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to the
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Committee on Science
Fiscal Year 2006 Federal R&D Budget
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Chairman Boehlert, Ranking Minority Member Gordon, and Members of the Committee, I am pleased to appear before you once again to discuss the President's research and development (R&D) budget. As I have said many times before, I greatly appreciate the effective working relationship between our office and your Committee, which I believe has resulted in good outcomes for the nation's science and technology enterprise.

The budget this year is subject to considerable pressure, as you know, and the President is committed to cutting the budget deficit in half by 2009. These factors make this year's budget proposal the tightest in nearly two decades.

Despite these pressures, Federal R&D funds will increase in the President's fiscal year (FY) 2006 budget. The Budget maintains a strong focus on winning the war against terrorism, while moderating the growth in overall spending, and this focus is reflected in the proposed R&D investments. The Administration has also maintained high levels of support for priority areas such as nanotechnology, information technology, the hydrogen initiative, and space exploration. Furthermore, while overall "non-security" discretionary spending is reduced by one percent, "non-security" R&D is not correspondingly diminished. The FY06 proposal preserves the substantial increases made – with your support – during the first term of this Administration. This treatment of R&D is consistent with the President's commitment to science and technology and the vital role they play in meeting the Nation's goals for national and economic security and the quality of life.

Comparing R&D investments in this Administration with investments in other top national priorities demonstrates this commitment: From FY01 to this FY06 proposal, federal spending on Department of Homeland Security activities will have increased 83 percent; Department of Education programs are up 40 percent; and Department of Defense spending is up 37 percent. At the same time total Federal investment in R&D will have increased 45 percent. The percentage increase in R&D has been second only to the increase in the Department of Homeland Security during President Bush's first five budget years (and I might add, during Chairman Boehlert's five years as Chairman of this Committee).

This historic increase in R&D has not been confined to a single agency or field of science. It does include a significant investment in defense R&D, whose value to the Nation's technical enterprise extends well beyond the defense establishment. Defense R&D funds significant university and private sector research, supports a large number of scientists, engineers and technical experts, and is instrumental in training and recruiting the next generation of technical

talent for the Nation. Non-defense R&D, however, has also benefited from similar large increases during the past five years.

I am emphasizing these historical data to provide a context for this year's request. Within a pattern of overall budget constraint, funds are provided that we believe are appropriate to maintain and refine the large program increases of previous years. Within the pattern of detailed agency budgets, priorities have been established and choices made that preserve the nation's investment in the critically important assets of science and technology.

THE PRESIDENT'S FY 2006 R&D BUDGET

The President's FY 2006 Budget requests $132.3 billion in Federal Research and Development funds, an increase of $733 million over this year's (2005) record R&D budget. The Budget allocates 13.6 percent of total discretionary outlays to R&D - the highest level in 37 years. Non-defense R&D accounts for 5.6 percent of total discretionary outlays, an amount significantly greater than the 5.0 percent average over the past three decades.

While non-defense discretionary program budget authority is reduced by 0.26 percent in this proposal, non-defense R&D funds are increased by 0.74 percent. The category of Basic Research is maintained near its historically high level at $26.6 billion in FY 2006, slightly down from $26.9 billion in FY 2005.

Not all programs can or should receive equal priority, and this budget reflects priority choices consistent with recommendations from numerous expert sources. In particular, this budget is informed by recommendations from the President's Council of Advisors on Science and Technology (PCAST), and reflects an extensive process of consultation among the Federal agencies, the Office of Management and Budget (OMB), and the Office of Science and Technology Policy (OSTP).

As in previous years this R&D budget highlights collaborations among multiple Federal agencies working together on broad themes. I will describe some individual agency highlights, followed by the five multi-agency R&D priorities highlighted in the President's FY 2006 Budget: Networking and Information Technology R&D; National Nanotechnology Initiative; Climate Change Science Program; Hydrogen Fuel Initiative; and Homeland Security R&D.

AGENCY BUDGET HIGHLIGHTS

Department of Defense (DoD):

DoD's FY 2006 R&D budget is over $70 billion. These funds will help to transform our Nation's military capabilities to meet future threats and to fight the Global War on Terror. They also will improve DoD's capabilities against weapons of mass destruction, including new laboratory facilities, detection systems, and protective measures against advanced biological and chemical weapons. From FY 2006 to FY 2011, $764 million is budgeted to upgrade

infrastructure at the U.S. Army Medical Research Institute of Infectious Disease (USAMRIID), a critical component of this Nation's Federal biodefense effort. USAMRIID not only works to protect men and women in uniform, it also responds to emerging infectious diseases that threaten our nation (i.e., SARS, West Nile, Hantavirus and Ebola).

