposals ignore the lessons of the Columbia accident investigation board and the decades of human spaceflight experience that have been gained with the lives of at least 17 astronauts since 1967. So I ask this question: How can you defend the proposal to cancel the Constellation program without any rational—and this next is a huge word—proven alternative plan? I have used up most of my time but I would like to hear your answer.

Dr. HOLDREN. Well, I thank the Ranking Member for that question. I am afraid my answer probably will be at least as long as the question, but let me see if I can keep it brief.

The first part of the question referred to a number of ventures in space in which we invested lots of money and seemingly nothing came out. I would argue first of all that we learned from every one of those. We learned a great deal, for example, from the X–33 and the lessons that we learned from those investments are still being applied and will continue to be applied. The second point I would make is that in terms of reliance on commercial firms, we have been relying on commercial firms from the beginning of the space program. McDonnell built the Mercury capsule. General Dynamics launched it on an Atlas converted from an ICBM. Rockwell International built the space shuttle. What we are changing in looking increasingly to the private sector to partner with for lifting astronauts into low earth orbit is not reliance on the private sector. We are changing the acquisition model so that we are acquiring services rather than acquiring the actual vehicles. But it will continue to be true that NASA will be deeply involved in and responsible for ensuring the safety of the astronauts, whatever we launch them on. Administrator Bolden, as you know, a former four-time astronaut, twice pilot, twice commander, was head of safety for the astronaut team in his time, has served on the advisory body on safety for NASA. This administrator is not going to settle for anything less than safety for the astronauts.

With respect to the Constellation program, with all respect and kudos to the NASA team and the contractors who have worked very hard, the fact is, as the Augustine Committee concluded, the Constellation program was unexecutable in its current form. If you wanted to get Constellation to the point where it could return U.S. astronauts to the surface of the moon even before 2025, the additional cost of that over the next decade from 2010 to 2020 would be, in the Augustine Committee's estimate, between $45 billion and $60 billion, and that to do something that we already did 50 years or more before we would be able to do it again. Each component of it was very seriously over budget. So we think that what we are proposing is a program that has a better chance of success than Constellation did at delivering what the American people want and expect from their space program, which is innovation, which is a forward-leaning program with exciting vision, exciting ideas, the possibility of ultimately taking Americans into deep space beyond the earth-moon system, with better technologies, more efficiently,

more safety than Constellation would ever have been able to manage, and we are doing it in a budget that we can afford. Obviously in these times, matching the goal, matching the approach to the available resources is crucial and we think that the Administration proposal does that.

Mr. HALL. I thank you, and I go back to the word I spoke there, proven. That is the one that I think worries most of us. I thank you for your good answers, sir.

Chairman GORDON. Dr. Baird is recognized for five minutes.

Mr. BAIRD. Dr. Holdren, thanks for your testimony and thanks for your service and for being here today. I just very briefly want to commend the Administration and you. It looks like we are finally try to resolve two issues that have been longstanding and complex and threaten our viability in many areas of science. The NPOESS satellite issue we have had hearings on, so I commend you. It looks like you want to try to get that thing finally sorted out, and also the icebreaker issue that has long been a conflict between Coast Guard and NSF, so I want to compliment you on that.

One of my colleagues has raised this issue of questions about research on climate change. It happens that several years back I introduced legislation that requested NSF to include scientific ethics teaching as part of all its grant recipients. So if you are a student receiving those grants, you have got to get some ethics training, and I think it is appropriate. My clinical psychology mandates that, and my doctorate training.

But I want to ask you and give you the opportunity, notwithstanding the troubling emergence of questions about certain data sets—do you believe and do you care to comment on the overall evidentiary basis for human anthropogenic $CO_2$ and other greenhouse gases leading to likely ocean acidification, increasing global temperatures and other phenomena. Would you care to address that, if you like?

Dr. HOLDREN. Yes, I am very happy to address that, Congressman. I would characterize the overall evidentiary base as robust. We understand the climate is changing in unusual ways compared to the background of natural variations. We understand with high confidence that human activities are responsible for a substantial part of the change we are observing, and I emphasize change we are observing. These are not computer models, they are measurements of rises in the temperature of the air, of the oceans, the retreat of glaciers in many parts of the world, changes in growing seasons, changes in species distributions, changes in precipitation patterns, and furthermore, the pattern of all of these changes fits what would be expected for the result of an increase in the atmospheric burden of greenhouse gases, carbon dioxide, methane and others.

We know as well from measurements that the acidity of the ocean is increasing. We know that is occurring. Part of the excess carbon dioxide in the atmosphere is taken up in the ocean and becomes carbonic acid. We know that ultimately that will have impacts on coral reefs and other organisms that form shells and skeletons out of calcium carbonate.

The revelations in the e-mails from East Anglia University's climate research unit I think have been blown out of all proportion.

They reveal an array of human frailties, certainly, including impatience with criticism, including defensiveness. Scientists are no less human than any other body of people, and when they are writing e-mails to each other, you will see some of those frailties. But what those e-mails add up to in terms of actually undermining scientific understanding of what is happening in climate is basically nothing. The particular controversy that those e-mails were mostly swirling around was a controversy that was settled by a detailed review by the National Academy of Sciences, published in 2006, which concluded that the overall funding of the study that was being criticized in many of those e-mails was basically sound, namely that with high likelihood it is true that the last 50 years have been the warmest half-century in the last several hundred, probably in the last 1,000 to 2,000. They concluded also that the method of analysis used to produce that initial report was fundamentally respectable and sound. Experts quarrel about the details but all of the different studies that have been done of that question with different methods, different approaches, different statistical techniques have all produced essentially the same result.

Mr. BAIRD. So the key point would be that while one can find relatively isolated incidents where certain data sets may be called into question, the broad bulk of the data continues to point in a particular direction, particularly regarding ocean acidification and also temperature increase.

Dr. HOLDREN. Yes.

Mr. BAIRD. One last comment. You talked about business. I was at the World Economic Forum recently, and my impression is that the bulk of businesses of the world, chemical industry, many energy industries, et cetera, accept the evidence that anthropogenic $CO_2$ is in fact changing our climate and changing the ocean, and we need to do something about it, and they are in fact ahead of this institution and others in insisting that we do something to incentivize and support businesses doing the right thing. Is that your impression?

Dr. HOLDREN. It is my impression, and it is my impression that it has been true for years. We had CEOs of some of the biggest energy companies and chemical companies in this country testifying five years ago before a committee of the United States Senate, and uniformly saying, it is time we start to address this problem, and what the private sector wants is certainty. What the private sector wants is a level playing field. What they want is predictability. They don't want to ignore this problem and they understand, a great many of them, that there will be a lot of money made in developing and marketing the technologies that are going to enable us to meet our energy needs while reducing our impacts on the climate and other aspects of the environment.

Mr. BAIRD. Thank you, Doctor.

Thank you, Mr. Chairman.

Chairman GORDON. Dr. Ehlers is recognized for five minutes.

Mr. EHLERS. Thank you, Mr. Chairman, and thank you, Dr. Holdren, for being here and for a very cogent and thoughtful presentation.

I would like to in the limited time that we are provided just comment about STEM education issues. As you know, I spent a lot of

time on this. In fact, when I first started it was called SMET, and I objected very strongly to that term. It had a bad connotation, SMET education.

Chairman GORDON. What is that acronym?

Mr. EHLERS. Same words but different order, science, math, education, technology.

Mr. BAIRD. Sherry Boehlert proposed it be METS but that was for a different reason.

Mr. EHLERS. Well, he was a baseball fanatic.

But in any event, it is now STEM education. A continuing problem we have had not just with this Administration but previous administrations is a perceived conflict between the National Science Foundation and the Department of Education on STEM education, and in fact at one time the OMB in the budget tried to zero out the National Science Foundation participation and put that money into the Department of Education because it was duplicative to have two agencies working on the same issue. That indicated a very shallow understanding of the mission of both the National Science Foundation and the Department of Education. It is disappointing to me to see in this Administration's budget proposal the same thing taking place, primarily zeroing out the NSF participation in STEM education. As you well know, as a scientist and a good friend of mine, there is a big difference between NSF's role in this and it is a very important role to do the research on the effectiveness of various methodologies of teaching, to experiment with different approaches to teaching it, and the NSF has been very carefully doing the groundwork for developing good STEM education programs whereas the Department of Education is primarily interested in propagating that out throughout the school systems in the country. They should be working together. They should have equal funding, not so much in dollars but in terms of the work they do, and I am concerned that your Administration apparently—maybe it is just a carryover in OMB that creates the problems, but it is leaving the NSF high and dry.

Now, fortunately, NSF got a fair amount of money through the Recovery Act so it is not a life emergency here but it is a trend that I would hope that you would speak out against within the Administration and be able to reverse, and it might be in fact a good idea to have an Administration work group outlining very clearly what each of those agencies can and should contribute to STEM education and then use that as a guide for the budgeting allocations. I would appreciate any comments or insights you could offer on this.

Dr. HOLDREN. Well, thank you, Congressman Ehlers, for that question. Let me make a couple of comments. I don't actually think there is, in this Administration, tension any longer between NSF and the Department of Education about this. One of the things that President Obama made clear in the very first Cabinet meeting was that across the board in all the challenges we face, including education, the challenges are too big and the resources too limited for us to afford not to cooperate, and the President has called for cooperation and there is a lot of it. I meet regularly with Secretary Duncan. I meet with the NSF director, Arden Bement. Of course, Dr. Bement has announced his retirement to return to Purdue. We

will be nominating a new director of NSF, and while I can't say at this moment who that will be, I can assure you it will be somebody who is committed to the education component of NSF's mission as well as the rest.

The other thing I would say about the budget is that what has happened increasingly in NSF is that almost every science program has education embedded in it. A very large percentage of the grants have an education component. A lot of the divisions in NSF actually require that the grants have an education component, and I know from firsthand experience from when I was the director of the Woods Hole Research Center, when one of our scientists had one of those grants, that there has been tremendously innovative activity in STEM education going on with NSF money through that particular mechanism.

But on your bottom line, that you hope I will advocate for continued NSF engagement in this domain and for cooperation between NSF and the Department of Education, I can assure you that I will.

Mr. EHLERS. I just—it looks to me like you have flat funding or decrease in the K–12 funding at NSF. What am I missing here? I realize it is spread across the agency but that is—you know, those particular areas——

Dr. HOLDREN. Well, I think what you are missing, Congressman, is that there are lots of funds in NSF that aren't labeled education per se in the budget line that are going to education. I give you the example that I am particularly familiar with because of the engagement of the Woods Hole Research Center. With it was a program on Arctic science that had a very large K–12 component in it, not listed as education in the NSF's budget, but involving kids in communities all around the Arctic Circle in hands-on research on the chemistry of surface waters in the great rivers flowing into the Arctic in a manner that has propagated and led to programs additionally in the United States getting school kids involved in real measurements. This is just one grant. Not a dime of it is showing up in the NSF's education line, but it is education of a sort that really matters, hands-on engagement of kids in science and technology.

Mr. EHLERS. Rather than taking any more time on this issue, I will pursue it with you privately later on.

Dr. HOLDREN. Happy to do that.

Mr. EHLERS. But thank you very much for your interest in the issue, and I yield back.

Chairman GORDON. We will sign up Dr. Ehlers for support of STEM education. Is that fair to say?

Mr. EHLERS. Yes, as long as it is not SMET.

Chairman GORDON. Mr. Luján is recognized.

Mr. LUJÁN. Mr. Chairman, thank you very much.

Dr. Holdren, thank you again for your service and for being here today. To take off or to lead off where the Chairman left off, Dr. Holdren, highlighting the importance of you linking innovation, entrepreneurship and job creation together, where we are looking to those that have the capabilities of solving problems and bringing that innovative expertise into the marketplace and creating job opportunities and solving big problems, I would ask this: that as we

look to see what DHS has done most recently in collaborating efforts with some of our NNSA [National Nuclear Security Administration] facilities over at DOE to be able to solve big problems, to be able to look at systematic approaches to making sure that we are identifying areas that we need to depend on some of our scientists, where we are able to develop some technology for imaging to identify liquids and explosives from a technology that came from mapping the brain, and we are now seeing how that potentially could move forward for deployment. To support that, the Science Foundation has some of our brilliant scientists and most brilliant minds around the country, like at the Santa Fe Institute where we are challenging these brain trusts to be able to solve big problems, is something that I hope we can bring more support to. And as we focus on job creation and innovation in the next several months, years and decades, I believe that it is critically important for us to examine our role in promoting the transfer of technology from our Federal NNSA National laboratories. How we can learn from the Stevenson-Wydler and Bayh-Dole technology transfer acts that were signed into law over 30 years ago. Much has changed at both the federal and university labs over the years, as well as in the U.S. business community, and has the Administration given any thought to reviewing the only laws governing federally funded technology transfer and how their implementation might be optimized to support innovation and job creation in today's globally environment? And how can we best ensure that federal funding directed towards technology transfer is being used efficiently and effectively?

Dr. HOLDREN. Well, thank you for that question, Congressman. Let me say first of all, I have a particular longstanding interest of my own in the national laboratories. My first job after my Ph.D. was at the Livermore Laboratory. I interviewed at both Los Alamos and Sandia as well, and I have actually been spending a fair amount of time in my current job meeting with Secretary Chu and the NNSA Administrator Tom D'Agostino talking about exactly this question, how we can get those great national laboratories to contribute even more to our national well-being by being more effective in the domain of technology transfer, of getting ideas and innovations from those laboratories and developed in partnerships between those laboratories and the private sector actually into the marketplace, and we have a number of ideas about how to do that. We are increasingly thinking of these laboratories that have sometimes been called "weapons laboratories" as being national security laboratories in the broadest sense, because so much of what they do has application far outside as you have already suggested the weapons domain itself. This is an area that we are working on and we will be looking at the existing array of laws and regulations affecting that manner of technology transfer and seeing how we can improve them.

Mr. LUJÁN. Thank you very much, Dr. Holdren.

Mr. Chairman, I know that we have had conversations about this, and how we can make sure that we are working in a more collaborative way to be able to bring some of these big ideas to fruition and move to the side where we are commercializing these big ideas to technology that are game changers, really, and everyday

applications and uses, and I very much appreciate, Dr. Holdren, the understanding on how some of this research with some of our defense facilities plays an enormous role in non-defense application and research and some of the gains and wins that we get out of there as well, and so I appreciate that very much.

Lastly, Dr. Holdren, one thing that I wanted to also go over is, with the Administration's request of the Office of Nuclear Energy increasing and so the Administration has recognized nuclear energy to focus primarily on closing the nuclear fuel cycle and developing advanced nuclear reactor technologies. The President has also asked and has created a blue ribbon panel to examine alternative solutions to waste storage, and so can you elaborate on the Administration's plan for developing safe, long-term solutions to managing the Nation's spent fuel rods to waste by using science to either recycle or break down the spent fuel?

Dr. HOLDREN. There is a very wide range of technical possibilities for how one deals with spent fuels. Some of those possibilities of course involve trying to recover the energy value in the fuel in various forms of reprocessing and recycling. Other approaches involve simply trying to process it in ways that reduce its radiological hazard over time. I don't want to prejudge what the findings of the Blue Ribbon Commission will be. I was involved in consultation with Secretary Chu in picking the folks who would be put on that commission. I think it is genuinely a blue ribbon group. It has some of the smartest people in the country in terms of their understanding of this array of possibilities. I think they are going to lay out the options in a way that will be very useful. There are a variety of different ways we could go. They have economic connotations, environmental connotations, national security connotations. The panel has a charge that requires it to take all those into account. So I am going to wait for their report before I weigh in with any thoughts of my own about what the winner might be.

Chairman GORDON. Thank you, Mr. Luján. You raised an important question, or issue, in terms of technology transfer from research to the private sector to jobs. I think that starts with sensitivity in doing it. I am seeing that and feeling that, I think, with the national labs. And the other thing I really think is that ARPA–E is going to help us with the model on how that can occur.

Mrs. Biggert is recognized for five minutes.

Mrs. BIGGERT. Thank you, Mr. Chairman, and thank you, Dr. Holdren, for being here. In your testimony, you refer to investments in R&D as promoting new technologies and maintaining America's competitiveness, which I applaud you for. Do you believe that leadership computing capability, like what we have at Argonne in my district, is also important to those goals?

Dr. HOLDREN. Absolutely. I think computing capacity is immensely important, and it is important in a wide variety of domains, in national security, in scientific intelligence, in environmental science and a great deal else. We have a strong focus on information technology in this Administration. We have both a Chief Technology Officer and a Chief Information Officer in the Administration for the first time. The Chief Technology Officer, Aneesh Chopra, also works as the Associate Director of OSTP for Technology and has that domain, and we are doing a lot of, I think,

really interesting and innovative things in investing in an improved computing and more broadly information infrastructure in this country because it matters not just to science, not just to national security, it matters a lot to the economy.

Mrs. BIGGERT. Thank you. Then moving on to something else, the U.S. trade deficit in 2008, the deficit in high-technology products was $55.5 billion dollars up from $16.6 billion dollars in 2002. I guess those are the latest figures that I have. But the U.S. trade balance was last in surplus in 2001 and a portion of this deficit is from U.S. companies that manufacture overseas and bring their products back to the United States, and even if we invest more in research and development programs and attract more professionals into these fields, how do we discourage companies from taking their production outside of the United States?

Dr. HOLDREN. I have to say, Congresswoman, that that question is way outside my domain of expertise; that is, international economic policy is not my strength, and I would be worried about what Larry Summers would do to me or Christy Romer when I got back to the White House.

Mrs. BIGGERT. Well, I serve on those committees too so I am always try to find the answers.

Dr. HOLDREN. I would love to find the answer too. I know the President is committed to doubling U.S. exports over the next few years. We know this is immensely important. High-tech exports are going to have to play a role in it.

Mrs. BIGGERT. I know that he mentioned it in his State of the Union. I hope you convey that if we can get those trade agreements that on the table right now, that would be very helpful, Panama and South Korea and Colombia.

Dr. HOLDREN. I will convey that message back.

Mrs. BIGGERT. Thank you. Then in 2009, you had an interview with Nature magazine and you said that we ultimately ought to look to put all uranium enrichment and fuel reprocessing if any is done under multi-national control. You said, "I think the world is ready for that." Could you elaborate on that statement, or do you still believe——

Dr. HOLDREN. I will elaborate on it a bit. If we want nuclear energy to be expandable again, not just in this country but around the world, and we want it to be expandable enough to make a difference, expandable enough to take a bite, for example, out of global greenhouse gas emissions, then nuclear reactors are going to have to be built in a lot of countries besides the United States, and if that is going to happen, the biggest single obstacle to achieving that in a manner that is in fact sustainable is avoiding the proliferation linkage, avoiding those technologies being misused to develop nuclear weapons capabilities in additional countries. The two points of vulnerability that link nuclear energy technology with nuclear weapons technology are the fuel enrichment plants, and if one chooses to reprocess and recycle, the fuel reprocessing plants. A purely technical approach to controlling that problem, simply by making periodic visits and measurements at uranium enrichment plants and measurements at uranium enrichment plants and reprocessing plants, are not adequate. Everybody who has looked at that picture realizes that the uncertainties in that process are too

big, the proliferation dangers too large. In my judgment, in the long run the most certain way to avoid proliferation from nuclear energy is to put the enrichment plants and the reprocessing plants under international management so that countries watch each other.

I think the United States could well afford to do this. Many of the other nuclear weapons states have indicated that they are ready to do it. And I believe it would give us the best option for a substantially increased contribution from nuclear energy around the world without an unacceptable proliferation liability.

Mrs. BIGGERT. And then going back to Yucca Mountain and the storage, and I am very much for reprocessing and whatever we can do and to speed that up so that we won't have to store the nuclear materials, nuclear waste in such large quantity, and that is why I am concerned that the Administration has made it clear really its intention to shut down Yucca Mountain, and the Department of Energy has formally withdrawn its license application before the NRC [Nuclear Regulatory Commission]. Given the circumstances surrounding this decision, particularly the fact that it was made before the NRC could complete its scientific review of the application, and before the merits of any alternative options were reviewed, it appears that you could say that this is really a political decision, and I think that there should be important policy decisions on this rather than just a political decision. So, you know, we have expended more than $10 billion dollars in Yucca Mountain, taxpayer dollars, and it seems premature to do this. Do you think that this will go forward or—you said you have a commission that is looking at it, and how long will that take?

Dr. HOLDREN. There is a Blue Ribbon Commission that has been set up. I think the time scale for that is a year or two. It is going to be a very deep and wide-ranging study of the alternatives. I myself would argue, as I argued in a different context a moment ago, that the money that has been invested in Yucca Mountain up until now has not been wasted even if we don't end up using Yucca Mountain as a repository because we have learned a lot about the characteristics of repositories and the challenges that have to be met in order to make a repository successful.

You asked whether that was not a political decision. I think any decision made in Washington has politics in it in the sense that decision makers have to decide what is going to fly, what is practical, what do we have a chance of getting into operation. I think a decision was made that in light of both the technical uncertainties and the forms and degrees of political opposition that it was not likely that we could put Yucca Mountain into operation on any early time scale, and so that was the decision that was made, but the Blue Ribbon Commission is going to look at everything, and if they conclude that going back to Yucca Mountain is the best idea we have got, I am sure they will say so.

Mrs. BIGGERT. Thank you. I yield back.

Chairman GORDON. Thank you, Mrs. Biggert. I will also point out to the gentlelady that we are soon going to be having hearings with the intention of authorization concerning research programs within nuclear energy both in terms of design, reprocessing and storage. So we will have a chance to, as we should, vet this issue.

Mrs. BIGGERT. Thank you. I look forward to that.

Chairman GORDON. Mrs. Dahlkemper is recognized.

Mrs. DAHLKEMPER. Thank you, Mr. Chairman, and thank you, Dr. Holdren. I wanted to ask you a little bit about the President's determination to double our R&D expenditures by 2017, and just can you maybe comment on the importance of the maintenance of that funding growth and our Nation's industrial, competitive, and economic security in the long run? I come from an area that always has been a manufacturing base, and we have certainly seen many jobs—I would concur with the trade deficit that we are currently seeing. We have lost many jobs in my area. I just want to have your comments on the President's goals here.

Dr. HOLDREN. Thank you, Congresswoman. Let me first be clear that the President has proposed to double the budgets of three specific agencies on that time scale: the National Science Foundation, the DOE Office of Science and the NIST laboratories. So he is not proposing to double the entire R&D budget of the country on that time scale. That would be a bigger challenge in the budget times we face. The roles of those particular agencies are very heavily weighted toward fundamental science, and in the case of the NIST laboratories, in a variety of directions that have the potential to support real advances in things like manufacturing. NIST works in nanotechnology. They work in advanced forms of measurement. They work in printed circuits. They work in a variety of fields that we believe have high potential ultimately for the manufacturing sector. And so those investments across those three particular agencies—the DOE Office of Science has very heavy investments in material science, in chemical engineering, in a variety of disciplines that again have high potential for the industries of the future. The NSF of course is active across a very wide range of fundamental science questions, and again, the attractiveness of doubling those particular agencies is not only that they are highly relevant but that they are relatively inexpensive compared to many other domains of applied research and development. So you get the potential for a large bang for the buck by increasing those particular investments at a time when you can't afford to increase everything.

Mrs. DAHLKEMPER. You did mention the nanotechnology, and there is a slightly decrease from the fiscal year 2010 funding. Can you please explain that decrease in the funding for nanotechnology, for the National Nanotechnology Initiative?

Dr. HOLDREN. I feel a little premature in answering that because we have got a nanotechnology working group in PCAST, the President's Council of Advisors on Science and Technology, that we expect to report at the time of our meeting with the President in early March and they are looking at exactly that question. I would guess that part of that is that industry is becoming more heavily involved in the nanotech area, and we always want to look not to have the government paying for things that industry is willing to do, and as industry takes a larger role, the government can sometimes afford to take a smaller one. But that is a guess at this point. We have a very high-caliber group in PCAST looking at just that question, and so the next time I come and testify, I hope I will have a better answer.

Mrs. DAHLKEMPER. I look forward to that. Thank you, and I yield back.

Chairman GORDON. Thank you, Mrs. Dahlkemper. I will quickly point out that that doubling in the Office of Science, NIST and the National Science Foundation was really a fundamental part of the COMPETES Act and we are going to be reviewing that soon in terms of the progress, and I think that is a very important element.

And in terms of nanotechnology, where there was a decrease generally in terms of health and safety, there was an increase, and that is really what I think industry is looking for right now is those health and safety types of validation as they get more and more products out to market.

So Dr. Broun is recognized for five minutes.

Mr. BROUN. Thank you, Mr. Chairman.

Dr. Holdren, first off I would like to thank you for the letter I received just yesterday regarding the Administration's efforts to ensure scientific integrity. You might recall I initially wrote you on July 13th and again on October 2nd and then once again on December 1st. In fact, I was beginning to wonder if the lights were on over there in your office. So it is good to know that you were able to find time to eventually reply to my letters the day before this hearing.

Mr. Chairman, I would like to ask unanimous consent to enter these three letters as well as the Director's response into the record.

[See Appendix 3]

Chairman GORDON. Without objection.

Mr. BROUN. Thank you, Mr. Chairman.

On March 9th—well, let me go back on the records, on these letters. These focus on basically three things: the magnitude of climate change, and I believe they have exaggerated the magnitude, the causes of climate change as well as the scientific method utilized, and in fact, I have asked questions before about scientific integrity and whether members of the Administration would at least admit that there is no scientific consensus about the causes of the climate change, and I have had a negative response from many members of the Administration on that because there is no scientific consensus on climate change. In fact, what I see from this Administration it seems to me is they are holding onto the idea that the world is flat.

But going on, on March 9, 2009, the President directed you to develop recommendations to "guarantee scientific integrity throughout the executive branch" within 120 days. The memo also stated that the "public must be able to trust the science and scientific process informing public policy decisions." When I wrote you last June, I called your attention to a troubling pattern that I saw developing within the government where decisions were being based not on the best science but for political reasons. However, within six months, the Administration has already racked up quite a sizable list of questionable acts. Those were clearly laid out in my letter so I won't waste time by repeating them but those issues still remain. Unfortunately, your response didn't address a single issue I brought up in my July or October letters and you still haven't issued any recommendations.

Then last year, e-mails were released from the University of East Anglia's Climate Research Unit that pointed to an upsetting record of group think where data was manipulated and withheld. Scientific journals were intimidated and reputations were attacked, all in the name of advancing political activism regarding climate change. Your reaction to these revelations has at least been consistent, and you showed this same reaction today, to dismiss all those that go against what this Administration is trying to promote. You proclaim that the contents of these e-mails, the actions of the scientists and the almost daily revelations of additional errors in IPCC claims have no effect on the underlying science. Admonishing the process and scientists at the same time that you defend their product is totally unreasonable. The science may not be affected by the recent revelations but right now we simply don't know. Clearly, scientists have been exaggerating their claims, hiding data, intimidating colleagues and manipulating the peer review process.

The credibility of many of the scientists involved in this work is dying by death of a thousand cuts. Simply putting your head in the sand and ignoring a flawed process will not work. Also troubling is the Administration's habit of making arbitrary, uninformed political decisions before they actually look into an issue or develop alternative plans that are adequate. The decision to shut down Yucca Mountain arguably is the most scientifically studied plot of land on the earth without a plan for future waste. The decision to scuttle the Nation's human spaceflight program and cede your leadership in space without any details or alternative plans. The decision to break up the $14 billion NPOESS program with little more than talking points all show that this Administration is putting the cart before the horse on too many decisions. The American people deserve more than empty rhetoric when it comes to scientific integrity and they deserve more than the arrogance, ignorance and incompetence that it is showing when it comes to making these decisions.

Doctor, I have a number of questions for the record and I would like to submit those, since my time is out, for a written response. I am just flabbergasted at just what is going on here with this because as a scientist, I want to know the answers. The American public deserve the answers, and we are not getting them. I think that this Administration is showing a tremendous amount of arrogance, ignorance and incompetence, and the American people deserve better.

Mr. Chairman, I yield back.

Chairman GORDON. Thank you, Dr. Broun. Your questions keep us all on our toes, so thank you for that.

