

**Statement of**  
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**Before the**  
**Subcommittee on Technology and Innovation**  
**Committee on Science and Technology**  
**U.S. House of Representatives**

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Mr. Chairman and Members of the Committee: thank you for the opportunity to speak today about the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs at the Department of Energy.

The DOE Office of Science (SC) manages the SBIR and STTR programs for the Department and has done so since the SBIR program was formed in 1982 and the STTR program in 1992. In addition to SC, six other DOE programs participate in the SBIR and STTR programs: the Offices of Fossil Energy, Energy Efficiency and Renewable Energy, Nuclear Energy, Environmental Management, Defense Nuclear Nonproliferation, and Electricity Delivery and Energy Reliability. The Department's naval reactors and weapons activities programs are exempt by law and do not contribute to SBIR and STTR programs.

The SBIR and STTR programs are viewed within the Department like any other research and development (R&D) program, namely, as a vehicle by which the Department accomplishes its R&D objectives. The Department has benefited from small business participation through the research and the resultant new knowledge and technologies developed by small businesses that have supported various Department R&D activities over the years. Examples of commercialization successes from the programs include development of new photovoltaic systems for utility scale solar energy production, shock-resistant and temperature-tolerant ceramics for more energy efficient engines, and fast-growing hybrid poplar trees as a sustainable and economical biomass energy source. Successful collaborations between small businesses and the DOE laboratory complex have also led to new insights and innovative technologies that enable advancement of the Department's program missions; for example, technologies which will significantly improve the performance of current and future DOE scientific user facilities.

## **PROGRAM TRENDS**

Over the 24 years of its existence, the DOE SBIR Program has matured and evolved significantly. We have issued 25 Phase I solicitations in SBIR, reviewed approximately 31,797 proposals, and selected for funding 4,413 Phase I projects and 1,816 Phase II projects. Since 1993 we have issued 13 solicitations for the STTR program, received 2,927 STTR proposals, and awarded 276 Phase I projects and 99 Phase II projects.

One of the most significant changes made to the SBIR program since its reauthorization in 2000 has been an increased emphasis on commercialization. Since the reauthorization, we have required Phase II grant applicants to submit succinct commercialization plans as part of their proposals, and the quality and completeness of the commercialization plan has been a weighted factor in the evaluation process. As a result, we are now requiring small businesses not only to undertake scientific and technical research of the highest caliber and to develop innovative approaches, but we are also requiring them to plan for the possibility of commercialization. We want participating small businesses to initiate and follow through on potential commercialization applications as a routine and consistent part of doing business with DOE. The most significant changes in the STTR reauthorization in 2001 have been the doubling of the set-aside from 0.15 percent to 0.30 percent of agency extramural R&D budgets and the increase in the award maximum of Phase II grants from \$500,000 to \$750,000, beginning in FY 2004.

DOE's SBIR program has provided commercialization assistance and training support to awardees since 1990. Since the 2000 reauthorization, however, the Department has implemented several program enhancements to better support commercialization. For example, the solicitation itself now includes a commercialization plan template which provides guidance on the type and structure of information necessary for a sound commercialization plan. In FY 2000 we also started combining the annual SBIR and STTR solicitations, and we increased our outreach activities. In FY 2003 we started collecting data on the Small Business Administration (SBA) defined Historically Underutilized Business Zones (HUBZones).

SBIR and STTR funding from FY 1995 through FY 2006 is shown in the tables below along with data on small business participation and the number of applications submitted and awarded. Approximately 25 percent of program funds support Phase I grants and 75 percent are allocated to Phase II grants. For both the SBIR and STTR programs, the number of proposal submissions, small business participation, and number of Phase I and Phase II grants awarded can vary from year to year depending on small business interest in the research topics announced.

SBIR and STTR program funds have gradually increased over the last decade, reflecting the trend in the Department's total extramural R&D funding. During this time the award to submission ratio has increased by approximately 50 percent. The percentage of awards going to first-time DOE SBIR/STTR awardees has also remained strong at 25-35 percent of total awards. We believe growing interest by small businesses to get engaged in energy related science and technology and help the Department address critical mission needs in the past 5-6 years has led to resurgence in the number of small businesses applying and the number of high quality proposals we have received.

