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Executive Office of the President of the United States
to the
Committee on Commerce, Science, and Transportation
United States Senate
on
Advancing American Innovation and Competitiveness
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Chairman Rockefeller, Ranking Member Hutchison, and Members of the Committee, it is my distinct privilege to be here with you today to discuss the Obama Administration's responses to the America COMPETES Act to date, my support for the Committee's interest in reauthorizing the Act, and the important investments in R&D and science, technology, engineering, and mathematics (STEM) education the Administration is proposing in order to continue to fulfill the vision of the Act going forward.

A little more than a half a century ago, Americans gazed astonished into the night sky at the glint of a Russian satellite arcing overhead—the first artificial satellite to orbit the Earth. As a nation, we quickly grasped the significance of that signal event, and responded aggressively with massive new investments in research and development (R&D) and a new commitment to science, technology, engineering, and mathematics (STEM) education. We created NASA and DARPA, and we built laboratories and manufacturing facilities—some as small as classrooms and others larger than football fields—to tackle the scientific and engineering challenges that suddenly loomed large.

Hardly more than a decade after that blinking wake-up call, Americans were walking on the surface of the moon, having leapfrogged Russia and every other advanced nation with a technological tour de force that laid the foundation for a solid 50 years of economic superiority. That burst of activity led to the creation of the Internet, microchips, the Global Positioning System (GPS), revolutionary improvements in medical technologies, and much more; created enormous entrepreneurial opportunities and countless jobs; and enabled a standard of living never before available to such a broad swath of any nation.

Today we are at another such moment in history, again faced with a fundamental innovation challenge. China, South Korea, India, and other nations are focusing increased attention on advanced manufacturing, renewable energy, and other technologies of the future, even as America's scientific and technological dominance has eroded.

The challenge we face may not be obvious at first glance. Last year, as they have in so many years, Americans won the vast majority of Nobel Prizes in the sciences. Not only that, but more so than in many other years it was easy to see how these winners' achievements had changed our lives for the better.

One won his prize for seminal work in fiber optics, the field of science at the heart of today's national broadband networks, which are streaming this hearing live to millions of Americans who cannot be here in Washington to see their government at work—networks that today support $900 billion of the American economy and will continue to prime this nation's

economic pump in ever greater degrees as this Administration, through the Recovery Act and our soon-to-be-released national broadband plan, races to lay thousands of miles more of cable every year.

Another Nobel winner was honored for having invented the charged coupled device or CCD, which is at the heart of the digital cameras that are embedded in our cell phones as well as every Flickr picture on the Web, and the YouTube videos viewed more than a billion times on the Internet every day.

But these Nobel winners and, for the most part, their fellow awardees, did their work decades ago—based on investments America made in the 1950s, 1960s, and 1970s.

Today we face a new Sputnik moment, albeit one not so easily recognized because the indications are more diverse and subtle than seeing a Russian satellite overhead when we had none. But consider:

- America has fallen from 1st in the world in broadband penetration to the middle of the pack among developed nations. [1]

- In science education, one widely used international assessment shows American 15-year-olds ranked 25th in math and 21st in science among OECD countries.[2]

- For the first time, in 2008, non-Americans were granted more U.S. patents than Americans.[3]

We can do better. America still can, and indeed must, be an innovation machine. Clearly, however, technological and economic superiority is not our birthright. It is something that in the past we have earned—earned as a result of smart investments in fundamental science and targeted investments in the next big things—and it is something we must get serious about earning again, so we can continue to lead the world in the next round of modernization and creativity, just as we have in the decades following Sputnik.

That is why the President has set the bold and ambitious long-term goal of lifting the sum of public and private investments in research and development in the United States to three percent of Gross Domestic Product (GDP)—to exceed, for the first time, the level of R&D investment at the height of the space race. Investing in innovation is not a luxury today—it is a necessity.

That is also why the President is committed to moving American students from the middle to the top of the pack in STEM education, and to be No.1 in the world once again when it comes to college graduation rates, as we were just a few decades ago.

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[1] OECD, OECD Broadband Portal, *Data on Broadband Subscribers per 100 inhabitants*, 2009 Q2 data.
[2] US Department of Education, National Center for Education Statistics, Program for International Student Assessment, *Highlights from PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context*, December 2007.
[3] NSF, *Science and Engineering Indicators 2010*, Chapter 6, based on US Patent and Trademark Office data.

And it is why—for reasons ranging from economic growth to environmental protection to enhanced national security—this Administration is determined to stoke the fires of American ingenuity, to support the workforce of today as well as the entrepreneurs and industries of tomorrow, to keep the pipeline of American productivity fully pressurized and provide the jobs, the security, and the position of global leadership that previous generations worked so hard to attain.

