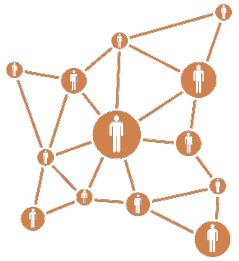
Improving Access to SBIR and Other Federal Grant Programs | 03.04.21

CLEAN ENERGY BUSINESS NETWORK®

the small business voice for the clean energy economy

Policy Support

Market & Technology Education



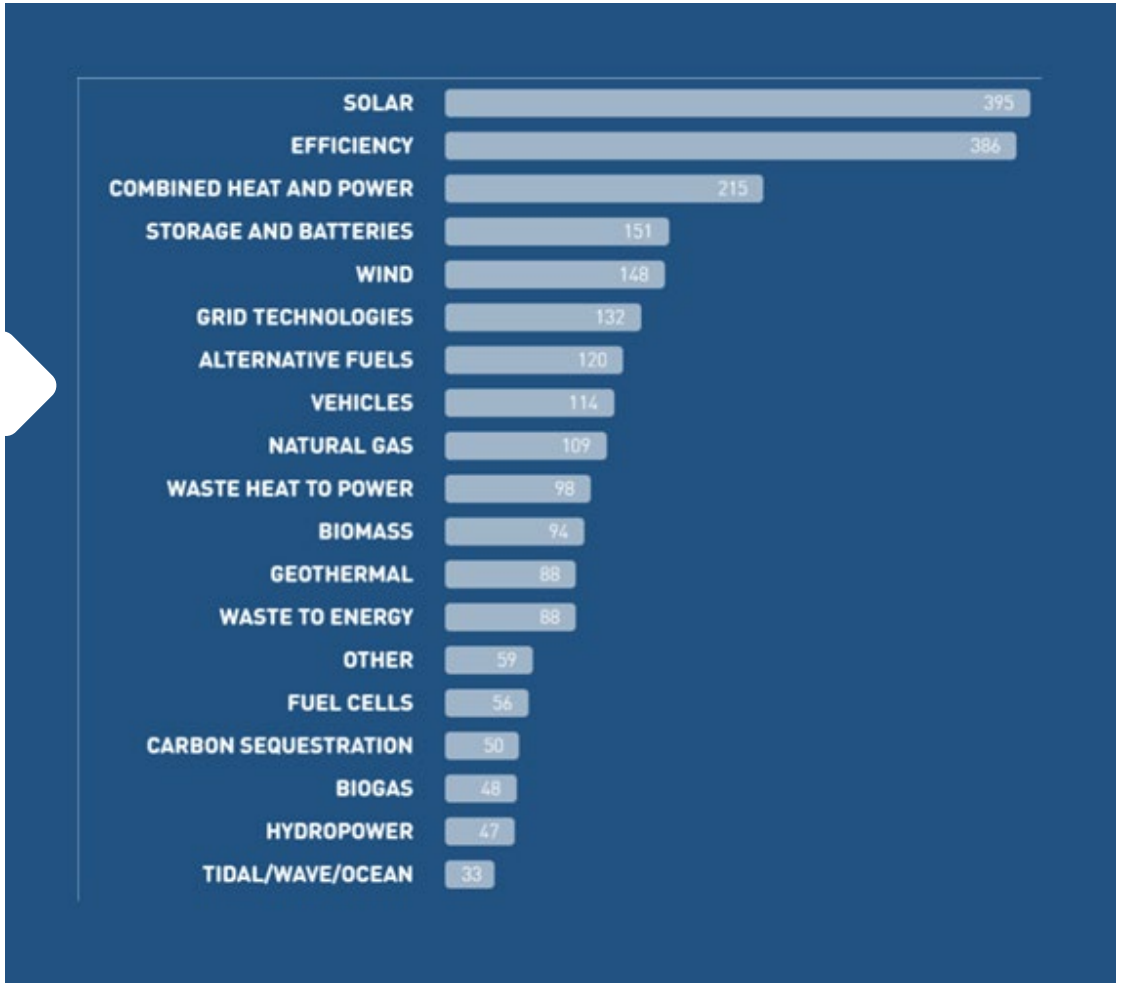
Business Development Assistance

OUR MISSION

OUR REACH

5,000+ small and midsize business leaders across 50 states

Diverse technologies



CLEAN ENERGY BUSINESS NETWORK

STAKEHOLDER DISCUSSIONS

- Low-Carbon Fuels Standards and Transportation Decarbonization (Feb. 22)
- Improving Access to SBIR and Federal Energy Innovation Programs (today)
- Industrial Decarbonization and Buy Clean Procurement Policies (April)
- Innovative Financing for Technology Demonstration and Commercialization (May)
- Introductory Roundtables with DOE Program Offices (June)
- National Institutes for Energy Innovation/DOE Reorganization Proposals (July)

THE JUNCTION BOX

MEMBERS-ONLY SALONS

Premium (dues-paying) members only – Business Network or Executive Circle:

- How can we decarbonize the U.S. transportation sector?
- How can we decarbonize the U.S. industrial sector?
- How can we incentivize the green hydrogen economy?
- How do we create money out of nothing (i.e., provide innovative financing for clean energy)?
- How do we continue to grow our businesses in an uncertain economy?
- How do we solve the talent/expertise/training gap for the clean energy industry?
- How can we promote diversity and inclusion in the clean energy industry?
- How can we demonstrate/commercialize new "startup" technologies?
- How do we run the "business" part (i.e., HR, accounting, equity ownership) of our companies more efficiently/effectively?
- How can we convince customers to spend money to save money down the road?
- How can we protect intellectual property at low cost?
- How can clean energy play a bigger role in supporting emergency & disaster relief in crises?

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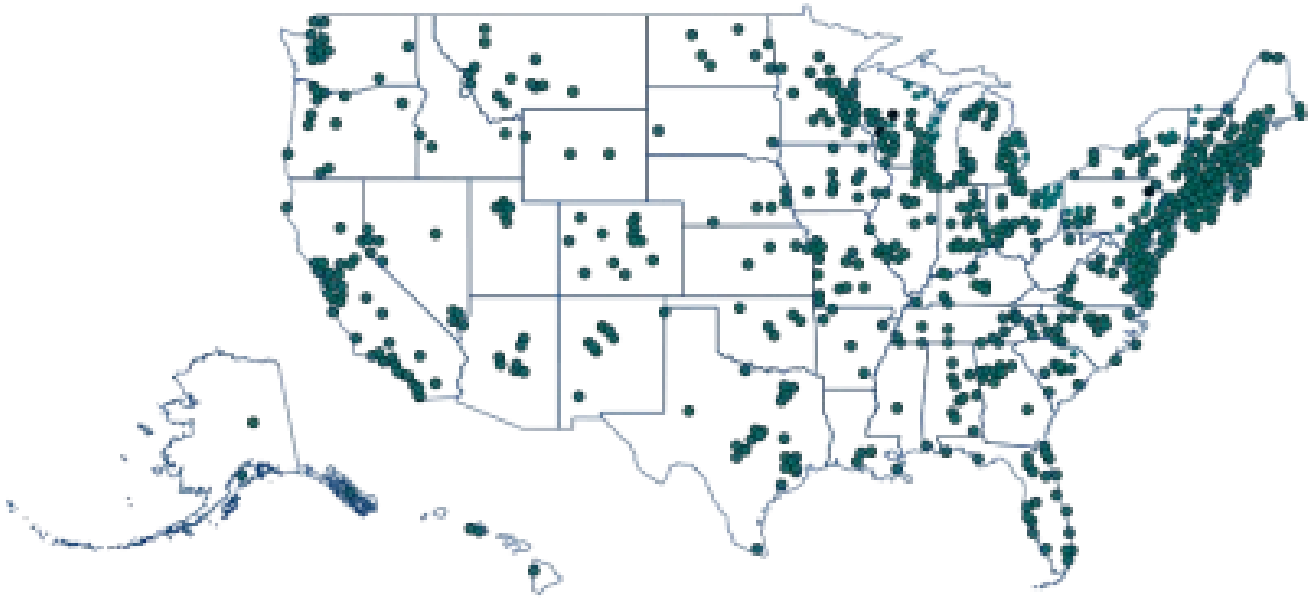