Dr. HOLDREN. Mr. Chairman, did you want me to respond?

Chairman GORDON. Well, I didn't hear a question there, but you are welcome to respond.

Dr. HOLDREN. I have a brief response to Congressman Broun. He won't be surprised to know that I don't agree with much of his characterization but I do agree that I owe him an apology for the appalling delay in responding to his letters, and the letter that I sent to him yesterday was only a response to his December 1st letter. The response to his earlier ones is in the review process now

and I hope you will get it in the next few days. There is no excuse for a delay of that magnitude. There are some explanations but there is no excuse, the explanations having to do with your first set of questions, having largely had to do with the guidelines that I have been obligated to produce under the President's memorandum of March 9th, and I had hoped to complete those guidelines before responding to your letter so that I could respond in full with the specifics of how we were going to address this array of questions going forward. It finally became apparent that the difficulties of constructing a set of guidelines that would be applicable across all the agencies and accepted by all concerned were going to cause further delay, and at that point I realized I just needed to answer as best I could the questions as you posed them. I do very much regret that delay and I agree that it is not acceptable.

The rest of your characterizations of the state of climate science and the Administration's decisions of course I don't agree with but we can perhaps deal with that offline and in the questions for the record. Thank you, sir.

Mr. HALL. Will the gentleman yield? I will ask a question the doctor wouldn't ask. Are you going to answer him this year?

Dr. HOLDREN. Again, the answer—the set of answers to his most recent letter, which was December, were communicated to Congressman Broun yesterday. I expect the answers to the earlier letters will be communicated to him within the week.

Mr. HALL. I was just being polite with you.

Mr. BROUN. Mr. Chairman, if I may?

Chairman GORDON. Certainly, Dr. Broun.

Mr. BROUN. Dr. Holdren, I accept your apology and I appreciate that.

Chairman GORDON. Thank you.

Mr. BROUN. When in the Marine Corps, I was taught excuses—there is no room for excuses, and I do accept your apology and I expect hopefully a rapid response from you, and I appreciate your saying so in a very public forum. I would like to work with you. As a scientist, I want to see scientific integrity. We need to know the answers. I happen to fall on the side where some of these things that the Administration is pursuing in policy, I fall on the other side from the Administration. But as a scientist, I do want to know the answer, and I hope that we can work together and we can work in concert to try to find some scientific integrity so the American people can get the answers that they desperately need.

Science cannot make policy but science can help us develop the proper policy. When I was in medical school, things that I was taught as being absolutely scientifically true five years later were proven to be false, and we are teaching something exactly opposite. So science is not a static thing or entity, and we need to use the best science to try to help policymakers develop the best policy for the American people, and I am eager to do that, even if my personal biases today—I am open to the scientific process but scientific integrity is absolutely critical, and I don't see that from this Administration, frankly, and I hope that we can work together and I do accept your apology. Thank you, sir, and I yield back.

Chairman GORDON. Thank you, Dr. Broun. I know you are sincere in your questions and you deserve an answer, and I am sure that you and Dr. Holdren are going to become pen pals.

And so Mr. Lipinski is recognized.

Mr. LIPINSKI. Thank you, Mr. Chairman. I want to thank Dr. Holdren for all of his work and the work of the Administration. You know that—I am sure you know we are working right now on NSF reauthorization. I was very happy to see that the Administration has recommended an eight percent increase in NSF funding, so I want to thank you for that recommendation.

One thing I wanted to focus on is the infrastructure that we have right now for doing research in this country because I think it is critical for our competitiveness, and of course NSF reauthorization is going to be incorporated in reauthorization of the *America COMPETES Act*, which is critical for our Nation. The most recent NSF survey of science and engineering research facilities found that academic institutions were deferring about $3.5 billion in needed renovation projects. From my experiences touring DOE facilities, I am concerned that there is also a backlog there of needed infrastructure. In the *Recovery and Reinvestment Act,* I was happy that the Administration and Congress put in there $200 million for ARI, Academic Research Infrastructure. Obviously that $200 million is not going to go too far towards a $3.5 billion backlog. I was wondering, the first part is, what the Administration, what you are doing looking at the backlog of infrastructure needs at our academic institutions and at our labs, and also just yesterday we had in my Research and Science Education Subcommittee a hearing on whether or not we should reinstitute the Academic Research Infrastructure program or find another way of funding the backlog at academic institutions. So it is a two-part question. First, is there a—what is the Administration doing looking at the backlog at both academic institutions, DOE labs and infrastructure, and second, are there any plans the Administration has for moving forward to address this backlog?

Dr. HOLDREN. Thank you for that question, and I think it is a tough one because in my view, in this country, we have been underinvesting in the maintenance and the renovation of our infrastructure for a long time across a wide range of issues. We have done it in the communications sector, the energy sector, the transport sector and the science and technology sector including in our universities and our national labs. This is not a problem—this underinvestment in infrastructure is not just a problem in the domain you mentioned, and I am not smart enough to know what the solution is across the board. I am hoping that some of my colleagues in the Administration may have some good ideas about that.

As far as the infrastructure for science and technology, the infrastructure for R&D, I have had a lot of university presidents in my office sharing their woes in that domain, and that is related to some very complicated questions including questions of overhead and where they can get the money to renew their facilities. I think we did make a contribution to addressing that problem as you mentioned, sir, in the Recovery Act where a fair amount of the science and technology money has gone into equipment and facilities at a

wide variety of kinds of institutions, not just because it makes sense for its own sake but because that is one way to avoid the cliff where you have this big infusion of money and then it goes away. By investing in equipment and facilities, you have the benefit of that infusion of money stretching over a long period of time, but we haven't done nearly enough. It is on our radar screen, but I have to admit, we don't have a plan yet for addressing this in a systematic way, and that is something that I would certainly like to see happen going forward and I would love to work with you and this committee in figuring it out.

Mr. LIPINSKI. Well, I look forward to working with you on that, and one other thing I wanted to bring up, in the 2007 COMPETES Act, we required the OSTP to coordinate planning for national research infrastructure across agencies, and we have not yet gotten that plan, so I think that is also a key part of this and I am looking forward to seeing that hopefully soon and looking forward to working with you on this as we move forward.

Dr. HOLDREN. Let me just say in brief response to the last question there that we have been resuscitating the National Science and Technology Council, which is the vehicle we have for coordinating analyses and collaborations across the agencies. It was not terribly active in the last Administration. It is becoming much more active now. We have the top people participating. We have got its various committees. The technology committee is being chaired by our CTO, Aneesh Chopra. And so we do have a mechanism functioning again to address that particular mandate, and we are going to do it.

Chairman GORDON. Mr. Olson is recognized.

Mr. OLSON. Thank you very much, Mr. Chairman, and Dr. Holdren, thank you for coming today. Unfortunately, I am going to start out with an admonition and then I have got a couple of questions.

One of the great things about this committee and U.S. human spaceflight is, there is no more bipartisan issue in the Congress than again U.S. human spaceflight, particularly with the current atmosphere we are living up here in Washington, and I want to specifically talk about a response you gave to Charles Krauthammer's issue criticizing the Administration's plan for human spaceflight, and you repeatedly referred to the Constellation program as George W. Bush's program. With all due respect, sir, it is not George W. Bush's program, it is America's Constellation program. It has been approved twice in authorization bills in this Congress, 2005, 2008, with different majorities in charge. The 2005 vote was 383 to 15. The 2008 authorization act was even a greater majority with the Democrats, 409 to 15. And we have got to be very careful. Again, one of the great strengths of human spaceflight, U.S. human spaceflight, is it's largely a nonpartisan issue, and if we turn it into a partisan issue, we are going to lose much more than what is at stake with the Administration's current proposal.

Getting back to the Augustine report, it is very clear from your comments today, from what I have read in the media, from comments I have seen from Deputy Administrator Garber that the Administration puts great weight behind the recommendations of the

Augustine Commission. One question I have is, there was a statement on the initial summary that came out from the Augustine Commission in September, and let me read this to you, and this is a quote: "There is now a strong consensus in the United States that the next step in human spaceflight is to travel beyond low earth orbit," and yet as I review the Administration's budget proposal, it condemns us to low earth orbit with no plan to go beyond low earth orbit. And so if you have given such credence to other recommendations of the Augustine Commission, why don't we have a plan like the Constellation to get us beyond low earth orbit?

Dr. HOLDREN. Thank you, Congressman. First of all, I agree with you that the space program has been and should remain a bipartisan effort, and it was certainly not my intention to undermine that in any way. I think it is something that Americans of all political persuasions should be able to agree about.

With respect to the Augustine report, we agree with the proposition in the Augustine report that moving beyond low earth orbit is important. It is a goal that we are retaining. The question is how to do it, using what technologies, on what time scale, to what destinations. And the goal that we have is to take U.S. astronauts into deep space in a way that is safe, in a way that is affordable, in a way that gets them to an array of deep space destinations, not just a particular one at a particular moment.

We believe, and the Augustine report supported this proposition, that the Constellation program as constructed and funded was not going to be a route that was sustainable for us to take to get U.S. astronaut into deep space. We think we have a better route to get there that invests much more extensively in advanced technology. We are certainly not giving up on deep space, and I would point out that Norm Augustine himself has endorsed the new plan. Many members of that Commission have written op-ed pieces or blogs or other statements indicating that they think within the constraints of budget the Administration's proposal has embraced a large proportion of the findings of the Augustine Commission.

Mr. OLSON. Thank you. You hit the nail on the head. It is within the constraints of the budget, and I feel very strongly that it is incumbent upon us here in Congress and the Administration to increase NASA's funding. I mean, the big problem has been, for the past 10 years, we have had this great vision, and I think going back to the moon is the proper vision for our human spaceflight at this time but we haven't been willing to give them the resources.

I want talk to you, Dr. Holdren, just about how the process of this recommendation for human spaceflight came about. In the course of your discussions and debates for this proposal, did you meet with any of the current Constellation contractors and did you meet with anyone representing the private organizations, specifically SpaceX or Orbital, in putting together the Administration's proposal?

Dr. HOLDREN. Well, first of all, the Augustine Committee had an extraordinarily interactive and public process. They had a large number of public meetings. They met with everybody you could imagine. The Augustine report contains an amazing list of all the folks that they met with. When we got the Augustine report, we then had a process within the White House but also involving of

course NASA to talk about and to explore the different kinds of possibilities that could be constructed as different options for the President's consideration coming out of those findings and everything else that we had been able to learn about the space program, the options it faces going forward and so on. Certainly we heard from representatives of the private sector, big companies, little companies. We heard from just about everybody who has an interest in this matter.

Chairman GORDON. Thank you. Mr. Olson, Administrator Bolden will be testifying before us soon, and I am sure we will have an opportunity to go into more depth, and I think following on that theme, Ms. Kosmas is recognized.

Ms. KOSMAS. Thank you, Mr. Chairman. Dr. Holdren, it is good to have you here and I appreciate your comments. As I have shared with you previously, you know that I am very concerned about the lack of specificity in the President's proposal for NASA, and this follows closely on the comments made by my colleague, Mr. Olson. I too feel that this is a very bipartisan issue and an extremely important one as we move into the 21st century for this Nation, to quote you, "to continue America's leadership in science and in space". Again, as the Representative for the Kennedy Space Center, I am particularly concerned that the budget has no concrete plans for a future exploration program. There is no goal outlined. There are no milestones for a program. There is no launch schedule. And this proposal basically leaves my constituents, which is a uniquely skilled and professional workforce, with no way to plan for the future. Under this plan, as you undoubtedly are aware, as many as 7,000 people will be laid off in my district. They will likely move away, and the loss of this workforce will cause, in my opinion, great devastation not only to the community but to our Nation's ambitions for space exploration.

So my question to you is, can you tell me how the Administration proposes to avoid dispersing this workforce which is critical to our space program and the positive effects that the space program has on our national security, our economic viability and our scientific leadership?

Dr. HOLDREN. Thank you, Congresswoman Kosmas. We have talked about this before, and I know that we have not yet provided enough detail, as much detail as you will want and the American people will want about this program but that is in process. As the Chairman mentioned, Administrator Bolden will be testifying here. He will have more detail. There will be more detail forthcoming as we develop and flesh out the options that have been identified in the new plan. But let me make a couple of points about your obviously very real and very valid concerns about the Kennedy Space Center.

In the President's proposal, we do propose first of all to fly out the shuttle manifest, even if that includes moving into 2011, which was not previously a done deal. You may say it is a no brainer but we agreed to do it, and that I think is terribly important that we fly out that manifest, we do it in a prudent and safe manner, and that of course will create for the period in which it lasts continuing activity at the Kennedy Space Center. We have proposed——

Ms. KOSMAS. And I thank you for confirming what Congress had already approved.

Dr. HOLDREN. Indeed. We have proposed to extend the life of the International Space Station, which is going to mean more launches of U.S. astronauts, and we believe those launches are going to take place at a pace that will exceed what would have taken place under Constellation. That will be more activity at the Kennedy Space Center.

Ms. KOSMAS. And they will be launched by what vehicle?

Dr. HOLDREN. I think there is a variety of possibilities for the vehicle that will do that. We are spinning up a variety of, and encouraging a variety of private contractors who have vehicles that they believe will be up to that task. As I mentioned before, the safety of those vehicles and their adequacy for that task will be examined and certified by NASA. But we have, I believe——

Ms. KOSMAS. But there is no notion for a NASA-led vehicle to transfer our astronauts to the Space Station?

Dr. HOLDREN. Not at this time. At this time, as you know, we are dependent for launching into low earth orbit——

Ms. KOSMAS. And nothing has been developed——

Dr. HOLDREN.—on the Russians.

Ms. KOSMAS.—by the private sector. In fact the private sector does not even have from NASA, at this point in time, what those safety specifications—what safety specifications will be required so——

Dr. HOLDREN. But they will get it. NASA is working on those specifications and they will be communicated to the private sector, and we believe there is a good possibility that the private sector capability to put U.S. astronauts in low earth orbit will be available before Ares I would have been available to do the same thing.

Ms. KOSMAS. Let me restate my question. Do you have any specific plan that will help me to suggest, as the President did, that he will assist us in mitigating the job loss at Kennedy Space Center pending the expiration of the shuttle manifest?

Dr. HOLDREN. Yes. I had actually not gotten to that item on the list but we do have plans to invest in the Kennedy Space Center to upgrade the facilities, to do long-overdue renovation, to expand its capacities because we think there are going to be more launches from Kennedy Space Center.

Ms. KOSMAS. Do you expect that those renovations will use the unique workforce that we now have doing the processing and launch preparation?

Dr. HOLDREN. The renovations per se obviously will not, but as we pursue the various possibilities for testing new technologies, for developing new heavy lift capabilities, there will be continuing action at the Kennedy Space Center that will employ some of those people. There is no question that there were going to be job losses associated with winding down the shuttle program. That was a done deal before we ever came to office. But I think we have more ideas and more specifics forthcoming about how to at least mitigate some of those job losses that were in place before, and there will be more detail on that.

Chairman GORDON. Thank you, Dr. Holdren. We will have additional hearings on this.

Mr. Bilbray, I am sorry to start with you, but if you could try to hold your remarks to four minutes, then that way I think we could get everybody through.

Mr. BILBRAY. Okay. I have to get over to Toyota pretty soon.

Doctor, let me first of all congratulate you and thank you for the use of terminology when asked about the data on climate change. I think, you know, robust is a respectable term that doesn't carry so much political weight but also leaves open the fact of healthy skepticism of any data, and I think that is reasonable. In fact, it is kind of interesting that the U.N. Council on Climate Change used the same term, robust, to basically say what was essential to address this issue in implementing certain programs, and my biggest observation after working over two decades on air pollution issues is the greatest threat to the credibility of the data is not necessary these e-mails and the scandal but the lack of commitment to the answers that we hear from the biggest proponents of the data in the political spectrum, basically crying that there is a major crisis but refusing to follow the guidance of scientists around the world on how to address those issues.

But I will move on and say, as I go down this report, I am reminded of the fact that at the turn of the last century, the British Parliament outlawed the use of automobiles unless a pedestrian walked in front of that vehicle with a red flag, and the fact is that the political process almost outlawed that technology from being able to be used until technicians persuaded the politicians to back off and move the other way. And when I go down the list here and I am looking at all of this, my concern is, I do not see a scientific assessment of how government regulation, government oversight and government restrictions will keep all of this from being able to implemented along the line. I will give you one. I will go down the list. Will it take two years for this Committee to review the reprocessing of nuclear waste that France has been doing for over two decades?

Dr. HOLDREN. I am not sure this is the forum for going into the details of the reprocessing issue but the French approach to reprocessing, in the judgment of Secretary Chu and in my judgment, would not make sense for the United States at this time. It does not significantly reduce the waste management burden. It increases cost, makes nuclear energy more complex.

Mr. BILBRAY. It is mostly the cost factor that is the biggest factor, though?

Dr. HOLDREN. No, I think if we want nuclear energy to be expandable in this country, we want to make it as inexpensive as possible, as simple as possible, as safe as possible, as proliferation-resistant as possible, and as non-controversial as possible. Reprocessing using the current technology goes in the wrong direction on all those counts.

Mr. BILBRAY. Okay.

Dr. HOLDREN. We need better reprocessing technologies. The Secretary and I agree on that as well.

Mr. BILBRAY. Because I am on short time, the proposed budget here retreats from natural gas use when in fact it is probably one of the most essential transition fuels until our biofuel technology goes in there. Is there any review at all being talked about in look-

ing at government regulations restricting the use of natural gas in pedestrian vehicles? I drove one in 1990 and we still have regulations today and public utility commissions and building codes that specifically restrict the use of natural gas home dispensing to be able to replace the traditional gasoline when in fact we know this is probably one of the cleanest fuels readily accessible to the consumer today.

Dr. HOLDREN. I don't see anything in this budget that retreats in any way from natural gas use. I think natural gas is a valuable resource. It is the cleanest burning of the fossil fuel resources. We could do much more with it. We have a lot of it. The private sector is going to do most of that. We don't need a lot of money in the federal R&D budget in order to deal with natural gas. The regulatory issues there, I have to say, are not my domain. If there are regulatory obstacles to using more natural gas, I would like to see them resolved.

Mr. BILBRAY. And I would like to see scientists stand forward and say that and get into it, and that is what is important.

The Bush Administration bet the farm on every one of its renewable research facilities on ethanol. Is this Administration willing to basically give alternatives to ethanol the same standing across the board and retreat from this dead-end road of going to ethanol as somehow the magic fuel that I think scientists across the board have said is a dead-end road? Is there any possibility for the Administration to reverse those positions of the Bush Administration and allow the next generation of truly emission-reduced fuels to get into those research facilities with equity with what I call the 'snake oil' called ethanol?

Chairman GORDON. Could that be a yes or no?

Dr. HOLDREN. Yes, we are interested in a wider array of biofuels, and will certainly support the pursuit of a wider array of biofuels as opposed to just ethanol.

Mr. BILBRAY. Doctor, thank you very much, and I just want to say again, we need to hear the scientists stand up and say when things—when regulations are standing in your way, or we will still be driving behind a guy with a red flag for the next 20, 30 years while climate change and all these other crises continue to be talked about but action is never made legal to be implemented. Thank you very much.

Chairman GORDON. Ms. Edwards is recognized.

Ms. EDWARDS. Thank you, Mr. Chairman, and I thank you because I know that were are going to have some more time to go into the human spaceflight component of the budget and I, like many of my colleagues here on this Committee, have serious questions about the Administration's direction, vantage point and policy but I won't go into them today. Among those, though, are, you know, what the impact is on the U.S. preeminence in space exploration, whether we are really mirroring the trajectory of international agency capacity and human spaceflight development. They seem to be going up and we seem to be going in a different direction, and obviously the questions around workforce and safety. And so I look forward to exploring those questions in greater detail.

I want to ask today, though, Dr. Holdren, about STEM education and particularly thank the leadership of our Chairman and Ms.

Johnson on making sure that we really understand what is going on with STEM with our young girls, with our minority communities and in the reach of these programs, but I wonder if you could give us a little bit more detail about how the programs through the National Science Foundation, Department of Education and these things are coming together in a more coordinated fashion, with a real vision toward K–12 education because it does seem there are all of these different holes and pockets and not a level of coordination that is really needed at the local level in school systems to understand better how to successfully implement greater capacity in our STEM learning.

Dr. HOLDREN. Thank you, Congresswoman. First of all, this is clearly a very tough problem. We have been talking about improving STEM education for decades. Progress has been frustratingly slow. If it were easy, we would have gotten it fixed a long time ago. It is hard, and it is hard in part because you need both bottom-up and top-down efforts of a variety of kinds to meet in the middle to cover the whole spectrum of things that need to be done. We are working much harder in this Administration than I think has previously been done to integrate these different components. The Domestic Policy Council, headed by Melody Barnes, is very much involved with this. Secretary Arne Duncan is very much involved in it. The NSF is involved in it. I am involved in it. And the President is involved in it. The First Lady is involved in it. We talk about this several times a week, of how to get these programs to work better together, to get the Race to the Top program and the Educate to Innovate program and the other initiatives that are being undertaken to reinforce each other so that we not only have better laboratories in every middle school and high school in the country, so that kids can learn science and engineering in a hands-on way rather than just being lectured at, but we also have the teachers who are trained to exploit those laboratory facilities in ways that kids really learn from them. A lot of things have to come together to make this work.

I think they are starting to come together. Secretary Duncan and I have an op-ed piece coming out in The Hill next week about some of the stuff that we are doing together to make this happen. I would love to talk with you offline about it at greater length. This is one of the highest priorities of the President and I have to tell you that every event that we propose from OSTP for the President's participation that has STEM education in it, he says yes. He comes and does it. He interacts with the kids. He is excited about this stuff. He knows how important it is, and as a result, we are all determined to get it done.

Ms. EDWARDS. Well, I would like to have an offline conversation about that because I do think it is a real challenge for our local school systems to understand how all of these puzzle pieces fit together so that there is success in STEM learning, not just for a handful. I mean, you know, in my district, you can go to any number of schools that are doing something right in individual schools but from a systemic standpoint, how is it that we get all of our children trained in the kind of way that they need to have skills to make them successful for this century? Lots more questions. Out of time. Thank you, Mr. Chairman.

Chairman GORDON. Thank you. That is a very important issue. Mr. Rohrabacher is recognized.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman, and let me just note that stem cell research is of course really important, and those of us—I have actually taken some hits for taking stands on this issue, which are contrary to some of my other party members, but let me just note that——

Ms. EDWARDS. I just want to make sure, I am focused on STEM learning, not stem cell research.

Mr. ROHRABACHER. Oh, excuse me. I heard you talk about—I will talk about stem cell research then. What we have found, however, and because it leads into my basic question, in stem cell research we saw that issue being politicized on the Hill, which I believe it shouldn't have been, and I might say politicized by both sides of the spectrum. We also have seen something even more politicized on the Hill over the last 20 years, and that this is the issue of global warming, and I noted that there are several quotes from you in the recent past where you talk about those who disagree with your position, disagree with this whole idea of the global warming phenomenon, you label them as deniers. I would hope that considering the revelations that we have had that has the evidence that has emerged showing mistakes, errors and, yes, outright fraud that took place in the IPCC reports, I would hope that you would watch your language in terms of just dismissing people who disagree with you on this issue.

At this point I would submit for the record, Mr. Chairman, an article. This came out about the reversal of Dr. Phil Jones, who is one of the great global warming advocates who now suggests there has been no global warming since 1995 and has admitted that it is possible that there are earlier time periods of warming that would——

Chairman GORDON. Without objection, it will be made part of the record.

Mr. ROHRABACHER.—with human activity as well as including for the record a list of 100 prominent scientists from around the world including heads of major universities science departments who think that the concept of global warming was never accurate.

[The information follows:]

Mail Online

# Climategate U-turn as scientist at centre of row admits: There has been no global warming since 1995

By Jonathan Petre
Last updated at 5:12 PM on 14th February 2010

- **Data for vital 'hockey stick graph' has gone missing**
- **There has been no global warming since 1995**
- **Warming periods have happened before - but NOT due to man-made changes**

**Data: Professor Phil Jones admitted his record keeping is 'not as good as it should be'**

The academic at the centre of the 'Climategate' affair, whose raw data is crucial to the theory of climate change, has admitted that he has trouble 'keeping track' of the information.

Colleagues say that the reason Professor Phil Jones has refused Freedom of Information requests is that he may have actually lost the relevant papers.

Professor Jones told the BBC yesterday there was truth in the observations of colleagues that he lacked organisational skills, that his office was swamped with piles of paper and that his record keeping is 'not as good as it should be'.

The data is crucial to the famous 'hockey stick graph' used by climate change advocates to support the theory.

Professor Jones also conceded the possibility that the world was warmer in medieval times than now – suggesting global warming may not be a man-made phenomenon.

And he said that for the past 15 years there has been no 'statistically significant' warming.

The admissions will be seized on by sceptics as fresh evidence that there are serious flaws at the heart of the science of climate change and the orthodoxy that recent rises in temperature are largely man-made.

Professor Jones has been in the spotlight since he stepped down as director of the University of East Anglia's Climatic Research Unit after the leaking of emails that sceptics claim show scientists were manipulating data.

The raw data, collected from hundreds of weather stations around the world and analysed by his unit, has been used for years to bolster efforts by the United Nation's Intergovernmental Panel on Climate Change to press governments to cut carbon dioxide emissions.

Following the leak of the emails, Professor Jones has been accused of 'scientific fraud' for allegedly deliberately suppressing information and refusing to share vital data with critics.

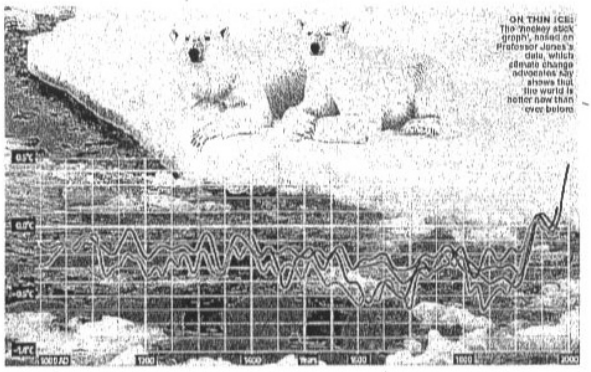
Discussing the interview, the BBC's environmental analyst Roger Harrabin said he had spoken to colleagues of Professor Jones who had told him that his strengths included integrity and doggedness but not record-keeping and office tidying.

Mr Harrabin, who conducted the interview for the BBC's website, said the professor had been collating tens of thousands of pieces of data from around the world to produce a coherent record of temperature change.

That material has been used to produce the 'hockey stick graph' which is relatively flat for centuries before rising steeply in recent decades.

According to Mr Harrabin, colleagues of Professor Jones said 'his office is piled high with paper, fragments from over the years, tens of thousands of pieces of paper, and they suspect what happened was he took in the raw data to a central database and then let the pieces of paper go because he never realised that 20 years later he would be held to account over them'.

Asked by Mr Harrabin about these issues, Professor Jones admitted the lack of organisation in the system had contributed to his reluctance to share data with critics, which he regretted.




But he denied he had cheated over the data or unfairly influenced the scientific process, and said he still believed recent temperature rises were predominantly man-made.

Asked about whether he lost track of data, Professor Jones said: 'There is some truth in that. We do have a trail of where the weather stations have come from but it's probably not as good as it should be.

'There's a continual updating of the dataset. Keeping track of everything is difficult. Some countries will do lots of checking or their data then issue improved data, so it can be very difficult. We have improved but we have to improve more.'

He also agreed that there had been two periods which experienced similar warming, from 1910 to 1940 and from 1975 to 1998, but said these could be explained by natural phenomena whereas more recent warming could not.

He further admitted that in the last 15 years there had been no 'statistically significant' warming, although he argued this was blip rather than the long-term trend.

And he said that the debate over whether the world could have been even warmer than now during the medieval period, whe there is evidence of high temperatures in northern countries, was far from settled.

Sceptics believe there is strong evidence that the world was warmer between about 800 and 1300 AD than now because of evidence of high temperatures in northern countries.

But climate change advocates have dismissed this as false or only applying to the northern part of the world.

