



DOE SBIR/STTR Programs & Additive Manufacturing

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Industrial Additive Manufacturing Workshop on Metals and Ceramics

Brookhaven National Laboratory

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U.S. DEPARTMENT OF
ENERGY

SBIR/STTR Programs
Office

RECENT SBIR/STTR ADDITIVE MANUFACTURING PROJECTS



DOE Program Offices Funding Additive Manufacturing

- Office of Science
 - Advanced Scientific Computing Research
 - Basic Energy Sciences
 - Fusion Energy Science
 - High Energy Physics
 - Nuclear Physics
- Office of Energy Efficiency & Renewable Energy
- Office of Fossil Energy
- Office of Nuclear Energy



Recent DOE SBIR/STTR Projects

- Advanced Scientific Computing Research
 - Additive Manufacturing Simulator
 - Robotic Additive Manufacturing Path Planning via HPC
- Basic Energy Sciences
 - Novel Additive Manufacturing that Joins SiC-SiC
 - Hybrid AM/SM of Complex Bimetallic Structures
 - Additive-Manufactured Superconductor Phase Shifters
 - Development of Additive Manufacturing for Neutron Scattering Collimators
 - Direct 3D femtosecond laser manufacturing of Solid Oxide Fuel Cells
- Fusion Energy Sciences
 - A new pulsed plasma technology for making micron and sub-micron metallic powders
 - Additive Manufacture of Tungsten Armored Plasma Facing Components



Recent DOE SBIR/STTR Projects (continued)

- High Energy Physics
 - An Innovative Additive Manufacturing Technology for High Density Interconnects
 - Additive Manufacturing of Scalable 3D Resonators
 - Production of Exotic Metal Powders for 3D Printing of Accelerator Components
 - Klystron Fabrication Using Additive Manufacturing
 - Low Temperature Additive Manufacturing of Superconducting Radio Frequency Cavities
- Nuclear Physics
 - Additively Manufactured Z-Channel Detectors for Heavy Ion Accelerator Diagnostics
 - A Scalable Additive Manufacturing Technology for Large Area Printed Circuit Boards

Recent DOE SBIR/STTR Projects (continued)

- Energy Efficiency and Renewable Energy

- A Concrete Additive Manufacturing Process for Fixed and Floating Wind Turbine Foundations and Towers
- Demonstration of Combinatorial Additive Manufacturing Approach for the Design of Alloys

- Fossil Energy

- Large Parts Additive Manufacturing
- Additive Manufacturing of Large Scale Heat Exchanger
- An Air Coupled Ultrasonic Array Scanning System for In-Situ Monitoring and Feedback Control of Additive Manufacturing
- Fabrication of Extreme Environment Materials for Large Parts Using Additive Manufacturing Methods
- Hybridization of Freeze Casting with Additive Manufacturing for Simplified Production of High Performance SOFCs
- Three Step Additive Manufacturing of Complete Solid Oxide Fuel Cells



Recent DOE SBIR/STTR Projects (continued)

- Nuclear Energy
 - Ultrasonic Scattering Inspection Approach for Improved Methods of Additive Manufacturing
 - Real Time Non-Destructive Evaluation during 3D Manufacturing of Metal Parts
 - Controllable 3D Manufacturing System
 - Additive Manufacturing of Small Modular Reactor Holddown Springs and Upper Nozzle Interfaces
 - Additive Manufacturing of High Strength Steel Components for the Small Modular Reactor
 - An Additive Manufacturing Technology for the Fabrication and Characterization of Nuclear Reactor Fuel



Recent SBIR/STTR Additive Manufacturing Projects at Other Federal Agencies

- Department of Defense
 - Real-Time Metrology and Feedback Control for Additive Manufacturing
- National Institutes of Health
 - Additive Manufacturing of Ceramic Dental Restorations
- National Aerospace and Space Administration
 - The Vulcan Advanced Hybrid Manufacturing System
- National Science Foundation
 - Increasing Maker Manufacturing through 3D Printing with Reclaimed Plastic & Direct Drive Pellet Extrusion
- SBIR/STTR award database: SBIR.gov



National Additive Manufacturing Innovation Institute (America Makes)