The America COMPETES Act has been a helpful tool in the early stages of attaining these goals. And the Administration is strongly supportive of congressional efforts to reauthorize this important Act this year. But the time has come to refine that initial approach—to strengthen the parts that have the most capacity to leverage the American economy and secure America's future and perhaps to trim some parts that have proven to be less valuable.

Meanwhile, this Administration has not waited for COMPETES to be reauthorized to continue pursuit of the goals the Act was created to achieve. In his first year in office, the President has taken key steps to move America forward by:

- Getting key science and technology agencies (NSF, DOE Office of Science, and the NIST laboratories) back on track toward doubled budgets;
- Investing record sums for R&D through 2009 and 2010 appropriations and the Recovery Act, as well as calling for further targeted budget increases in 2011;
- Launching a comprehensive Strategy for American Innovation that lays out a practical path to rejuvenating American industry and creating millions of high-quality jobs;
- Inaugurating Educate to Innovate—a public-private partnership in STEM education that has already raised more than half a billion dollars in cash and in-kind donations to revitalize science and engineering programs in schools;
- Unveiling a new plan for the U.S. space program that extends the life of the International Space Station and increases investments in game-changing technologies for human exploration of space beyond low Earth orbit, with budgets that match the goals;
- Sharply ramping up support for clean-energy and energy-efficiency research, development, demonstration, and deployment, including standing up the Advanced Research Projects Agency for Energy, or ARPA-E.

The America COMPETES Act can and should remain a valuable tool to support these and other strategies for propelling America into a better future.

Reauthorization of the America COMPETES Act

The Obama Administration believes that the America COMPETES Act should be reauthorized this year so that the Nation can continue to build on the achievements of the original Act. The President and the Vice President, who supported the original COMPETES Act when they were Senators, share my belief that the COMPETES Act provides a valuable roadmap to guide Federal policies in innovation, competitiveness, and STEM education. We are supportive of this Committee's efforts to reauthorize this landmark act this year, and we very much look forward to working with the Committee to make the reauthorization a reality during this session of Congress.

The original COMPETES Act identified three key science agencies—the National Science Foundation, the DOE Office of Science, and the National Institute of Standards and Technology laboratories—as essential to our Nation's future prosperity and to preserving America's place as the world leader in science and technology. Last April, in a speech at the National Academy of Sciences, President Obama announced his President's Plan for Science and Innovation, which would place these agencies' budgets on the doubling path that Congress called for in COMPETES. Although the previous Administration supported an effort to double these agencies' budgets between 2006 and 2016, the appropriated budgets 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 2011 Budget maintains that trajectory with a 6.6 percent increase for their combined budgets, totaling $13.3 billion

The reauthorization of the COMPETES Act is an opportunity for Congress to sustain the vision of doubling the budgets of these three agencies. The authorizations in the original COMPETES Act extend through fiscal year (FY) 2010. For FY 2011 and beyond, the Administration supports authorizations for NSF, DOE Office of Science, and the NIST laboratory programs at the budget levels outlined in the 2011 Budget, which would achieve the President's vision of doubling these budgets by 2017.

I would also like to call attention to the 2011 Budget's strong support for NIST's external programs. The 2011 Budget requests $130 million for the Hollings Manufacturing Extension Partnership (MEP), a $5 million increase over the 2010 enacted level consistent with the Administration's plan to double funding by 2015. The 2011 Budget also requests $80 million, a $10 million increase over 2010, for the Technology Innovation Program (TIP), created and authorized in the America COMPETES Act. These NIST programs are important components of *A Framework for American Manufacturing*, the comprehensive strategy for supporting American manufacturers announced in December.

The President's FY2011 Budget proposes $300 million for the Advanced Research Projects Agency-Energy (ARPA-E), created and authorized in the America COMPETES Act and first funded in the Recovery Act. ARPA-E supports 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 proposed allocation in the 2011 Budget would allow ARPA-E to make additional awards next year.

I would also like to call the Committee's attention to the 2011 Budget's strong support for other Federal agencies whose investments in science help underpin this country's economic competitiveness, environmental quality, and national security. For example:

- The Budget proposes in FY 2011 $5.0 billion for NASA's science portfolio and $1.15 billion for NASA's Aeronautics and Space Research and Technology portfolio, increases of more than $500 million in Science and about $400 million for Space Technology compared to 2010 (Space Technology includes the Innovative Partnership Programs (IPP) budget, which was funded at $175.2 million in FY 2010). The Science increase is primarily in Earth Science to enable continuity of key climate observations and accelerate Earth observing science missions recommended in the National Research Council's

(NRC's) decadal survey, which defines the priorities of the nation's earth science community.

- The NOAA budget of $5.6 billion is an increase of $806 million over the 2010 enacted level to 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.
- The Defense Advanced Research Projects Agency (DARPA) would receive $3.1 billion for longer-term breakthrough research.
- 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.
- And the 2011 Budget provides $32.1 billion for NIH, an increase of $1.0 billion, or 3.2 percent above the 2010 enacted level, to support 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.

