Statement of Director of the Office of Science, William F. Brinkman

U.S. Department of Energy

Subcommittee on Energy & Water Appropriations

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INTRODUCTION

Thank you Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Committee. I am pleased to come before you today to discuss the Office of Science at the Department of Energy. The DOE Office of Science is the Nation's largest source of funding for basic research in the physical sciences. Our research investments and user facilities are vital to advancing U.S. leadership in science and strengthening our national competiveness. I thank you and this Committee for your ongoing support for our mission.

We face a unique and challenging time during this period of intense budget uncertainty. We are operating under a continuing resolution that expires on March 27th. We face sequestration cuts that will mean a reduction of $215 million for the Office of Science as compared to the FY 2012 enacted level. The Office of Science is doing everything possible to mitigate the problems caused by both the continuing resolution and impact of sequestration. However, there will be impacts to our programs, facilities, and construction projects that affect not just the progress of the science we steward, but also the everyday lives of the researchers, institutions, and businesses we support.

Sequestration greatly endangers the scope of our scientific program, as well as our ability to keep our construction projects on time and on budget. While we are facing dramatic cuts to scientific funding due to sequestration at home, other countries around the world are challenging our scientific leadership in essentially all the scientific disciplines that we steward. Stable and predictable funding is critical to the proper execution of our mission.

Despite this uncertainty, our facilities and research make highly significant contributions to science. The 2012 Nobel Prize in chemistry was awarded last October for work on the structure of the G protein-coupled receptors using our synchrotron x-ray light sources, the fourth time our facilities have played an essential role in protein structure discoveries that were recognized by the Nobel Prize.

The Linac Coherent Light Source (LCLS) at SLAC National Accelerator Laboratory (SLAC), the world's first hard X-ray free electron laser, continues to enable science that was previously impossible. Its ultra-intense stroboscopic x-ray pulses enabled the very first simultaneous images

of the atomic and electronic structures of Photosystem II, a large light-harvesting protein complex found in green plants and algae that is the essence of photosynthesis.

At the Large Hadron Collider (LHC), we observed a new subatomic elementary particle that is consistent with the long-sought Higgs boson that bestows other fundamental particles with mass. The Relativistic Heavy Ion Collider (RHIC) has forged ahead with studies of a form of matter, the quark-gluon plasma, that likely last existed for only moments after the Big Bang. The Daya Bay experiment, an international collaboration with China, was able to make the first definitive measurement of a fundamental parameter that controls the behavior of neutrinos.

We are also making inroads toward new discoveries with potentially large impacts on future energy technologies. Our Energy Frontier Research Centers are making many important contributions, from new structures for solar cells to new forms of catalysts and catalytic reactions. In addition to the Joint Center for Artificial Photosynthesis Energy Innovation Hub, we have started the new Joint Center for Energy Storage Research, our Battery and Energy Storage Hub. This hub has the ambitious goal of creating revolutionary batteries that are five times more efficient, five times lighter, and five times less expensive than conventional lithium ion technology. We also recently renewed the DOE Bioenergy Research Centers (BRCs) for an additional five years. Among other accomplishments, BRC researchers have developed new approaches to increase the amount of easily-digestible starch in switchgrass and have identified new lignin subunits that could be modified to make it easier to process plants into liquid fuel.

Industry continues to rely on our user facilities for critical measurements. As an example, at Argonne National Laboratory's (ANL) Advanced Photon Source, Eli Lilly maintains a permanent beam line to enable rapid determination of the structure of various possible molecules for novel drug design. Our computing facilities are also in demand. As of early this calendar year, the Industrial High Performance Computing Partnerships Program at the Oak Ridge National Laboratory (ORNL) has fifteen projects being carried out by industry. Many Fortune 500 companies and scores of medium and small businesses utilize our scientific user facilities each year to advance American innovation.

IMPACTS OF SEQUESTRATION

While we have supported many discoveries and accomplishments during the past year, sequestration reduces funding in the Office of Science by $215 million compared to the FY 2012 enacted levels. This will have significant and potentially lasting impacts on the scientific user facilities and our research portfolio. Each of our six core science programs will have to absorb this cut in proportion to their budgets. Cuts to basic research threaten our scientific leadership and economic competiveness at a time when investments in science and technology are more important than ever to our Nation's future prosperity. At a time when other nations are intensifying their investments in R&D--recognizing the centrality of such investments to their prosperity, security, and international competitiveness; America, once the world's undisputed leader in R&D, is hobbling its research efforts.

The consequences of sequestration are further compounded by the consequences of operating under the continuing resolution (CR) that expires on March 27th. In preparation for the budgetary uncertainty caused by the confluence of these two events, each program in the Office of Science has been cautious with its funds. We have operated at a spending rate below the current CR level for the first six months of FY 2013.
Should sequestration stay in effect, it will have significant impacts across all of the Office of Science programs. Growth in computing performance has the potential to advance multiple sectors of our economy, including science, manufacturing, and national defense. In our Advanced Scientific Computing Research program, reductions in our supercomputing budget will mean cancelling the second planned request for proposals for the new FastForward initiative to accelerate the next generation of supercomputers at a time when international competition in this domain is growing. Research funds to universities will be delayed, impacting as many as 60 graduate students.