I want to take this opportunity to express my concern that investments in defense R&D are often discounted by science budget observers as somehow less important than non-defense science. That is a serious misconception. Weapons systems development and other national security-related discovery and technology creation drive innovation and strengthen economic competitiveness in much the same way as technical work for other purposes. The technology required for national and homeland security is nearly always "dual use" and benefits civilian as well as military products.

Because science, mathematics, and engineering (SME) are vital disciplines to our national defense, a formal DoD Science, Mathematics and Research for Transformation (SMART) Defense Scholarship Pilot Program was established in FY 2005. The purpose is to promote the education, recruitment and retention of U.S. citizens in SME studies deemed critical to national defense. DoD also uses other scholarship and fellowship programs (i.e., the National Defense Science and Engineering Graduate (NDSEG) fellowship program) to sponsor graduate students. Funding for NDSEG has increased to support 200 new students annually by FY 2007.

A total of $5.5 billion is provided for DoD basic and applied research. This is $905 million less than the FY 2005 enacted level in this category, but greater than the FY 2005 enacted level minus Congressional earmarks (over $1 billion) – and $250 million more than the FY 2005 request. This budget request does not continue FY 2005 earmarks beyond FY 2005, instead increasing programs of priority to military leaders. Earmarks are not consistent with using funds most efficiently to target military priorities or to support the best research for military purposes. The Administration is prepared to work with Congress to achieve consistency in Legislative and Executive priorities to fund the best scientific research possible to support our military forces.

Department of Homeland Security (DHS):

DHS-wide funding for science and technology (including TSA, Coast Guard and Secret Service) will increase from $1.2 billion to $1.5 billion (FY 2005 to FY 2006). Within that total, DHS Science and Technology (S&T) Directorate funding will increase from $1.1 billion to $1.4 billion (FY 2005 to FY 2006). R&D is focused on countering chemical, biological, radiological, nuclear, and other catastrophic threats.

The President is requesting $227 million in DHS to fund the creation of a Domestic Nuclear Defense Office (DNDO) whose responsibility will be to develop a comprehensive system to detect and mitigate any attempt to import or transport a nuclear explosive device, fissile material, or radiological material intended for use within the U.S. The DNDO will enhance and coordinate the nuclear detection efforts of Federal, State and local governments and the private sector to ensure a managed, coordinated response. At the Federal level, the DNDO will draw representatives from agencies involved with nuclear defense research. They will analyze current nuclear defense R&D investments and create a prioritized road map of future research that will

address current gaps and deficiencies. This will allow for the development of a coordinated plan, while at the same time ensuring that critical gaps are addressed and redundancies avoided, and maintaining the integrity of each agency's current unique missions.

The S&T Directorate is leading the Administration effort to develop new countermeasures to protect civilian and commercial aircraft against man portable air defense systems (MANPADS). In the 2006 Budget, the President has requested $110 million to continue DHS's counter-MANPADS program. This $49 million increase over last year's budget will go to funding phase II of the program in which systems developed by BAE Systems and Northrup Grumman will undergo rigorous testing and evaluation.

The University Programs Office within the S&T Directorate has established three Homeland Security Centers of Excellence (Texas A&M, USC, and the University of Minnesota) and has just awarded a grant to the University of Maryland to become the fourth Center of Excellence. This program will continue to operate and expand to 7 Centers with a requested FY 2006 budget of $63.6 million, which is 90 percent of the current year budget. The fellowship program will continue at the FY 2005 level.

National Institutes of Health (NIH):

Following fulfillment of the President's commitment to complete the five-year doubling of the agency's budget, the FY 2006 request is $28.8 billion, a $196 million increase from FY 2005 enacted. The recent budget doubling changes the scale of NIH operations and requires new management mechanisms to better integrate, coordinate and focus research, especially interdisciplinary research, across NIH's 27 Institutes and Centers (ICs).

Since 2001, the NIH Budget has increased by $8.2 billion or 40 percent. NIH is committing $333 million towards Roadmap initiatives, an increase of $98 million over the FY 2005 enacted level. The Roadmap is a part of the total NIH budget, and is important as a means to optimize the effectiveness of the entire research portfolio, focusing on efforts that no single or small group of ICs could address. Roadmap initiatives will provide the tools to transform the content and process of medical research over the next decade.

