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SBIR/STTR Reauthorization: A Review of Technology Transfer

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Thank you Chairwoman Comstock, Ranking Member Lipinski, and Members of the Subcommittee. I am pleased to come before you today to discuss the Department of Energy's (DOE's) programs for Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR). For decades, these programs have served as key sources of Federal funding for innovative American small businesses, including startups, which make important contributions to technology commercialization and job creation.

I would like to begin by highlighting the scientific and commercial achievements of three of our past SBIR/STTR awardees. These examples illustrate how federally-funded scientific advancements made at small businesses can have public benefit as well as commercial success.

- Niowave, Inc., based in Lansing, Michigan, received three DOE SBIR Phase I and II awards in the past decade to enable superconducting linear accelerators to be reduced in size and cost. These innovations have allowed Niowave to address a number of commercial applications including medical radioisotope production, free electron lasers, intense X-ray sources, and fast neutron sources. In September 2015, Niowave achieved an important milestone: it produced Molybdenum-99, an important medical radioisotope, by fissioning uranium using one of its superconducting linear accelerators. The decay product of Molybdenum-99, Technetium-99m, is used in approximately 80% of all nuclear diagnostic imaging procedures in the world, with over 30 million procedures annually. The U.S. consumes about half of the world's annual production of Molybdenum-99, but we currently have no domestic production capabilities for this critical isotope. Niowave's innovations in accelerator technology will bring this important industry to the U.S., with commercial-scale production scheduled to begin in 2017.
- Aerodyne Research Inc., of Billerica, Massachusetts, received DOE SBIR awards to miniaturize laboratory scientific instruments that characterize aerosols so that the instruments could be used in aircraft. This has been a key enabler for advancing climate research. Today Aerodyne provides research and development services and advanced

sensor and software products to industrial, academic, and government customers for monitoring and enhancing regional and global environmental quality; developing clean and efficient energy and propulsion technologies; and advancing remote sensing, surveillance, and image processing capabilities for the national defense. Aerodyne has delivered over 70 instruments and realized revenue in excess of $25M from their innovations.

- Finally, the first large commercial production of nanomaterials, specifically fullerenes (a form of carbon in which the molecule is hollow with a spherical or soccer-ball shape), was enabled by two SBIR awards from DOE and two from the National Science Foundation (NSF) to TDA Research of Wheat Ridge, CO. Formed in 1987 by two staff from what is now the National Renewal Energy Laboratory, TDA Research has grown to a staff of 80 with annual revenues of approximately $14 million. TDA remains a privately held R&D company that develops catalytic- and sorbent-based materials and processes, new materials (polymers and carbons), and military and aerospace components.

The DOE Office of Science (SC) has managed the DOE SBIR/STTR Programs since the SBIR program was formed in 1982 and the STTR program was formed in 1992. With a budget of $5,347 million in FY 2016, SC is the Nation's largest Federal sponsor of basic research in the physical sciences and the lead Federal agency supporting fundamental scientific research for the Nation's energy future. Approximately 42 percent of the budget is devoted to the support of research at the frontiers of science—from the study of fundamental subatomic particles, atoms, and molecules that are the building blocks of the materials of our universe and everything in it to the DNA, proteins, and cells that are the building blocks of life. Another 38 percent is devoted to the operation of the 27 state-of-the-art national scientific user facilities, the most advanced tools of modern science, which together propel the U.S. to the forefront of science and technology development. SC user facilities provide tools and capabilities to more than 31,000 researchers annually from universities, national laboratories, and industry. Of the remaining funding, most is devoted to major facility construction projects. SBIR/STTR set-aside percentages are applied to all SC operating expense research funding including facility operations, but excluding capital equipment and construction.

The DOE SBIR/STTR Programs work collaboratively with 12 program offices throughout DOE. These include the six basic science research programs in the Office of Science (Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics); four applied energy technology programs (Energy Efficiency and Renewable Energy, Electricity Delivery and Energy Reliability, Fossil Energy, and Nuclear Energy); the Office of Environmental Management; and the Office of Defense Nuclear Nonproliferation within the National Nuclear Security Administration

Each program office makes awards commensurate with its budget allocation, sometimes in collaboration with other offices on topics of mutual interest. SC provides about 65 percent of the total DOE SBIR/STTR funding. Since its establishment as a separate program element, the Advanced Research Projects Agency-Energy (ARPA-E) has managed its own small SBIR/STTR program with initial awards in 2012. The results of the ARPA-E awards are included in the DOE SBIR/STTR annual report to the SBA. In FY 2015, the DOE SBIR Program issued 255 Phase I awards and 146 Phase II awards totaling $191.7M and the DOE STTR Program issued 39 Phase I awards and 19 Phase II awards totaling $25.5M. Additionally, the Office of Science works with the new Office of Technology Transitions on strategies on how to leverage lab technology transfer programs and other technology commercialization activities to facilitate the transition of federally-funded R&D to the market.