- First in a series of 14 manufacturing institutes sponsored by the Departments of Commerce, Defense and Energy starting in 2012.
- Mission: Develop and grow the U.S. additive manufacturing infrastructure
 - Drives innovation, technology roadmaps, and standards
- Funding: >\$120M in federal and non-federal funding
- More information: <https://www.americamakes.us/>



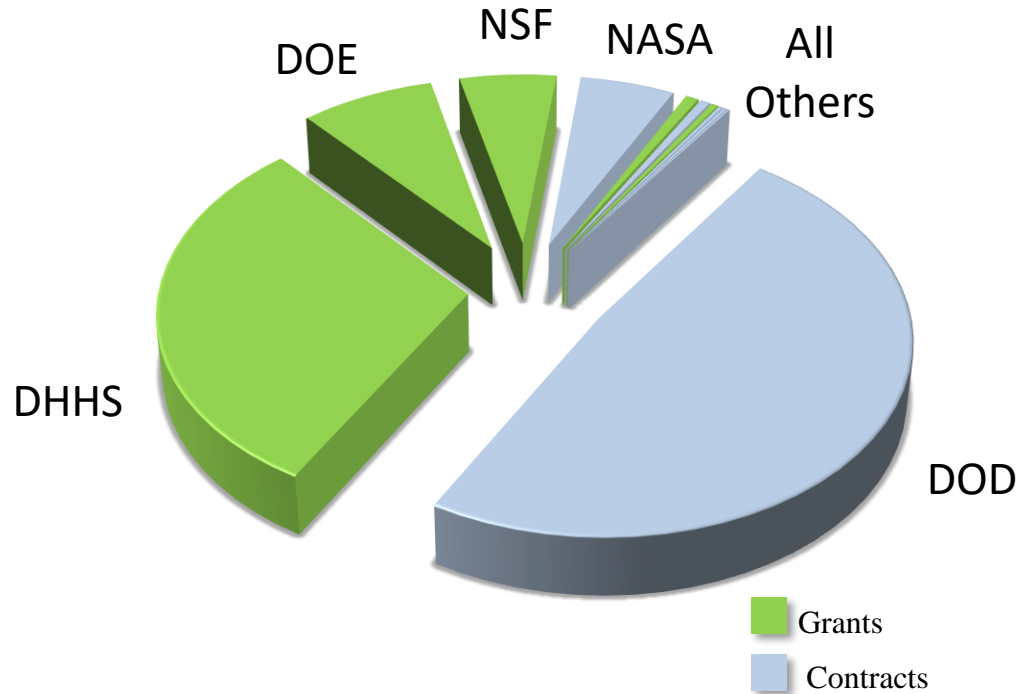
DOE SBIR/STTR PROGRAMS



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Estimated SBIR/STTR Budgets by Agency, FY 2018



~ \$3.6B in FY 2018 across all agencies

AGENCIES WITH SBIR & STTR PROGRAMS	APPROX BUDGET
Department of Defense (DOD)	\$ 1.750 B
Department of Health and Human Services (DHHS), including the National Institutes of Health (NIH)*	\$1.088 B
Department of Energy (DOE), including Advanced Research Projects Agency – Energy (ARPA-E)	\$280.0 M
National Science Foundation (NSF)	\$ 202.4 M
National Aeronautics and Space Administration (NASA)	\$198.0 M
AGENCIES WITH ONLY SBIR PROGRAMS	APPROX BUDGET
Department of Agriculture (USDA)	\$27.0M
Department of Homeland Security (DHS): Science and Technology Directorate (S&T) & Countering Weapons of Mass Destruction Office (CWMD)	\$20.8 M
Department of Commerce: National Oceanic and Atmospheric Administration (NOAA) & National Institute of Standards and Technology (NIST)	\$14.2M
Department of Transportation (DOT)	\$8.5 M
Department of Education (ED)	\$7.5 M
Environmental Protection Agency (EPA)	\$4.2 M

*DHHS also issues contracts

SBIR & STTR Program Goals

Small Business Innovation Research (SBIR) *est. 1982*

- Stimulate technological innovation
- Use small business to meet Federal R&D needs
- Foster and encourage participation by women and socially and economically disadvantaged persons in technological innovation
- Increase private-sector commercialization of innovations derived from Federal R&D