Other highlights include $2.9 billion for AIDS research, including the highest priority goal of development of an AIDS vaccine, and almost $1.8 billion for Biodefense research and development activities. In addition, NIH has recently issued an interim final rule changing the way employee conflict of interest is regulated. We believe this action will greatly increase public confidence in the integrity of the NIH intramural research program. NIH also has proposed an NIH Public Access Policy, which provides the public with better access to research publications resulting from NIH-funded research. This is accomplished by establishing a comprehensive, searchable electronic archive of NIH-funded research publications, providing publicly available access to all.

National Science Foundation (NSF):

Funds are requested to increase the budget for NSF by 2.4 percent to $5.6 billion in FY 2006, 26 percent above 2001's $4.4 billion level. Similar investments in the past have yielded important

scientific discoveries, which boost economic growth and enhance Americans' quality of life.

NSF leads two Administration priority research areas that promise to strengthen the nation's economy: the National Nanotechnology Initiative (NNI) and the Networking and Information Technology R&D program (NITRD). NSF-funded nanotechnology research, proposed at $344 million in FY 2006, a 1.6 percent increase over 2005 and 129 percent since 2001, has advanced our understanding of materials at the molecular level and has provided insights into how innovative mechanisms and tools can be built atom by atom. This emerging field holds promise for a broad range of developing technologies, including higher-performance materials, more efficient manufacturing processes, higher-capacity computer storage, and microscopic biomedical instruments and mechanisms. NSF's investments in NITRD, funded at $803 million in 2006, a one-percent increase over 2005 and 26 percent since 2001, support all major areas of basic information technology (IT) research. NSF also incorporates IT advances into its scientific and engineering applications, supports using computing and networking infrastructure for research, and contributes to IT-related education for scientists, engineers, and the IT workforce.

Growing concerns about the vulnerability of computers, networks and information systems have prompted increased NSF investments in cyber security research, education and training. The FY 2006 Budget provides $94 million for these activities.

Every research discipline in the agency is increased between 1 to 3.5 percent, allowing the grant funding rate to be restored to 21 percent (from 20 percent in 2005). Funding is provided for the five Major Research Equipment (MRE) projects already approved (Atacama Large Millimeter Array, EarthScope, the IceCube Neutrino Observatory, the Rare Symmetry Violating Processes (RSVP) installation, the National Ecological Observatory Network (NEON), and the Scientific Ocean Drilling Vessel).

In order to most effectively and efficiently support the Nation's polar research activities in Antarctica, funding for three polar icebreakers is being transferred from the U.S. Coast Guard to NSF ($48 million). In the future, this will permit NSF to define the options for refurbishment or replacement of two of the ships, as well as operational options for the third (Arctic) icebreaker.

The FY 2006 Budget will continue NSF's efforts to prepare U.S. students for the science and engineering workforce, with funds for 4,600 graduate research fellowships and traineeships. NSF provides annual stipends in these programs of $30,000, which is significantly higher than the average stipend of $18,000 in 2001.

Department of Energy (DoE):

The FY 2006 Budget provides $3.5 billion for DoE's Office of Science, a $57 million reduction after removing $80 million in earmarks. This reduction does not imply diminished priority for Office of Science operations, but reflects various construction and procurement adjustments. Over a five year period this Administration has invested more than $17 billion in Office of Science basic research at DoE, 14 percent greater than the previous five-year period in constant dollars.

The Department has a broad program of basic research and operates a unique suite of major scientific user facilities in support of its missions. The FY 2006 Budget provides funding to complete construction and begin operation of the Spallation Neutron Source – to become the world's pre-eminent facility for materials studies – and four new nanoscale science research centers. $25 million is included for the development of a High-end Computing (HEC) Leadership Class Computer, bringing the total three-year investment to $100 million. $83 million begins construction of the Linac Coherent Light Source – a revolutionary new facility that will open entirely new realms of discovery in the chemical, materials, and biological sciences. Basic materials and chemistry research in support of the Hydrogen Fuel Initiative is enhanced to $33 million and assuming that international partners reach a timely site decision, $46 million is available to begin fabrication of U.S. contributions to the International Thermonuclear Experimental Reactor (ITER). These investments will allow U.S. scientists to remain at the forefront of their fields.