### SBIR Trends: Phase I

Year	SBIR Funds <sup>1</sup>	Phase I Submissions	External Peer Reviewed	Phase I Awards	Award to Submission Ratio	# of Individual Companies that Submitted	# of Companies with Funded Projects	First-Time Awardees	SEDSM <sup>2</sup>	HubZone Awardees <sup>3</sup>
2006	\$104,217,000	1309	1021	260	1 / 5	809	173	67	31	13
2005	\$101,445,000	1490	1037	259	1 / 6	823	179	85	26	7
2004	\$102,331,375	1312	857	247	1 / 5	736	187	83	31	14
2003	\$94,201,450	1186	738	218	1 / 5	678	181	72	27	8
2002	\$94,025,000	949	754	228	1 / 4	564	166	77	22	--
2001	\$87,804,000	874	661	212	1 / 4	495	151	52	28	--
2000	\$83,507,800	1048	771	202	1 / 5	583	152	68	30	--
1999	\$80,418,736	1135	731	203	1 / 6	578	150	57	26	--
1998	\$78,147,301	1191	888	204	1 / 6	624	146	62	25	--
1997	\$76,307,046	1225	804	199	1 / 6	631	154	69	23	--
1996	\$65,506,066	1437	972	173	1 / 8	756	130	46	20	--
1995	\$73,777,702	1569	867	199	1 / 8	803	156	55	22	--

<sup>1</sup> Total SBIR funds for Phase I and Phase II

<sup>2</sup> SEDSB: Socially & Economically Disadvantaged Small Businesses

<sup>3</sup> Collection of HUBZone data started in FY 2003

### SBIR Trends: Phase II

Year	Phase II Submissions	External Peer Reviewed	Phase II Awards	Award to Submission Ratio	# of Individual Companies that Submitted	# of Companies with Funded Projects	First-Time Awardees	SEDSB <sup>1</sup>	HubZone Awardees <sup>2</sup>
2006	226	226	123	1 / 1.8	158	96	39	16	7
2005	227	227	107	1 / 2	175	93	39	11	4
2004	199	199	117	1 / 1.7	150	93	36	11	9
2003	207	207	102	1 / 2	153	83	50	6	--
2002	189	189	103	1 / 1.8	137	85	38	13	--
2001	178	178	98	1 / 1.8	134	80	43	10	--
2000	184	184	91	1 / 2	138	76	25	17	--
1999	179	179	86	1 / 2	134	69	28	11	--
1998	174	174	85	1 / 2	135	72	44	10	--
1997	150	150	85	1 / 1.8	121	75	33	8	--
1996	171	171	72	1 / 2	141	60	22	8	--
1995	192	192	81	1 / 2	146	70	40	7	--

<sup>1</sup> SEDSB: Socially & Economically Disadvantaged Small Businesses

<sup>2</sup> Collection of HUBZone data started in FY 2003

### STTR Trends: Phase I

Year	STTR Funds <sup>1</sup>	Phase I Submissions	External Peer Reviewed	Phase I Awards	Award to Submission Ratio	# of Individual Companies that Submitted	# of Companies with Funded Projects	First-Time Awardees	SEDSB <sup>2</sup>	HubZone Awardees <sup>3</sup>
2006	\$12,509,000	242	196	29	1 / 8	181	26	8	2	1
2005	\$12,174,000	284	210	30	1 / 9	192	29	12	5	2
2004	\$12,279,765	280	191	53	1 / 5	152	50	29	5	0
2003	\$5,652,087	226	141	12	1 / 19	116	12	8	1	0
2002	\$5,641,000	191	120	17	1 / 11	98	17	12	1	--
2001	\$5,268,240	159	119	18	1 / 9	94	17	9	3	--
2000	\$5,010,468	146	113	18	1 / 8	93	18	10	2	--
1999	\$4,542,979	82	65	16	1 / 5	67	16	14	2	--
1998	\$4,548,249	66	45	14	1 / 5	59	14	11	1	--
1997	\$4,489,109	189	110	15	1 / 13	167	15	14	1	--
1996	\$4,995,690	232	154	15	1 / 15	183	15	13	2	--
1995	\$4,762,354	177	102	18	1 / 10	156	17	17	1	--

<sup>1</sup> Total STTR funds for Phase I and Phase II

<sup>2</sup> SEDSB: Socially & Economically Disadvantaged Small Businesses

<sup>3</sup> Collection of HUBZone data started in FY 2003

### STTR Trends: Phase II

Year	Phase II Submissions	External Peer Reviewed	Phase II Awards	Award to Submission Ratio	# of Individual Companies that Submitted	# of Companies with Funded Projects	First-Time Awardees	SEDSB <sup>1</sup>	HubZone Awardees <sup>2</sup>
2006	27	27	15	1 / 1.8	26	14	7	3	2
2005	48	48	13	1 / 3.7	46	13	6	0	0
2004	8	8	5	1 / 1.6	8	5	3	1	0
2003	16	16	11	1 / 1.4	16	11	8	0	0
2002	17	17	11	1 / 1.4	17	11	8	3	--
2001	13	13	5	1 / 2.6	13	5	2	1	--
2000	12	12	7	1 / 1.7	12	7	5	1	--
1999	10	10	6	1 / 1.6	10	6	6	1	--
1998	14	14	7	1 / 2	14	7	7	1	--
1997	11	11	6	1 / 1.8	11	6	6	2	--
1996	17	17	7	1 / 2.4	16	7	7	0	--
1995	18	18	6	1 / 3	18	6	6	2	--