Small Business Technology Transfer (STTR) *est. 1992*

- Stimulate and foster scientific and technological innovation through cooperative research and development carried out between small business concerns and research institutions
- Foster technology transfer between small business concerns and research institutions

SBIR and STTR were reauthorized on December 23, 2016 (P.L. 114-840) through September 30, 2022



Major Differences between SBIR & STTR

- STTR: Requires collaboration with a Research Institution
 - Research Institution
 - College, University, Federal R&D Laboratory, other non-profit research organization
- Principal Investigator primary employment
 - SBIR: employed by the small business
 - STTR: employed by the small business OR research institution
- Percentage of R/R&D conducted by the small business
 - SBIR
 - Phase I: minimum 2/3 by small business
 - Phase II: minimum 1/2 by small business
 - STTR:
 - Phase I & II: minimum 40% by small business; minimum 30% by research institution
 - Subcontracting is permitted provided the level of effort requirements above are met



3 Phases

PHASE I: FEASIBILITY, PROOF OF CONCEPT

- Award Amount: **\$200,000**
- Project Duration: 6-12 months

Increased in
FY 2019



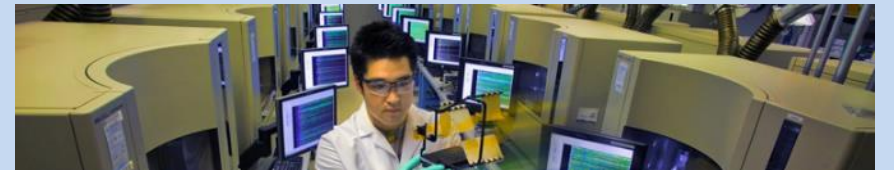
PHASE II: CONTINUE R/R&D FOR PROTOTYPES OR PROCESSES

- Award Amount: **\$1,100,000 or \$1,600,000** (varies by topic)
- Project Duration: 2 years
- Additional Phase II awards can be made

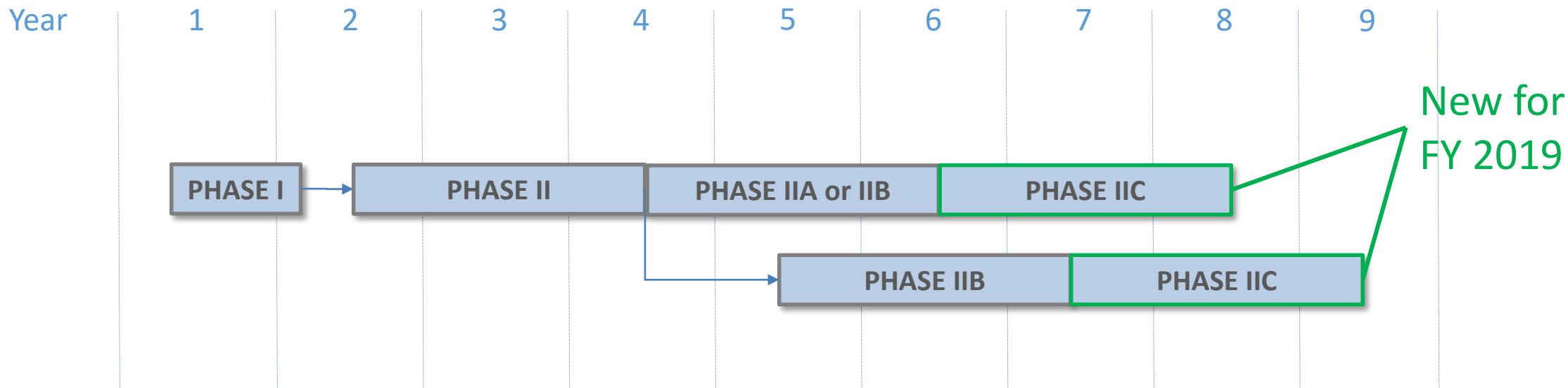


PHASE III: COMMERCIALIZATION

- Federal or Private Funding (non-SBIR/STTR funds)
- No dollar or time limits



Award Timeline



Second Phase II

- Phase IIA: For projects requiring more time and funding than available with a single Phase II award to complete prototype or process development
- Phase IIB: For projects that have successfully completed prototype or process development and require additional R&D funding to transition an innovation towards commercialization