Professor Jones departed from this consensus when he said: 'There is much debate over whether the Medieval Warm Perioc was global in extent or not. The MWP is most clearly expressed in parts of North America, the North Atlantic and Europe and parts of Asia.

'For it to be global in extent, the MWP would need to be seen clearly in more records from the tropical regions and the Southern hemisphere. There are very few palaeoclimatic records for these latter two regions.

'Of course, if the MWP was shown to be global in extent and as warm or warmer than today, then obviously the late 20th Century warmth would not be unprecedented. On the other hand, if the MWP was global, but was less warm than today, then the current warmth would be unprecedented.'

Sceptics said this was the first time a senior scientist working with the IPCC had admitted to the possibility that the Medieval Warming Period could have been global, and therefore the world could have been hotter then than now.

Professor Jones criticised those who complained he had not shared his data with them, saying they could always collate their own from publicly available material in the US. And he said the climate had not cooled 'until recently – and then barely at all. The trend is a warming trend'.

Mr Harrabin told Radio 4's Today programme that, despite the controversies, there still appeared to be no fundamental flaws in the majority scientific view that climate change was largely man-made.

But Dr Benny Pieser, director of the sceptical Global Warming Policy Foundation, said Professor Jones's 'excuses' for his failure to share data were hollow as he had shared it with colleagues and 'mates'.

He said that until all the data was released, sceptics could not test it to see if it supported the conclusions claimed by climate change advocates.

He added that the professor's concessions over medieval warming were 'significant' because they were his first public admission that the science was not settled.



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With that said, let me get on to a question about space and let me commend you and the Administration for being courageous enough to take a bold step in dealing with space issues. The fact is that Republicans love to talk about cutting down government waste but whenever it comes down to actually cutting something or redirecting resources away from government bureaucracy in the areas of space or defense, we end up not being on the side of the angels. I would suggest that your Administration has tried to take an honest approach to looking at what NASA is all about. The goal of NASA should not be maintaining the NASA science bureaucracy. We just spent $9 billion on the Constellation project and have almost nothing to show for it, and there are about five or six other

projects that we can say the same thing. We are talking about billions and billions of dollars with nothing to show for it. Well, I am pleased that this Administration is willing to stand up to the plate and try to challenge this and say well, let us see if the private sector can come up with some alternatives that will save us some money.

Let me note that the Constellation wasn't our only way of getting into space. We have Atlas and we have Delta rocket systems that, if we challenge the private sector to use those rocket systems rather than spending billions and billions of dollars of developing a new government rocket system, it might be the cost-effective way of using those systems coupled with some new innovation from the private sector. And thank you very much, and I know I have used up my time, but maybe if you could just say yes or no.

Chairman GORDON. I think he will say both.

Dr. HOLDREN. On NASA, yes. On climate change, no.

Chairman GORDON. Many thanks for the angelic Mr. Rohrabacher's, comments.

And now we go to the patient Ms. Johnson.

Ms. JOHNSON. Thank you very much, and thank you, Dr. Holdren, for being here. My frustration is the same as Dr. Broun's and Mr. Olson's on the integrity of research. The eight years that President Bush was in, there were constant complaints about the altering of reports in the office and everything else, so I think that hopefully we can get beyond the past mistrust, hopefully with a party label, and look very honestly at the scientific research and scientific integrity and know full well that as we do research, things do change, new knowledge is found, and so many of the things that we are doing will show that.

I think I heard you say that the investment would be where you could get some results a little cheaper and quicker in the areas of funding. I am from Texas and I believe in NASA, but it is very expensive, and I know that. It has rendered probably the best results of any research we have had but that too can change and so we have to prepare our young people to look at something different. I am very concerned about whether or not we are putting the right emphasis and getting the right results from the STEM education. Because if we are not doing that, it won't make a whole lot of difference how much money we spend, because we still won't have the qualified people to make the best of the research. And I appreciate the fact that you and Secretary Duncan are working together because it is very, very much needed. And I hope that all of us will continue to question without being that hostile about—because of party labels, but because we need to know this knowledge for the future and we need to have an opportunity and the ability to continue to seek it. So I look forward to the article you are talking about but also I wanted you to comment just quickly on some of the things that you might be working with Secretary Duncan as relates to America COMPETES and the provisions that were made in that, research and preparation of instructors as well, because that is where I think our biggest weakness is.

Dr. HOLDREN. Well, I can just say very quickly, I think you are absolutely right on all counts. I don't disagree with anything you have said, and your last comment about the preparation of instruc-

tors is absolutely crucial and we are making big investments and thinking about how to innovate in both incentivizing some of our brightest people to go into teaching and doing a better job of preparing them for teaching science and math and engineering and technology in our schools. So there is absolutely no disagreement there. I think we are together on the need. We are together on the goals, and I think we will find that we are together on a lot of the means.

Ms. JOHNSON. Thank you very much, Mr. Chairman.

Chairman GORDON. Thank you, Ms. Johnson.

Ms. Fudge and then Mr. Tonko, and then we will have to conclude.

Ms. FUDGE. Thank you, Mr. Chairman, and thank you, Dr. Holdren.

My first question really you don't need to answer today, but if you could get back to my office with it. I certainly understand that the President has pledged almost $4 billion for STEM education in the budget. My concern is with Race to the Top funding. What we continue to do, unfortunately, is to pick out a select few schools who have the resources to write grants, who have the resources to be involved, and we leave the masses of the children behind. I really do believe that every student deserves the opportunity to compete in STEM, and Race to the Top does not accomplish that. And so what I really want to know is how we can extend support to students from underserved areas so that they are given the same exposure and opportunity to develop their STEM skills. And in addition, I want to know if there is a plan at all to establish a clearinghouse for federal STEM programs because I have been trying to find one and I don't think a complete list exists.

My question is, in my district, which is from—I represent Cleveland, Ohio, and northeast Ohio. Obviously we had a very strong manufacturing base, and it is a part of the region that has been significantly impacted by the decline of the auto industry. In your testimony, you cite a recent White House report called *"A Framework for Revitalizing American Manufacturing."* One of the recommendations in this report is for better coordination of manufacturing R&D programs across the Federal Government through the National Science and Technology Council. What is the status of that interagency process? Could you give us some brief overview of the Administration's strategy and vision of how federal R&D investment should support American manufacturing and job creation?

Dr. HOLDREN. Thank you. A quick answer on that, because I know time is limited. The National Science and Technology Council technology committee has been meeting on this. We have a committee of PCAST as well, the President's Committee of Advisors of Science and Technology, that the President has asked to look at manufacturing initiatives of a variety of kinds, and we are doing that. The folks across the Administration understand the priority. Larry Summers and the National Economic Council are very much involved in this, understand the priority on revitalizing manufacturing in this country and getting back into a leadership stance with respect to our capacity to manufacture cost-effectively, to develop new products. This is a major push in the Administration

and there are lot of different folks involved I it, and again, I would love to get back to you with some of the details.

Ms. FUDGE. Okay. They are involved, but are they working across agencies?

Dr. HOLDREN. Yes, we are working—I mean, that is what the NSTC is all about.

Ms. FUDGE. I know that is what it is supposed to be.

Dr. HOLDREN. It is. We are doing it. The folks from the different agencies are coming, they are participating, they are communicating. They are starting to collaborate. We have a functioning NSTC again.

Ms. FUDGE. Thank you, Mr. Chairman. I yield back.

Chairman GORDON. Mr. Tonko is recognized.

Mr. TONKO. Thank you, Mr. Chair.

Dr. Holdren, welcome. I was pleased that you were talking about linking innovation, entrepreneurship and job creation. You highlight NSF's Ecosystem program and EDA's efforts supporting regional innovation clusters. We know that DOE is supporting the creation of innovation hubs and clusters. Can you somehow explain how these initiatives complement each other and if there is any coordination or collaboration effort underway?

Dr. HOLDREN. Again, I addressed that briefly before. The notion of innovation ecosystems is being pursued in concrete terms in this Energy Regional Innovation Cluster where we have seven different agencies working together, including the DOE, to build innovation clusters around the energy innovation hubs that the DOE has already been spinning up. The level of coordination there is very high. The level of interaction with the private sector is very high. I think I said before, I have never seen so much enthusiasm from private companies wanting to partner with the government in various ways to get innovation out into the marketplace again in this country. You know, we could give you a long laundry list of the things that are happening but there is a lot.

Mr. TONKO. And another area with the regulatory barriers of demonstrating renewable energy technologies, can you suggest how we might facilitate the coordination between OSTP and DOE's research programs and other regulating agencies that have somewhat moved to the commercialization of our clean energy technologies, which I think is, you know, a very important linchpin to advancing a green energy agenda, clean energy economy.

Dr. HOLDREN. It is an important linchpin, and OSTP and DOE and PCAST are all working very closely together on this. We have a PCAST panel set up on energy technology innovation, looking at how to move things from the R&D stage into commercialization. I happen to be an old friend of Steve Chu's. We worked together on many things long before either one of us was in government. We talk together several times a week. I am also and my staff are on very good terms with all the deputies over there so there is a very close working relationship between OSTP and DOE in this domain, and I think we are going to come up with some real innovation in how to advance this process of getting renewable energy out there into the marketplace.

Mr. TONKO. And do you see that being—with a commitment from the funding that will require? Because I believe that it is going to

take not only a huge investment, but coordination with the utility industry out there. When we look at some of the things being done across the globe, they are bringing about renewables because they are demanding that—you need a huge customer out there, I think, or a supplier, and I think our utility network needs to be part of that coordination.

Dr. HOLDREN. They do need to be a part of it and you also need a transmission grid that can take renewable energy from the places where it is most abundant to the places where it is most needed, and we need to substantially increase investments in the grid as a general matter. We need a smarter grid to help get this done with an increasing renewables contribution in it, and we are focused on all of those issues. I agree with you about its importance, so does Secretary Chu. And I think the private sector is ready to work with us in getting some of these things done.

Mr. TONKO. Thank you.

Chairman GORDON. Dr. Holdren, that concludes our witnesses, and I want to again thank you for joining us today. I think the breadth of questions demonstrated that you have quite a broad portfolio, and that is one of the reasons that as I mentioned earlier, it is important for our country for you to succeed. We want to see you be successful for our future.

The record will remain open for two weeks for additional statements from the Members and for answers to follow up any questions that the Committee may ask the witnesses. I am sure that you, as I say, and Mr. Broun will have the opportunity to have some discussions in the future, and again, we welcome you here. The witness is excused and the hearing is adjourned.

[Whereupon, at 11:37 a.m., the Committee was adjourned.]

# Appendix 1:

## Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

*Responses by 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*

**Questions submitted by Representative Ralph M. Hall**

*Q1. Your testimony re-asserts the goal President Obama announced last year to invest 3 percent of GDP on public and private R&D. However, while the budget projects that GDP will grow by 5.9 percent, the budget increase for R&D is just 0.2 percent, so the public R&D-to-GDP ratio actually declines with this budget. What exactly is the Administration's plan to achieve this goal, especially in light of the fact that its budget is going in the wrong direction?*

*A1.* The 2011 Budget will make progress toward the President's goal by increasing Federal funding for R&D as a percentage of GDP for nondefense activities. The proposals for the conduct of non-defense R&D (basic and applied research, and development) in the 2011 Budget, combined with spending from past appropriations, will result in outlays (expenditures) of $66.6 billion ha FY 2011, compared to $60.9 billion in estimated nondefense R&D outlays in FY 2010. This 9.2 percent increase between FY 2010 and 2011 would exceed the 4.6 percent growth in GDP between FY 2010 and 2011 projected in the President's budget (see Budget of the US Government FY 2011 Historical Table 10.1). The Budget shows a decrease in total R&D outlays as a percentage of GDP due primarily to a decrease in DOD's development programs.

*Q2. In your testimony you highlight a number of different agencies that are engaged in research in the area of climate change. Do you have any estimate on the amount of Federal research money that is being devoted to research on climate change? Would this include the funding provided through the U.S. Global Change Research Program? Does all climate research funding come under that header?*

*A2.* The 2011 Budget proposes $2.6 billion for research on climate change from 13 Federal departments and independent agencies, under the heading of the US Global Change Research Program (USGCRP). The USGCRP budget crosscut is intended to capture most of the Federal government's investments in climate research, with research related to the mitigation of greenhouse gases being tracked through the Climate Change Technology Program. OSTP is currently working with the USGCRP program office and the agencies to insure that all Federal climate change research investments are categorized as such.

*Q3. In 2008, the United States trade deficit in high technology products was $55.5 billion, up from $16.6 billion in 2002. The US trade balance in high technology products was last in surplus in 2001. A portion of this deficit is from US companies that manufacture overseas and bring the products back to the US. Even if we invest more in research and development programs and attract more professionals into high technology fields, how do we discourage companies from taking production outside the U.S.?*

*A3.* The Obama Administration is taking steps to keep the industries of the future and associated jobs in the United States. The President's *Strategy for American Innovation,* announced in September 2009, provides a framework for understanding how R&D investments, STEM education policies, and supporting policies in other areas such as manufacturing, trade, and entrepreneurship work together to keep high technology industries in the United States. To highlight the importance of manufacturing within the strategy, in December 2009 the Administration released *A Framework for Revitalizing American Manufacturing.* This document (attached) is a strategy for keeping advanced manufacturing jobs and value in the United States, and lays out the policies the Administration intends to pursue. Within the R&D area, the policies include expanded research in the 2011 Budget on advanced manufacturing and nanomanufacturing.

*Q4. Your testimony states that the budget "sustains the President's commitment to double the budgets of three key science agencies," including the DOE Office of Science. However, the Office of Science is increased by just 4.4 percent, after receiving only a two percent increase last year. Do you intend to double the budget for the Office of Science? If so, over how many years?*

*A4.* The Budget maintains the President's commitment to double funding for key science agencies, including the Department of Energy's Office of Science. The 2011 Budget establishes a budget profile to achieve doubling from 2006 levels by 2017.

*Q5. The government has spent nearly 25 years and expended more than $10 billion on Yucca Mountain and it seems premature to allow the application to be withdrawn before there is any determination by the Nuclear Regulatory Commission as to whether it would be safe. And the Administration has repeatedly stated that it will be "the most open, transparent Administration in history". As such, can you assure us that your office will work with DOE to make sure all Yucca-related paperwork, materials and documentation are maintained and made available to Congress for proper review and consideration?*

*A5.* DOE has committed in filings with the NRC Atomic Safety Licensing Board (ASLB) that, until there is a final non-appealable order dismissing the license application for a repository at Yucca Mountain, DOE will keep its Licensing Support Network (LSN) website compliant and accessible through the NRC's LSN portal. DOE is working with the National Archives and Records Administration to ensure the preservation of this material after the conclusion of the licensing proceeding. In addition, DOE is committed to preserving all documents and other materials of scientific value. OSTP will work with DOE to ensure that all materials are carefully reviewed for scientific value before anything is discarded.

*Q6. Promoting "Green Jobs" or "Clean Energy Jobs" is clearly a priority for the administration as reflected in this budget. However, a growing body of data indicates that these models are inefficient and highly expensive. An authoritative study by one of Spain's leading universities found that the average subsidy cost for each "green job" created in Spain was $800,000, and that Spain's creation of 50,000 green jobs resulted in 110,000 lost jobs elsewhere in the country. A similar study in Germany found that wind and solar subsidization in Germany amounted to $244,000 per "green job" and added 7.5 percent to the cost of household electricity bills. If these reports are true, would you still support the policy of promoting "green jobs" instead of promoting job creation through the expansion of traditional energy resources? Are you aware of these studies and have you considered the concerns they raise in formulating your own green jobs agenda? Given the studies' conclusions that such subsidies hurt job creation and increase energy prices, will you consider estimating the potential for similar expensive and counterproductive impacts as a result of the Administration's green jobs agenda?*

*A6.* Yes, we are familiar with the studies you cite. While we have concerns about the methodology used in these studies (e.g., see the August 2009 NREL response to the King Juan Carlos University report; reference below), the energy policies in question are substantially different from those of the U.S. Federal government. We have no plans, therefore, to conduct a cost-benefit analysis of the clean energy policies in Germany and Spain. We have, however, analyzed the potential benefits of clean energy investments in the Recovery Act, which is specifically intended to create jobs, including green jobs. The President's Council of Economic Advisors estimates that the approximately $90 billion of Recovery Act investments will save or create about 720,000 job-years by the end of 2012. Projects in the renewable energy generation and transmission, energy efficiency, and transit categories create the most jobs: approximately two-thirds of the job-years saved or created represent work on clean energy projects.

The Administration remains committed to creating green jobs. Beyond the Recovery Act, the President's FY 2011 Budget expands by $5 billion our Advanced Energy Manufacturing Tax Credit; it substantially expands support for construction of new nuclear power plants by increasing loan guarantee authority for such projects by $36 billion; it provides$500 million in credit subsidy to support $3 billion to $5 billion of loan guarantees for energy efficiency and renewable energy projects; it continues to support modernization of our electrical grid; and it helps foster the growth of wind and solar energy projects. Further, the President has set a goal of doubling our exports over the next five years and thereby supporting two million American jobs, many of which will be in clean energy industries. The transition from fossil fuels to clean energy will challenge both America's technical ingenuity and our political will. This challenge holds out tremendous possibilities not just for improving

our health and the environment, but also for creating new, high-paying green jobs and driving the recovery of America's manufacturing economy.[1]

*Q7. This is the second budget that the Administration has requested funding for the Regaining our ENERGY Science and Engineering Edge (RE–ENERGYSE) program, an NSF and DOE collaboration to "attract and educate future American scientists in the clean energy field." The FY 11 request for this activity is $74 million. ($19 million for NSF and $55 million for DOE). Neither your testimony nor the DOE or NSF Budget books give detailed information on this program. Could you please give us specific details on RE–ENERGYSE, how it will work, and how this money will be spent?*

*A7.* DOE and NSF 2011 Budget submissions provide detailed information on how this interagency effort will work and how funds will be spent. Attached are documents providing detailed information on the RE–ENERGYSE program from the FY 2011 congressional budget justifications of NSF and DOE.

*Q8. In your testimony you state that the three agencies involved in NPOESS (NASA, NOAA and DOD) announced that they are no longer jointly participating in the NPOESS program.*

*Q8a. Was this decision made by the agencies or was it made by your office with input from the agencies?*

*A8,8a.* My testimony stated that the Administration is restructuring the process by which the three agencies collaborate to implement the Nation's polar-orbiting environmental satellite program. In fact, all three agencies are still involved in some aspect of developing a next generation polar-orbiting environmental satellite system. The February 1, 2010 decision was made by the leaders of the relevant offices in the Executive Office of the President (EOP), specifically by me, the OMB Director, and the National Security Advisor., after an intensive interagency process involving an EOP Task Force and top officials and supporting staff from NASA, NOAA, and DOD.

*Q8b. There was very little information accompanying the announcement on the dissolution of the NPOESS tri-agency program.*

*i. Was an estimate done on what it would cost to keep the program together, but move the whole thing (procurement, management, etc.) to either DOD or NASA? Was this estimate compared to the cost of separate programs? Please provide the Committee with the costs estimates of the options considered and reasons for taking the path you chose versus the others.*

*A8b,i.* The EOP-led process analyzed cost-estimates for various options, including continuation of the program under the current IPO structure, as well as moving the management function for the program to either the Air Force Space and Missile Systems Center (SMC) or to NASA's Goddard Space Flight Center (GSFC). But I should stress that throughout the process, the Task Force recognized that cost should not be the sole driver in decision-making. The ultimate goal was to position the program for success in order to ensure continuity of the Nation's weather forecasting and climate monitoring needs, by improving the governance structure of the program and aligning the program with proven acquisition center capabilities.

When the Task Force began the analysis of the NPOESS program in August of 2009, the official life-cycle cost estimate was $13.9B. The DOD estimates presented in October 2009 for the NPOESS program of record showed an increase of that figure to $15.1B, while the NPOESS Integrated Program Office (IPO) provided a revised cost-estimate of $16. 5B in November 2009. NASA had also previously performed various cost-estimates for the NPOESS program of record, but these estimates assumed that the program had been conducted within NASA from the beginning, and thus were not comparable to the official cost estimates. NASA's various estimates performed" at both the 70 % and 80% confidence level for the full life-cycle cost, based on parametric analysis (in effect, cost curves for different types of equipment), were between $17B and $19B or more, depending on the assumptions

[1] Sources: NREL NREL/TP-6A2-46261, August 2009, NREL Response to the Report "Study of the Effects on Employment of Public Aid to Renewable Energy Sources from King Juan Carlos University (Spain)" *http://www.nrel.gov/docs/fy09osti/46261.pdf.*

Council of Economic Advisors, Economic Report of the President, Feb. 2010. *http://www.whitehouse.gov/administration/eop/cea/economic-report-of-the-President.*

Treasury Secretary Timothy F. Geithner.

Written Testimony before the House Budget Committee, February 24, 2010.

*http://www.ustreas.gov/press/releases/tg56l.htm.*

made about the maturity level of the various sensors. The agencies use differing cost methodologies and risk tolerance levels, which results in differing conclusions of the agencies on costs of the NPOESS program at given point in time. However, the agencies all agreed, and the Task Force concurred, that the life-cycle cost of the program would exceed the current official estimate of $13.9B.

The fact that the cost estimates were continuing to increase, as well as the lack of consensus between the agencies on which was the appropriate estimate to use, all reflected a fundamental problem with the program—namely, divergent views between the agencies as to the overall requirements of the program as well as the underlying needs. The inability of the agencies to compromise on this basic matter highlighted a further conclusion of the Task Force—that over time, the goals of the agencies associated with the program had drifted apart significantly. The risk of further escalating cost, on a program with approximately $5B invested through FY 2009 (and which was originally estimated to cost $7.0B in 2002), was notable and concerning.

*ii. How is the tri-agency program going to be dissolved?*

*Aii.* Direction to restructure was transmitted from EOP, through the Under Secretary of Defense for Acquisition, Technology, and Logistics to the Program Executive Officer (PEO) for Environmental Sensing and the NPOESS Integrated Program Office (IPO) through a DOD Acquisition Decision Memorandum. With receipt of the formal direction, the FPO has begun restructure and transition discussions and activities with the agencies, including disposition of the current contracted and government efforts. The three agencies (DOD, NOAA and NASA) have formed a transition team to plan and implement the transition of NPOESS into the NOAA Joint Polar Satellite System. (JPSS) program and future DOD polar-orbiting programs. Efforts from the NPOESS program applicable to either NOAA or DOD follow-on programs will be transitioned to those programs as they ramp up. Current government staff positions will be adjudicated by the agency from which they originate.

*iii. Will DOD still utilize the sensors that were developed as part of its commitment to NPOESS, specifically the Microwave Image Sounder, on future satellites?*

*Aiii.* The Air Force is evaluating the full suite of sensors, including the Microwave Imager/Sounder (MIS) and Space Environmental Monitor for NPOESS (SEM–N), for use on the follow-on program. Current program funds will be used to continue both the MIS and SEM–N efforts in FY 2010 to their next major development milestone while DOD completes a thorough requirements review and an Analysis of Alternatives (AoA) that will inform the follow-on platform decision. Regardless of the outcome of the review and AoA, DOD will have access to the data from the sensors that NOAA's Joint Polar Satellite System (JPSS) will fly in the afternoon orbit, as well as the data that NOAA is seeking to access from the Japanese Aerospace Exploration Agency's Global Change Observation Mission (GCOM) to fulfill requirements that MIS would have met for the afternoon orbit.

*iv. DOD has enough legacy satellites to get them to 2020, possibly even 2025. Will they just go back to the drawing board for the next series of satellites to fly in the early morning orbit? Or will they continue using the NPOESS platform as the basis of any new satellite program?*

*Aiv.* DOD is planning a thorough requirements review and will follow that with an AoA that will inform the follow-on platoon decision. In the meantime, DOD is also examining other ways to fulfill their requirements, including continuing with the current contractor team. DOD's global mission requires that it have access to polar-orbiting data from all three orbits: early morning, mid-morning and afternoon. Although DOD has remaining legacy satellites for the early morning orbit, DOD still has data requirements that will have to be fulfilled by receiving data from the European mid-morning orbit and the NOAA early afternoon orbit.

*v. How does splitting the program up reduce the risk? What is the current risk of project failure?*

*Av.* Although there is the potential for some near-term delays due to the restructuring efforts, the improved management structure of JPSS program will enable the program to proceed forward in the mid-to-long term in a more effective and efficient manner. The risks of the restructure should be compared with the potential risks of continuing along the path of the status quo. The NPOESS program encountered significant schedule slips and cost increases throughout its history. Delays in instrument development for NPP caused the launch of that satellite to be delayed six years from the initial program baseline. Cost and schedule growth for the VIIRS

sensor caused similar delays in development of the spacecraft for the first NPOESS satellite.

The inability of the NPOESS tri-agency governance structure to deal with the program's cost and schedule growth was the source of much of the past difficulties. Maintaining this structure would likely have continued the history of schedule slips and cost increases. Although it would be difficult to quantify this risk, the past history of the program is indicative. The program restructure reduces the risk by clarifying acquisition authoritiesand making a single agency responsible for each orbit. The restructure also allows each agency to manage its program within that agency's existing culture and environment. The newly restructured program will have greater government control over the development process. For example, NOAA will be able, with NASA as its acquisition agent, to have greater control over setting the pace of work that is required to develop the instruments as well as the space and ground segments for the afternoon orbit. The restructured program also provides clear accountability, responsibility, and authority for each orbit, simplifying the complicated tri-agency decision processes that plagued NPOESS. In response to recommendations of the Independent Review Team (IRT), the restructure also provides infrastructure from acquisition centers that will support each acquisition with a deep bench of technical and program personnel and rigorous, documented processes.

The ability to recover lost schedule and rebuild critical spares program will not occur overnight. The program will take some years to restore the robustness of the nation's polar satellite missions. The ability to use different-sized spacecraft as well as international and commercial platforms will provide some flexibility to achieve improved continuity of observation, however.

*Q9. It is my understanding the DOD and NOAA will still utilize the new joint ground system, that the information will come in together. How useful will this be if DOD maintains legacy instruments? Is there a concern that we will only really be able to utilize legacy-level information from the new NOAA satellite since it has to be integrated with the DOD legacy information? If so, wouldn't this make the entire upgrade a waste of money?*

*A9.* The NPOESS-designed ground system is well suited to incorporate legacy systems, if this is desired by the DOD in the future. NOAA will continue to support development of the new sensors and the information and products they will provide. Today's systems are unique and independent designs. The new ground system offers the agencies the opportunity to make operations more efficient by transitioning to a single enterprise solution for multiple satellites. For a period of time, NOAA and DOD will work to transition use of the new NPOESS/JPSS ground network by both legacy systems until the JPSS satellites and the future DOD satellites are in place.

Current DOD Defense Meteorological Satellite Program (DMSP) and NOAA Polar -orbiting Operational Environmental Satellite (POES) satellites are operated by NOAA's Office of Satellite Operations, which can continue to support legacy sensors. This office has provided the command, control, and communication for DMSP spacecraft from Suitland, Maryland since 1998 with Schriever Air Force Base in Colorado providing back-up support. NOAA and DOD have had a long history of sharing data fully and openly for weather, space weather forecasting, and climate monitoring while operating separate polar-orbiting satellite systems (i.e. POES and DMSP). NOAA will continue to operate the DMSP and future DOD environmental satellite platforms in the morning orbit under the restructured NPOESS program.

*Q10. DOD is currently responsible for 50 percent of the cost of the tri-agency program. Now that NOAA is going its own way, is it taking full responsibility for the cost of the ground system for which DOD would then pay NOAA to operate their half? Doesn't this put a greater burden on NOAA's budget if they are now responsible for all of the installed costs of the ground system, whereas before, they would only be responsible for half?*

*A10.* The President's FY 2011 budget provides adequate resources in NOAA's budget to support NOAA's efforts for complete development of the ground system, which will be used by DOD and NOAA for both the morning and afternoon orbits. NOAA believes the challenges that remain to field and deploy the ground system are manageable.