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KICKSTARTER:
Doug Rand
Federation of American Scientists

Intro to the Small Business Innovation Research (SBIR) program

Doug Rand (drand@fas.org)

Senior Fellow, Federation of American Scientists

Former Assistant Director for Entrepreneurship,
White House Office of Science and Technology Policy

Overview

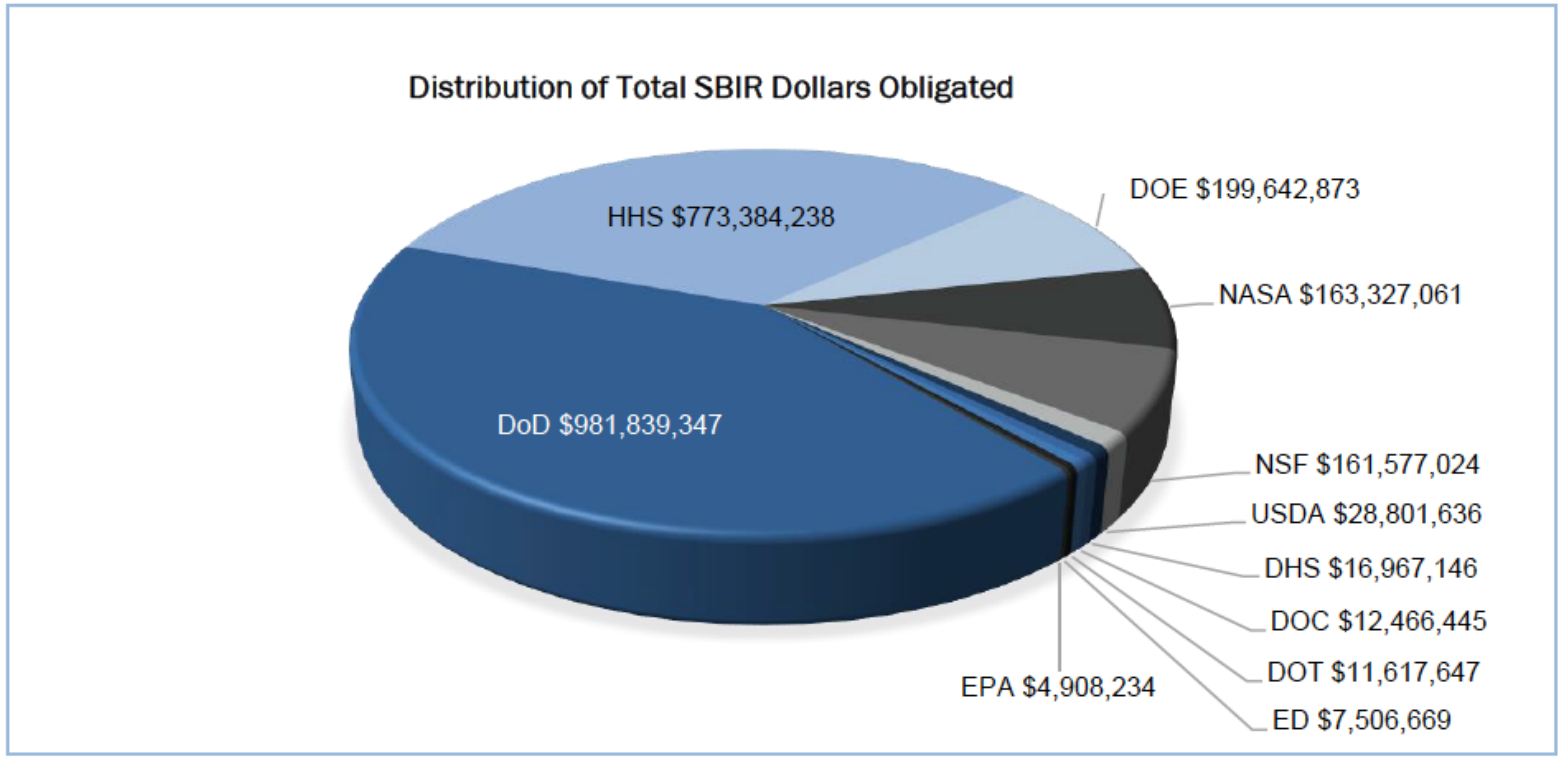
- Established by Congress in 1982, the Small Business Innovation Research (SBIR) program is the federal government's largest annual funding opportunity available exclusively to startups and small businesses.
- Over $3.5 billon awarded to nearly 3,800 firms in Fiscal Year 2019.
- Monitored and coordinated by the U.S. Small Business Administration.
- Awards administered by 11 other federal agencies, each of which is obligated by Congress to set aside 3.65% of its extramural R&D budget:
  - 3.20% for SBIR awards (100% goes to the small business)
  - 0.45% for Small Business Technology Transfer (STTR) awards (typically 70% goes to the small business and 30% to a university partner)