<sup>1</sup> SEDSB: Socially & Economically Disadvantaged Small Businesses

<sup>2</sup> Collection of HUBZone data started in FY 2003

## **OUTREACH**

DOE actively participates in national, regional, and state sponsored outreach activities to engage small businesses and provide information and resources to better position them to participate in the SBIR and STTR programs. These outreach activities generally involve two-to-three day conferences featuring presentations and panel discussions involving Federal agency program managers and experts in the areas of proposal preparation and budget formulation. One-on-one meetings with prospective small businesses are also provided to allow attendees to discuss their technology concepts and how they might address agency needs.

The DOE SBIR and STTR programs also facilitate and participate in presentations and panel discussions at the Department's annual Small Business Conference. These conferences typically draw between 400-600 participants each year and have been successful in attracting a significant number of socially and economically disadvantaged small businesses that are strongly encouraged to consider SBIR and STTR program opportunities. The DOE SBIR and STTR program staff also participate in outreach efforts by State Economic Development Agencies that are aimed at helping their small business communities pursue Federal SBIR and STTR funding opportunities.

The Department's annual combined solicitation for the SBIR and STTR programs is advertised on Grants.gov, the Federal Government's Web Portal for all federal grant applications and also on the Department's E-Center (<http://e-center.doe.gov>) for all Business and Financial Assistance opportunities available from the Department. We also use the internet, regional and national conferences, and trade journals to ensure the applicant community is well informed. The SBIR/STTR electronic mailing list consists of over 14,500 small businesses. Additionally, the Department encourages the DOE national laboratories to partner with small businesses to help them accomplish their science and technology research and development goals.

## **RESEARCH TOPICS**

The Department's SBIR and STTR programs' goals include: 1) funding high quality projects with relevance to the Department's mission needs; 2) increasing private-sector commercialization and Departmental transition of technology developed through DOE SBIR-supported R&D; 3) stimulating technological innovation in the private sector; and 4) improving the return on investment from federally-funded research for economic and social benefits to the Nation.

Specific research topics for the SBIR and STTR programs are developed by those DOE technical program offices which contribute funds to SBIR and STTR. Program Offices consider their high priority research and program mission needs, as well as the Department's goals, in selecting research topics. Over 54 technical topics, spanning research areas that support the Department's missions in energy, the environment, national security, and science were included in the FY 2007 solicitation. Examples of current technical topic descriptions are as follows:

- Nanotechnology Applications for Energy Efficiency and Renewable Energy
- Solid State Lighting
- Chemical Reactions and Separations Processes for Bio-Refinery Applications
- Hydrogen Production and Delivery

- Coal Gasification and Combustion Technologies
- Technologies Related to Hybrid Electric Vehicles with Special Emphasis on Plug-in Hybrids
- Technology to Support National Scientific User Facilities
- Materials for Advanced Nuclear Energy Systems
- Nuclear Physics Electronics Design and Fabrication
- Research to Support Proliferation Detection
- Advanced Technologies and Materials for Fusion Energy Systems
- Accelerator Technology for the International Linear Collider
- High Energy Physics Data Acquisition and Processing
- Scalable System Software for Petascale Computers
- Nuclear Particle Physics and Radiation Detection Systems, Instrumentation and Techniques
- Power Electronics and Advanced Materials for Energy Storage
- Carbon Cycle Measurements of the Atmosphere and Biosphere

## **PROCESS FOR PROPOSAL REVIEW AND SELECTION CRITERIA**

The merit-based review of SBIR and STTR proposals is conducted in the same rigorous manner as other Office of Science research programs. Phase I grant applications are judged on a competitive basis against other applicants within the same technical program area (e.g., Fossil Energy, Energy Efficiency, Basic Energy Sciences, etc.) in several stages. First, all are screened initially by DOE technical managers to ensure that they (1) meet stated funding opportunity notice requirements; (2) are responsive to the topic and subtopic category; (3) contain sufficient information for a meaningful technical review; (4) are for research or for research and development; and (5) do not duplicate other previous or current work. Grant applications which fail to pass the initial screening are declined.