Under the JPSS program, NOAA would need to have a ground system in place to support JPSS–1 and JPSS–2. Given the expected 2015 launch of JPSS–1, it is more cost-effective for NOAA to take the lead to continue development of the NPOESS ground system for its JPSS program. In fact, significant progress on the ground system has occurred at the NOAA Satellite Operations Facility (NSOF) where command and control of the JPSS satellites will occur. Similarly, the network of SafetyNet sites that would support the acquisition of data from JPSS satellites

has been identified and NOAA would gain more from leveraging that work instead of starting from scratch. With respect to providing data to DOD from the JPSS ground system, the technological adapters that would be required to do so would be relatively inexpensive to undertake.

*Q11. Will the contract with Northrop Grumman be dissolved? How much will it cost the taxpayers for the termination of the contract?*

*A11.* The NPOESS transition team is currently considering how to proceed with the existing NPOESS contracts into the future. While termination is an option, NASA and NOAA are taking initial steps to remove responsibility for the development of the instruments and the ground system from the Northrop Grumman Aerospace Systems (NGAS) contract. The exact timing of these descopes will be determined by the transition team. Use of an NGAS provided spacecraft bus is still being studied by both DOD and NOAA/NASA.

*A11.* By DOD policy, the NPOESS program must obligate termination liability on contract each fiscal year. It is possible some termination and settlement costs can carry into FY 2012. The cost is under current review by DOD, and one-half of these costs would be NOAA's responsibility. Negotiations regarding the contract will be led by DOD on behalf of the government. Termination and settlement costs are also highly dependent on the decision-making of the transition teams. These activities are extremely acquisition sensitive, and it is premature to discuss the terms of the changing of the contract until the transition team has completed its assessment of next steps.

*Q12. Do you have a plan in place to fix the many problems in the current program in the event that Congress rejects your recommendation to split the project and chooses to fund the program in the same manner as currently funded?*

*A12.* During the EOP Task Force deliberations, the agencies identified a number of critical steps that would be necessary to strengthen the current PEO and IPO organizations as well as underlying agency support to improve the likelihood of success, if such a route were taken. These steps have not been pursued in light of the final EOP decision to conduct separate acquisitions.

The Administration believes it was in the best interest of U.S. taxpayers to restructure the NPOESS program. The decision is supported by the long history of reviews called for by House and Senate Authorizers and Appropriators and completed by the Government Accountability Office (GAO), as well as other reviews completed by the Department of Commerce Inspector General as well as senior-level independent reviews of the program.

**Questions submitted by Representative Vernon J. Ehlers**

*Q1. Overall, the education directorate (EJIR) at NSF receives a 2.2% increase in the FY 11. This is in contrast to an 8% requested increase to the research directorates. Why is there such a difference?*

*A1.* The 2011 Budget proposes a substantial increase for NSF STEM education programs within a nonsecurity discretionary budget that is flat with 2010 enacted funding levels. The 2011 Budget proposes a 4.5 percent increase for STEM programs across NSF, as counted within NSF's "learning" strategic plan goal. A 4.5 percent increase is substantial compared to overall growth in nonsecurity discretionary programs in the Budget. The fact that the total NSF budget increases at 8.0 percent is indicative of the President's strong support for basic research as a key element for long-term economic growth. The 2.2 percent increase applies only to NSF's Education and Human Resources Directorate, which accounts for most but not all of NSF's STEM education funding.

*Q2. More specifically, NSF K–12 Education Research programs are essentially flat funded, except for work focused on implementation. Where is the Administration funding ongoing research in how K–12 students learn and how K–12 teachers teach? The response that NSF is funding more education agency-wide is not acceptable; while I appreciate that the research directorates are working more effectively at incorporating education into the research mission, this should have always been the case. And for the most part, the education supported through the research directorates is NOT research into STEM education, but education on STEM research. Continuing to provide this response to the discrepancy between the RRA and EHR budgets indicates a sense of ignorance about the different types of research the NSF conducts and I would appreciate a more substantive response.*

*A2.* The Department of Education's Institute of Education Sciences (IES) is the Federal government's primary engine for research on how students learn and how teachers teach. The 2011 Budget requests $739 million for IES, an increase of $80 million or 12 percent over the 2010 enacted funding level. Within IES, the Administration requests $260.7 million for research, development, and dissemination, an increase of $60.5 million over the 2010 appropriation. The requested increase would be used to support new research activities in early childhood, elementary and secondary, and postsecondary education; evaluations of Recovery Act programs; and an impact study of professional development in mathematics for elementary school teachers, to be conducted in collaboration with the National Science Foundation. The request for 2011 would also support ongoing programs of research and development in mathematics and science education, mathematics and science education for students with disabilities, teacher quality in mathematics and science education, and learning and cognition. IES supports national research and development centers on validating measures of effective math teaching and cognition and science instruction. It is worth noting that as part of the Administration's government-wide initiative to strengthen program evaluation, the IES request also includes significant new resources for the evaluation of education reform efforts under the American Recovery and Reinvestment Act and efforts to improve Science, Technology, Engineering. and Mathematics (STEM) education. IES communicates research findings to parents, educators, and policymakers through its technical assistance and dissemination network, which includes the Regional Educational Laboratories, the What Works Clearinghouse, the Education Resources Information Center, and the National Library of Education. For example, the What Works Clearinghouse has published reports on the evidence of effectiveness of education interventions in elementary school mathematics and middle school mathematics and has also published practice guides with practical recommendations for educators on assisting students who are struggling with mathematics and encouraging girls in mathematics and science courses. These and other What Works Clearinghouse reports are available on the IES website (http://ies.ed.gov/ncee/wwc/). The request for 2011 would provide nearly $90 million to continue support for these activities.

**Questions submitted by Representative Brian P. Bilbray**

*Q1. Can you talk about where OSTP comes down on the issue of having research agencies dedicate a certain percentage of their budgets—8% has been suggested—to high risk, high impact research that is potentially transformative, and could contribute substantially to our national capacity for innovation? Just this past weekend, I (Congressman Bilbray) hosted a meeting of leaders from the San Diego research community and NIH Director Collins, and this issue was a topic of discussion. What Director Collins and I heard from this group of academic and business leaders is that there is a tendency for peer review to drive agencies in an overly conservative direction in terms of their funding decisions, particularly in times of great budget pressures such as these.*

*A1.* I share your concerns about the sometimes conservative nature of peer review, and I agree strongly that research funding agencies should emphasize the support of potentially transformative or high-risk/high-impact research. Over the past year, OSTP has made support of such research a high priority and has worked with agencies to ensure that such research is funded. As one example, the R&D Priorities Memo issued jointly by OSTP and the Office of Management and Budget (OMB) in August 2009 articulating interagency priorities for the Federal R&D investment prominently emphasizes 'high-risk, high-payoff research' as a top priority for the 2011 Budget. But I do not believe a percentage target is the best approach for encouraging such research. One reason is that a single percentage target is unlikely to fit the diversity of Federal research funding agencies. Another reason is that a percentage target for high-risk, high-impact research risks segregating such research from the rest of an agency's research portfolio and also risks making the remaining 92 percent or so of the portfolio more conservative. We do not want transformative research walled off from other research, but instead prefer the approach of encouraging agencies to think about making all of their research more transformative in appropriate and creative ways.

I strongly believe that consistent science funding is part of the solution to our current economic difficulties. Unfortunately, our government's "peak and valley" pattern of scientific funding is disruptive to the flow of the scientific process if funding levels are flying high one year only to be followed the next year with a crash landing. If we are truly to harness the best that our researches have to offer we must settle on consistent funding levels that are fiscally responsible, prudent and scientif-

ically sound. Please elaborate on how the President's budget request will help reduce the impact of the "peak and valley" funding pattern we've been experiencing recently.

I share your belief that consistent science funding is important. The President's 2011 Budget builds on investments in the Recovery Act, 2009 appropriations, and 2010 appropriations to sustain increases for key research agencies. These sustained increases build on four practical challenges for the Federal R&D investment that have consistently guided the Obama Administration's R&D investment strategies: applying science and technology strategies to drive economic recovery, job creation, and economic growth; promoting innovative energy technologies to reduce energy imports and mitigate the impact of climate change while creating green jobs and new businesses; applying biomedical science and information technology to help Americans live longer, healthier lives while reducing health care costs; and assuring we have the technologies needed to protect our troops, citizens, and national interests, including those needed to verify arms control and nonproliferation agreements essential to our security. The 2011 Budget also carries forward the President's Plan for Science and Innovation, announced by the President in April 2009, to double the budgets of three key science agencies. The 2011 Budget lays out a consistent, smooth path to doubling the budgets of the National Science Foundation, the DOE Office of Science, and the National Institute of Standards and Technology laboratories by 2017.

**Questions submitted by Representative Baron P. Hill**

In 2005, President George W. Bush signed Executive Order 13385 which assigned the role and responsibilities of the President's Information Technology Advisory Committee (PITAC) to the President's Council of Advisors on Science and Technology (PCAST). Prior to Executive Order 13385, PITAC provided a focused and credible evaluation of the funding, coordination, and implementation of federal high-performance computing (HPC) activities which PCAST, because of its broad and comprehensive mission, cannot be expected to fulfill. The elimination of PITAC has left a tremendous void in the advanced networking and information technology community and threatens to jeopardize US leadership in these fields.

*Q1. Dr. Holdren—as the leader of PCAST, please comment on how effectively that panel has been able to take over the responsibilities previously held by PITAC since 2005. How do you respond to concerns from the HPC community that the lack of a focused and credible voice on these issues may jeopardize our leadership in these areas?*

*A1.* The current PCAST, assembled in 2009, includes members who are highly regarded within HPC communities, notably Eric Schmidt, David Shaw, William Press, and Craig Mundie. PCAST is cognizant of its PITAC responsibilities, and with the. President's approval assigned Eric Schmidt and Shirley Ann Jackson, immediately following the PCAST's inception, to serve as PITAC Co-Chairs.

PCAST and PITAC are committed to engaging and collaborating with the IT community (of which HPC is a part) to improve the breadth of expertise underlying recommendations to the President. PCAST recognizes that it lacks some expertise required to perform the totality of its functions, and has compensated for those gaps by assembling working groups with high degrees of expertise specific to the tasks at hand. For example, for the recent PCAST review of the National Nanotechnology Initiative, PCAST assembled a working group consisting of 12 non-PCAST members and three PCAST members to conduct the review, and invited an additional 37 nanotechnology experts to testify at its working group meetings.

A number of other PCAST efforts currently underway, such as the Health Information Technology and Advanced Manufacturing studies and the review of the Networking and Information Technology Research and Development program, also involve HPC-related components and are informed by members of the HPC communities in a variety of ways.

In addition, PITAC co-chairs plan to convene events where the IT community will be invited to attend and asked to identify additional areas for attention by PITAC. PITAC will then assemble working groups with input and representation from the IT community to address these issues.

*Q2. Section 7024 of America COMPETES authorizes the establishment of an HPC advisory committee. Does OSTP support such an action and, if so, what has your office clone in this regard so far and what further actions are expected over the next six months?*

*A2.* The PCAST mechanism described in the answer to the question immediately above will be used to provide the HPC advisory committee functions established in the America COMPETES Act (Public Law 110–69), the High Performance Computing Act of 1991 (Public Law 102–194), and the Next Generation Internet Act of 1998 (Public Law 105–305). As part of its work in this domain, PCAST will review the Networking and Information Technology Research and Development (NITRD) program, including the elements set forth in the legislation above, and will report on its findings and recommendations.

**Questions submitted by Representative Gary C. Peters**

*Q1. Dr. Holdren, the Manufacturing Extension Partnership is a program that is very important to me, and I know from companies in my district just how vital MEP support is to the long term success and competitiveness of small and medium sized American manufacturers. I think preserving and strengthening this program should be a top priority as we discuss job creation or economic recovery strategies. The administration has shown a lot of interest in supporting manufacturing and promoting manufacturing jobs, and President Obama's framework for revitalizing manufacturing discusses doubling the MEP program over the next five years. Can you expand further on the Administration's vision for the future of MEP? What changes do you envision for MEP if the program follows this course of expansion?*

*A2.* For the past two decades, MEP has helped thousands of small and mid-sized companies improve their competitiveness through various programs such as lean manufacturing, six-sigma quality, etc. This has resulted in considerable cost savings and quality improvements. Recognizing the merits of the MEP program, President Obama has proposed to —increase the budget to $180 million by 2015. As part of this commitment, $130 million was allocated to MEP in the President's 2011 budget to enhance the competitiveness of the Nation's manufacturers by facilitating the adoption of more efficient manufacturing processes. With its thousands of agents or "boots on the ground" spread across the nation, MEP is in a position to understand the pulse of the industry. We envision that it will respond quickly with new, innovative, and effective programs to keep our manufacturing base competitive. Such programs may involve implementation of best practices in any number of areas including sustainable manufacturing—from reducing waste in the manufacturing process to developing new, environmentally-focused products and workforce and supply chain development.

*Q2. As you know, MEP currently functions with equal contributions from the Federal government, State government, and manufacturers. However, at least 23 state MEP centers reported a decrease or elimination of state MEP funding in 2009 alone, and some centers have been operating without state funding for years which increases the pressure on the small manufacturer to maintain the program level. I have introduced legislation with Rep. Ehlers this year that would reduce the matching requirements for small manufacturers—are these structural changes something the administration is considering as it grows the MEP program?*

*A2.* I recognize the fiscal constraints many states are currently facing and the potential impact on the MEP centers' ability to meet their cost share obligations. The matching requirement of the MEP program is a core component of the program's success because it encourages significant local and state buy-in into the program. I understand there are proposals, such as yours, proposing changes and flexibility to the cost share. I am happy to work with you and the National Institute of Standards and Technology to explore ways to address situations in which states are in particularly dire circumstances.

# Appendix 2:

## Re-Energyse Fudning Profile

## RE-ENERGYSE (Regaining our Energy Science and Engineering Edge)
## Funding Profile by Subprogram

(dollars in thousands)

| | FY 2009 Current Appropriation | FY 2009 Current Recovery Act Appropriation | FY 2010 Current Appropriation | FY 2011 Request |
|---|---|---|---|---|
| RE-ENERGYSE | | | | |
| Higher Education | 0 | 0 | 0 | 35,000 |
| Technical Training, Education and Outreach | 0 | 0 | 0 | 15,000 |
| Total, RE-ENERGYSE | 0 | 0 | 0 | 50,000 |

**Public Law Authorizations:**

Public Law 95–91, "Department of Energy Organization Act" (1977)
Public Law 101–510, "DOE Science Education Enhancement Act" (1991)
Public Law 109–58, "Energy Policy Act of 2005"
Public Law 110–69, "America COMPETES Act of 2007"
Public Law 110-140, "Energy Independence and Security Act of 2007"

### Mission

The mission of RE-ENERGYSE (Regaining our Energy Science and Engineering Edge) is to provide the education and training necessary to build a highly skilled U.S. clean energy workforce dedicated to solving the world's greatest energy challenges.[a]

### Benefits

The U.S. is on the cusp of transformational changes in how energy is produced and used. Major investments are being made by the Federal government and private industry in clean energy technologies that will help create entirely new growth industries, expand markets for solar, wind, and other clean energy sources, and support the productivity gains inherent in energy efficiency. These efforts, if coupled with a well-educated and skilled clean energy workforce, will ensure that the U.S. remains highly competitive in global markets, while meeting the President's goal of reducing greenhouse gas (GHG) emissions by 83 percent by 2050.

However, challenges exist. Statistics show that the U.S. currently lags behind other nations in the race to produce and bring to market new clean energy systems. European countries, for example, currently control 80 percent of the wind technology market, and China is projected to become the world's largest

[a] RE-ENERGYSE activities funded within the Office of Energy Efficiency and Renewable Energy (EERE) will be coordinated with the Office of Nuclear Energy (NE) ($5 million requested). Funds are requested in separate accounts to be consistent with appropriated intent; RE-ENERGYSE funds requested within NE will only support nuclear technology education, and funds requested in EERE will support other clean energy technologies. RE-ENERGYSE activities will also be coordinated closely with the National Science Foundation (NSF).

supporter of solar energy by 2011.[a] A recent study by the World Wildlife Fund showed that the U.S. is ranked 19th in relative global clean energy technology product sales, weighted by GDP; behind France, Germany, Japan, and others outside of the G8.[b]

The U.S. ranks behind other major nations in making the transitions required to educate students for emerging energy trades, research efforts, and other professions to support the future energy technology mix. Having a high competency level in science, technology development, engineering, and mathematics (STEM) subjects is critical to knowledge creation, technology, and innovation. However, the U.S. ranks 20th out of the 30 Organisation of Economic Cooperation and Development (OECD) nations in the percentage of students which performed at the top level of science.[c] According to a study of the National Assessment of Educational Progress, only 18 percent of U.S. 12th grade students performed at or above the proficient level in math and science, while only two percent excelled. These numbers are not sufficient to create the leaders and innovators of a new clean energy workforce or even resupply the current energy workforce, which could see a 40 to 60 percent retirement rate within the next five years.

In order to make the leap in global energy technology leadership, the U.S. must also make the leap in energy education. However, the current energy education infrastructure is severely under developed. According to the Association of American Universities, there are no post-doctorate fellowships at U.S. universities related to renewable energy, and not one of the 149 U.S. professional science masters degree programs offered currently at 84 American universities focuses on interdisciplinary energy studies.[d] At the community college level, the American Association of Community Colleges estimates that less than 10 percent of the Nation's 1,700 community colleges have begun to develop curricula for renewable energy and energy efficiency career tracks, and these programs generally lack national standards and accreditation processes.[e] According to the Interstate Renewable Energy Council's training catalog, only 106 institutions are currently offering courses in energy efficiency and renewable energy technologies, of which only 24 are universities.[f] This is significant, as there are 6,519 post-secondary institutions in the U.S.[g]

Meeting the challenge of creating the new clean energy economy will require research and development of new energy technologies and the application of science to understand the impact of these technologies on a sustainable environment. As such, DOE will partner with the National Science Foundation (NSF) to collaborate closely on the administration, management and impact measurement of RE-ENERGYSE

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[a] United Nations Environment Programme. *"Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World"* Published by Worldwatch Institute. September 2008: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_098503.pdf

[b] "Clean Economy, Living Planet: Building Strong Clean Energy Technology Industries." World Wildlife Fund. Amsterdam, The Netherlands. November 2009. p. 13: http://assets.panda.org/downloads/rapport_wwf_cleaneconomy_international_def.pdf

[c] "Education at a Glance 2009: OECD Indicators." Organization for Economic Co-operation and Development. September 2009. p. 78: http://www.oecd.org/dataoecd/41/25/43636332.pdf

[d] Professional Science Master's (PSM), PSM Locations Map, http://www.sciencemasters.com/Default.aspx?tabid=58 (January 11, 2010).

[e] American Association of Community Colleges, 2009: http://www.aacc.nche.edu/Pages/default.aspx

[f] "2009 Updates and Trends." Interstate Renewable Energy Council. October 2009. Anaheim, CA. p. 4: http://irecusa.org/wp-content/uploads/2009/10/IREC-2009-Annual-ReportFinal.pdf

[g] As specified by Title IV of the Higher Education Act

education programs. This partnership will build on the scientific and engineering expertise of both agencies in the energy field, and benefit from NSF's successful track record of integrating research with education in programs it has developed and administered over the past two decades.

**Contribution to the Secretary's Goals**

RE-ENERGYSE contributes to the following Secretarial goals.

Innovation: Lead the world in science, technology, and engineering

RE-ENERGYSE addresses basic and applied science through the support of research fellowships and internships at DOE National Laboratories, universities, other research institutions, and the private sector. These fellowships will complement existing Federal efforts, and provide the U.S. research community with a major influx of highly specialized technical expertise that can bring new technologies to the marketplace.

Energy: Build a competitive, low-carbon economy and secure America's energy future

Given the need to reduce the environmental impact of the U.S. energy sector, there is a need for a well-trained workforce for a transformed energy sector. RE-ENERGYSE will help create leading scientists, engineers and technicians who can accelerate the adoption and improve the reliability and performance of clean energy technologies. This will lead to transformational changes in U.S. energy demand and supply that enables the U.S. to achieve a low carbon future.

RE-ENERGYSE will educate and train Americans to adapt green technology to their existing industry/trade, to enter thousands of green jobs and increase U.S. competitiveness. This effort will help universities and community colleges develop cutting edge programs, with redesigned and new curricula to produce tens of thousands of other highly skilled U.S. workers who can sustain American excellence in clean energy in industry, trades, academia, the Federal government, and National Laboratories.

RE-ENERGYSE will develop leading edge undergraduate and graduate programs; help between 3,000 and 6,000 highly educated scientists, engineers, and other professionals enter the clean energy field by 2016; and approximately 7,000 to 13,000 professionals by 2021. By 2016, efforts will result in the development of approximately 75 community college and other training programs to equip thousands of technically skilled workers for clean energy jobs. By 2016, thousands of U.S. residents and students will be educated about clean energy technologies leading reduced energy consumption and cost saving benefits.

**Annual Performance Results and Targets**

The RE-ENERGYSE Program activities support the Secretary's Strategic Priority goal of Innovation by coordinating education efforts within DOE, working collaboratively with NSF, and other federal agencies to build a pipeline to create a resource of highly educated scientists and engineers. This pipeline will further accelerate the burgeoning clean technology industry in the U.S., positioning the country to lead in science, technology, engineering and energy by educating students through universities, community colleges, and K-12 programs. These programs, which will not only prepare students to pursue careers in developing and deploying the clean energy solutions of the future, will also increase awareness of the issues surrounding energy efficiency and sustainability.

RE-ENERGYSE will help make the U.S. significantly more technologically competitive globally, while contributing to creating a grassroots foundation of a low-carbon economy here at home. In response to

international climate agreements, $CO_2$ reduction goals,[a] and investments in clean energy technologies,[b] the clean energy market is poised as the next great industry. Through the 2009 Recovery Act, the U.S. government made considerable investments in the advancement of clean energy technologies and energy infrastructure which could accelerate development of clean technologies. Pending legislation may have additional incentives for the development and deployment of these technologies into the marketplace.

Despite the current financial climate, the clean energy market is expected to grow between 5 and 15 percent per year for the foreseeable future,[c] resulting in a concurrent growth in workforce demand. RE-ENERGYSE will offer fellowships, multi-disciplinary masters programs, technical training, and K-12 education and outreach programs. The programs supported by RE-ENERGYSE respond to the very real challenge that the U.S. suffers a shortage of skilled workers available to enter energy professions.[d]

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[a] 2009 G-8 Summit, Declaration of the Leaders on Energy and Climate committed to limit average global temperatures from exceeding 2 degrees Celsius above pre-industrial levels. This figure corresponds with the 450 ppm scenario and $CO_2$ reduction targets. http://www.g8italia2009.it/G8/Home/Summit/G8-G8_Layout_locale-1199882116809_Atti.htm

[b] The Recovery Act provided DOE with substantial funding to support clean energy and environmental clean up projects, creating hundreds of thousands of jobs and providing a meaningful down payment on the nation's energy and environmental future.

[c] "Clean Economy, Living Planet: Building Strong Clean Energy Technology Industries." World Wildlife Fund. Amsterdam, The Netherlands. November 2009. http://assets.panda.org/downloads/rapport_wwf_cleaneconomy_international_def.pdf

[d] 40 to 60 percent of energy utilities' skilled workers and engineers could retire by 2012. Center for Energy Workforce Demand 2007 Report: Gaps in the Energy Workforce Pipeline: http://www.cewd.org/documents/CEWD_08Results.pdf

**Annual Performance Targets and Results**

**Secretarial Goal:** Goal 1: Innovation: Lead the world in science, technology, and engineering,
Goal 2: Energy: Build a competitive, low-carbon economy and secure America's energy future

**GPRA Unit Program Goal:** RE-ENERGYSE

**Subprogram Name**: Higher Education

| FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 |
|---|---|---|---|---|---|---|---|---|---|
| **Performance Measure:** Number of post-secondary students awarded competitive STEM education research fellowships and internships.[a] | | | | | | | | | |
| T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: 1130<br>A: | T: 1130<br>A: | T: 1130<br>A: | T: 1130<br>A: | T: 1130<br>A: |

[a] The FY 2011 performance measures are based on similar education and training programs in other Federal agencies, for example the National Science Foundation. Previous years of educational activities conducted by EERE further informed the creation of this new performance measure for RE-ENERGYSE. Performance monitoring for the Higher Education subprogram activities are intended to support future impact evaluations to assess potential effects on public awareness, attitude and behavior.

**Annual Performance Targets and Results**

**Secretarial Goal:** Goal 1: Innovation: Lead the world in science, technology, and engineering,

Goal 2: Energy: Build a competitive, low-carbon economy and secure America's energy future

**GPRA Unit Program Goal:** RE-ENERGYSE

**Subprogram Name**: Technical Training, Education and Outreach

| FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 |
|---|---|---|---|---|---|---|---|---|---|
| **Performance Measure:** Number of students participating (directly or indirectly) in a technical training, K-12 education and/or outreach program sponsored by RE-ENERGYSE.[a] | | | | | | | | | |
| T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: NA<br>A: NA | T: 250,000<br>A: | T: 350,000<br>A: | T: 450,000<br>A: | T: 550,000<br>A: | T: 600,000<br>A: |

[a] The FY 2011 performance measures are based on similar education and training programs in other Federal agencies, for example the National Science Foundation. Previous years of educational activities conducted by EERE further informed the creation of this new performance measure for RE-ENERGYSE. Performance monitoring for the Technical Training, Education and Outreach subprogram activities are intended to support future impact evaluations to assess potential effects on public awareness, attitude and behavior

**Means and Strategies**

RE-ENERGYSE will use the following means and strategies:

- Strategically plan and implement activities by coordinating with experts in education, DOE's Office of Science, the Department of Labor (DOL), the Department of Education, the NSF, and the American Academy of Community Colleges, to ensure that this program fills educational gaps and does not duplicate efforts;
- Leverage the capacity of universities, the DOE National Laboratories, educational foundations, NSF, and industry to offer educational and research opportunities that will make a critical difference in informing and inspiring students to pursue careers in clean energy;
- Reach out broadly to universities, community colleges, and other relevant institutions to encourage widespread involvement of diverse communities, as well as constructive competition to stimulate the development of outstanding programs;
- Develop the outreach infrastructure necessary to communicate and disseminate curricula and other programs materials, and importantly enable collaboration and feedback;
- Issue competitive solicitations to ensure that high quality institutions have the means and interest to create and sustain education and training efforts;
- Dedicate up to 10 percent of each subprogram for metric driven program evaluation activities and peer reviews;
- Create energy-specific materials at the K-12 level, to engage, excite, and educate;
- Provide direct channels feeding energy-accredited and up-to-date materials into K-12 schools and communities; and
- Attract qualified candidates to competitive higher education programs.

RE-ENERGYSE provides a much needed collaborative model of innovation in the Federal government, by performing the following activities:

- Works with NSF, DOL, Department of Education, the American Association of Community Colleges, and other leading scientific and academic organizations to create teacher professional development opportunities nationwide, and ensure strategic and non-duplicative investment in science education at all levels;
- Works with leading researchers in the public, private, and academic sectors to provide cutting-edge research opportunities that can attract highly qualified undergraduate, graduate, and post-doctoral students into the clean energy field;
- Works with the NSF to compile and evaluate existing K-12 resources for teaching, as well as creating innovative ways to communicate the challenges and promises of clean energy at all grade levels; develop and assess the effectiveness of different educational communication strategies and innovate ways to scale-up the most effective ones into general practice; and
- Rewarding student success and fostering innovation and collaboration is an important element of engaging youth. Incentive competitions will complement the academic effort through public, private and academic organizations.

**Validation and Verification**

To validate and verify the impact of each program, RE-ENERGYSE will:

- Assemble an expert panel from the science, education and government sectors to review and accredit educational materials, competition guidelines, and other outreach materials;
- Conduct rigorous reviews of individual performance, program effectiveness, and overall programmatic accomplishment of goals, and impact on student achievement;
- Undertake comprehensive impact and process evaluations for training and outreach elements, as supported by the OMB Voluntary Evaluation Initiative (OMB October 7, 2009). These evaluations will expand on initial program design and be conducted by third-party independent evaluators;
- Use randomized controlled trials when possible;
- Use effective evaluation processes including pre- and post-program testing of participants, longitudinal workforce studies to determine program effectiveness, and external reviews conducted by experts in education and training; and
- Conduct technical workshops with key stakeholder groups to inform priorities and implementation. Representatives from academia, industry, the Federal Government, professional societies and other stakeholder groups will provide input needed to help effectively carry out and monitor programs.