Overview

- The vast majority of these funds are awarded by just five agencies, more or less independently of one another:

- Department of Defense (DOD)
- National Institutes of Health (NIH/HHS)
- Department of Energy (DOE)
- National Science Foundation (NSF)
- National Aeronautics and Space Administration (NASA)

Chart 1: Distribution of Total SBIR Dollars Obligated - Participating Agencies



Overview

- These awards must be spent almost exclusively on the small business' R&D expenses (including salary).
- The funding is non-dilutive (i.e. the government receives no direct financial upside).
- Awards are divided into multiple phases with the ultimate goal of new technology commercialization:
  - **Phase I:** $150,000-225,000 during a period of 6-12 months, to establish technical feasibility and commercial potential.
  - **Phase II:** $750,000-1,000,000 during a period of up to 2 years, to support further technology R&D and commercialization efforts.

Overview

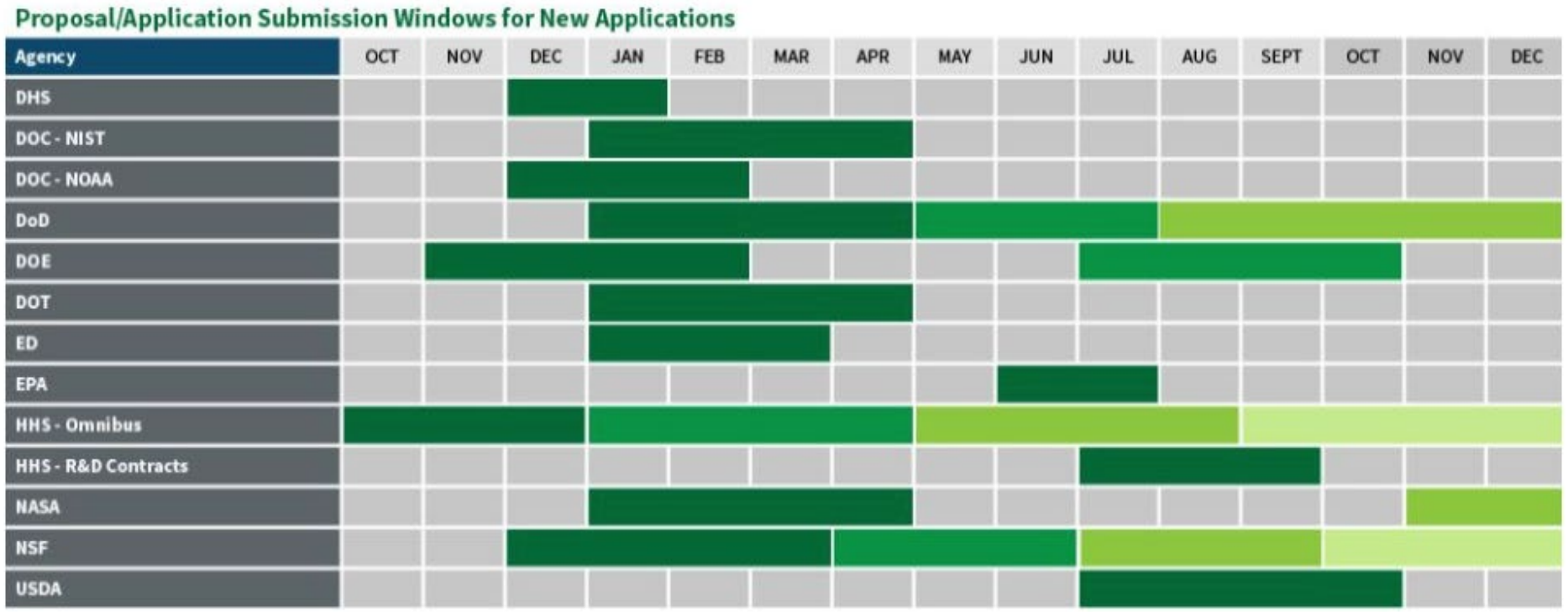
- **Phase IIB:** Some agencies allow follow-on awards; for example, NSF will provide a 1:2 match with private-sector investment up to a total of $1.5 million.