The DOE SBIR/STTR Programs Office is responsible for issuing topics and solicitations, managing the review and selection process, working with the SC Office of Acquisition and Assistance to award SBIR/STTR Phase I and Phase II grants, issuing annual reports to the U. S. Small Business Administration, performing outreach, and setting overall policy for the Department's SBIR and STTR programs. The 12 participating programs are responsible for topic development, reviewer assignment, award selection, and project oversight. In the FY 2016 Phase I solicitations issued in August and November 2015, 57 technical topics and 264 subtopics were included, spanning research areas in Energy Production (fossil, nuclear, renewable, and fusion energy), Energy Use (in vehicles, buildings, and industry), and Fundamental Energy Sciences (materials, chemical, biological, environmental, and computational sciences among others).

The SBIR/STTR Reauthorization Act of 2011 created a pilot program that allowed agencies to use up to 3% of SBIR program funds to improve the administration of these programs. I would like to highlight two initiatives that were enabled by this pilot program: improvements in our timelines and our Phase 0 Assistance Program. By accelerating investment in our web-based grants management system and introducing process changes, we have reduced the time required to process applications and to issue awards. In FY 2011, it took approximately 8 months between the close of a solicitation and the release of funds for Phase I awards; today it takes only about 4 months.

The Phase 0 Assistance Program was instituted to help eligible underrepresented small businesses successfully apply for DOE SBIR/STTR funding. DOE is the first Federal agency to develop such a program for SBIR/STTR applicants. The Phase 0 Assistance Program seeks to increase the number of responsive, high-quality proposals submitted to DOE from targeted states with historically low SBIR/STTR submissions to DOE, and from women- and minority-owned businesses nationally. The Phase 0 Assistance Program includes Letter of Intent writing assistance; Phase I proposal preparation, review, and submission assistance; small business development training and mentoring; communication and market research assistance; technology advice and consultation; indirect rate and financial information; and Intellectual Property

consultation. The DOE Phase 0 Assistance Program is modelled after state programs that assist small businesses in applying to Federal SBIR/STTR programs and that provide state funding to assist in generating high-quality applications.

In states that have these programs, the DOE program complements those services and has successfully partnered with state organizations in each of DOE's underrepresented states for SBIR/STTR applications and awards. Over the course of three Funding Opportunity Announcements, the DOE Phase 0 Assistance Program has received more than 500 applications for assistance and has provided services to 165 participants. Feedback from a recent participant shows the value of the Phase 0 program to those new to engaging with government programs: "We have had a very positive experience with the DOE Phase 0 Assistance Program. It was very helpful to us, our Phase 0 coach was great, and we were well supported throughout the process. Finally, we'd like to thank DOE for launching and supporting this program — it is a critical resource to help startups & innovative small businesses navigate the government grant space, engage with the DOE successfully, and accelerate energy innovation."

The SBIR/STTR Reauthorization Act of 2011 also permitted agencies to make Sequential Phase II awards. These awards permit agencies to fund additional R&D to assist with transition to commercialization. In Fiscal Year (FY) 2015, 17% of the Phase II awards were Sequential Phase II awards.

In order to further enhance transition of DOE-funded innovations developed at DOE National Labs and universities, the DOE SBIR/STTR Programs Office began including technology transfer opportunities in its solicitations in FY 2013. DOE works with partnering research institutions so that awardees receive a six month, no-cost option to license the innovation in conjunction with their SBIR/STTR award. In FY 2015, 10 Phase I and 2 Phase II awards were made representing technologies from Michigan State University, Lawrence Berkeley National Laboratory, the National Renewable Energy Laboratory, Oak Ridge National Laboratory, and Savannah River National Laboratory.

As Congress considers reauthorization of the SBIR/STTR program in advance of its expiration in FY 2017, the Department of Energy supports permanent reauthorization to provide Federal agencies with long-term certainty and stability.

The annual set-aside amounts for agency SBIR/STTR programs should be maintained at FY 2017 levels (3.2%/0.45%), which represent more than a 30% increase over FY11 levels (2.5%/0.3%). Future growth in SBIR/STTR programs should be realized through overall extramural R&D budget increases for each SBIR/STTR funding agency.

The motivation for this position is that the very significant increases for the SBIR/STTR programs over the past few years are in sharp contrast to the small growth in the underlying programs. We note that during the period FY 2011 to FY 2016, the SBIR/STTR set asides grew

by 23%. During this same period, the DOE Office of Science research funding grew by 3.9% *over the entire five years*, and the facility operations funding grew by 12.3%. Additional increases in the set-aside would further reduce the available basic research funding.

Finally, we are grateful for our existing flexibility provided on award size and sequencing, consistent with the diverse needs of small businesses in different industries and technology arenas and for the ability to innovate in program management, for example, through the Phase 0 pilot program.

Thank you for this opportunity to come before you today to discuss the DOE SBIR/STTR Programs and the Office of Science. I appreciate the Committee's interest in this topic and look forward to answering your questions.