Grant applications that meet the conditions above are then further evaluated by outside independent scientific and engineering experts selected by DOE technical program managers. The external reviewers evaluate each proposal in terms of the following criteria:

1. **Strength of the Scientific/Technical Approach** as evidenced by (1) the innovativeness of the idea and the approach; (2) the significance of the scientific or technical challenge; and (3) the thoroughness of the presentation.
2. **Ability to Carry out the Project in a Cost Effective Manner** as evidenced by (1) the qualifications of the Principal Investigator, other key staff, and consultants, if any, and the level of adequacy of equipment and facilities; (2) the soundness and level of adequacy of the work plan to show progress toward proving the feasibility of the concept; and (3) the degree to which the proposed project budget is justified by the research plan.
3. **Impact** as evidenced by (1) the significance of the technical and/or economic benefits of the proposed work, if successful; (2) the likelihood that the proposed work could lead to a marketable product or process; and (3) the likelihood that the project could attract further development funding after the SBIR project ends.

DOE makes selections for SBIR/STTR Phase I awards from those grant applications judged to have the highest overall merit within their technical program area, with approximately equal weight given to each

of the criteria above. DOE does not fund any grant application if there is a reservation with respect to any of the three evaluation criteria, as determined by the review process. In addition, because DOE has developed a process intended to support only high quality research and development, grant applications will be considered candidates for funding only if they receive strong endorsements with respect to at least two of the three criteria.

Third, from those grant applications considered candidates for funding following peer review, each of the participating DOE Program Offices makes selections. Final decisions are made by the DOE SBIR/STTR Program Manager based on the recommendation of the Program Offices and consideration of other factors like budget and program balance. On average, about 1 out of every 6 SBIR Phase I grant applications and about 1 out of every 9 STTR Phase I grant applications is selected for funding.

The Phase II methodology is the same, except that a commercialization plan is also evaluated as part of the Impact criterion. As with Phase I, Phase II grant applications are sent out for external peer review by independent experts. Phase II applicants must be DOE Phase I recipients. About 1 out of every 2 Phase II grant applications is selected for funding.

Within the SBIR/STTR office, an oversight review of the scoring of SBIR and STTR grant applications is conducted to assure that any proposal recommended for funding is supported by the set of peer reviews for that grant application. We believe that SC's management practices, which emphasize quality science and technology, are critical to maintaining the integrity of the SBIR/STTR selection process.

Phase II applicants must apply the year following the year they received a Phase I award. Phase I grants are awarded in June and extend for nine months through March of the following year. Phase II grant applications are required to be submitted by the middle of April in order to meet an end of FY award deadline. Because the Department has flexibility to provide partial funding as soon as Phase II awardees are selected, we are able to minimize any gaps in financing under the SBIR and STTR phased award structure. Phase II awardees are typically selected within a reasonable period following their completion of the Phase I grant.

## **DATABASES**

Currently the DOE SBIR and STTR programs maintain a database system that stores a proposal record for each of the 34,724 Phase I and 4,124 Phase II SBIR and STTR grant applications received by the Department to date. The database also maintains Phase III data such as information on follow-on investments and commercialization successes. This latter information is derived from the annual commercialization surveys completed by awardees. This database is not available to the public.

All awardees are required to include a summary abstract that does not include any proprietary or sensitive business information of the proposed activity suitable for dissemination to the public. The summary must include a statement of the problem or situation that is being addressed; statement of how this problem is being addressed; commercial applications and other benefits; and a summary to be used for Congressional notification. Abstracts of the funded projects are available to the public on the DOE SBIR/STTR webpage as well as from the SBA TechNet database. The SBA TechNet database also provides company information, including name and address, SBIR/STTR project award history, whether

the company is classified as a socially and economically disadvantaged small business or HUBZone Certified small business, and expected research results.

The proprietary nature of the research proposals and results presents a challenge with respect to making this information available to the public. Awardees are required to submit a final report (Phase I or Phase II) to the DOE after the conclusion of the research period. The government has a limited right to use such data for government purposes but is not permitted to release proprietary data outside the government without permission of the grantee for a period of not less than four years.

## **COMMERCIALIZATION ASSISTANCE**

A large majority of SBIR awardees have excellent skills in science and engineering research but lack experience in product development, financing business growth, raising venture capital, and marketing. Companies participate in DOE's commercialization assistance services at no cost as the SBIR law allows agencies to use a portion of the SBIR set-aside funds for discretionary technical assistance, including commercialization. The different types of commercialization assistance and training opportunities available to selected Phase I and Phase II winners are described below. DOE's SBIR/STTR website outlines these programs and showcases commercialization success stories.