Data Sources:

- A wide range of education and science organizations (e.g., National Science Foundation, National Center for Education Statistics, National Science Board, Department of Education, and National Science Teachers Association) will be consulted to provide data for the development of program priorities.
- Existing studies that can guide efforts include:
  - *Rising Above the Gathering Storm (2007)* http://sciencedems.house.gov/Media/File/Reports/natacad_compete_exsum_6feb06.pdf;
  - *Graduate Education: The Backbone of American Competitiveness and Innovation (2007)* http://www.cgsnet.org/portals/0/pdf/GR_GradEdAmComp_0407_EMB.pdf; and
  - *Losing the Competitive Advantage: The Challenge for Science and Technology in the United States (2005)* http://www.aeanet.org/publications/IDJJ_AeA_Competitiveness.asp.
- Data collected from grant recipients and other sources as needed, such as pre- and post-program surveys, to verify the accomplishment of specified goals and milestones.

Baselines:

- Number of post-secondary students awarded competitive STEM education research fellowships and internships: 0 in 2010; and
- Number of students participating (directly or indirectly) in a technical training, K-12 education and/or outreach program sponsored by RE-ENERGYSE: 0 in 2010.

Frequency: Annual

| | |
|---|---|
| Evaluation: | In carrying out the program's mission, RE-ENERGYSE will use several forms of evaluation to assess progress and to promote program improvement:<br>▪ Critical peer review of both the program and subprogram portfolios and activities by independent third-party evaluators;<br>▪ Specialized program field metrics and impact and process evaluation studies, including metrics, preparing a multi-year comprehensive Evaluation Plan, and implementing the Plan to gather baseline data;<br>▪ Quarterly and annual assessment of program and management results based performance; and<br>▪ Annual review of methods. |
| Data Storage: | EERE Benefits website, the EERE Corporate Planning System, and other computer-based data systems. |
| Verification: | Peer reviews and program evaluations. |

## Higher Education
## Funding Schedule by Activity

| | (dollars in thousands) | | |
|---|---|---|---|
| | FY 2009 | FY 2010 | FY 2011 |
| Higher Education | 0 | 0 | 35,000 |
| Total, Higher Education | 0 | 0 | 35,000 |

### Description

The Higher Education subprogram will support fellowships, internships, post-doctoral opportunities, and the development of interdisciplinary masters programs in the area of clean energy. In particular, this subprogram will support:

- Up to 60, three-year fellowships for graduate students in engineering and other relevant fields;
- Up to 70 post-doctoral opportunities that will allow exceptional students to apply their skills in a laboratory setting devoted to clean energy topics;
- Up to 1,000 assistantships for undergraduate students to support a summer research project, as well as continued study in the clean energy field with participating faculty members;
- The development of two interdisciplinary masters programs in clean energy;
- Up to 3,000 students involved in the high-profile Solar Decathlon competition, which is proposed to be included within RE-ENERGYSE in FY 2011; and
- Implementation, from the ground up, of rigorous evaluation methods to assess the impact and process for RE-ENERGYSE activities on the clean energy workforce using various metrics including number of students, cost-effectiveness, career choices upon completion on activities, etc.[a]

### Benefits

Higher Education efforts will result in hundreds of highly qualified candidates each year entering the clean energy field through various disciplines. These activities will make competitive awards to ensure support for the superior proposals, programs, and individuals. The development of an effective education pipeline will serve the needs of a growing clean energy field to ensure U.S. leadership in energy and climate change mitigation.

These opportunities for undergraduates, graduate, and post-doctoral students will support at least 500 U.S. citizens per year who will contribute to the invention and commercialization of advanced clean energy technologies, such as net zero energy buildings, nanotechnology-based solar cells, energy storage for advanced electric cars, smart grid technologies, and other areas. Higher education programs focused on clean energy, along with funded research opportunities, will encourage students to pursue careers in clean energy research and practice in industry, academia, and government.

[a] Best-practices for evaluating the impact of higher education programs were elucidated, for example, in the Report of the Academic Competitiveness Council in 2007 – http://www.ed.gov/about/inits/ed/competitiveness/acc-mathscience/report.pdf

Undergraduate internships for U.S. students are vital to ensuring U.S. leadership in STEM fields. Enrollment by U.S. students in STEM graduate programs from 1996 to 2006 has been relatively flat (less than one percent increase in 10 years), while foreign student enrollment in U.S. graduate programs increased by 31 percent during the same time period.[a] These efforts in increasing the supply of U.S. STEM undergraduates interested in energy and environmental research is critical to developing a sustained pipeline of skilled energy workers for U.S. industry, academia, and U.S. research institutions.

**Detailed Justification**

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| **Higher Education** | **0** | **0** | **35,000** |

The Higher Education subprogram is dedicated to the development of scientists, engineers, and other professionals with the skills needed to enter the clean energy field. Widespread outreach will be conducted at U.S. universities, scientific professional societies, and other organizations with relevant student populations within each subprogram activity. Priority will be placed on recruiting applicants from under-represented populations and applicants attending Minority Serving Institutions (MSIs). Activities within this subprogram include post-doctoral fellowships, graduate fellowships, interdisciplinary masters programs, undergraduate research internships, and a high profile university competition.

The Post-Doctoral Fellowships (approximate funding $8 million) will support approximately 70 post-doctoral one-year fellowships in various energy science and technology fields, with particular emphasis on energy efficiency, renewable energy, and other clean energy topics at DOE National Laboratories, research institutions, and industry. Eligible applicants will include recent graduates, as well as other professionals with a relevant Ph.D. who are interested in moving into the clean energy field. Therefore, this opportunity will attract not only new doctoral students but also highly educated scientists in related fields.

These post-doctoral fellowships will fill a compelling need within clean energy and DOE workforce development pipeline. A 2008 NSF survey[b] found that of the 1,718 postdoctoral students working at DOE National Laboratories; only 39 percent (664) were U.S. citizens. This supports recent reports by the National Academies of Science[c] that U.S. citizens are not pursuing STEM careers in numbers equal to other nations.

The Graduate Research Fellowships will support approximately 60 three-year fellowships leading to a Ph.D. in science, engineering and other fields such as chemistry, materials science, or computational sciences, with a particular emphasis on clean energy topics. Fellowships will provide up to three years of support over a maximum of five years, and will pay for tuition and fees at a U.S. university, travel associated with the students' research, and an annual stipend. Research fellowships will be encouraged at DOE National Laboratories, other research institutions, and at industries that conduct research in clean energy technologies. Applicants will be competitively selected by external reviewers based on an

[a] "Survey of Graduate Students in Post-Doctorate in Science and Engineering." National Science Foundation, Division of Science, Resources and Statistics. 2007. Table 1.

[b] "Survey of Postdoctorates at Federally Funded Research and Development Centers." National Science Foundation. November 2008.

[c] "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future." National Academies of Science. 2007.

(dollars in thousands)

| FY 2009 | FY 2010 | FY 2011 |
|---|---|---|

evaluation of each application against established criteria, such as the student's academic performance and demonstrated interest and experience in clean energy research. (Approximate funding $10 million)

The Masters Program in Interdisciplinary Energy Studies will solicit applicants through a competitive process offered only to U.S. universities. This activity will also support the development of at least two Clean Energy University Collaborations (CEUCs) per year across the U.S. These CEUCs will develop and offer two-year programs of study in various fields including science, engineering, public policy, economics, architecture, and business. CEUCs will support curriculum development, equip laboratories, train students, develop faculty lecture series, and dedicate specific resources to encourage innovation in the clean energy field. In addition, each CEUC will participate in an annual national student business plan competition project.

Each CEUC will offer a master's degree in "Interdisciplinary Energy Studies" related to the solution of energy problems and the advancement of energy efficiency and clean energy. The interdisciplinary master's program will require coursework in the selected discipline, as well as courses focusing on public policy, business, and economics, specialized study in energy engineering or a related energy field, and a part-time or summer student internship at a DOE National Laboratory, a private sector research firm, or other laboratory. Given the high and growing industry demand for professionals with cross-cutting energy training, these graduates will be particularly valuable. (Approximate funding $6 million)

The Undergraduate Internships will support up to 1,000 research appointments for undergraduate students through competitive awards to students to participate in individually mentored research in the clean energy field. Internships can be carried out at universities, in industry, and at DOE National Laboratories. Through these internships, students will become a part of the research community and a source of energy innovation for DOE and the U.S.

Students will apply on a competitive basis, and will then be matched with mentors working in each student's field of interest. Participants will spend an intensive 10 to 16 weeks working under the individual mentorship of resident scientists, and will produce an abstract and research paper, with a goal of publishing results in a peer-reviewed journal. Participants will attend seminars that broaden their view of energy science careers and help them understand how to become members of the energy research community. This activity will provide hands-on experience and academic mentoring for a large group of students to improve their expertise and ability to make early contributions as they move toward careers in the clean energy field. (Approximate funding $6 million)

Beginning in FY 2011, the Solar Decathlon is proposed to be transferred from the Buildings Technology Program and included within the RE-ENERGYSE Program. Solar Decathlon is a high-profile university competition held in Washington, D.C., that promotes public awareness of highly efficient building technologies and Zero Energy Homes (ZEH) using solar energy. The competition also fosters innovation and encourages incorporation of new building technologies and design practices into engineering and architecture university curricula. This event is held in September/October every other year. New teams for the 2011 Solar Decathlon will be recruited through a request for proposals issued in October 2009 to all universities throughout the country. The proposals will be reviewed and ranked, and the top 20 universities will be selected and each awarded grants to support their projects. New participants will be announced in January 2010. Activities will also include monitoring the 2009 competition houses to gain long-term performance data after the homes are relocated to a permanent site. In addition, these funds may be used to support efforts such as peer reviews; data collection and

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| dissemination; and technical, market, economic, and other analyses. (Approximate funding $5 million) In addition, up to 10 percent of funds will be used for administration and evaluation. | | | |
| **Total, Higher Education** | **0** | **0** | **35,000** |

**Explanation of Funding Changes**

| | FY 2011 vs. FY 2010 ($000) |
|---|---|
| **Higher Education** | |
| The increase reflects the start of a new activity and the transfer of the Solar Decathlon from the Buildings Technology Program. | +35,000 |
| **Total Funding Change, Higher Education** | **+35,000** |

**Technical Training, Education and Outreach**
**Funding Schedule by Activity**

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| Technical Training, Education and Outreach | 0 | 0 | 15,000 |
| Total, Technical Training, Education and Outreach | 0 | 0 | 15,000 |

**Description**

The Technical Training, Education and Outreach subprogram will support the development of effective training programs at community colleges and other training centers. Competitively-selected community colleges and other training institutions will develop up-to-date, technically accurate curricula, as well as faculty training that will focus on solving the Nation's energy challenges. Training and educational programs will be designed to meet current and near-term local market needs for a green workforce. This subprogram will also include activities designed to engage and empower K-12 students, parents, and educators to help meet the Nation's energy and environment challenges. This subprogram will include a national communication campaign to create an energy-literate population and develop high-value, targeted public service advertisements and strategic media relations to create broad public awareness. The subprogram will also support K-12 energy literacy by working closely with schools and educational programs to enhance STEM education and support the future workforce needs. These efforts will include ongoing evaluations and semi-annual reporting to inform program implementation, execution and content as well as measure effectiveness.

**Benefits**

According to the Interstate Renewable Energy Council's training catalog, only 106 institutions are offering courses in energy efficiency and renewable energy technologies, of which only 24 are universities.[a] There are 6,519 post-secondary institutions in the U.S.[b] Community colleges account for over 40 percent of U.S. undergraduate enrollment and enroll a majority of under-represented students in STEM. However, less than 10 percent of the Nation's 1,700 community colleges offer courses in "green technology."[c] Colleges that do offer such courses, with the exception of the solar industry, lack national certification processes.

Expanding the ability of community colleges and other institutions to provide technical training and certification is a critical factor in ensuring that the U.S. workforce is scaled up and adequately trained to implement new and advanced energy technologies. Furthermore, community colleges and training centers remain a largely untapped but highly viable avenue to increase participation of under-represented, as well as lower-income populations, in STEM clean energy careers. DOE will conduct a comprehensive study in FY 2010 that defines the current and projected needs at the community college level for energy-related fields, and work to establish what DOE can do to fill the gaps required to meet these workforce and educational needs.

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[a] "2009 Updates and Trends." Interstate Renewable Energy Council. October 2009. Anaheim, CA. p. 4: http://irecusa.org/wp-content/uploads/2009/10/IREC-2009-Annual-ReportFinal.pdf

[b] As specified by Title IV of the Higher Education Act

[c] American Association of Community College's CC STATS home page: http://www2.aacc.nche.edu/research/index.htm

This subprogram will ensure excellence in technical training for workers interested in entering clean energy trades. Approximately seven technical training programs will be established each year with the capacity to train up to 400 highly skilled technicians each year to enter the clean energy field.

This subprogram will also reach thousands of K-12 students and educators with campaigns, curricula, competitions, and other efforts aimed at educating, engaging, and inspiring students to pursue clean energy careers and adopt sustainable energy practices that are necessary to mitigate climate change.

Efforts will also help tap into the potential for increased energy efficiency in the U.S., conveying simple messages that can remind Americans that energy savings are important. Just as recycling has become a standard operating practice recognized widely by all Americans as an integral part of their lives, smarter, more efficient use of energy can become much more widely integrated. A national, strategic communication campaign can help launch such a transformation.

**Detailed Justification**

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| **Technical Training, Education and Outreach** | **0** | **0** | **15,000** |

Technical training grants will be awarded through competitive and peer reviewed processes. This subprogram will offer competitive grants to community colleges and other training institutions to develop certificate programs to train approximately 400 U.S. technicians and faculty per year in STEM subjects focusing on clean energy technologies, processes, and applications. Selected institutions will develop appropriate curriculum, equip laboratories, and train students and faculty in clean energy fields. In addition, students and faculty at these institutions will be eligible for research internships at DOE National Laboratories, industry, and academic institutions. In addition to the technical grants, this effort will include the development of an online, state-of-the-art, educational system to train teachers and workers on a variety of skills needed in clean energy fields. The training system will be modeled in part on the effective online learning systems used by the Department of Defense that includes training through simulation. In addition, the system will be designed to allow for continuous improvement as new methods, technologies, and information becomes available. This effort will complement the direct grants to community colleges and create an avenue for information sharing among grant recipients and others involved in clean energy training and education. (Approximate funding $6 million)

The K-12 Education activity will work with U.S. K-12 students and educators who are eager to contribute their ideas to the solution of long-term environment and energy challenges, but often do not have adequate knowledge about the issues or potential career opportunities. These activities will be aimed at inspiring the next generation of Americans to pursue careers in science and energy, as well as teach young students the importance of sustainable energy use and energy savings in their daily lives and choices. (Approximate funding $9 million)

DOE will seek input from a wide range of stakeholders and experts to formulate a strategy specifically targeted at enhancing K-12 interest in and understanding of science, technology, and clean energy. K-12 targeted activities will be coordinated with educational efforts across DOE and other Federal agencies. In addition to the Federal sector, DOE will reach out to private and non-profit organizations involved in science education to avoid duplication and build on other effective programs.

In FY 2011, DOE will implement activities that are viewed as most effective in getting K-12 students

(dollars in thousands)

| FY 2009 | FY 2010 | FY 2011 |
|---|---|---|

excited about how they can become a part of developing solutions to important problems associated with energy use such as climate change. This effort will include developing innovative approaches to engage the Nation's K-12 students and teachers, such as new online training offering interactive games and lessons that use the latest graphics, simulation, and technologies designed to appeal to youth.

In addition, DOE will collaborate with NSF on a national outreach effort to communicate the benefits of energy efficiency, as well as the actions that U.S. citizens can take to realize those benefits. The campaign will stress practical, cost-effective measures consumers can use to reduce consumption. The campaign will tailor messages to most effectively appeal to specific audiences. Depending on the targeted audience, messages may stress the cost benefits of energy efficiency; the link between affordable domestic energy and job growth; or, the connection between energy conservation, climate change and other environmental issues; as well as a variety of other themes. The campaign will take advantage of multimedia and modern communication technologies that have become widely used particularly among younger audiences (e.g., text messaging, Twitter, You-tube, video games, etc.). As with messaging, the method for communication will be tailored to the appropriate audience. This effort will include ongoing evaluations and semi-annual reporting to inform program implementation, execution and content as well as measure effectiveness.

In addition, up to 10 percent of funds will be used for administration and evaluation.

| | | | |
|---|---|---|---|
| **Total, Technical Training and K-12 Education** | **0** | **0** | **15,000** |

**Explanation of Funding Changes**

| | FY 2011 vs. FY 2010 ($000) |
|---|---|
| **Technical Training, Education and Outreach** | |
| The increase reflects the start of a new activity. | +15,000 |
| **Total Funding Change, Technical Training, Education and Outreach** | **+15,000** |

## RE-ENERGYSE
## (Regaining our Energy Science and Engineering Edge)

### Funding Profile by Subprogram

(dollars in thousands)

| | FY 2009 Current Appropriation | FY 2009 Current Recovery Act Appropriation | FY 2010 Current Appropriation | FY 2011 Request |
|---|---|---|---|---|
| RE-ENERGYSE | 0 | 0 | 0 | 5,000 |

### Mission

The mission of RE-ENERGYSE (Regaining our Energy Science and Engineering Edge) is to provide the education and training necessary to build a highly skilled U.S. clean energy workforce dedicated to solving the world's greatest energy challenges.[a]

### Benefits

RE-ENERGYSE supports scientific discovery and innovation at universities across the United States. This program will provide important educational support to bolster nuclear engineering and science programs at U.S. universities, which supports continued use of nuclear power. A robust nuclear industry and infrastructure will result in multiple benefits for our Nation: clean, secure energy supply and lower greenhouse-gas emissions.

### Annual Performance Results and Targets

RE-ENERGYSE contributes to the Secretary's Goal of *Innovation: Lead the World in Science, Technology, and Engineering* and to the National Nuclear Infrastructure GPRA Unit Program Goal. RE-ENERGYSE supports university nuclear engineering programs through scholarships and fellowships. These fellowships will complement existing Federal efforts and will help ensure that the next generation of scientists and engineers are available to support existing and future nuclear energy generation capacity and provide necessary innovation.

### Means and Strategies

RE-ENERGYZE will use various means and strategies to achieve its GRPA Unit Program Goal. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

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[a] In FY 2011, the Office of Nuclear Energy (NE) will provide funds through RE-ENERGYSE for scholarships and fellowships. This activity will be coordinated with RE-ENERGYSE activities funded within the Office of Energy Efficiency and Renewable Energy (EERE). NE and EERE funds are requested in separate accounts to be consistent with appropriated intent; RE-ENERGYSE funds requested within NE will only support nuclear technology education.

The Department will implement the following means:

- Provide scholarships and fellowships to support nuclear engineering university programs through RE-ENERGYSE.

The Department will implement the following strategies:

- Strategically plan and implement activities by coordinating with experts in education, the Department of Energy's (DOE) Office of Science, the Department of Labor, the Department of Education, the National Science Foundation (NSF), and the American Academy of Community Colleges, to ensure that this program fills educational gaps and does not duplicate efforts;
- Leverage the capacity of universities, the DOE National Laboratories, educational foundations, and industry to offer educational and research opportunities that will make a critical difference in informing and inspiring students to pursue careers in clean energy;
- Reach out broadly to universities, community colleges, and other relevant institutions to encourage widespread involvement of diverse communities, as well as constructive competition to stimulate the development of outstanding programs;
- Develop the outreach infrastructure necessary to communicate and disseminate curricula and other programs materials and importantly enable collaboration and feedback;
- Issue competitive solicitations to ensure that high quality institutions have the means and interest to create and sustain education and training efforts;
- Dedicate up to 10 percent of each subprogram for metric driven program evaluation activities and peer reviews;
- Create energy-specific materials at the school grade K-12 levels to engage, excite, and educate;
- Provide direct channels feeding energy-accredited and up-to-date materials into K-12 schools and communities; and
- Attract qualified candidates to competitive higher education programs.

These strategies will result in efficient and effective management of the program, thus putting the taxpayers' dollars to more productive use.

In carrying out the program's mission, the program performs the following collaborative activities:

- Work closely with RE-ENERGYSE to implement the means and strategies and ensure a well coordinated, efficient, effective program.

**Validation and Verification**

The NE conducts various internal and external reviews and audits to validate and verify program performance. Periodic program reviews evaluate progress against established plans. NE holds monthly, quarterly, semi-annual, and annual reviews, consistent with program management plans and project baselines, to ensure technical progress, cost, and schedule adherence, and responsiveness to program requirements. Internally, NE provides continual management and oversight of its Research and Development (R&D) and vital infrastructure programs. Examples of NE's R&D programs include Reactor Concepts RD&D and Fuel Cycle R&D. NE infrastructure programs, such as the Radiological Facilities Management program and the Idaho Facilities Management program, are managed using similar oversight techniques. NE will work closely with RE-ENERGYSE verify and validate the impacts of the program through a variety of means, such as assembling an expert panel to review and accredit program materials, using effective performance and effectiveness evaluation processes, and conducting workshops to inform priorities. A wide range of education and science organizations (e.g.,

NSF, National Center for Education Statistics, National Science Board, Department of Education, and National Science Teachers Association) will be consulted to provide data for the development of program priorities.

## RE-ENERGYSE

### Funding Schedule by Activity

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| RE-ENERGYSE | 0 | 0 | 5,000 |

**Benefits**

NE is providing funds for scholarships and fellowships through RE-ENERGYSE to support the development of future nuclear researchers, scientists, and engineers. Strengthened university nuclear programs will help support the Nation's current and future nuclear energy needs.

### Detailed Justification

(dollars in thousands)

| | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|
| **RE-ENERGYSE** | **0** | **0** | **5,000** |
| In FY 2011, the RE-ENERGYSE program plans to fund approximately 88 one-year scholarships and 30 three-year fellowships to students enrolled in nuclear energy-related fields of study of disciplines at U.S. universities and two-year colleges. | | | |
| **Total, RE-ENERGYSE** | **0** | **0** | **5,000** |

### Explanation of Funding Changes

| | FY 2011 vs. FY 2010 ($000) |
|---|---|
| **RE-ENERGYSE** | |
| In FY 2011, new funding is being requested for this program to support the Department's broad educational effort that cuts across DOE programs to coordinate, standardize, and evaluate Science, Technology, Engineering, and Mathematics education programs. | +5,000 |
| **Total Funding Change, RE-ENERGYSE** | **+5,000** |

**RE-ENERGYSE: A DOE–NSF Partnership in Research and Education on Renewable Energy and a Sustainable Environment**

RE-ENERGYSE (REgaining our ENERGY Science and Engineering Edge) is a developing partnership between the Department of Energy (DOE) and NSF that will inspire more young people to pursue careers in renewable energy and related environmental areas. Its goals are to address what President Obama has identified as the "generational challenge" of clean energy and to secure U.S. leadership in sustainable energy by building the clean energy workforce of the future. This partnership will build on: the scientific and engineering expertise of both agencies in the energy field, NSF's successful track record of integrating research with education using proven programs developed over the past two decades, and NSF's experience in linking research on energy, technology, and the environment with social, behavioral and economic research.

NSF and DOE will explore additional planning workshops that focus on identifying educational opportunities for sparking interest in careers related to sustainable energy and the environment, and identifying future workforce needs in these areas. NSF and DOE also have a continuing partnership in public awareness and outreach activities that support the goals of RE-ENERGYSE.

In FY 2011, NSF will invest roughly $19.0 million in RE-ENERGYSE through five existing research and education programs that help develop the future STEM workforce. These programs provide fellowships, traineeships, and research opportunities for undergraduate and graduate students, as well as build collaboration between academia and industry. NSF will contribute at least 5 percent of its support for the following programs towards specific, energy-related awards:

- Graduate Research Fellowship (GRF);
- Graduate STEM Fellows in K–12 Education (GK–12);
- Integrative Graduate Education and Research Traineeship (IGERT);
- Support for community colleges through Advanced Technological Education (ATE); and
- Research Experiences for Undergraduates (REU) sites.

Through these investments, the Nation will prepare a generation of young people to meet the clean energy challenge.

# Appendix 2:

## Scientific Integrity Correspondence

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES
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July 13, 2009

Dr. John Holdren
Director
Office of Science and Technology Policy
725 17th St., NW, Room 5228
Washington, DC 20502

Dear Dr. Holdren:

As you know, on March 9, 2009 the President issued an executive memorandum on scientific integrity that illustrated many of the same principles he espoused during his campaign. In this memorandum, the President tasked the Director of the Office of Science and Technology Policy (OSTP) to develop recommendations within 120 days to guarantee scientific integrity throughout the executive branch.[1] Similarly, in one of his first acts, President Obama on January 21, 2009 issued an executive memorandum outlining his principles to achieve "an unprecedented level of openness in government" and calling for recommendations for an Open Government Directive within 120 days.[2]

While I commend the President for taking proactive steps to ensure scientific integrity and transparency in the federal government, recent incidents at several agencies paint a different picture of how this Administration may view these issues. Viewed individually, each of these cases is cause enough for concern, but when viewed together, I fear they reveal a troubling pattern that warrants immediate attention. Accordingly, I ask that you review and respond to the following comments and questions by no later than July 17, 2009.

**The Environmental Protection Agency's (EPA) Greenhouse Gas Endangerment Finding**

Recent press reports revealed that important comments from career EPA analysts on the agency's greenhouse gas endangerment finding were suppressed by a senior agency official. These press reports include emails that indicated that the Director of the EPA's National Center for Environmental Economics (NCEE) refused to include the comments, not because of a lack of scientific merit, but according to the official, because "the

[1] White House Memorandum, Subject: Scientific Integrity, March 9, 2009
[2] White House Memorandum, Subject: Transparency and Open Government, January 21, 2009

administration [had] decided to move forward on endangerment," and the "comments [did] not help the legal or policy case for this decision." In seeking to have his report included in the proceeding, the analyst wrote, "They are significant because they present information critical to the justification (or lack thereof) for the proposed endangerment finding. They are valid because they explain much of the observational data that have been collected which cannot be explained by the [International Panel on Climate Change] models." After muzzling the report, the Director stated, "With the endangerment finding nearly final, you need to move on to other issues and subjects. I don't want you to spend any additional EPA time on climate change. No papers, no research etc."[3] I find it hard to reconcile these actions with the President's direction, or the EPA Administrators own word when she promised "Political appointees will not compromise the integrity of EPA's technical experts to advance particular regulatory outcomes," and "EPA's addressing of scientific decisions should reflect the expert judgment of the Agency's career scientists and independent advisers."[4]

1. Is the NCEE Director's exclusion of the staff report on the grounds that it did not advance the "policy case" for the endangerment finding consistent with President Obama's guidance that "facts drive scientific decisions—not the other way around?"[5] How will the Administration handle issues such as this going forward?