National Aeronautics and Space Administration (NASA):

During the year since the President outlined a bold vision for sustained and affordable human and robotic exploration of space, NASA has restructured its organization and reprioritized its programs. The current human spaceflight programs, Shuttle and International Space Station, are focusing research and technology development on enabling the vision, while requirements are being established for the next generation of space transportation. An exciting array of space science missions are being planned that will enhance our understanding of the solar system, including interactions between the Earth and the space environment, and building observatories that will peer further into the cosmos to understand the origin of the universe, its structure, evolution and destiny.

The President's FY 2006 Budget request for NASA is $16.456 billion, a 2.4 percent increase from 2005, reflecting a strong commitment by the Administration to pursue the exploration vision. The FY 2006 Budget request also makes some hard decisions, canceling some projects with high technical risk and others whose cost estimates would have led to the certain cancellation and delay of several other important programs. The budget request maintains NASA's focus on exploration and science while strengthening the long-term foundation for continued success.

The budget requests about $3.2 billion in FY 2006 for new vehicles and technologies to enable sustained human and advanced robotic exploration far from Earth. NASA has identified the major requirements for a Crew Exploration Vehicle that will carry astronauts to the Moon. NASA plans to perform risk reduction tests in 2008 and stage its first crewed flight by 2014. NASA will also continue pursuing nuclear technologies for space applications, optical communications for high data rate connectivity to space probes, radiation shielding, and other advanced technologies to support the exploration vision. In addition, NASA is pursuing innovative means to engage private industry including offering space prizes to spur innovation.

The budget requests approximately $5.5 billion in FY 2006 to continue advancing our scientific understanding of the Sun, Earth, and planets and to inform decisions regarding appropriate human exploration missions. NASA will also build on its legacy of revolutionizing astronomy by continuing current operations of space telescopes such as Hubble, Chandra, and Spitzer while

planning for the next generation of spacecraft that will enhance our ability to find planets around other stars, peer deep into the history of the universe, and improve our understanding of its structure.

The FY 2006 Budget continues to fund critical investments in Earth science satellites, technologies, and research. NASA will continue to play a major part in the interagency Climate Change Science Research Program, and contribute to the international initiative on the Global Earth Observing System of Systems.

The budget requests approximately $6.4 billion in FY 2006 for operating the Space Shuttle and continuing assembly and operations of the International Space Station. NASA is examining configurations that meet the needs of both the new space exploration vision and our international partners using as few Shuttle flights as possible to enable Shuttle retirement by 2010, following completion of its role in ISS assembly. In concert with the new vision, NASA will refocus U.S. Space Station research on activities that prepare human explorers to travel beyond low Earth orbit, such as developing countermeasures against space radiation and understanding long-term physiological effects of reduced gravity.

As the United States implements the Vision for U.S. Space Exploration, the Administration recognizes the value of effective cooperation with Russia to further our space exploration goals. At the same time, we have to appropriately reflect U.S. nonproliferation policy and objectives in our relationship with Russia. The Administration is thus interested in seeking a balanced approach that continues to protect our nonproliferation goals while advancing potential U.S. cooperation with Russia on the Vision for U.S. Space Exploration. Such a balanced approach must include the Iran Nonproliferation Act of 2000 (INA), which currently complicates cooperation with Russia on the International Space Station (ISS), and will also have an adverse impact on cooperation with Russia on our future space exploration efforts related to human space flight. To that end, the Administration looks forward to working with Congress to ensure that the Vision for U.S. Space Exploration is able to succeed while remaining fully consistent with broader U.S. national security and nonproliferation goals.

Department of Commerce:

The 2006 Budget provides over $1 billion for R&D at the Department of Commerce.

National Institute of Standards and Technology (NIST) “core” programs receive $485 million, an increase of 8 percent over 2005 (22 percent after earmarks are excluded). The Administration continues to insist on the highest priority for NIST lab research because it is producing the scientific foundation for new technologies and providing essential technical support through its standards activities for industrial development and commercialization of new and emerging technologies. The FY 2006 request is a 40 percent increase over 2001. NIST is proposing a new strategic initiative in 2006, Advances in Manufacturing, funded at $19.6 million, and a new NIST business plan is being developed to better focus and address high leverage areas of advanced manufacturing, nanotechnology, quantum computing, homeland security, and biosystems and health.