### **Commercialization Opportunity Forum:**

One of the services provided to Phase II awardees is the Commercialization Opportunity Forum Program, which has been provided by DOE for 16 years. This program is conducted by Dawnbreaker, a private organization from Rochester, New York, competitively selected and under contract to DOE.

The Opportunity Forum Program brings small businesses with promising technologies face-to-face with potential investors. This program provides small businesses the opportunity to work with professionals first to develop and refine a business plan and business plan presentation. Then small businesses are brought together with decision makers from appropriate partnering and funding sources in a two-day forum that includes both formal presentations and informal networking opportunities. In preparation for the Forum, the SBIR/STTR participating companies identify prospective investors and allies. Using these leads and others, Dawnbreaker is responsible for assuring that a sufficient number of upper level decision makers from appropriate partnering and funding sources attend the Forum. The program is one of the mechanisms the DOE SBIR program uses to encourage private equity participation and provide opportunities for interaction with small businesses.

Foresight Science and Technology, Inc., located in Princeton, New Jersey conducted an SBIR Commercialization Project for DOE in 1988. This project was a pilot program designed to test the viability of providing training in marketing to DOE SBIR Phase II winners. This effort formed the basis of other commercialization assistance that is now provided on a limited basis to those small businesses that are unable to participate in the Commercialization Opportunity Forum Program. These alternative services are delivered through a competitively selected contract currently held by Foresight that includes the following:



**Trailblazer™ (Initiated early in Phase I to support Phase II application):**

The Trailblazer™ develops market data and determines the level of participation required by the small business for concurrent engineering-based product or service development with a strategic partner. Both literature searches and interviews are conducted. The program runs six weeks and it helps businesses:

- 1) identify major market niches for commercialization;
- 2) determine key requirements and traits for market-viable products or services;
- 3) develop a value for the technology that gives it a competitive advantage; and
- 4) identify feasible vehicles for commercialization and map a path into the market.

**Virtual Deal Simulator™ (Initiated early in Phase II):**

The Virtual Deal Simulator™ (VDS™) uses computer-based templates to understand and explore the needs for developing commercialization deals by establishing a sequence of tasks for: 1) the completion of R&D; 2) transitioning the technology development into production; and 3) transitioning the technology product into the market. VDS™ also identifies critical path tasks and milestones for commercialization. The program helps identify associated costs, required resources, outputs, and metrics for success, time investment required for each of the tasks, and intellectual property concerns for each task, which can be used to track and evaluate post-deal progress. The VDS™ can also be used to identify potential technology, knowledge, and capability gaps in product development and in transitioning into the market and make suggestions for risk reduction. The duration of this program is six weeks.

**Technology Niche Analysis™ (Initiated mid-Phase II to identify Phase III partners):**

The Technology Niche Analysis™ (TNA™) assesses potential applications for a particular technology. Both literature searches and interviews of company executives and industry experts are conducted. This program lasts for six weeks. For each viable application, TNA™ identifies:

- 1) the needs and concerns of end-users which drive the competitive opening;
- 2) competing technology and products;
- 3) the competitive advantage of the proposed technology and market drivers;
- 4) key standards, regulations, and certifications influencing buyer acceptance;
- 5) potential customers, licensees, investors, or other commercialization partners (targets as specified by participant preferences); and,
- 6) a commercialization strategy, together with tasking and a schedule for implementation of the strategy and design suggestions for the product.

Targets are contacted to ensure they are viable leads and to collect important information for follow-up deal-making; points of contact are provided.

**CONCLUSION**

Since its inception, the Department has invested almost \$1.5 billion in SBIR and STTR Phase I and Phase II grants. In return, approximately 60 percent of Phase II-supported companies have earned a total of more than \$1.6 billion in sales and \$1.3 billion in additional Phase III development funding—67 percent of which came from non-Federal sources—helping the nation capitalize on its substantial R&D investment. The Department of Energy strives to maintain a strong and appropriately balanced core research program by supporting R&D at universities, the DOE national laboratories, and small

businesses; and America's small businesses continue to make valuable contributions to advancing the Department's missions. We are happy to continue to work with Members of this Committee and others as Congress considers the reauthorization of the SBIR and STTR programs and ways to make them even more successful in the future.

This concludes my testimony. Thank you again, Mr. Chairman, for the opportunity to testify here today. I would be happy to answer any questions you may have.