**Interagency Deliberations on EPA's Greenhouse Gas Endangerment Finding**

These reports of questionable interference into science-related policymaking extend beyond EPA. An interagency report marked "Deliberative/Attorney-Client Privilege" leaked last month indicated that regulating greenhouse gases under the Clean Air Act "is likely to have serious economic consequences for regulated entities throughout the U.S. economy, including small businesses and small communities." The memo went on to state that:

> "In the absence of a strong statement of the standards being applied in this decision, there is a concern that EPA is making a finding based on (1) 'harm' from substances that have no demonstrated direct health effects, such as respiratory or toxic effects, (2) available scientific data that purports to conclusively establish the nature and extent of the adverse public health and welfare impacts are almost exclusively from non-EPA sources, and (3) applying a dramatically expanded precautionary principle."[6]

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[3] Robin Bravender, "Two EPA Staffers Question Science Behind Climate 'Endangerment' Proposal," *The New York Times,* June 26, 2009, Business Section.
[4] Tom Avril and John Sullivan, "EPA Nominee Vows to Follow Science, *The Philadelphia Inquirer,* January 15, 2009.
[5] Remarks by the President at the National Academy of Sciences Annual Meeting, April 27, 2009.
[6] http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=0900006480965abd

It seems as though one of the most important and far-reaching decisions made by the EPA was forced through the interagency review process with little regard for appropriate rules, procedures, scientific integrity, or transparency. This is particularly troubling given the recent direction in the President's March 9, 2009 memorandum that "each agency should make available to the public the scientific or technological findings or conclusions considered or relied on in policy decisions."[7] After this memo was revealed, an Administration official quickly attempted to publicly discredit and "out" a long-time civil servant as a "Bush Administration hold-over" – despite the fact that press reports indicated that employee entered government service during the Clinton Administration, and prior to that served on the staff of a Democratic Member of Congress.[8] Retaliation against employees because they provide findings that inconveniently contradict political goals is unacceptable.

2. Does the attempt to discredit a government employee and his or her associated comments in the interagency review process violate the letter or spirit of subsection (1)(f) of the President's memorandum on scientific integrity regarding whistleblower protections as they relate to agency decision-making processes? If not, why? If so, how is this being addressed?

**The Climate Czar's "Vow of Silence"**

In developing new fuel economy standards for passenger vehicles and light trucks, it seems as though the Administration also practiced doublespeak. While the Administration promised unprecedented levels of transparency, Carol Browner, the President's "Climate Czar" actively engaged in limiting the public's access to these deliberations. On May 20, 2009 the *New York Times* reported that the White House held a series of secret meetings with select special interest groups as they were crafting the new standards. In that same report, Mary Nichols, the head of the California Air Resources Board (CARB) stated that "Browner quietly orchestrated private discussions from the White House with auto industry officials," and that "[we] put nothing in writing, ever."[9] Initial review of these directives point to a clear attempt to subvert the Presidential Records Act, which directs the President to take "all such steps as may be necessary to assure that the activities, deliberations, decisions, and policies that reflect the performance of his constitutional, statutory, or other official or ceremonial duties are adequately documented and that such records are maintained as presidential records."[10] If these reports are true, it is hard to imagine how this would promote the President's pledge to "creat[e] an unprecedented level of openness in government."[11]

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[7] White House Memorandum, Subject: Scientific Integrity, March 9, 2009
[8] Robin Bravender, "Murky Reg-Review Process Sets Stage for Frenzy Over OMB Climate Memo," *The New York Times,* May 14, 2009, Business Section.
[9] Colin Sullivan, "Vow of Silence Key to House-Calif. Fuel Economy Talks," *The New York Times,* May 20, 2009, Business Section.
[10] 44 U.S.C. § 2203
[11] White House Memorandum, Subject: Transparency and Open Government, January 21, 2009

**Secret White House Meetings**

Following the same opaque and exclusive process that produced new fuel economy standards, the White House continues to block Freedom of Information Act (FOIA) requests and general inquiries into coal executives' and lobbyists' secret meetings with the White House regarding the development of the Administration's "clean coal" policies.[12] FOIA requests for White House visitor logs by MSNBC and the Citizens for Responsibility and Ethics in Washington (CREW) were rejected despite the President's declaration of transparency and openness.[1314] The Administration's refusal to work in the light of day is particularly perplexing given the President's admonishments as a candidate of the previous Administration's Energy Task Force meetings.[15]

3. Are the above actions consistent with the principle in the President's executive memorandum on transparency that the Administration "will take appropriate action, consistent with law and policy, to disclose information rapidly in forms that the public can readily find and use." Further, are they consistent with section (1)(d) of the memorandum on scientific integrity stating that agencies "should make available to the public the scientific or technological findings or conclusions considered or relied upon in policy decisions?" Last, are they consistent with the letter and spirit of the Presidential Records Act? If not, why? If so, how is this issue being addressed?

**Climate Change Science Program**

On June 16, 2009 the U.S. Global Change Research Program released a report titled "Global Climate Change Impacts in the United States." Following the report's release, you stated that it "integrates the most up-to-date scientific findings into a comprehensive picture."[16] Despite this declaration, several criticisms have been leveled against the report for systemically misrepresenting the best science on the issues of climate change and natural disasters. Specifically in question is the exclusion of a large body of recent peer-reviewed scientific literature on natural disasters in favor of inclusion of non-peer-reviewed scientific research that might strengthen the Administration's stated policy goal of greenhouse gas regulation.[17]

4. Was the decision to exclude peer-reviewed data in favor of non-peer reviewed information consistent with section (1)(c) of the President's memorandum on scientific integrity stating that "when scientific or technological information is

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[12] Michael Isikoff, "Obama Closes Doors on Openness," *Newsweek,* June 29, 2009.
[13] Bill Dedman, "Obama Blocks List of Visitors to White House, MSNBC Online, June 16, 2009,
[14] CREW, "CREW v. U.S. Department of Homeland Security (White House Visitor Logs – Coal Execs), Citizens for Responsibility and Ethics in Washington, http://www.citizensforethics.org/node/40129.
[15] Organizing for America, "Remarks of Senator Obama at the Lobbying Reform Summit," Barack Obama Online, http://www.barackobama.com/2006/01/26/remarks_of_senator_barack_obam_6.php\
[16] Office of Science and Technology Policy, "New Report Provides Authoritative Assessment of National, Regional Impacts of Global Climate Change, " Press Release, 16 June 2009.
[17] John Tierney, "U.S. Climate Report Assailed," *The New York Times,* June 18, 2009, Science Section.

considered in policy decisions, the information should be subject to well-established scientific processes, including peer review where appropriate, and each agency should appropriately and accurately reflect that information in complying with and applying relevant statutory standards." If so, how is it consistent? If not, what is being done to address the issue?

Astute observers will recognize that the underlying issues relating to suppression, censoring, and retribution are not purely scientific in nature, and therefore are not germane to the President's memorandum on science integrity. Previous investigations into the censoring of scientists focused not on whether their research findings were suppressed, but on whether they were prevented from communicating their findings and opinions. A NASA Inspector General investigation found that the ability of Dr. James Hansen to communicate his findings was impaired despite giving over 1,400 on-the-job interviews.[18] More importantly, it also found "no evidence indicating that NASA blocked or interfered with the actual research."[19] Issues surrounding Dr. Hansen focused on his ability to communicate with the media regarding policy decisions. Unlike the Hansen incident, evidence in these cases clearly point to Administration officials directly impeding scientific work with unambiguous directives such as "No papers, no research etc."[20] Therefore, I find these new incidents even more troubling than previous events.

I am also concerned that these are not isolated instances. The importance of these underlying issues being addressed is far-reaching and will impact the lives of every American. Consequently, the public deserves more than rhetoric. Because of this apparent pattern of muzzling experts, limiting access, retaliating against dissent, and systematically misrepresenting science, we respectfully request that you respond with:

5. A plan to reconcile the above listed discrepancies with the Administration's principles of scientific integrity and transparency outlined in the President's January 21 and March 9, 2009 memoranda.
6. A description of the steps taken by your office to ensure that negative employment actions will not be taken against individuals who present information contrary to the Administration's policy goals.
7. A plan to ensure that employees' work and media access is not restricted by Administration or Agency officials because of policy goals.
8. An explanation of whether or not OSTP decided to maintain and advance the principles outlined by the previous Administration in Dr. Marburger's May

[18] Investigative Summary: Regarding the Allegations that NASA Suppressed Climate Change Science and Denied Media Access to Dr. James E. Hansen, a NASA Scientist, NASA, Office of the inspector General, June 2, 2008.
[19] *Id.*
[20] Robin Bravender, "Two EPA Staffers Question Science Behind Climate 'Endangerment' Proposal," *The New York Times,* June 26, 2009, Business Section.

28, 2008 memorandum on "Principles for the Release of Scientific Research Results."[21]

I look forward to working with you to ensure that scientific integrity and transparency are priorities in the new Administration. Please respond to these requests no later than July 24, 2009. If you have any questions, please contact Mr. Tom Hammond, professional staff member, Subcommittee on Investigations and Oversight, Committee on Science and Technology at 202-225-6371.

Sincerely,

REP. PAUL BROUN, M.D.
Ranking Member
Subcommittee on Investigations
and Oversight

cc: REP. BRAD MILLER
Chairman
Subcommittee on Investigations & Oversight

[21] Office of Science and Technology Policy Memorandum, Subject: Principles for Release of Scientific Research Results, May 28, 2008

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6301
(202) 225–6375
TTY: (202) 226–4410
http://science.house.gov

October 2, 2009

The Honorable John Holdren
Director
Office of Science and Technology Policy
725 17th St., NW, Room 5228
Washington, DC 20502

Dear Dr. Holdren:

On July 13, 2009 I wrote to you concerning a troubling pattern of events regarding scientific integrity within the Administration. In that letter, I respectfully requested information relating to how the Administration planned to address the public's mounting concerns regarding this important issue. Unfortunately, your office has not made this a priority.

This is not simply an issue of ignoring legitimate inquiries from Members attempting to execute their constitutional responsibilities. On March 9, 2009, the President also directed your office to compile recommendations regarding scientific integrity within 120 days.[1] To the best of my knowledge, your office has not complied with this directive either. In fact, your office's responses to both requests are now over two months late.

The President recently spoke before the National Institutes of Health and stated that "...we've seen our leadership slipping as scientific integrity was at times undermined..."[2] As additional issues regarding scientific integrity continue to mount, I sincerely hope your office's recommendations will ensure this Administration's actions will match its rhetoric.

---

[1] White House Memorandum, Subject: Scientific Integrity, March 9, 2009
[2] Remarks by the President on the American Recovery and Reinvestment Act, September 30 2009.

I look forward to your prompt response to my initial inquiry and your response to the President's March 9, 2009 memorandum, as they are already several months past-due. If you have any questions, please contact Mr. Tom Hammond of the Committee staff at 202-225-6371.

Sincerely,

REP. PAUL BROUN, M.D.
Ranking Member
Subcommittee on Investigations
And Oversight

cc: REP. BRAD MILLER
Chairman
Subcommittee on Investigations and Oversight

Attachment

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE AND TECHNOLOGY

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December 1, 2009

The Honorable John Holdren
Director
Office of Science and Technology Policy
725 17th St., NW, Room 5228
Washington, DC 20502

Dear Dr. Holdren:

On March 9, 2009, President Obama issued a memorandum calling on you to develop recommendations to "guarantee scientific integrity throughout the executive branch" within 120 days.[1] The President's memorandum set forth as a foundational principle that "the public must be able to trust the science and scientific process informing public policy decisions." Similarly, in one of his first acts, President Obama issued an executive memorandum outlining his principles to achieve "an unprecedented level of openness in government" and calling for recommendations for an Open Government Directive within 120 days.[2]

In light of the recent release of emails and other documentation from the University of East Anglia's Climate Research Unit (CRU), the content of which raise serious questions about the integrity of the scientific data and processes relied upon for public policy decisions related to climate change, and as a follow up to my two previous letters to you regarding the Administration's application of its scientific integrity principles, I once again write you requesting a response to my inquiries.

The scientific community enjoys a tremendous amount of public trust. Unfortunately, the themes exposed in the CRU documents led to a loss of confidence in certain individuals as dispassionate arbiters of climate science. At the least, the contents of the emails point to a troubling trend of groupthink where data is manipulated and withheld, scientific journals are intimidated, and reputations are attacked for political expedience. While the emails and other documents are still undergoing review, I want to call your attention to three disturbing items that raise immediate, specific concerns:

---

[1] White House Memorandum, Subject: Scientific Integrity, March 9, 2009
[2] White House Memorandum, Subject: Transparency and Open Government, January 21, 2009

1. **Extensive correspondence among federally funded researchers seeking to avoid sharing data and other information related to taxpayer funded scientific research results**. Numerous emails illustrate a concerted effort by scientists to circumvent both U.S and British Freedom of Information Act requirements. In one instance, a researcher declares that he would rather delete information than make it available for review, and he encourages other researchers to do the same.[3] These actions appear to be in direct contradiction to section (1)(d) of the President's Scientific Integrity and Open Government memoranda, and are generally inconsistent with the scrutiny and review that is fundamental to the scientific process.

2. **Suppressing science and data that does not conform with preferred outcomes.** Several emails discuss attempts to blacklist certain researchers' papers from publication, and, failing that, encourage initiating a boycott of scientific journals that publish papers whose conclusions do not conform to a certain outcome.[4] Additional emails discuss ousting editorial board members with non-conforming views on climate change.[5] Perhaps most disturbing, one researcher commits himself to ensuring that any non-conforming science is not mentioned in the Intergovernmental Panel on Climate Change's 4th Assessment Report (a report policymakers rely on for impartial expertise on the issue of climate change) by stating, "Kevin and I will keep them out somehow — even if we have to redefine what the peer-review literature is!"[6]

2. **Attempts to manipulate data to support a certain scientific conclusion.** In one instance, a researcher states of using a "trick" to "hide the decline [in

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[3] Email from Michael Mann to Phil Jones dated May 29, 2008. Subject: Re: IPCC & FOI (attached)
Email from Michael Mann to Phil Jones dated February 3, 2005. Subject: Re: For your eyes only (attached)
Email from Phil Jones to Tom Wigley dated January 21, 2005. Subject: Re: FOIA (attached)
Email from Phil Jones to Gavin Schmidt dated August 20, 2008. Subject: Re: Revised version the Wengen paper (attached)
Email from Phil Jones to Benjamin Santer dated December 3, 2008. Subject: Re: Schles suggestion (attached)

[4] Email from Phil Jones to Benjamin Santer dated March 19, 2009. Subject: See the below link. (attached)
Email from Malcolm Hughes to Michal Mann dated January 21, 2005. Subject: Re: Fwd: Your concerns with 2004GL021750 McIntyre (attached)
Email from Keith Briffa to Michal Mann and Tim Osborn dated November 15, 2005. Subject: Re: heads up… (attached)
Email from Michael Mann to Phil Jones dated March 11, 2003. Subject: Re: Fwd: Soon & Baliunas (attached)
Email from Phil Jones to Benjamin Santer dated March 19, 2009. Subject: See the below link (attached)

[5] Email from Tom Wigley to Timothy Carter dated April 24, 2003. Subject: Java climate model (attached)

[6] Email from Phil Jones to Michael Mann dated July 8, 2004. Subject: HIGHLY CONFIDENTIAL (attached)

> temperature]."[7] Another researcher says "it would be nice to try to 'contain' the putative 'MWP' [Medieval Warming Period]."[8]

Far from dispassionate, truth-seeking scientific work, the references above are just a small sampling of what appears to be a highly disturbing pattern of *politics leading the science* in a manner wholly inconsistent with both the President's directive on scientific integrity as well as accepted scientific practice and ethics. While some of the aforementioned correspondence includes questionable actions by Federal scientists, most if not all of the participants receive Federal funding through grants. Most troubling, the data and information in question forms the foundation upon which policymakers around the world seek to craft a global agreement on regulatory action to address climate change.

Accordingly, and consistent with the President's statement that "the public must be able to trust the science and scientific process informing public policy decisions," I request the following information

> **(1)** Your determination regarding whether the above items violate the President's directive on scientific integrity.
>
> **(2)** Your plan on how to address such violations if such a determination is made.
>
> **(3)** The effects this newly released information will have on the Administration's confidence in the reliability of climate change-related data and research results and corresponding policy position leading up to the Copenhagen negotiations.
>
> **(4)** Your determination as to whether or not the Administration's principles, as laid out in the President's scientific integrity memo, apply to federal grant recipients as well as federal scientists.
>
> **(5)** Whether the Administration intends to investigate possible Freedom of Information Act violations.

In addition to these requests, I also once again ask you to respond to my previous related inquiries regarding scientific integrity from my letters of July 13, 2009 and October 2, 2009. I look forward to your prompt responses as they are already several months past-

---

[7] Email from Michael Mann to Phil Jones, Ray Bradley, Tom Wigley, Tom Crowley, Keith Briffa, Kevin Trenberth, Michael Oppenheimer, and Jonathan Overpeck dated June 4, 2003. Subject: Re: Prospective Eos pieces? (attached)

[8] Email from Phil Jones to Ray Bradley, Michael Mann, and Malcolm Hughes dated November 16, 1999. Subject: Diagram for WHO Statement (attached)

due. If you have any questions, please contact Mr. Tom Hammond of the Committee staff at 202-225-6371.

Sincerely,

REP. PAUL BROUN, M.D.
Ranking Member
Subcommittee on Investigations
And Oversight

cc: REP. BRAD MILLER
Chairman
Subcommittee on Investigations and Oversight

Attachments

From: Michael Mann <mann@xxxxxxxxx.xxx>
To: Phil Jones <p.jones@xxxxxxxxx.xxx>
Subject: Re: IPCC & FOI
Date: Thu, 29 May 2008 08:12:02 -0400
Reply-to: mann@xxxxxxxxx.xxx

<x-flowed>
Hi Phil,

laughable that CA would claim to have discovered the problem. They would have run off to the Wall Street Journal for an exclusive were that to have been true.

I'll contact Gene about this ASAP. His new email is: generwahl@xxxxxxxxx.xxx

talk to you later,

mike

Phil Jones wrote:
>
>> Mike,
> Can you delete any emails you may have had with Keith re AR4?
> Keith will do likewise. He's not in at the moment - minor family crisis.
>
> Can you also email Gene and get him to do the same? I don't
> have his new email address.
>
> We will be getting Caspar to do likewise.
>
> I see that CA claim they discovered the 1945 problem in the Nature
> paper!!
>
> Cheers
> Phil
>
>
>
>>
>
> Prof. Phil Jones
> Climatic Research Unit Telephone +44 (0) 1603 592090
> School of Environmental Sciences Fax +44 (0) 1603 507784
> University of East Anglia
> Norwich Email p.jones@xxxxxxxxx.xxx
> NR4 7TJ
> UK
> ----------
>

--
Michael E. Mann
Associate Professor
Director, Earth System Science Center (ESSC)

Department of Meteorology Phone: (814) 863-4075
503 Walker Building FAX: (814) 865-3663
The Pennsylvania State University email: mann@xxxxxxxxx.xxx
University Park, PA 16802-5013

http://www.met.psu.edu/dept/faculty/mann.htm

</x-flowed>

From: Phil Jones <p.jones@xxxxxxxxx.xxx>
To: "Michael E. Mann" <mann@xxxxxxxxx.xxx>
Subject: Re: For your eyes only
Date: Thu Feb 3 13:11:46 2005

Mike,
It would be good to produce future series with and without the long instrumental series and maybe the documentary ones as well. The long measurements can then be used to validate the low-freq aspects at least back to 1750, maybe earlier with the documentary. There are some key warm decades (1730s, some in the 16th century) which the Moberg reconstruction completely misses and gives the impression that all years are cold between 1500 and 1750.
Away Feb 6-10 and 12-20 and 22-25 (last in Chicago - on the panel to consider the vertical temp work of CCSP).
Cheers
Phil
Cheers
Phil
At 15:26 02/02/2005, you wrote:

Thanks Phil,
Yes, we've learned out lesson about FTP. We're going to be very careful in the future what gets put there. Scott really screwed up big time when he established that directory so that Tim could access the data.
Yeah, there is a freedom of information act in the U.S., and the contrarians are going to try to use it for all its worth. But there are also intellectual property rights issues, so it isn't clear how these sorts of things will play out ultimately in the U.S.
I saw the paleo draft (actually I saw an early version, and sent Keith some minor comments). It looks very good at present--will be interesting to see how they deal w/ the contrarian criticisms--there will be many. I'm hoping they'll stand firm (I believe they will--I think the chapter has the right sort of personalities for that)...
Will keep you updated on stuff...
talk to you later,
mike
At 09:41 AM 2/2/2005, Phil Jones wrote:

Mike,
I presume congratulations are in order - so congrats etc !
Just sent loads of station data to Scott. Make sure he documents everything better this time ! And don't leave stuff lying around on ftp sites - you never know who is trawling
them. The two MMs have been after the CRU station data for years. If they ever hear there
is a Freedom of Information Act now in the UK, I think I'll delete the file rather than send
to anyone. Does your similar act in the US force you to respond to enquiries within 20 days? - our does ! The UK works on precedents, so the first request will test it. We also
have a data protection act, which I will hide behind. Tom Wigley has sent me a worried email when he heard about it - thought people could ask him for his model code. He has retired officially from UEA so he can hide behind that. IPR should be relevant here,
but I can see me getting into an argument with someone at UEA who'll say we must adhere
to it !
Are you planning a complete reworking of your paleo series? Like to be involved if you are.
Had a quick look at Ch 6 on paleo of AR4. The MWP side bar references Briffa, Bradley, Mann, Jones, Crowley, Hughes, Diaz - oh and Lamb ! Looks OK, but I can't see it getting past all the stages in its present form. MM and SB get dismissed. All the right
emphasis is there, but the wording on occasions will be crucial. I expect this to be the
main contentious issue in AR4. I expect (hope) that the MSU one will fade away. It seems
the more the CCSP (the thing Tom Karl is organizing) looks into Christy and Spencer's series, the more problems/issues they are finding. I might be on the NRC review panel, so will keep you informed.
Rob van Dorland is an LA on the Radiative Forcing chapter, so he's a paleo expert by GRL statndards.
Cheers
Phil
At 13:41 02/02/2005, you wrote:

Phil--thought I should let you know that its official now that I'll be moving to Penn State next Fall.
I'll be in the Meteorology Dept. & Earth and Environmental Systems Institute, and plan to head up a center for "Earth System History" within the institute. Will keep you updated,
Mike

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School of Environmental Sciences Fax +44 (0) 1603 507784
University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
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Professor Michael E. Mann
Department of Environmental Sciences, Clark Hall
University of Virginia
Charlottesville, VA 22903

e-mail: mann@xxxxxxxx.xxx Phone: (434) 924-7770 FAX: (434) 982-2137
[1]http://www.evsc.virginia.edu/faculty/people/mann.shtml

Prof. Phil Jones
Climatic Research Unit Telephone +44 (0) 1603 592090
School of Environmental Sciences Fax +44 (0) 1603 507784
University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
UK

References

1. http://www.evsc.virginia.edu/faculty/people/mann.shtml

From: Phil Jones <p.jones@xxxxxxxxx.xxx>
To: Tom Wigley <wigley@xxxxxxxxx.xxx>
Subject: Re: FOIA
Date: Fri Jan 21 15:20:06 2005
Cc: Ben Santer <santer1@xxxxxxxxx.xxx>

Tom,
I'll look at what you've said over the weekend re CCSP.
I don't know the other panel members. I've not heard any
more about it since agreeing a week ago.
As for FOIA Sarah isn't technically employed by UEA and she
will likely be paid by Manchester Metropolitan University.
I wouldn't worry about the code. If FOIA does ever get
used by anyone, there is also IPR to consider as well.
Data is covered by all the agreements we sign with people,
so I will be hiding behind them. I'll be passing any
requests onto the person at UEA who has been given a post to
deal with them.
Cheers
Phil
At 14:35 21/01/2005, Tom Wigley wrote:

Phil,
Thanks for the quick reply.
The leaflet appeared so general, but it was prepared by UEA so
they may have simplified things. From their wording, computer code
would be covered by the FOIA. My concern was if Sarah is/was still
employed by UEA. I guess she could claim that she had only written
one tenth of the code and release every tenth line.
Sorry I won't see you, but I will not come up to Norwich until
Monday.
Let me fill you in a bit (confidentially). You probably know the panel
members. We were concerned that the chair would be a strong person.
It is Jerry Mahlman -- about the best possible choice. Richard Smith
is the statistician -- also excellent. Dave Randall, too -- very good.
As token skeptic there is Dick Lindzen -- but at least he is a smart
guy and he does listen. He may raise his paper with Gianitsis that
purports to show low climate sensitivity from volcanoes. I will
attach our paper that proves otherwise, in press in JGR.
Preparing the report has been a good and bad experience. I think
I had the worst task with the Exec. Summ. -- it tied up most of
my time for the past 3 months. The good has been the positive
interactions between most of the people -- a really excellent bunch.
I have been very impressed by Carl Mears and John Lanzante.
At meetings, John Christy has been quite good -- and there were
good and positive interactions between John and Roy and the RSS
gang that helped clarify a lot. Outside the meeting, in the email world,
he has been more of a pain. He has made a lot of useful suggestions
for the ExSumm -- but he keeps accusing the AOGCMers of
faking their models (not quite as bluntly as this). In the emails there
are some very useful exchanges from Jerry Meehl, Ramaswamy and
Ben detailing the AOGCM development process. We will be
writing a BAMS article on this in the summer -- much of what happens
in model development is unknown to the rest of the community. The
'faking' idea prompted me to write a tongue in cheek note -- also
attached. As far as I know, John will not raise this particular issue
in his dissentin views.
To accommodate dissenting views, the report will have a "dissenters'
appendix", with responses. You will get this at some stage -- the
deadline for dissenters to produce is Jan 31, and we will not finish
our rebuttals until mid Feb. The dissenters are John C, and (far worse)
Roger Pielke Sr. All of the rest of us disagree with these persons'
dissenting views. Roger has been extremely difficult -- but the details
are too complex to put in an email. On the other hand he has made
a number of useful contributions to the ExSumm and other chapters.
Suffice to say that he has some strange ideas (often to do with the
effects of landuse change) that are interesting but still, in my view,
speculative -- but testable.
We have yet to see the dissents -- and it would not be ethical for
me to say any more than I have already.
Best wishes,
Tom.
Phil Jones wrote:

Tom,
I hope the VTT panel doesn't prove a meeting too many
at this time. It is currently scheduled for Feb 23-25 and
I only get back from an 8 day workshop in Pune on
Feb 20.
The IPCC Chapter with Kevin is now with WGI in
Boulder. We did put you down as one of our
potential reviewers. Don't know whether you'll
have time or whether WGI will select you -
regional balance etc.
Next week I'll be in Reading and Exeter, so
won'be be in CRU. Have to be at an RMS Awards
meeting then something on Reanalysis, then I
have to collect some data from the archives
in Exeter for a small project we have. It is
easier for me to get this than explain to
someone how to do it. So I'll miss you -
not back till Thursday night.

On the FOI Act there is a little leaflet we
have all been sent. It doesn't really clarify
what we might have to do re programs or
data. Like all things in Britain we will only
find out when the first person or organization
asks. I wouldn't tell anybody about the FOI
Act in Britain. I don't think UEA really knows
what's involved.
As you're no longer an employee I would
use this argument if anything comes along.
I think it is supposed to mainly apply to
issues of personal information - references for
jobs etc.
Sorry I'll miss you next week. If you're in
on Sunday perhaps you could come round to
our new house in Wicklewood. Phone number
is still the same as 01953 605643. Keith and
Sarah know where it is even if they did get lost the
first time they came.
Cheers
Phil
At 02:59 21/01/2005, you wrote:

Phil,
Tom Karl told me you will be on the VTT review panel. This is
very good news.
Unfortunately I will not be at the meeting on the 23rd -- I will
be in midair half way across the Pacific to spend a couple of
weeks in Adelaide.
I got a brochure on the FOI Act from UEA. Does this mean
that, if someone asks for a computer program we have to give
it out?? Can you check this for me (and Sarah).
I will be at CRU next Mon, Tue, Wed in case Sarah did not
tell you.
Thanks,
Tom.