- **Phase III:** Not actually part of the SBIR program, “Phase III” generally refers to a direct or sole source procurement of an SBIR-funded technology (typically by DOD or NASA).

How to apply

- Agencies typically issue 1 or 2 funding notices each year

https://www.sbir.gov/solicitations



How to apply

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https://www.sbir.gov/solicitations

Schedule: Phase I

AGENCY	PRE-RELEASE	OPENS	CLOSES
Department of Health and Human Services		Multiple Dates	Multiple Dates
Department of Defense: 21.A and 21.1 BAA	Dec-8-2020	Jan-14-2021	Mar-04-2021
Department of Commerce: NIST		Jan-25-2021	Apr-14-2021
Department of Transportation		Feb-04-2021	Mar-08-2021
National Science Foundation		Feb-12-2021	Mar-04-2021
Department of Defense: 21.A and 21.1 BAA	Dec-8-2020	Jan-14-2021	Mar-04-2021
Department of Defense: 21.B and 21.2 BAA	Apr-21-2021	May-19-2021	Jun-17-2021
Department of Defense: 21.C and 21.3 BAA	Aug-25-2021	Sept-23-2021	Oct-22-2021
Environmental Protection Agency		Jun-2021	Sep-2021
Department of Agriculture		Jul-2021	Oct-2021
Department of Commerce: NOAA		Oct-2021	Jan-2022
National Aeronautics and Space Administratio		Nov-2021	Jan-2022
Department of Homeland Security		Dec-2021	Jan-2022
Department of Education		Dec-2021	Jan-2022
Department of Energy		Dec-2021	Feb-2021

How to apply

Research topics can be broad…

(e.g. NSF is essentially open to anything that doesn't require clinical trials)

Technology topic areas

Review this list of technology topic areas (sectors we fund) to see which best aligns with your company's work. If none of the technology topic areas quite reflects your work, but you feel your company is otherwise a good fit, you can apply under the Other Topics (OT) category.

→ Advanced Manufacturing (M)
→ Advanced Materials (AM)
→ Artificial Intelligence (AI)
→ Biological Technologies (BT)
→ Biomedical Technologies (BM)
→ Chemical Technologies (CT)
→ Digital Health (DH)
→ Distributed Ledger (DL)
→ Educational Technologies and Applications (EA)
→ Energy and Power Systems (EP)
→ Environmental Technologies (ET)
→ Information Technologies (IT)
→ Instrumentation and Hardware Systems (IH)
→ Internet of Things (I)
→ Medical Devices (MD)
→ Nanotechnology (N)
→ Other Topics (OT)
→ Photonics (PH)
→ Quantum Information Technologies (QT)
→ Robotics (R)
→ Semiconductors (S)
→ Sensors (SE)
→ Space (SP)
→ Wireless Technologies (W)

How to apply

…or very narrow.

(e.g. DOD defines very specific mission needs with an eye toward ultimate acquisition)

A19-154 TITLE: Remote Optical Surface Contaminant Detection and Mapping

TECHNOLOGY AREA(S): Chemical/Biological Defense

OBJECTIVE: Develop remote optical sensor receiver for the non-contact detection and geospatial mapping of chemical contaminants on surfaces.