The FY 2006 Budget again proposes to terminate the Advanced Technology Program (ATP). The Administration believes firmly that other NIST research and development programs have profoundly greater impact than ATP, and are essential to the continued technical leadership of U.S.-based businesses, American workers, and the domestic economy. The Budget proposes to fund the Hollings Manufacturing Extension Partnership Program at $47 million, a 50-percent reduction from the 2005 grant level. The Administration's approach will maintain a strong national network of centers while focusing funding based on centers' performance in providing information and consulting services to small manufacturers. The program has also augmented funding through expanding partnerships with other agencies and institutions. Given this new operating environment, the Administration believes the program has evolved to a stage at which less reliance on direct appropriations is required.

For the National Oceanic and Atmospheric Administration (NOAA), the FY 2006 Budget provides $361 million for Oceanic and Atmospheric Research (OAR), an 11 percent reduction from 2005 enacted, due mostly to earmarks. This investment provides for ongoing research on climate, weather, air quality, and ocean processes. For NOAA programs that support the climate change science program, $181 million is provided, and Sea Grants are sustained at the 2005 level of $61 million.

To improve efficiency, the Budget also streamlines administrative layers within the Technology Administration (TA). The Budget reflects TA's intent to evaluate its current operating practices and incorporate methods to improve the effectiveness of its operations.

Environmental Protection Agency (EPA):

The FY 2006 EPA S&T request is $792 million, a 2 percent increase over FY 2005, even before removing $70 million in earmarks. This investment supports core Agency programs and strengthens the application of science to EPA regulatory actions and other programs.

The Administration is directing $20 million of S&T funding to a new pilot program within EPA that the program offices (e.g., Water, Office of Solid Waste and Emergency Response, Air) would then use to fund applied research in the Office of Research and Development (ORD). This is intended to improve the use of ORD (to avoid duplicative program efforts), coordination between the program offices and ORD, and responsiveness and accountability. This program contributes to the overall increase in S&T funding.

$79 million in new funding will support homeland security projects and research at EPA related to water security monitoring and surveillance, post-incident building and environmental decontamination, and Environmental Laboratory Preparedness and Response.

The FY 2006 Budget requests approximately $65 million for the Science to Achieve Results (STAR) program, which includes a decrease in exploratory research grants. Given the overall tightness of EPA's budget (-6 percent from 2005 enacted), and the need to fun core programmatic needs, STAR grants, which cannot focus on EPA program needs, were reduced.

Department of Transportation (DOT):

The FY 2006 Budget request for highway-related research is $543 million, $23 million less than 2005, before removing significant earmarks. Highway research includes the Federal Highway Administration's transportation research and technology contract programs, National Highway Traffic Safety Administration research and analysis, and Federal Motor Carrier Safety Administration research and technology.

The 2006 request for Federal Aviation Administration (FAA) Research, Engineering and Development is $130 million, virtually the same as 2005's $131 million. In 2003, Congress created the Next Generation Air Transportation System Joint Planning and Development Office (JPDO) [Public Law 108-176] to coordinate the goals, priorities, and research activities across the Federal Government relative to the air transportation system. The JPDO vision was articulated in their Integrated Plan released on December 12, 2004 and the research needs identified to date are being addressed through prioritization and leveraging of existing funds at FAA, NASA, and DoD.

PRIORITY INITIATIVES

The 2006 budget highlights priority interagency initiatives described briefly below. These initiatives are coordinated through the National Science and Technology Council (NSTC) for which my office has responsibility for day-to-day operations. The Council prepares research and development strategies that cross agency boundaries to form a consolidated and coordinated investment package.

Networking and Information Technology R&D – With President Bush's FY 2006 Budget request of $2.2 billion for the Networking and Information Technology R&D (NITRD) program, the investment in this area over five years will total more than $10.4 billion. Research in networking and information technologies underpins advances in virtually every other area of science and technology and provides new capacity for economic productivity. Through active coordination, NITRD agencies mutually leverage resources to make broader advances in networking and information technology than any single agency could attain.

- NSF continues to provide the largest share of federal NITRD funding, reflecting the Foundation's broad mission as well as its leadership role in coordinating NITRD activities. The FY 2006 request for NSF is $803 million, an $8 million increase from the 2005 estimate.
- High-end computing continues to be a major focus within the NITRD program. In FY 2004, the interagency High End Computing Revitalization Task Force (HECRTF) produced the *Federal Plan for High-End Computing*, which describes a roadmap for progress in core technologies for high-end computing, mechanisms for improving access to high-end computing resources, and strategies for improving Federal procurement and coordination of high-end systems. The FY 2006 budget reflects the continuation of NITRD activities that are consistent with recommendations described in the *Federal Plan*, such as investments in new high-end systems by NASA and DoE's Office of Science.