The Administration would encourage the Congress to provide the requested growth for these programs.

Let me offer here a few thoughts on how Congress might strengthen the parts of the COMPETES Act that have the most capacity to leverage the American economy and secure America's future. A major strength of the original COMPETES Act was its authorizations of Federal policies to encourage innovation and competitiveness. Just as the original COMPETES Act authorized the creation of ARPA-E and laid the foundation for its eventual launch in April of last year, the reauthorization of the COMPETES Act is an opportunity for Congress to lay the foundations for other innovative approaches to addressing the challenges we face.

For example, Congress has the opportunity to authorize DOE's Energy Innovation Hubs. 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. Congress also has the opportunity to authorize NSF's proposal for $12 million in the 2011 Budget 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.

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

Both the America COMPETES Act and the 2007 *Rising Above the Gathering Storm* report produced by the National Academies called attention to the need for enhanced Federal efforts in STEM education. And the President has been emphatic about his commitment, which I share, to increase the participation and the performance of American students in STEM subjects and to raising the international ranking of our students from the middle 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 these ambitious goals.

The 2011 Budget invests $3.7 billion in STEM education programs across the federal government, including an historic $1 billion commitment to improve math and science achievement among K-12 students—that latter figure an increase of more than 40 percent over the FY 2010 level. The impact of these investments will be magnified by "Educate to Innovate," an initiative launched by the President to motivate and inspire young people to excel in STEM subjects. This campaign has already mobilized more than $500 million in financial and in-kind support from companies, foundations, philanthropies, universities, non-profit organizations, and grassroots volunteers.

In addition to these leveraged 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.

The Administration's vision for STEM education includes improving student outcomes by using the latest educational technologies and cognitive and learning research results, but we also want to ensure that we are addressing the very basic issues that limit student access to high-quality STEM education. Reauthorization of COMPETES is an opportunity for Congress to reinforce our efforts to improve access to high-quality, cutting-edge STEM equipment and infrastructure in K-12 classrooms, as well as access to well trained teachers and counselors. (Both of these elements were part of the historic investments made in R&D and STEM education through the National Defense Education Act of 1958.)

The Obama Administration is committed to investing in and scaling up what works in STEM education, while improving coordination and minimizing duplication among federal STEM education programs. The Department of Education and the 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 and takes advantage of the new energy and interest at the Department of Education in partnering with science agencies that have both expertise and substantial investments in STEM education; (2) clarifying evidence standards used to evaluate program impact and aligning our work on evidence and evaluation so that we can compare the effectiveness of programs across Federal agencies and Departments and identify the most promising STEM efforts for further validation, testing, and suitability for scale-up; (3) a locus of resources at the agency level, in particular within the Department of Education, to allow effective interagency coordination and coherence on STEM education; and (4) specific strategies and efforts to ensure opportunities in STEM education for traditionally underrepresented groups, such as women and girls, minorities, and students with disabilities, realizing that the diversity of our nation is a strength as we look for innovative design solutions to compete in an increasingly demanding global marketplace.

Scientific Integrity

Among the responsibilities that the America COMPETES Act bequeathed to OSTP was a requirement that the Director, in consultation with the Director of OMB and others, develop an overarching set of principles to ensure the communication and open exchange of research data collected by scientists employed by Federal civilian agencies and to prevent the suppression or distortion of such research findings. The Act also required OSTP to develop specific policies and procedures regarding the public release of data consistent with the principles established in the Act, a task that the last Administration did not fulfill.

In March 2009, President Obama released a Presidential Memorandum that iterated six principles "to restore scientific integrity in government decision making" and tasked the Director of OSTP with making recommendations for Presidential action designed to guarantee scientific integrity throughout the executive branch, based on those principles. In response to that call, OSTP organized a comprehensive strategy for developing such recommendations, including creation of an interagency working group and the launch of a blog-based public forum to gather input from stakeholders. Based on a summary report by that working group, which incorporated public comments and a review of policies at various agencies, OSTP has been crafting recommendations on this topic that will be delivered to the President for his approval and, after that, released for implementation by relevant agencies. OSTP anticipates that these recommendations will more than satisfy the remaining responsibilities under America COMPETES.

Conclusion

I know this Committee shares with me, and with the President, the important goal of advancing America's standing in the world as a leader in innovation and competitiveness. It is a goal that I think you will all agree transcends partisan politics because, in fact, it is so important and so central to this Nation's well-being.

I look forward to working with all of the Members on this Committee toward the reauthorization of the COMPETES Act and, more broadly, on all that we can do together to achieve the potential of science, technology, innovation, and STEM education to strengthen our country and improve our world.