In our largest program, Basic Energy Sciences, the Linac Coherent Light Source II (LCLS II) upgrade project at SLAC is in danger of a significant delay that will lead to substantial increases in total project cost. Our FY 13 Budget proposed changing the scope of LCLS-II, making it a construction line item; however, under a CR construction funds are not available. As a result the project cannot enter into a contract for civil construction, and it faces reduced funding levels that will delay its completion. The new National Synchrotron Light Source II at Brookhaven National Laboratory (BNL), planned to become fully operational in 2015, may be forced to reduce early operations, impacting its scheduled availability for scientific users.

In the Biological and Environmental Research program, there are wide ranging impacts due to the current CR, spanning low dose radiation, biofuel feedstock, and carbon cycle research. Three funding opportunity announcements will be cancelled, impacting potentially over 25 grants. Other grants will be cancelled before their final year, impacting scores of senior investigators and students alike. ANL, LBNL, Pacific Northwest National Laboratory, and ORNL all face reductions in their BER research programs.

In the Fusion Energy Sciences, sequestration will impact both domestic research facilities and funding for U.S.-made hardware for the international ITER project. We are still assessing the proper balance of reductions in these two areas. Funding levels for ITER below the FY 13 Budget request will impact our ability to meet US hardware delivery dates in support of the ITER construction schedule.

In High Energy Physics, Fermi National Accelerator Laboratory (Fermilab) will face reduced accelerator runtime and staff reductions. Core research will also be reduced, impacting scientists at universities nation-wide and at DOE laboratories.

In Nuclear Physics, the run time at RHIC at BNL will be reduced, prematurely ending a series of planned experiments with polarized protons and compromising efforts to make unique and world-leading discoveries. The Thomas Jefferson National Accelerator Laboratory faces funding reductions that will reduce scientific efforts, as well as have other impacts on materials and supplies procurement that will hinder the Continuous Electron Beam Accelerator Facility 12GeV Upgrade – a project already extended by previous budget shortfalls

Overall, the impacts to facilities operations at our laboratories will have an impact on university and private sector research. Over 25,000 scientists nationwide, and across many fields, rely on Office of Science user facilities for their research. While the impact is difficult to quantify, the scientific progress of many researchers will be slowed by user facility budget reductions.

INCREASING INTERNATIONAL COMPETITION

These cuts to our scientific programs and facilities occur at a time when the United States faces an increasingly competitive international landscape in scientific research. For most of the second half of the twentieth century, the United States was the world leader in essentially all of science. However, in the last twenty years, a substantial number of countries around the world have been rapidly increasing their scientific investments and productivity. Today, European Union publishes more scientific papers than the United States. Stated simply, the United States is losing ground to other countries around the world, which are greatly increasing their scientific output. The European Union, Chinese, Japanese, and South Korean governments are investing heavily in science. While the investments made in the Office of Science and other United States' science agencies over the past decades have made the United States a world leader in many scientific areas, stable, sustained funding is necessary if the United States is to maintain its world-leading status. The research reductions necessitated by sequestration will only serve to further reduce US scientific output relative to the rest of the world.

New facilities and investments in other countries also challenge our global leadership in several areas. As an example, the LCLS free electron laser, which I highlighted earlier, is currently one-of-a-kind – but not for long. There are currently four competitive facilities being built around the world, three in Europe and one in South Korea. Under a sequester, we will be unable to keep the LCLS II project on schedule which could blunt our competitive edge in this area.

Since the inception of high-performance computing, the United States has been a world leader in this field. The Advanced Scientific Computing Research program supports two leadership computing facilities at ONRL and ANL, respectively, and a general-purpose computing facility at LBNL, altogether providing a combination of high performance computing resources, user support, and broad scope of scientific research unparalleled in other countries. Today, our historical leadership is being challenged by the EU, China, and Japan, all of which have set goals to be the first to achieve exascale level computing, which will improve current computing capabilities 1000-fold. The reductions in ASCR funding necessitated by the sequester will impact our ability to keep pace with the rest of the world.

CLOSING

The Office of Science has delivered impactful discoveries, tools, and resources that are in great demand by scientists. Our research investments have positioned the U.S. as a global leader in fields crucial to our national, environmental, and energy security. Our user facilities – the most comprehensive suite of large scale research tools in the world – have enabled United States

industry to achieve breakthroughs in areas ranging from drug discovery to the design of vehicles, aircraft, and jet engines.

Certainly, the federal government must maximize the return for the taxpayer. But sequestration cuts will have real and lasting consequences. The reduced funding levels of sequestration will greatly undermine our position, at a time when other countries are increasing their investments in science and technology.