- NASA continues to emphasize high-end computing within its NITRD portfolio through the recently-completed acquisition of the *Project Columbia* supercomputer, a portion of which NASA plans to make available to other Federal users. Following completion of the acquisition of *Columbia*, NASA's expenditure in high-end computing is normalizing at a lower level.
- DoE's Office of Science has also committed to operate their new *Leadership Class Computing* facility at the Oak Ridge National Laboratory as a national user facility. DoE's FY 2006 request of $25 million for the Leadership facility brings that Federal investment to $100 million.

National Nanotechnology Initiative – President Bush's FY 2006 Budget provides over $1 billion for the multi-agency National Nanotechnology Initiative (NNI), bringing the total NNI investment under this Administration to $4.7 billion. This sustained investment will advance our understanding of the unique phenomena and processes that occur at the nanometer scale and expedite the responsible use of this knowledge to achieve advances in medicine, manufacturing, high-performance materials, information technology, and energy and environmental technologies.

- The largest investments continue to be made by NSF where the FY 2006 NSF request is $344 million, an increase of $6 million over the 2005 estimate.
- DOE contribution to the initiative ramps up dramatically with commencement of operations in four of its five new major Nanoscale Science Research Centers located across the country. The Centers will provide research equipment and infrastructure that will be broadly available to researchers from across the scientific research community. Construction completion keeps total DOE NNI spending flat in FY 2006, but a portion of construction roll-off funds are made available for operational support.
- The FY 2006 request of $147 million by HHS includes programs at NIH emphasizing nanotechnology-based biomedical advances occurring at the intersection of biology and the physical sciences, such as the National Cancer Institute's Alliance for Nanotechnology in Cancer, and at the National Institute of Occupational Safety and Health (NIOSH) that address implications and applications of nanotechnology for health and safety in the workplace.
- With the addition of NIOSH, 11 Federal agencies currently fund nanotechnology research and development under the NNI, and another 11 participate in coordination. Agencies that have joined the NNI as participants over the past year include the U.S. Patent and Trademark Office and the Consumer Product Safety Commission, indicating the increasing importance of commercialization activities.

Climate Change Research and Development – The FY 2006 Budget continues strong support for the Climate Change Science Program (CCSP) and the Climate Change Technology Program (CCTP).

- The CCSP budget continues to support the goals outlined in the CCSP Strategic Plan, which was released in July 2003. Beginning in FY 2006, CCSP will formally track the expected actions, deliverables, and milestones for each of its programs in order to assess overall performance.
- The FY 2006 Budget proposes approximately $1.9 billion to fund CCSP, virtually the same as 2005 despite reductions in NASA (-$102 million) due to re-prioritization of

programs. With this request, the Administration will have invested more than $9 billion over five years to improve our understanding of the global climate system.

- The FY 2006 Budget provides approximately $2.9 billion for the U.S. Climate Change Technology Program (CCTP), which supports research, development, deployment, and voluntary programs to reduce greenhouse gas emissions via renewable energy, fossil energy and nuclear energy, efficiency improvements, and carbon sequestration.
- In 2005, the CCTP will publish a draft Strategic Plan and solicit comments from the scientific community and the public. The CCTP will also identify within its portfolio a subset of National Climate Change Technology Initiative (NCCTI) priority activities.

Hydrogen Fuel Initiative – The Hydrogen Fuel Initiative (HFI) seeks to develop new science and technology to support a major shift toward the use of hydrogen as an energy medium, particularly for transportation. The FY 2006 Budget for HFI is $260 million, $35 million (16 percent) greater than the FY 2005 level. The Initiative remains on track to meet President Bush's five-year, $1.2 billion commitment to hydrogen research and development announced in his 2003 State of the Union address. Some highlights include:

- $20 million, an $11 million (122 percent) increase over FY 2005, will fund the *Nuclear Hydrogen Initiative*. This initiative will conduct the R&D on enabling technologies, demonstrate nuclear-based hydrogen production technologies, and study potential hydrogen production schemes to support the President's vision for a future Hydrogen economy.
- $33 million for fundamental research within DoE's Office of Science. This research seeks to overcome key technical hurdles in hydrogen production, storage, and conversion, by seeking revolutionary breakthroughs in areas such as non-precious-metal catalysts, high-temperature membrane materials, multifunctional nanoscale structures, biological and photoelectrochemical hydrogen production, and precision manufacturing processes.
- Congressional earmarking is slowing progress on HFI, however, and may jeopardize the ability of the Administration to achieve its goal of a 2015 decision by industry to commercialize fuel cell vehicles and infrastructure. In 2005, DoE's *Hydrogen Technology Program*, a key component of HFI, received 17 earmarks totaling $37 million, about 40% of the program's funding.