DESCRIPTION: Surface contamination by chemical warfare agents presents a serious threat both to the civilian and military sectors and an adequate defense against these weapons will require rapid detection and identification of both known and unknown agents. Methods of detecting and localizing chemical contamination on operational surfaces is limited to contact sampling and analysis by colorimetric or molecular analysis, forcing a time- and resource-intensive reconnaissance mission that places personnel or systems into direct contact with the hazardous materials in order to interrogate the surface. Recent advances in laser-based optical spectroscopy demonstrate the efficacy of non-contact remote methods for the sensing of chemical on surfaces. Ultraviolet Raman spectroscopy affords one demonstrable means for non-contact optical detection of hazardous materials on surfaces, but the standoff range is limited by atmospheric attenuation of the laser source. An alternative to standoff illumination and sensing of the spectral signature would be the application of remotely-piloted unmanned systems fitted with the laser and spectrometer; however, unmanned ground vehicles have limited maneuverability and would become contaminated on contact with the contaminated surface in order to map the contaminated area. Unmanned aerial systems (UAS) have much greater maneuverability, but a limited mission life and payload size, weight, and power (SWAP) budget. A possible compromise to minimize the SWAP of the UAS payload would be to mount a laser source on the base platform (e.g. the Nuclear Biological Chemical Reconnaissance Vehicle) and mount an optical receiver/analyzer on the UAS. An integrated system that mounts a receiver on a UAS and synchronizes the flight path of the UAS to follow the laser spot on the surface would enable the detection of contaminants without necessarily contaminating the UAS platform. A standoff range from the NBCRV of 50 meters (threshold) to 100 meters (objective) with a 1-meter (threshold) to 2-meter (objective) standoff range for the UAS-mounted receiver would enable the rapid remote interrogation and geospatial mapping of contaminants on surfaces while protecting the reconnaissance platforms from contamination due to contact with the chemical hazard.

PHASE I: Conduct a feasibility study of detecting liquid contaminants on the ground using a remote, autonomous UAS-mounted receiver paired with a larger, vehicle-mounted laser illumination source. Perform laser-illuminated spectral measurements of a contaminant deposited on concrete, asphalt, grass, and sand surfaces using a static (laboratory bench) system in order to prove the detection concept. Appropriate simulant or toxic industrial chemical targets for this study would include the insecticides malathion and parathion, representing solid and liquid state hazards, respectively. Measurements should be performed using liquid droplets of mission-relevant sizes (~500 μm, micron) on the various relevant surfaces at aerial concentrations of 10 grams/square meter or less. Using the proof-of concept results, develop a system model and conceptual design of a fast hyperspectral line imaging detection system for on-the-move detection.