Third Phase II—SBIR only

- Commercialization Pilot Program authorized by Congress through 2022
- Requires 1:1 investor matching funds

Intellectual Property

- Patent rights
 - Small business concerns normally retain the principal worldwide patent rights to any invention developed with Government support
- Government Use
 - The Federal Government receives a royalty-free license for Federal Government use



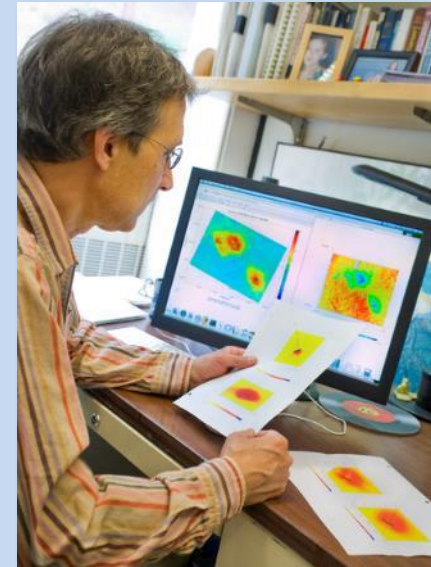
<http://www.uspto.gov/>



Data Protection

- Protection Period
 - Data generated from your R/R&D is protected from public disclosure for 20 years
- Government Use
 - The Government retains a royalty-free license for Government use of any technical data delivered under an SBIR award, whether patented or not

Effective
May 2019



FY 2020 SBIR/STTR Phase I Funding Opportunity Announcements

Phase I Release 1

- Office of Advanced Scientific Computing Research (ASCR)
- Office of Basic Energy Sciences (BES)
- Office of Biological and Environmental Research (BER)
- Office of Nuclear Physics (NP)

Phase I Release 2

- Office of Cyber Security, Energy Security, and Emergency Response (CESER)
- Office of Defense Nuclear Nonproliferation (NA)
- Office of Electricity (OE)
- Office of Energy Efficiency and Renewable Energy (EERE)
- Office of Fossil Energy (FE)
- Office of Fusion Energy Sciences (FES)
- Office of High Energy Physics (HEP)
- Office of Nuclear Energy (NE)



Schedule: FY 2020 Phase I, Releases 1 & 2

Phase I FOA Schedule	Release 1	Release 2
Topics Issued	Monday, July 15, 2019	Tuesday, October 12, 2019
Webinar(s)	Week of July 22, 2019	Week of November 18, 2019
FOA Issued	Monday, August 12, 2019	Monday, December 16, 2019
Webinar(s)	Friday, August 16, 2019	Friday, December 20, 2019
Letters of Intent (LOI) Due	Tuesday, September 3, 2019	Monday January 6, 2020
Non-Responsive LOI Feedback Provided	Tuesday, September 24, 2019	Monday, January 27, 2020
Applications Due	Tuesday, October 15, 2019	Monday, February 24, 2020
Award Notification	Monday, January 6, 2020*	Monday, May 18, 2020*
Projected Grant Start Date	Tuesday, February 18, 2020	Monday, June 29, 2020

**preliminary dates subject to change*



Assistance for the Application Process

- We have an online learning system to assist new applicants:
 - <http://www.doesbirlearning.com/>
- Additional resources can be found on our website:
 - <https://science.energy.gov/sbir/applicant-resources/>
- First time applicants are also eligible to utilize of Phase 0 Application Assistance Program:
 - <http://www.dawnbreaker.com/doephase0/>
 - Services
 - Letter of Intent (LOI) writing assistance
 - Phase I Proposal Preparation, Review and Registration Assistance
 - Market Research Assistance
 - Small Business Development Training, Mentoring and Registrations
 - Technology Advice and Consultation
 - Intellectual Property Consultation
 - Indirect Rates and Financials