Homeland Security – Technology continues to help secure our nation against terrorism. Research and development over the past three years in detectors against weapons of mass destruction (WMD) threat agents, medical countermeasures to improve public health preparedness and to protect our Nation's food and livestock, and advances in protecting the First Responders are moving from laboratory to operational use. The President's FY 2006 Budget continues an aggressive investment in research, development, and the research infrastructure so as to further enhance our Nation's security. Priority research areas include:

- $227 million to fund the creation of a *Domestic Nuclear Defense Office* (DNDO) in DHS, whose responsibility will be to develop a comprehensive system to detect and mitigate any attempt to import or transport a nuclear explosive device, fissile material or radiological material intended for illicit use within the U.S.
- $1.8 billion to the Department of Health and Human Services (HHS) to fund research and development of countermeasures against biological, chemical and radiological threat agents.

- $596 million is allocated for the U.S. Department of Agriculture, HHS and DHS to improve food and agriculture defense. This includes funding for research on exotic and emerging diseases of plants and animals and to prevent and detect food contamination, expanding and improving laboratory facilities, and enhancing disease monitoring, surveillance and vaccine storage.
- $94 million will fund new and ongoing research at EPA related to their role in water security and post-incident decontamination. Systems for monitoring and surveillance of terrorist threat agents in drinking water will be piloted in several U.S. cities. Decontamination capabilities will be strengthened by testing new cleaning methods, systems and antimicrobial products for buildings and outdoor areas and by conducting risk assessment work to support decontamination/revision of cleanup guidance goals.

MANAGING THE FEDERAL RESEARCH BUDGET

Consistent with the President's Management Agenda, the Administration is improving the effectiveness of the Federal Government's investments in R&D by applying transparent investment criteria in analyses that inform recommendations for program funding and management. R&D performance assessment must be done carefully to avoid negatively impacting scientific productivity. Research often leads scientists and engineers down unpredictable pathways with unpredictable results. This characteristic of research requires special consideration when measuring an R&D program's performance against its initial goals.

Elements of good R&D program management include establishing priorities with expected results, specifying criteria that programs or projects must meet to be started or continued, setting clear milestones for gauging progress, and identifying metrics for assessing results.

The R&D Investment Criteria accommodate the very wide range of R&D activities, from basic research to development and demonstration programs, by addressing three fundamental aspects of R&D:

- *Relevance* – Programs must be able to articulate why they are important, relevant, and appropriate for Federal investment;
- *Quality* – Programs must justify how funds will be allocated to ensure quality; and
- *Performance* – Programs must be able to monitor and document how well the investments are performing.

R&D projects and programs relevant to industry are expected to meet criteria to determine the appropriateness of the public investment, enable comparisons of proposed and demonstrated benefits, and provide meaningful decision points for completing or transitioning the activity to the private sector.

OSTP and OMB are continuing to assess the strengths and weaknesses of R&D programs across the Federal government in order to identify and apply good R&D management practices throughout the government.

CONCLUSION

Making choices is difficult even when budgets are generous. But tight budgets have the virtue of focusing on priorities and strengthening program management. This year's R&D budget proposal maintains levels of funding that allow America to maintain its leadership position in science and move ahead in selected priority areas. It is responsible in its treatment of security-related science and technology, and it rewards good planning and management.

America currently spends one and a half times as much on Federally funded research and development as Europe does, and three times as much as Japan, the next highest investor in R&D. Our scientists collectively have the best laboratories in the world, the most extensive infrastructure supporting research, the greatest opportunities to pursue novel lines of investigation, and the most freedom to turn their discoveries into profitable ventures if they are inclined to do so.

We lead not only in science, but also in translating science to economically significant products that enhance the quality of life for all people.

This budget will sustain this leadership and maintain science and technology capabilities that are the envy of the world. I would be pleased to respond to questions.