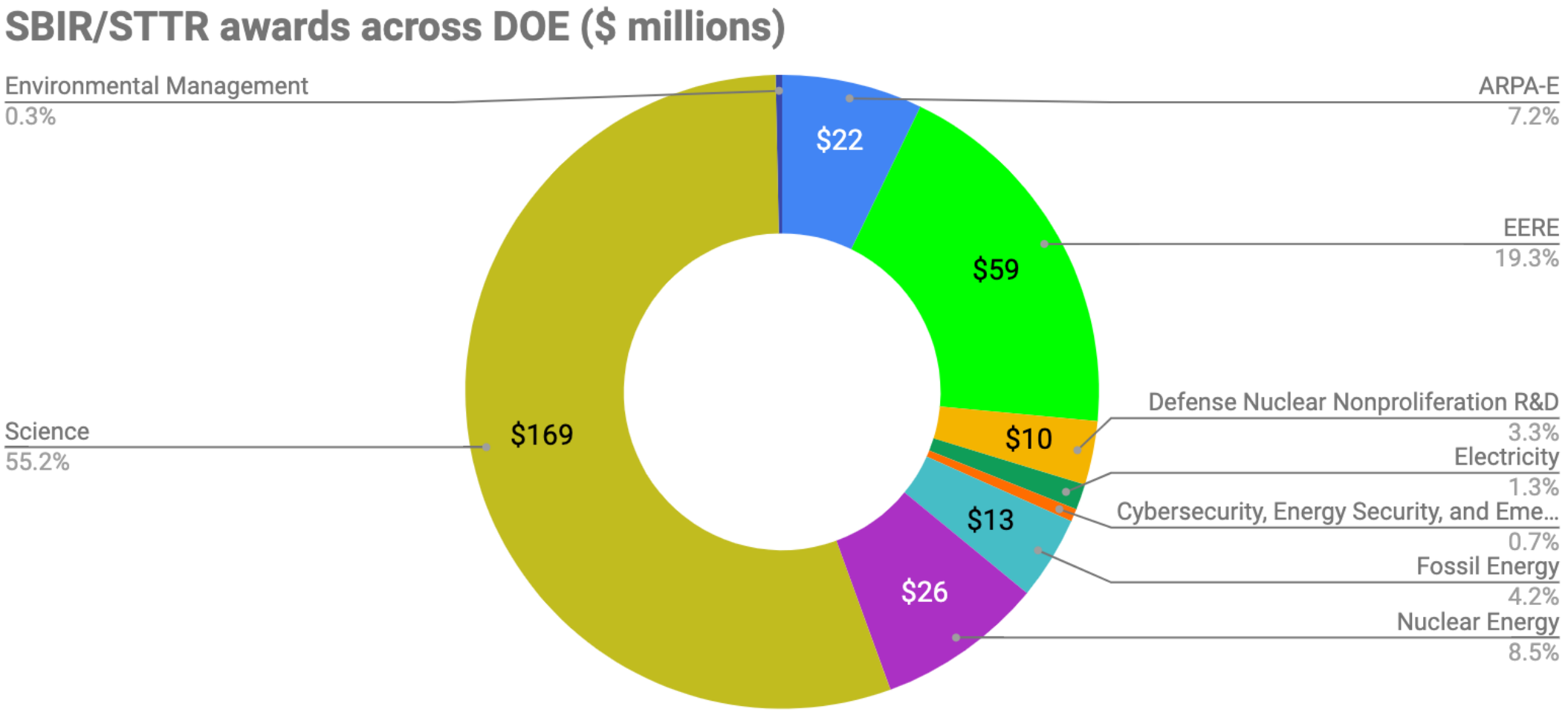
PHASE II: Develop a prototype demonstration system using the results of the Phase I study. The remotely operated unmanned aerial vehicle should travel at speeds up to 45 mph with a standoff distance of 1-2 meters from the surface while tracking the laser spot projected onto the surface from 50 meters (threshold) to 100 meters (objective) at slant angles approaching 180 degrees. The system should be able to detect 10 grams per square meter (threshold) to less than 1 gram per square meter (objective) of solid or liquid contaminants. Develop necessary data acquisition, telemetry, and analytic signal processing system to provide real-time detection of chemical agents and toxic industrial chemicals in real time. Size, weight, and power constraints impose a limit of 50,000 cm3, 50 lbs, 350 watts on the laser source and 1000 cm3, 6 lbs, 150 watts on the remote optical sensing platform. Dual-use functionality of the laser source to provide light detection and ranging capabilities are desired, but not required.

PHASE III DUAL USE APPLICATIONS: Further research and development during Phase III efforts will be directed towards refining a final deployable design, incorporating design modifications based on results from tests conducted during Phase II, and improving engineering/form-factors, equipment hardening, and manufacturability designs to meet the operational requirements of the Joint Chemical and Biological Defense Program, U.S. Army CONOPS and end-user requirements. PHASE III DUAL USE APPLICATIONS: There are many environmental applications for a sensitive remote chemical detector/identifier. A rugged, sensitive, and flexible remotely operated chemical detector will benefit precision agriculture by providing accurate validation of crop chemical applications and plant health. Environmental remediation industries would benefit from the sensitive detection, localization, and mapping of chemical spills and fugitive emissions from industrial incidents. Homeland security and environmental regulation offices can use the technology to characterize and remediate domestic crises such as natural disasters.