Commercialization

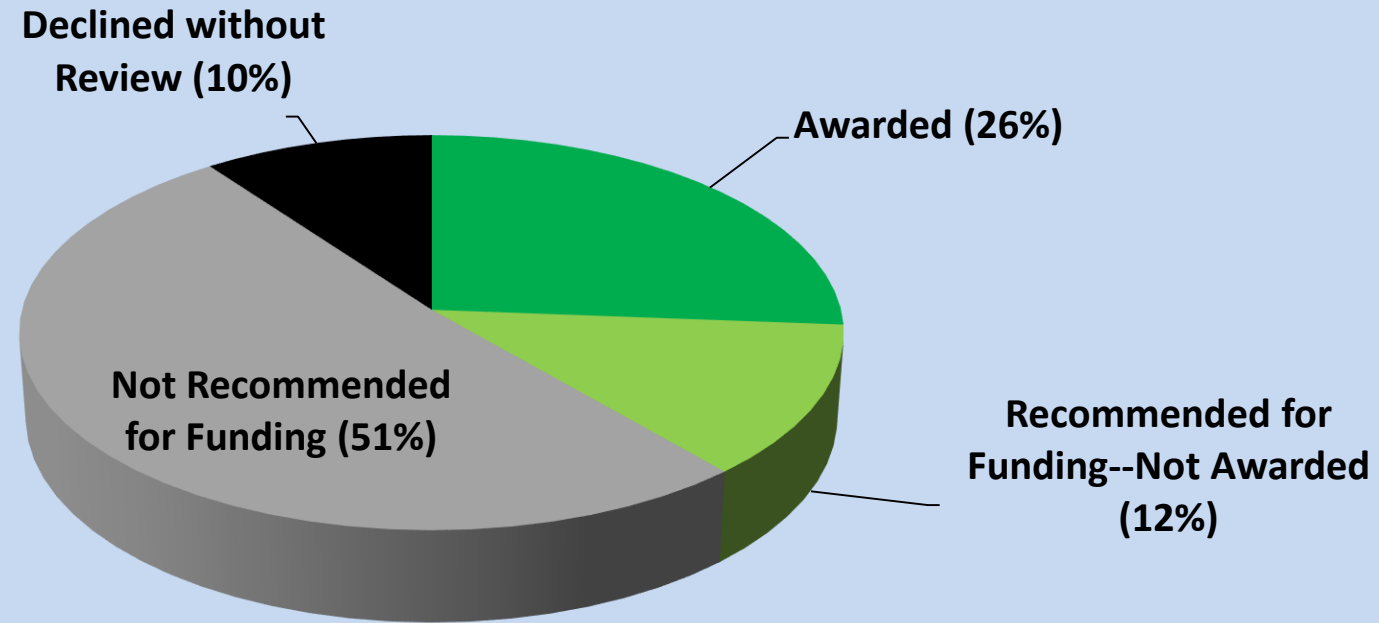
- DOE topics are drafted by program managers who are aware of the technology roadblocks but may not be aware of the commercialization challenges
- Small business applications are expected to address the commercialization challenges and ensure that there is a profitable business opportunity
 - Phase I & II Applications must include Commercialization Plans
 - Commercialization Plans accommodate long commercialization timeframes: emphasis on first 10 years of commercialization beginning with first sale
 - Commercialization in adjacent markets can also be included
- DOE performs follow-up surveys to track commercialization outcomes of its SBIR/STTR awards
- Commercialization Assistance provided to Phase I/II grantees:
 - \$6500 for Phase I; \$50,000 for Phase II
 - You may use the DOE vendor or your own vendor(s)

Increased in
FY 2019



Phase I Application & Award Statistics for FY 2018

- Phase I
 - 1,546 applications
 - 402 awards



QUESTIONS?

Contact information:

- DOE SBIR/STTR Operations: 301-903-5707
- DOE SBIR/STTR Email: sbir-sttr@science.doe.gov

Our Website:

- DOE SBIR/STTR main website: www.science.energy.gov/sbir

Join our Mailing List:

- Join our Mailing List – this field is on every DOE SBIR/STTR web page

DOE Phase 0 Assistance Program: <http://www.dawnbreaker.com/doephase0/>

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