Prof. Phil Jones
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NR4 7TJ
UK

From: Phil Jones <p.jones@xxxxxxxxx.xxx>
To: Gavin Schmidt <gschmidt@xxxxxxxxx.xxx>
Subject: Re: Revised version the Wengen paper
Date: Wed Aug 20 09:32:52 2008
Cc: Michael Mann <mann@xxxxxxxxx.xxx>

Gavin,
Almost all have gone in. Have sent an email to Janice re the regional freshening.
On the boreholes I've used mostly Mike's revised text, with bits of
yours making it read a little better.
Thinking about the final bit for the Appendix. Keith should be in later, so
I'll check with him - and look at that vineyard book. I did rephrase the bit
about the 'evidence' as Lamb refers to it. I wanted to use his phrasing - he
used this word several times in these various papers. What he means is his
mind and its inherent bias(es).
Your final sentence though about improvements in reviewing and
traceability is a bit of a hostage to fortune. The skeptics will try to hang on to
something, but I don't want to give them something clearly tangible.
Keith/Tim still getting FOI requests as well as MOHC and Reading. All our
FOI officers have been in discussions and are now using the same exceptions
not to respond - advice they got from the Information Commissioner. As an
aside and just between us, it seems that Brian Hoskins has withdrawn himself
from the WG1 Lead nominations. It seems he doesn't want to have to deal with
this hassle.
The FOI line we're all using is this. IPCC is exempt from any countries FOI - the
skeptics
have been told this. Even though we (MOHC, CRU/UEA) possibly hold relevant info
the IPCC is not part our remit (mission statement, aims etc) therefore we don't
have an obligation to pass it on.
Cheers
Phil
At 18:07 19/08/2008, you wrote:

Phil, here are some edits - mostly language, a couple of bits of logic,
an attempt to soothe Mike on the borehole bit, and a paragraph for
consideration in the Appendix. Two questions require a little thinking -
the reference to 'regional freshening' on the coral section needs to be
more specific - I doubt it is a global phenomena, second there is an 'in
prep' reference to some new work by van Ommen - I don't think this is
appropriate and should either be removed and put as a personal
communication.
Having looked over the tropical trees section, I think that's fine.
The fig A1 does need labelling though.
Gavin
On Tue, 2008-08-19 at 09:11, Phil Jones wrote:
> Mike,
> Peck didn't do the speleothem bit either.
> Cheers
> Phil
>
> Mike,
> Have your text in - just need to read the borehole section again.
> Noted your comment re the final Appendix figure. Will look at more
> when Tim back.
> Peck's bit is 2.5 and the terrestrial part of 2.6 - except for the
> borehole text.
>
> Next time I co-ordinate anything I'll get the GB cycling coach
> involved. We've just one our 7th gold medal on two wheels. Only
> one short of Phelps.
>
> Cheers
> Phil
>
>
> At 13:52 19/08/2008, Michael Mann wrote:
> > thanks Phil--which part is Peck's? I'd like to read it over
> > carefully,
> >
> > mike
> >
> > Phil Jones wrote:
> > > Mike, Gavin,
> > > On the final Appendix plot, the first and last 12 years of
> > > the annual CET record
> > > were omitted from the smoothed plot. Tim's away, but when he did
> > > this with
> > > them in the light blue line goes off the plot at the end. The
> > > purpose of the piece
> > > was to show that the red/black lines were essentially the same.
> > > It wasn't
> > > to show the current light blue smoothed line was above the
> > > red/blue lines,
> > > as they are crap anyway.
> > > The y-axis scale of the plot is constrained by what was in
> > > the IPCC
> > > diagram from the first report. What we'll try is adding it fully
> > > back in or
> > > dashing the first/last 12 years. The 50-year smoother includes
> > > quite
> > > a bit of padding - we're using your technique Mike. The issue is
> > > that CET

> > > has been so warm the last 20 years or so.
> > > Normal people in the UK think the weather is cold and the
> > > summer is
> > > lousy, but the CET is on course for another very warm year.
> > > Warmth
> > > in winter/spring doesn't seem to count in most people's minds
> > > when it comes to warming.
> > >
> > > Will mod the borehole section now. Because this had been
> > > written
> > > by Juerg initially, I added in a paraphrased section from AR4. I
> > > will
> > > mod this accordingly. Hope you noticed Peck's stuff.
> > >
> > > Cheers
> > > Phil
> > >
> > > At 17:28 18/08/2008, Michael Mann wrote:
> > > > Hi Phil,
> > > >
> > > > traveling, and only had brief opportunity to look this over.
> > > > only 2 substantial comments:
> > > >
> > > > 1. I don't know who wrote the first paragraph of section 3.3
> > > > (bottom of page 52/page 53), but the lack of acknowledgement
> > > > here in this key summary that we actually introduced the idea of
> > > > 'pseudoproxies' into the climate literature is very troubling.
> > > > the end of the first sentence:
> > > > e.g., Zorita and Gonz

From: Phil Jones <p.jones@xxxxxxxx.xxx>
To: santer1@xxxxxxxxx.xxx, Tom Wigley <wigley@xxxxxxxxx.xxx>
Subject: Re: Schles suggestion
Date: Wed Dec 3 13:57:09 2008
Cc: mann <mann@xxxxxxxx.xxx>, Gavin Schmidt <gschmidt@xxxxxxxxx.xxx>, Karl Taylor <taylor13@xxxxxxxxx.xxx>, peter gleckler <gleckler1@xxxxxxxxx.xxx>

Ben,
When the FOI requests began here, the FOI person said we had to abide by the requests. It took a couple of half hour sessions - one at a screen, to convince them otherwise showing them what CA was all about. Once they became aware of the types of people we were dealing with, everyone at UEA (in the registry and in the Environmental Sciences school - the head of school and a few others) became very supportive. I've got to know the FOI person quite well and the Chief Librarian - who deals with appeals. The VC is also aware of what is going on - at least for one of the requests, but probably doesn't know the number we're dealing with. We are in double figures.

One issue is that these requests aren't that widely known within the School. So I don't know who else at UEA may be getting them. CRU is moving up the ladder of requests at UEA though - we're way behind computing though. We're away of requests going to others in the UK - MOHC, Reading, DEFRA and Imperial College. So spelling out all the detail to the LLNL management should be the first thing you do. I hope that Dave is being supportive at PCMDI.
The inadvertent email I sent last month has led to a Data Protection Act request sent by a certain Canadian, saying that the email maligned his scientific credibility with his peers!
If he pays 10 pounds (which he hasn't yet) I am supposed to go through my emails and he can get anything I've written about him. About 2 months ago I deleted loads of emails, so have very little - if anything at all. This legislation is different from the FOI -
it is supposed to be used to find put why you might have a poor credit rating !
In response to FOI and EIR requests, we've put up some data - mainly paleo data. Each request generally leads to more - to explain what we've put up. Every time, so far, that hasn't led to anything being added - instead just statements saying read what is in the papers and what is on the web site! Tim Osborn sent one such response (via the FOI person) earlier this week. We've never sent programs, any codes and manuals.
In the UK, the Research Assessment Exercise results will be out in 2 weeks time. These are expensive to produce and take too much time, so from next year we'll be moving onto a metric based system. The metrics will be # and amounts of grants, papers and citations etc. I did flippantly suggest that the # of FOI requests you get should be another.
When you look at CA, they only look papers from a handful of people. They will start on another coming out in The Holocene early next year. Gavin and Mike are on this with loads of others. I've told both exactly what will appear on CA once they get access to it!
Cheers
Phil
At 01:17 03/12/2008, Ben Santer wrote:

Dear Tom,
I think that the idea of a Commentary in Science or Nature is a good one. Steve Sherwood made a similar suggestion. I'd be perfectly happy NOT to be involved in such a Commentary. My involvement would look too self-serving.
One of the problems is that I'm caught in a real Catch-22 situation. At present, I'm damned and publicly vilified because I refused to provide McIntyre with the data he requested. But had I acceded to McIntyre's initial request for climate model data, I'm convinced (based on the past experiences of Mike Mann, Phil, and Gavin) that I would have spent years of my scientific career dealing with demands for further explanations, additional data, Fortran code, etc. (Phil has been complying with FOIA requests from McIntyre and his cronies for over two years). And if I ever denied a single request for further information, McIntyre would have rubbed his hands gleefully and written: "You see - he's guilty as charged!" on his website.
You and I have spent over a decade of our scientific careers on the MSU issue, Tom. During much of that time, we've had to do science in "reactive mode", responding to the latest outrageous claims and inept science by John Christy, David Douglass, or S. Fred Singer. For the remainder of my scientific career, I'd like to dictate my own research agenda. I don't want that agenda driven by the constant need to respond to Christy, Douglass, and Singer. And I certainly don't want to spend years of my life interacting with the likes of Steven McIntyre.
I hope LLNL management will provide me with their full support. If they do not, I'm fully prepared to seek employment elsewhere.
With best regards,
Ben
Tom Wigley wrote:

Ben,
Re the idea Michael sent around (to Revkin et al.)
this is something that Nature or Science might like as a Commentary. It might even be possible to include some indirect reference to the Mc audit issue. The notes I sent could be a starting point. One problem is that you could not be first author as this would look like garnering publicity for your own work (as the 2 key papers are both Santer et al.) Even having me as the first author may not work. An ideal person would be Tom Karl, who sent me a response saying "nice summary".
What do you think?

Tom.

--

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From: Phil Jones <p.jones@xxxxxxxx.xxx>
To: santer1@xxxxxxxxx.xxx
Subject: Re: See the link below
Date: Thu Mar 19 17:02:53 2009

Ben,
I don't know whether they even had a meeting yet - but I did say I would send something to their Chief Exec.
In my 2 slides worth at Bethesda I will be showing London's UHI and the effect that it hasn't got any bigger since 1900. It's easy to do with 3 long time series. It is only one urban site (St James Park), but that is where the measurements are from. Heathrow has a bit of a UHI and it has go bigger.
I'm having a dispute with the new editor of Weather. I've complained about him to the RMS Chief Exec. If I don't get him to back down, I won't be sending any more papers to any RMS journals and I'll be resigning from the RMS. The paper is about London and its UHI!
Cheers
Phil
At 16:48 19/03/2009, you wrote:

Thanks, Phil. The stuff on the website is awful. I'm really sorry you have to deal with that kind of crap.
If the RMS is going to require authors to make ALL data available - raw data PLUS results from all intermediate calculations - I will not submit any further papers to RMS journals.
Cheers,
Ben
Phil Jones wrote:

Paul,

I sent you this last night, but in another email. I should have sent you two emails - apologies. The issues were not linked. This email is to bring your attention to the link at the end.
The next few sentences repeat what I said last night.
I had been meaning to email you about the RMS and IJC issue of data availability for numbers and data used in papers that appear in RMS journals. This results from the issue that arose with the paper by Ben Santer et al in IJC last year. Ben has made the data available that this complainant wanted. The issue is that this is intermediate data. The raw data that Ben had used to derive the intermediate data was all fully available. If you're going to consider asking authors to make some or all of the data available, then they had done already. The complainant didn't want to have to go to the trouble of doing all the work that Ben had done.
I hope this is clear.
Another issue that should be considered as well is this.

With many papers, we're using Met Office observations. We've abstracted these from BADC to use them in the papers. We're not allowed to make these available to others. We'd need to get the Met Office's permission in all cases.
This email came overnight - from Tom Peterson, who works at NCDC in Asheville.

[1]http://
wattsupwiththat.com/2009/03/18/finally-an-honest-quantification-of-urban-warming-by-a-ma
jor-climate-scientist/
*Phil Jones, the director of the Hadley Climate Center in the UK.*

We all know that this is not my job. The paper being referred to appeared in JGR last year. The paper is
Jones, P.D., Lister, D.H. and Li, Q., 2008: Urbanization effects in large-scale temperature records, with an emphasis on China. /J. Geophys. Res/. *113*, D16122, doi:10.1029/2008JD009916.
The paper clearly states where I work - CRU at UEA. There is no mention of the Hadley Centre!
There is also no about face as stated on the web page.
Sending this as it gives a good example of the sort of people you are dealing with when you might be considering changes to data policies at the RMS.
Several years ago I decided there was no point in responding to issues raised on blog sites. Ben has made the same decision as well.
There are probably wider issues due to climate change becoming more main stream in the more popular media that the RMS might like to consider. I just think you should be aware of some of the background. CRU has had numerous FOI requests since the beginning of 2007. The Met Office, Reading, NCDC and GISS have had as well - many related to IPCC involvement. I know the world changes and the way we do things changes,
but these requests and the sorts of simple mistakes, should not have an influence on the way things have been adequately dealt with for over a century.

Cheers
Phil

--
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References

1. http://

From: Malcolm Hughes <mhughes@x.xxxxxxxxx.xxx>
To: "Michael E. Mann" <mann@xxxxxxxxx.xxx>
Subject: Re: Fwd: Your concerns with 2004GL021750 McIntyre
Date: Fri, 21 Jan 2005 10:47:40 -0700
Cc: Tom Wigley <wigley@xxxxxxxxx.xxx>, rbradley@xxxxxxxxx.xxx, tosborn@xxxxxxxxx.xxx, wigley@xxxxxxxxx.xxx, phil Jones <p.jones@xxxxxxxxx.xxx>, keith Briffa <k.briffa@xxxxxxxxx.xxx>, Gavin Schmidt <gschmidt@xxxxxxxxx.xxx>

<x-flowed>
Michael E. Mann wrote:

> Hi Malcolm,
>
> This assumes that the editor/s in question would act in good faith.
> I'm not convinced of this.
>
> I don't believe a response in GRL is warranted in any case. The MM
> claims in question are debunked in other papers that are in press and
> in review elsewhere. I'm not sure that GRL can be seen as an honest
> broker in these debates anymore, and it is probably best to do an end
> run around GRL now where possible. They have published far too many
> deeply flawed contrarian papers in the past year or so. There is no
> possible excuse for them publishing all 3 Douglass papers and the Soon
> et al paper. These were all pure crap.
>
> There appears to be a more fundamental problem w/ GRL now,
> unfortunately...
>
> Mike
>
> At 08:47 PM 1/20/2005, mhughes@xxxxxxxxx.xxx wrote:
>
>> Mike - I found this sentence in the reply from the GRL
>> Editor-in-Chief to be
>> interesting:
>> "As this manuscript was not written as a Comment, but rather as
>> a full-up scientific manuscript, you would not in general be asked to
>> look it over."
>> Does it not then follow that if you were to challenge their "work" in
>> a "full-
>> up scientific manuscript", but not as a "Comment" it, too, should be
>> reviewed
>> without reference to MM?
>> Maybe the editor-in-chief should be asked if this is the case, or simply
>> challenged by a submission?

>> Cheers, Malcolm
>> Quoting "Michael E. Mann" <mann@xxxxxxxxx.xxx>:
>>
>> >
>> >
>> > Thanks Tom,
>> >
>> >
>> > Yeah, basically this is just a heads up to people that something
>> might be
>> > up here. What a shame that would be. It's one thing to lose "Climate
>> > Research". We can't afford to lose GRL. I think it would be
>> > useful if people begin to record their experiences w/ both Saiers and
>> > potentially Mackwell (I don't know him--he would seem to be
>> complicit w/
>> > what is going on here).
>> >
>> >
>> > If there is a clear body of evidence that something is amiss, it
>> could be
>> > taken through the proper channels. I don't that the entire AGU
>> hierarchy
>> > has yet been compromised!
>> >
>> >
>> > The GRL article simply parrots the rejected Nature comment--little
>> > substantial difference that I can see at all.
>> >
>> >
>> > Will keep you all posted of any relevant developments,
>> >
>> >
>> > mike
>> >
>> >
>> > At 04:30 PM 1/20/2005, Tom Wigley wrote:
>> >
>> > Mike,
>> >
>> >
>> >
>> > This is truly awful. GRL has gone downhill rapidly in recent years.
>> > I
>> >
>> > think the decline began before Saiers. I have had some unhelpful
>> >

>> > dealings with him recently with regard to a paper Sarah and I have
>> >
>> > on glaciers -- it was well received by the referees, and so is in
>> > the
>> >
>> > publication pipeline. However, I got the impression that Saiers was
>> >
>> > trying to keep it from being published.
>> >
>> >
>> > Proving bad behavior here is very difficult. If you think that
>> > Saiers
>> >
>> > is in the greenhouse skeptics camp, then, if we can find
>> > documentary
>> >
>> > evidence of this, we could go through official AGU channels to get
>> >
>> > him ousted. Even this would be difficult.
>> >
>> >
>> > How different is the GRL paper from the Nature paper? Did the
>> >
>> > authors counter any of the criticisms? My experience with Douglass
>> >
>> > is that the identical (bar format changes) paper to one previously
>> >
>> > rejected was submitted to GRL.
>> >
>> >
>> > Tom.
>> >
>> > ==========
>> >
>> >
>> > Michael E. Mann wrote:
>> >
>> > Dear All,
>> >
>> >
>> > Just a heads up. Apparently, the contrarians now have an
>> > "in" with GRL. This guy Saiers has a prior connection w/ the
>> > University of Virginia Dept. of Environmental Sciences that causes me
>> > some unease.
>> >
>> >

>> > I think we now know how the various Douglass et al papers w/
>> Michaels and
>> > Singer, the Soon et al paper, and now this one have gotten published in
>> > GRL.
>> >
>> >
>> > Mike
>> >
>> >
>> >
>> >
>> > Subject: Your concerns with
>> > 2004GL021750 McIntyre
>> >
>> > Date: Thu, 20 Jan 2005 14:42:12 -0600
>> >
>> > X-MS-Has-Attach:
>> >
>> > X-MS-TNEF-Correlator:
>> >
>> > Thread-Topic: Your concerns with 2004GL021750 McIntyre
>> >
>> > Thread-Index: AcT/MITTfwM54m4OS32mJvW4BluE+A==
>> >
>> > From: "Mackwell, Stephen"
>> > <mackwell@xxxxxxxxx.xxx>
>> >
>> > To:
>> > <mann@xxxxxxxxx.xxx>
>> >
>> > Cc: <cjr@xxxxxxxxx.xxx>,
>> > <james.saiers@xxxxxxxxx.xxx>
>> >
>> > X-OriginalArrivalTime: 20 Jan 2005 20:42:12.0740 (UTC)
>> > FILETIME=[84F55440:01C4FF30]
>> >
>> > X-UVA-Virus-Scanned: by amavisd-new at fork7.mail.virginia.edu
>> >
>> > X-MIME-Autoconverted: from base64 to 8bit by
>> multiproxy.evsc.Virginia.EDU
>> > id j0KKgLO11138
>> >
>> >
>> > Dear Prof. Mann
>> >
>> > In your recent email to Chris Reason, you laid out your concerns that I

>> > presume were the reason for your phone call to me last week. I have
>> > reviewed the manuscript by McIntyre, as well as the reviews. The editor
>> > in this case was Prof. James Saiers. He did note initially that the
>> > manuscript did challenge published work, and so felt the need for an
>> > extensive and thorough review. For that reason, he requested
>> reviews from
>> > 3 knowledgable scientists. All three reviews recommended
>> > publication.
>> >
>> > While I do agree that this manuscript does challenge (somewhat
>> > aggresively) some of your past work, I do not feel that it takes a
>> > particularly harsh tone. On the other hand, I can understand your
>> > reaction. As this manuscript was not written as a Comment, but
>> rather as
>> > a full-up scientific manuscript, you would not in general be asked to
>> > look it over. And I am satisfied by the credentials of the reviewers.
>> > Thus, I do not feel that we have sufficient reason to interfere in the
>> > timely publication of this work.
>> >
>> > However, you are perfectly in your rights to write a Comment, in which
>> > you challenge the authors' arguments and assertions. Should you
>> elect to
>> > do this, your Comment would be provided to them and they would be
>> offered
>> > the chance to write a Reply. Both Comment and Reply would then be
>> > reviewed and published together (if they survived the review process).
>> > Comments are limited to the equivalent of 2 journal pages.
>> >
>> > Regards
>> >
>> > Steve Mackwell
>> >
>> > Editor in Chief, GRL
>> >
>> >
>> >
>> > _____
>> >
>> >
>> > Professor Michael E. Mann
>> >
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>> > of Environmental Sciences, Clark Hall
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>> > Phone: (434) 924-7770 FAX: (434) 982-2137
>> >
>> >
>> > http://www.evsc.virginia.edu/faculty/people/mann.shtml
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>

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> http://www.evsc.virginia.edu/faculty/people/mann.shtml
>
Hi Mike - of course we shouldn't make that assumption. If the issues are being dealt with elsewhere in the peer-reviewed literature soon (in time for IPCC to be aware of them) then there would be no reason for a riposte in GRL. Even so, it might be worth putting the hypothetical case to the Editor-in-Chief to test his response. Cheers, Malcolm
</x-flowed>

From: Keith Briffa <k.briffa@xxxxxxxxx.xxx>
To: mann@xxxxxxxxx.xxx, Tim Osborn <t.osborn@xxxxxxxxx.xxx>
Subject: Re: heads up...
Date: Tue Nov 15 17:47:53 2005
Cc: Phil Jones <p.jones@xxxxxxxxx.xxx>

Mike
thanks for this. When time allows we will do a response to this poster and simply post it on our web page. As others have said , the dating of the chronology in the Urals is not wrong - but the magnitude of the extreme years in the early Urals reconstruction were not adjusted to account for inflated variance related to low chronology replication - so they are sort of right that the emphasis on 1032 is probably overdone.
Anyway thanks again
Keith
At 15:29 15/11/2005, Michael E. Mann wrote:

Thanks Tim, Phil
yes, I never had any doubt he's wrong. In fact he's been wrong about just about every claim he's ever made. He almost had a point w/ the PCA centering, but as we all know, that doesn't matter at all in the end. The issue isn't whether or not he's right, as we all well know by now, but whether his false assertions have enough superficial plausability to get traction. In this case, they might, so probably good to at least be prepared.
I was told by a journalist Paul Thacker that his poster got prominent placement, probably not an accident (see forwarded email). I believe that Mike Schlesinger and David Karoly were there in the same session, so might be worth checking w/ them. I think
Connie Woodhouse and Tom Wigley were also at the meeting, but not sure...
I suspect that this is the first in a line of attacks (I'm sure Tom C is next in line) that will ultimately get "published" one way or another. The GRL leak may have been plugged up now w/ new editorial leadership there, but these guys always have "Climate Research" and "Energy and Environment", and will go there if necessary.
They are telegraphing quite clearly where they are going w/ all of this...
Mike
Tim Osborn wrote:

Thanks for this Mike. We'd spotted an earlier draft of his poster and were a bit concerned about this receiving prominence at the meeting.
Did it arouse much discussion, do you know? Keith and Tom Melvin looked into the dating
a while back when McIntyre first raised it and were quite satisfied with the published dating I think. Not sure what should be done - unless he submits something for peer-review. Cheers, Tim
At 14:53 15/11/2005, Michael E. Mann wrote:

not sure if you guys are aware, McIntyre presented this poster at the CCSP meeting.
Apparently, they gave him a very prominent location, so that everyone entering the meeting would have seen the poster...
mike
can find at:
<[1]http://www.climatescience.gov/workshop2005/abstracts/p-gc-1.htm>http://www.climatesc
ience.gov/workshop2005/abstracts/p-gc-1.htm
P-GC1.4
More on Hockey Sticks: The Case of Jones et al. [1998]
Stephen McIntyre,
<[2]mailto:stephen.mcintyre@xxxxxxxxx.xxx>stephen.mcintyre@xxxxxxxxx.xxx
Multiproxy studies purporting to show 20th century uniqueness have been applied by policymakers, but they have received remarkably little independent critical analysis. Jones et al. [1998] is a prominent multi-proxy study used by IPCC [2001] and others to affirm the hockey stick shaped temperature reconstruction of Mann et al. [1998]. However, the reconstruction of Jones et al. [1998] is based on only 3-4 proxies in the controversial Medieval Warm Period, including non-arms-length studies by Briffa et al. [1992] and Briffa et al [1995]. We show that the Polar Urals data set in Briffa et al [1992] fails to meet a variety of quality control standards, both in replication and crossdating. The conclusion of Briffa et al. [1995] that 1032 was the "coldest year" of the millennium proves to be based on inadequate replication of only 3 tree ring cores, of which at least 2 are almost certainly incorrectly crossdated. We show that an ad hoc adjustment to the Tornetrask data set in Briffa et al [1992] cannot be justified. The individual and combined impact of defects in the Polar Urals data set and Tornetrask adjustments on the reconstruction of Jones et al [1998] is substantial and can be seen to have the effect of modifying what would otherwise indicate a pronounced Medieval Warm
Period in the proxy reconstruction. Inhomogeneity problems in the Polar Urals and Tornetrask data sets, pertaining to altitude, minimum girth bias and pith centering bias will also be discussed.
--
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<[4]http://www.met.psu.edu/dept/faculty/mann.htm>[5]http://www.met.psu.edu/dept/faculty/
mann.htm

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[9]http://www.cru.uea.ac.uk/cru/people/briffa/

References

1. http://www.climatescience.gov/workshop2005/abstracts/p-gc-1.htm%3Ehttp://www.climatescience.gov/workshop2005/abstracts/p-gc-1.htm
2. mailto:stephen.mcintyre@xxxxxxxxx.xxx
3. mailto:mann@xxxxxxxxx.xxx%3Emann@xxxxxxxxx.xxx
4. http://www.met.psu.edu/dept/faculty/mann.htln
5. http://www.met.psu.edu/dept/faculty/mann.htm
6. http://www.cru.uea.ac.uk/~timo/
7. http://www.cru.uea.ac.uk/~timo/sunclock.htm
8. http://www.met.psu.edu/dept/faculty/mann.htm
9. http://www.cru.uea.ac.uk/cru/people/briffa/

From: "Michael E. Mann" <mann@xxxxxxxxx.xxx>
To: Phil Jones <p.jones@xxxxxxxxx.xxx>,rbradley@xxxxxxxxx.xxx,
mhughes@xxxxxxxxx.xxx,srutherford@xxxxxxxxx.xxx,tcrowley@xxxxxxxxx.xxx
Subject: Re: Fwd: Soon & Baliunas
Date: Tue, 11 Mar 2003 08:14:49 -0500
Cc: k.briffa@xxxxxxxxx.xxx,jto@u.arizona.edu,drdendro@xxxxxxxxx.xxx,
keith.alverson@xxxxxxxxx.xxx,mnaccrac@xxxxxxxxx.xxx,jto@u.arizona.edu,
mann@xxxxxxxxx.xxx

Thanks Phil,
(Tom: Congrats again!)
The Soon & Baliunas paper couldn't have cleared a 'legitimate' peer review process anywhere. That leaves only one possibility--that the peer-review process at Climate Research has been hijacked by a few skeptics on the editorial board. And it isn't just De Freitas, unfortunately I think this group also includes a member of my own department... The skeptics appear to have staged a 'coup' at "Climate Research" (it was a mediocre journal to begin with, but now its a mediocre journal with a definite 'purpose').
Folks might want to check out the editors and review editors:
[1]http://www.int-res.com/journals/cr/crEditors.html
In fact, Mike McCracken first pointed out this article to me, and he and I have discussed this a bit. I've cc'd Mike in on this as well, and I've included Peck too. I told Mike that I believed our only choice was to ignore this paper. They've already achieved what they wanted--the claim of a peer-reviewed paper. There is nothing we can do about that now, but
the last thing we want to do is bring attention to this paper, which will be ignored by the community on the whole...
It is pretty clear that thee skeptics here have staged a bit of a coup, even in the presence of a number of reasonable folks on the editorial board (Whetton, Goodess, ...). My
guess is that Von Storch is actually with them (frankly, he's an odd individual, and I'm not sure he isn't himself somewhat of a skeptic himself), and without Von Storch on their side, they would have a very forceful personality promoting their new vision.
There have been several papers by Pat Michaels, as well as the Soon & Baliunas paper, that
couldn't get published in a reputable journal.
This was the danger of always criticising the skeptics for not publishing in the "peer-reviewed literature". Obviously, they found a solution to that--take over a journal!
So what do we do about this? I think we have to stop considering "Climate Research" as a
legitimate peer-reviewed journal. Perhaps we should encourage our colleagues in the climate
research community to no longer submit to, or cite papers in, this journal. We would also need to consider what we tell or request of our more reasonable colleagues who currently sit on the editorial board...
What do others think?
mike

At 08:49 AM 3/11/2003 +0000, Phil Jones wrote:

Dear All,
Apologies for sending this again. I was expecting a stack of emails this morning in
response, but I inadvertently left Mike off (mistake in pasting) and picked up Tom's old
address. Tom is busy though with another offspring !
I looked briefly at the paper last night and it is appalling - worst word I can think of today
without the mood pepper appearing on the email ! I'll have time to read more at the weekend
as I'm coming to the US for the DoE CCPP meeting at Charleston. Added Ed, Peck and Keith A.
onto this list as well. I would like to have time to rise to the bait, but I have so much else on at
the moment. As a few of us will be at the EGS/AGU meet in Nice, we should consider what
to do there.
The phrasing of the questions at the start of the paper determine the answer they get. They
have no idea what multiproxy averaging does. By their logic, I could argue 1998 wasn't the
warmest year globally, because it wasn't the warmest everywhere. With their LIA being 1300-
1900 and their MWP 800-1300, there appears (at my quick first reading) no discussion of synchroneity of the cool/warm periods. Even with the instrumental record, the early and late
20th century warming periods are only significant locally at between 10-20% of grid boxes.
Writing this I am becoming more convinced we should do something - even if this is just
to state once and for all what we mean by the LIA and MWP. I think the skeptics will use
this paper to their own ends and it will set paleo back a number of years if it goes unchallenged.
I will be emailing the journal to tell them I'm having nothing more to do with it until they
rid themselves of this troublesome editor. A CRU person is on the editorial board, but papers
get dealt with by the editor assigned by Hans von Storch.
Cheers
Phil
Dear all,
Tim Osborn has just come across this. Best to ignore probably, so don't let it spoil your

day. I've not looked at it yet. It results from this journal having a number of editors. The
responsible one for this is a well-known skeptic in NZ. He has let a few papers through by
Michaels and Gray in the past. I've had words with Hans von Storch about this, but got nowhere.
Another thing to discuss in Nice !
Cheers
Phil

X-Sender: f055@xxxxxxxxx.xxx
X-Mailer: QUALCOMM Windows Eudora Version 5.1
Date: Mon, 10 Mar 2003 14:32:14 +0000
To: p.jones@uea
From: Tim Osborn <t.osborn@xxxxxxxxx.xxx>
Subject: Soon & Baliunas

Dr Timothy J Osborn | phone: +44 1603 592089
Senior Research Associate | fax: +44 1603 507784
Climatic Research Unit | e-mail: t.osborn@xxxxxxxxx.xxx
School of Environmental Sciences | web-site:
University of East Anglia _____ | [2]http://www.cru.uea.ac.uk/~timo/
Norwich NR4 7TJ | sunclock:
UK | [3]http://www.cru.uea.ac.uk/~timo/sunclock.htm

Prof. Phil Jones
Climatic Research Unit Telephone +44 (0) 1603 592090
School of Environmental Sciences Fax +44 (0) 1603 507784
University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
UK

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Professor Michael E. Mann
Department of Environmental Sciences, Clark Hall
University of Virginia
Charlottesville, VA 22903

e-mail: mann@xxxxxxxxx.xxx Phone: (434) 924-7770 FAX: (434) 982-2137
[4]http://www.evsc.virginia.edu/faculty/people/mann.shtml

References

1. http://www.int-res.com/journals/cr/crEditors.html
2. http://www.cru.uea.ac.uk/~timo/
3. http://www.cru.uea.ac.uk/~timo/sunclock.htm
4. http://www.evsc.virginia.edu/faculty/people/mann.shtml

University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
UK

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Lawrence Livermore National Laboratory
P.O. Box 808, Mail Stop L-103
Livermore, CA 94550, U.S.A.
Tel: (925) 422-3840
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email: santer1@xxxxxxxxx.xxx

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Prof. Phil Jones
Climatic Research Unit Telephone +44 (0) 1603 592090
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University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
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References

1. http:///

From: Phil Jones <p.jones@xxxxxxxxx.xxx>
To: santer1@xxxxxxxxx.xxx
Subject: Re: See the link below
Date: Thu Mar 19 17:02:53 2009

Ben,
I don't know whether they even had a meeting yet - but I did say I would send something to their Chief Exec.
In my 2 slides worth at Bethesda I will be showing London's UHI and the effect that it hasn't got any bigger since 1900. It's easy to do with 3 long time series. It is only one urban site (St James Park), but that is where the measurements are from. Heathrow has a bit of a UHI and it has go bigger.
I'm having a dispute with the new editor of Weather. I've complained about him to the RMS Chief Exec. If I don't get him to back down, I won't be sending any more papers to any RMS journals and I'll be resigning from the RMS.
The paper is about London and its UHI!
Cheers
Phil
At 16:48 19/03/2009, you wrote:

Thanks, Phil. The stuff on the website is awful. I'm really sorry you have to deal with that kind of crap.
If the RMS is going to require authors to make ALL data available - raw data PLUS results from all intermediate calculations - I will not submit any further papers to RMS journals.
Cheers,
Ben
Phil Jones wrote:

Paul,

I sent you this last night, but in another email. I should have sent you two emails - apologies. The issues were not linked. This email is to bring your attention to the link at the end.
The next few sentences repeat what I said last night.
I had been meaning to email you about the RMS and UC issue of data availability for numbers and data used in papers that appear in RMS journals. This results from the issue that arose with the paper by Ben Santer et al in UC last year. Ben has made the data available that this complainant wanted. The issue is that this is intermediate data. The raw data that Ben had used to derive the intermediate data was all fully available. If you're going to consider asking authors to make some or all of the data available, then they had done already. The complainant didn't want to have to go to the trouble of doing all the work that Ben had done.
I hope this is clear.
Another issue that should be considered as well is this.

With many papers, we're using Met Office observations. We've abstracted these from BADC to use them in the papers. We're not allowed to make these available to others. We'd need to get the Met Office's permission in all cases.
This email came overnight - from Tom Peterson, who works at NCDC in Asheville.

[1]http://
wattsupwiththat.com/2009/03/18/finally-an-honest-quantification-of-urban-warming-by-a-ma
jor-climate-scientist/
"Phil Jones, the director of the Hadley Climate Center in the UK."

We all know that this is not my job. The paper being referred to appeared in JGR last year. The paper is
Jones, P.D., Lister, D.H. and Li, Q., 2008: Urbanization effects in large-scale temperature records, with an emphasis on China. *J. Geophys. Res.* **113**, D16122, doi:10.1029/2008JD009916.
The paper clearly states where I work - CRU at UEA. There is no mention of the Hadley Centre!
There is also no about face as stated on the web page.
Sending this as it gives a good example of the sort of people you are dealing with when you might be considering changes to data policies at the RMS.
Several years ago I decided there was no point in responding to issues raised on blog sites. Ben has made the same decision as well.
There are probably wider issues due to climate change becoming more main stream in the more popular media that the RMS might like to consider. I just think you should be aware of some of the background. CRU has had numerous FOI requests since the beginning of 2007. The Met Office, Reading, NCDC and GISS have had as well - many related to IPCC involvement. I know the world changes and the way we do things changes,
but these requests and the sorts of simple mistakes, should not have an influence on the way things have been adequately dealt with for over a century.

Cheers
Phil

--
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NOAA's National Climatic Data Center
151 Patton Avenue
Asheville, NC 28801
Voice: +1-828-271-4287
Fax: +1-828-271-4876

Prof. Phil Jones
Climatic Research Unit Telephone +44 (0) 1603 592090
School of Environmental Sciences Fax +44 (0) 1603 507784

From: Tom Wigley <wigley@xxxxxxxxx.xxx>
To: Timothy Carter <tim.carter@xxxxxxxxx.xxx>
Subject: Re: Java climate model
Date: Thu, 24 Apr 2003 09:17:29 -0600
Cc: Mike Hulme <m.hulme@xxxxxxxxx.xxx>, Phil Jones <p.jones@xxxxxxxxx.xxx>

Tim,

I know about what Matthews has done. He did so without contacting Sarah or me. He uses a statistical emulation method that can never account for the full range of uncertainties. I would not trust it outside the calibration zone -- so I doubt that it can work well for (e.g.) stabilization cases. As far as I know it has not been peer reviewed. Furthermore, unless he has illegally got hold of the TAR version of the model, what he has done can only be an emulation of the SAR version.

Personally, I regard this as junk science (i.e., not science at all).

Matthews is doing the community a considerable disservice.

Tom.

PS Re CR, I do not know the best way to handle the specifics of the editoring. Hans von Storch is partly to blame -- he encourages the publication of crap science 'in order to stimulate debate'. One approach is to go direct to the publishers and point out the fact that their journal is perceived as being a medium for disseminating misinformation under the guise of refereed work. I use the word 'perceived' here, since whether it is true or not is not what the publishers care about -- it is how the journal is seen by the community that counts.

I think we could get a large group of highly credentialed scientists to sign such a letter -- 50+ people.

Note that I am copying this view only to Mike Hulme and Phil Jones. Mike's idea to get editorial board members to resign will probably not work -- must get rid of von Storch too, otherwise holes will eventually fill up with people like Legates, Balling, Lindzen, Michaels, Singer, etc. I have heard that the publishers are not happy with von Storch, so the above approach might remove that hurdle too.

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Timothy Carter wrote:

>
> Dear Tom,
>
> Since you were online yesterday contributing to the "Climate Research"
> discussion, I figured that you might be in town to give your views on the
> Java Climate Model which, I understand, is based in large part on MAGICC:
>
> http://chooseclimate.org/jcm/
>
> and seems to be getting considerable exposure amongst the policy community
> now that Ben Matthews (was he a student of yours at UEA?) has made this
> available online.
>
> I wondered if this has been subjected to "peer review" by the people whose
> models it is based on or anyone else, since I have Ministry people here in
> Finland asking me if this type of tool is something they should think of
> using during the negotiating process!
>
> It's certainly a smart piece of software, though it seems to have
> irritating bugs, like returning to the default state when any little thing
> is adjusted. What is critically important, though, is that it can do what
> it is advertising. If it can't, then the careful work done offline by
> people such as yourself, could be undermined.
>
> Any thoughts?
>
> Best regards from a sunny though cool Helsinki.
>
> Tim
>
> P.S. On the CR issue, I agree that a rebuttal seems to be the only method
> of addressing the problem (I communicated this to Mike yesterday morning),
> and I wonder if a review of the refereeing policy is in order. The only way
> I can think of would be for all papers to go through two Editors rather
> than one, the former to have overall responsibility, the latter to provide
> a second opinion on a paper and reviewers' comments prior to publication. A
> General Editor would be needed to adjudicate in the event of disagreement.
> Of course, this could then slow down the review process enormously.
> However, without an editorial board to vote someone off, how can suspect
> Editors be removed except by the Publisher (in this case, Inter-Research).

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> Editors be removed except by the Publisher (in this case, Inter-Research).

From: Phil Jones <p.jones@xxxxxxxxx.xxx>
To: "Michael E. Mann" <mann@xxxxxxxxx.xxx>
Subject: HIGHLY CONFIDENTIAL
Date: Thu Jul 8 16:30:16 2004

Mike,
Only have it in the pdf form. FYI ONLY - don't pass on. Relevant paras are the last 2 in section 4 on p13. As I said it is worded carefully due to Adrian knowing Eugenia for years. He knows the're wrong, but he succumbed to her almost pleading with him to tone it down as it might affect her proposals in the future !
I didn't say any of this, so be careful how you use it - if at all. Keep quiet also that you have the pdf.
The attachment is a very good paper - I've been pushing Adrian over the last weeks to get it submitted to JGR or J. Climate. The main results are great for CRU and also for ERA-40. The basic message is clear - you have to put enough surface and sonde obs into a model to produce Reanalyses. The jumps when the data input change stand out so clearly. NCEP does many odd things also around sea ice and over snow and ice. The other paper by MM is just garbage - as you knew. De Freitas again. Pielke is also losing all credibility as well by replying to the mad Finn as well - frequently as I see it.
I can't see either of these papers being in the next IPCC report. Kevin and I will keep them
out somehow - even if we have to redefine what the peer-review literature is !
Cheers
Phil
Mike,
For your interest, there is an ECMWF ERA-40 Report coming out soon, which shows that Kalnay and Cai are wrong. It isn't that strongly worded as the first author is a personal friend of Eugenia. The result is rather hidden in the middle of the report. It isn't peer review, but a slimmed down version will go to a journal. KC are wrong because
the difference between NCEP and real surface temps (CRU) over eastern N. America doesn't
happen with ERA-40. ERA-40 assimilates surface temps (which NCEP didn't) and doing this makes the agreement with CRU better. Also ERA-40's trends in the lower atmosphere
are all physically consistent where NCEP's are not - over eastern US.

I can send if you want, but it won't be out as a report for a couple of months.
Cheers
Phil

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University of East Anglia
Norwich Email p.jones@xxxxxxxxx.xxx
NR4 7TJ
UK

From: "Michael E. Mann" <mann@xxxxxxxxx.xxx>
To: Phil Jones <p.jones@xxxxxxxxx.xxx>, rbradley@xxxxxxxxx.xxx, Tom Wigley <wigley@xxxxxxxxx.xxx>, Tom Crowley <tcrowley@xxxxxxxxx.xxx>, Keith Briffa <k.briffa@xxxxxxxxx.xxx>, trenbert@xxxxxxxxx.xxx, Michael Oppenheimer <omichael@xxxxxxxxx.xxx>, Jonathan Overpeck <jto@u.arizona.edu>
Subject: Re: Prospective Eos piece?
Date: Wed, 04 Jun 2003 10:17:57 -0400
Cc: mann@xxxxxxxxx.xxx, Scott Rutherford <srutherford@xxxxxxxxx.xxx>

Thanks Phil, and Thanks Tom W and Keith for your willingness to help/sign on. This certainly gives us a "quorum" pending even a few possible additional signatories I'm waiting to hear back from.
In response to the queries, I will work on a draft today w/ references and two suggested figures, and will try to send on by this evening (east coast USA). Tom W indicated that he
wouldn't be able look at a draft until Thursday anyway, so why doesn't everyone just take a day then to digest what I've provided and then get back to me with comments/changes (using word "track changes" if you like).
I'd like to tentatively propose to pass this along to Phil as the "official keeper" of the draft to finalize and submit IF it isn't in satisfactory shape by the time I have to leave (July 11--if I hadn't mentioned, I'm getting married, and then honeymoon, prior to IUGG in
Sapporo--gone for about 1 month total). Phil, does that sound ok to you?
Re Figures, what I had in mind were the following two figures:
1) A plot of various of the most reliable (in terms of strength of temperature signal and reliability of millennial-scale variability) regional proxy temperature reconstructions around the Northern Hemisphere that are available over the past 1-2 thousand years to convey the important point that warm and cold periods where highly regionally variable. Phil and Ray are probably in the best position to prepare this (?). Phil and I have recently submitted a paper using about a dozen NH records that fit this category, and many
of which are available nearly 2K back--I think that trying to adopt a timeframe of 2K, rather than the usual 1K, addresses a good earlier point that Peck made w/ regard to the memo, that it would be nice to try to "contain" the putative "MWP", even if we don't yet have a hemispheric mean reconstruction available that far back [Phil and I have one in review--not sure it is kosher to show that yet though--I've put in an inquiry to Judy Jacobs at AGU about this]. If we wanted to be fancy, we could do this the way certain plots
were presented in one of the past IPCC reports (was it 1990?) in which a spatial map was provided in the center (this would show the locations of the proxies), with "rays" radiating out to the top, sides, and bottom attached to rectanges showing the different timeseries. Its a bit of work, but would be a great way to convey both the spatial and temporal information at the same time.
2) A version of the now-familiar "spaghetti plot" showing the various reconstructions as well as model simulations for the NH over the past 1 (or maybe 2K). To give you an idea of
what I have in mind, I'm attaching a Science piece I wrote last year that contains the same sort of plot.
However, what I'd like to do different here is:
In addition to the "multiproxy" reconstructions, I'd like to Add Keith's maximum latewood
density-based series, since it is entirely independent of the multiproxy series, but conveys the same basic message. I would also like to try to extend the scope of the plot back to nearly 2K. This would be either w/ the Mann and Jones extension (in review in GRL)
or, if that is deemed not kosher, the Briffa et al Eurasian tree-ring composite that extends back about 2K, and, based on Phil and my results, appears alone to give a reasonably accurate picture of the full hemispheric trend.
Thoughts, comments on any of this?
thanks all for the help,
mike
At 09:25 AM 6/4/2003 +0100, Phil Jones wrote:

Mike,
This is definitely worth doing and I hope you have the time before the 11th, or can pass
it on to one of us at that time. As you know I'm away for a couple of days but back Friday.
So count me in. I've forwarded you all the email comments I've sent to reporters/fellow scientists, so you're fully aware of my views, which are essentially the same as all of the list
and many others in paleo. EOS would get to most fellow scientists. As I said to you the other
day, it is amazing how far and wide the SB pieces have managed to percolate. When it comes
out I would hope that AGU/EOS 'publicity machine' will shout the message from rooftops
everywhere. As many of us need to be available when it comes out.
There is still no firm news on what Climate Research will do, although they will likely
have two editors for potentially controversial papers, and the editors will consult when papers
get different reviews. All standard practice I'd have thought. At present the editors get no
guidance whatsoever. It would seem that if they don't know what standard practice is then
they shouldn't be doing the job !
Cheers
Phil
At 22:34 03/06/03 -0400, Michael E. Mann wrote:

Dear Colleagues,

Eos has invited me (and prospective co-authors) to write a 'forum' piece (see below). This was at Ellen Mosely-Thompson's suggestion, upon my sending her a copy of the attached memo that Michael Oppenheimer and I jointly wrote. Michael and I wrote this to
assist colleagues who had been requesting more background information to help counter the spurious claims (with which I believe you're all now familiar) of the latest Baliunas & Soon pieces.
The idea I have in mind would be to use what Michael and I have drafted as an initial starting point for a slightly expanded piece, that would address the same basic issues and, as indicated below, could include some references and figures. As indicated in Judy Jacobs' letter below, the piece would be rewritten in such a way as to be less explicitly (though perhaps not less implicitly) directed at the Baliunas/Soon claims, criticisms, and attacks.
Phil, Ray, and Peck have already indicated tentative interest in being co-authors. I'm sending this to the rest of you (Tom C, Keith, Tom W, Kevin) in the hopes of broadening the list of co-authors. I strongly believe that a piece of this sort co-authored by 9 or so prominent members of the climate research community (with background and/or interest in paleoclimate) will go a long way ih helping to counter these attacks, which are being used, in turn, to launch attacks against IPCC.
AGU has offered to expedite the process considerably, which is necessary because I'll be travelling for about a month beginning June 11th. So I'm going to work hard to get something together ASAP. I'd would therefore greatly appreciate a quick response from each of you as to whether or not you would potentially be willing to be involved as a co-author. If you're unable or unwilling given other current commitments, I'll understand.
Thanks in advance for getting back to me on this,
mike

Date: Tue, 03 Jun 2003 20:19:08 -0400
From: Ellen Mosley-Thompson <thompson.4@xxxxxxxxx.xxx>
Subject: Re: position paper by Mann,
Bradley et al that is a refutation to Soon et al
X-Sender: ethompso@xxxxxxxxx.xxx
To: Judy Jacobs <JJacobs@xxxxxxxxx.xxx>, "Michael E. Mann" <mann@xxxxxxxxx.xxx>
X-Mailer: QUALCOMM Windows Eudora Version 4.3
Judy and Mike -
This sounds outstanding.
Am I right in assuming that Fred reviews and approves the Forum pieces?
If so, can you hint about expediting this. Timing is very critical here.
Judy, thanks for taking the bull by the horns and getting the ball rolling.
Best regards,
Ellen
At 07:33 PM 06/03/2003 -0400, Judy Jacobs wrote:

Dear Dr. Mann,

Thanks for the prompt reply.
Based on what you have said, it sounds to me as if Mann, Bradley, et al. will not be in violation of AGU's prohibition on duplicate publication.
The attachment to your e-mail definitely has the look and feel of something that would be published in Eos under the "FORUM" column header. FORUM pieces are usually comments
on articles of any description that have been published in previous issues of Eos; or they can be articles on purely scientific or science policy-related issues around which there is some controversy or difference of opinion; or articles on current public issues that are of interest to the geosciences; or on issues--science or broader policy ones---On which there is an official AGU Position Statement. In this last category, I offer, for example, the teaching of creationism in public schools, either alongside evolution, or to the exclusion of evolution.
AGU has an official Position Statement, "Climate Change and Greenhouse Gases," which states, among other things, that there is a high probability that man-made gases primarily from the burning of fossil fuels is contributing to a gradual rise in mean globab temperatures. In this context, your proto-article---in the form of the attachment you sent me-- would seem right on target for a Forum piece. However, since the Soon et al. article wasn't actually published in Eos, anything that you and Dr. Bradley craft will have to minimize reference to the specific article or articles, and concentrate on "the science" that is set forth in these papers. Presumably this problem could be solved by simply referencing these papers.
A Forum piece can be as long as 1500 words, or approximately 6 double-spaced pages. A maximum of two figures is permitted. A maximum of 10 references is encouraged, but if the number doesn't exceed 10 too outrageously, I don't make a fuss, and neither will Ellen.
Authors are now asked to submit their manuscripts and figures electronically via AGU's Internet-based Geophysical Electronic Manuscript System (GEMS), which makes it possible
for the entire submission-review process to be conducted online.
If you have never used GEMS before, you can register for a login and password, and get initial instructions, by going to
[1]http://eos-submit.agu.org/
If you would like to have a set of step-by-step instructions for first-time GEMS users, please ask me.
Ellen indicated that she/you would like to get something published sooner rather than later. The Eos staff can certainly expedite the editorial process for anything you and your colleagues submit.
Don't hesitate to contact me with any further questions.
Best regards,
Judy Jacobs
Michael E. Mann wrote:

Dear Judy,
Thanks very much for getting back to me on this. Ellen had mentioned this possibility, and I have been looking forward to hearing back about this.

Michael Oppenheimer and I drafted an informal memo that we passed along to colleagues
who needed some more background information so that they could comment on the Soon et al
papers in response to various inquiries they were receiving from the press, etc. I've attached a copy of this memo.
It has not been our intention for this memo to appear in print, and it has not been submitted anywhere for publication. On the other hand, when Ellen mentioned the possibility of publishing something *like* this in e.g. the "Eos" forum, that seemed like an excellent idea to me, and several of my colleagues that I have discussed the possibility with.
What we had in mind was to produce a revised version of the basic memo that I've attached, modifying it where necessary, and perhaps expanding it a bit, seeking broader co-authorship by about 9 or so other leading climate scientists. So far, Phil Jones of the University of East Anglia, Ray Bradley of the University of Massachusetts, and Jonathan Overpeck of the University of Arizona, have all indicated their interest in co-authoring such a piece. We suspect that a few other individuals would be interested in being co-authors as well. I didn't want to pursue this further, however, until I knew whether or not an Eos piece was a possibility.
So pending further word from you, I would indeed be interested in preparing a multi-authored "position" paper for Eos in collaboration with these co-authors, based loosely on the memo that Ihave attached.
I look forward to further word from you on this,
best regards,
mike mann
At 04:59 PM 6/3/2003 -0400, you wrote:

Dear Dr. Mann,
I am the managing editor for Eos, the weekly newspaper of the American Geophysical Union.
Late last week, the Eos editor for atmospheric sciences, Ellen Mosley-Thompson, asked me if Eos would publish what she called "a position paper" by you, Phillip Bradley, et al that would, in effect, be a refutation to a paper by Soon et al. that was published in a British journal, Energy & Environment a few weeks ago. This Energy & Environment article was subsequently picked up by the Discovery Channel and other print and electronic media that reach the general public.
Before I can answer this question, I need to ask if you and your colleagues intend for this position paper to be published simultaneously in outlets other than Eos. If this is the case, I'm afraid it being published in Eos is a moot point, because of AGU's no duplicate publication policy: if the material has been published elsewhere first, AGU will not publish it.
I look forward to your response.
Best regrds,

Judy Jacobs

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[2]http://www.evsc.virginia.edu/faculty/people/mann.shtml

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[4]http://www.evsc.virginia.edu/faculty/people/mann.shtml
Attachment Converted: "c:eudoraattachMannPersp20021.pdf"

References

1. http://eos-submit.agu.org/
2. http://www.evsc.virginia.edu/faculty/people/mann.shtml
3. http://www.evsc.virginia.edu/faculty/people/mann.shtml
4. http://www.evsc.virginia.edu/faculty/people/mann.shtml

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

February 23, 2010

The Honorable Paul Broun, M.D.
Ranking Member
Subcommittee on Investigations and Oversight
Committee on Science and Technology
U.S. House of Representatives
Suite 2320 Rayburn House Office Building
Washington, DC 20515-6301

Dear Representative Broun:

Thank you for your letter of December 1, 2009, in which you asked that I respond to several questions regarding the e-mails that were stolen from the Climate Research Center at the University of East Anglia, England, and the Administration's efforts to foster scientific integrity in government. I appreciate your interest and welcome the opportunity to answer your questions. I apologize for the delay in responding.

With respect to the overall import of the e-mails, a key point is that nothing they contain gives cause to question the soundness of current scientific understandings about the basic character, causes, and consequences of climate change as depicted in the extensive peer-reviewed literature on this topic. For independent and reputable support for this view, please see, for example
http://www.factcheck.org/2009/12/climategate/,
http://www.ucsusa.org/assets/documents/global_warming/scientists-statement-on.pdf,
http://www.ametsoc.org/policy/climatechangeclarify.html,
http://www.sciencemag.org/cgi/reprint/327/5966/624.pdf.

Before turning to your specific questions, I'd like to make one further general point. Scientists, like any other category of human beings, are not immune from human frailties, including intemperate reactions to criticism. Such frailties are on display in some of the stolen e-mails. But the nature of the scientific process, which entails not only many forms of peer review but also strong peer pressure in favor of openness and respect for evidence, tends to ensure that any shortcomings of individual scientists or groups of scientists do not skew outcomes significantly or for long. Spelling out principles and guidelines for scientific integrity in government agencies will not prevent occasional individual violations, any more than these can be entirely eradicated in the wider scientific community, but it can reduce their incidence and can speed corrective action where appropriate. That is why President Obama is committed – and I am committed – to promulgating a clear and consistent approach to integrity and transparency in the conduct and use of science in government.

Your letter asked for information from me on five specific issues:

a. "Your determination regarding whether the above items [contents of emails illegally obtained from the UK Climate Center in East Anglia] violate the President's directive on scientific integrity."

**ANSWER:** The President's Memorandum on Scientific Integrity, issued last March 9, assigned to me "the responsibility for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technical processes." The memorandum directed me to develop "recommendations for Presidential action" based on principles including that "Each agency should have appropriate rules and procedures to ensure the integrity of the scientific process within the agency", as well as "procedures to identify and address instances in which the scientific process or the integrity of scientific and technology information may be compromised." My recommendations have been through multiple drafts and multiple reviews within the Executive Branch and are not yet finalized. But I can say that they will be consistent with the principle just quoted, placing on each relevant agency the primary responsibility for determining whether any specific action by an employee or employees of that agency compromises the scientific process or the integrity of scientific and technological information and, if so, what remedial action is appropriate under the circumstances.

b. Your plan on how to address such violations if such a determination is made.

**ANSWER:** As noted in the previous answer, the primary responsibility for this will rest with the relevant agency.

c. The effects this newly released information will have on the Administration's confidence in the reliability of climate change-related data and research results and corresponding policy position leading up to the Copenhagen negotiations.

**ANSWER:** Nothing I have seen in the emails gives cause to question the essential scientific understandings about the character, causes, and consequences of climate change as depicted in reports of respected scientific bodies around the world.

d. Your determination as to whether or not the Administration's principles, as laid out in the President's scientific integrity memo, apply to federal grant recipients as well as federal scientists.

**ANSWER:** President Obama's Memorandum on Scientific Integrity does not apply to Federal grant recipients.

e. Whether the Administration intends to investigate possible Freedom of Information Act violations.

**ANSWER:** It is the responsibility of each agency to ensure compliance with the Freedom of Information Act. As the Director of OSTP, I have a special interest in agencies' compliance with their statutory obligations under the Act with regard to information requests concerning matters that relate to scientific integrity, and it is my expectation that agencies will comply with their FOIA obligations with respect to matters of scientific integrity as well as, of course, with respect to other matters.

I appreciate your interest in scientific integrity and in efforts to further improve our scientific understanding of the causes and impacts of climate change. Please let me know if you have any further questions or require additional information.

Sincerely,

John P. Holdren

John P. Holdren
Director, Office of Science and Technology Policy

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