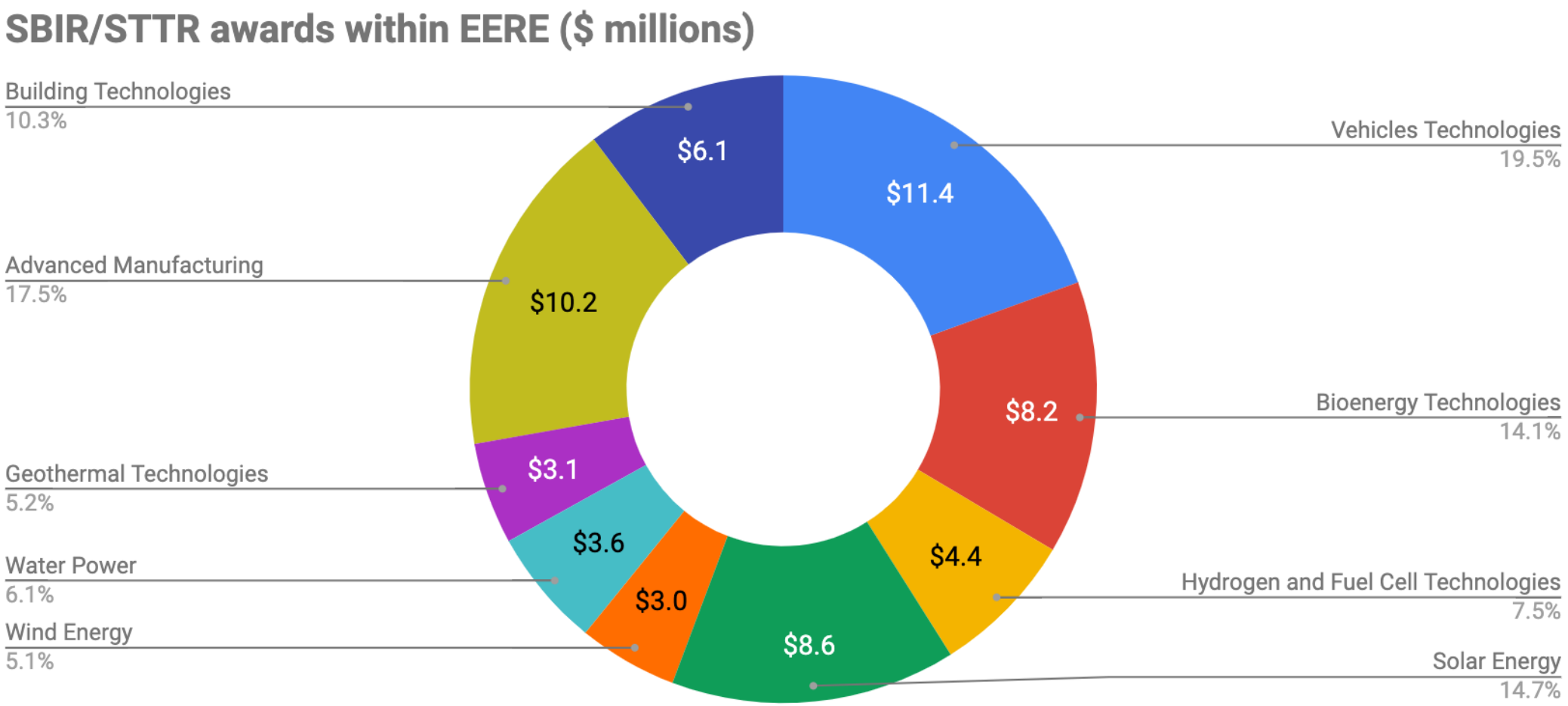
How to apply

- Get early feedback from the relevant Program Manager
- Get a DUNS number
- Register with the federal System for Award Management (SAM)
- Tee up letters of recommendation
- Write up a lengthy proposal according to the agency's particular guidelines (consultant optional!)
- Submit proposal
- Wait several months for a decision
- Wait a few more months for the funding

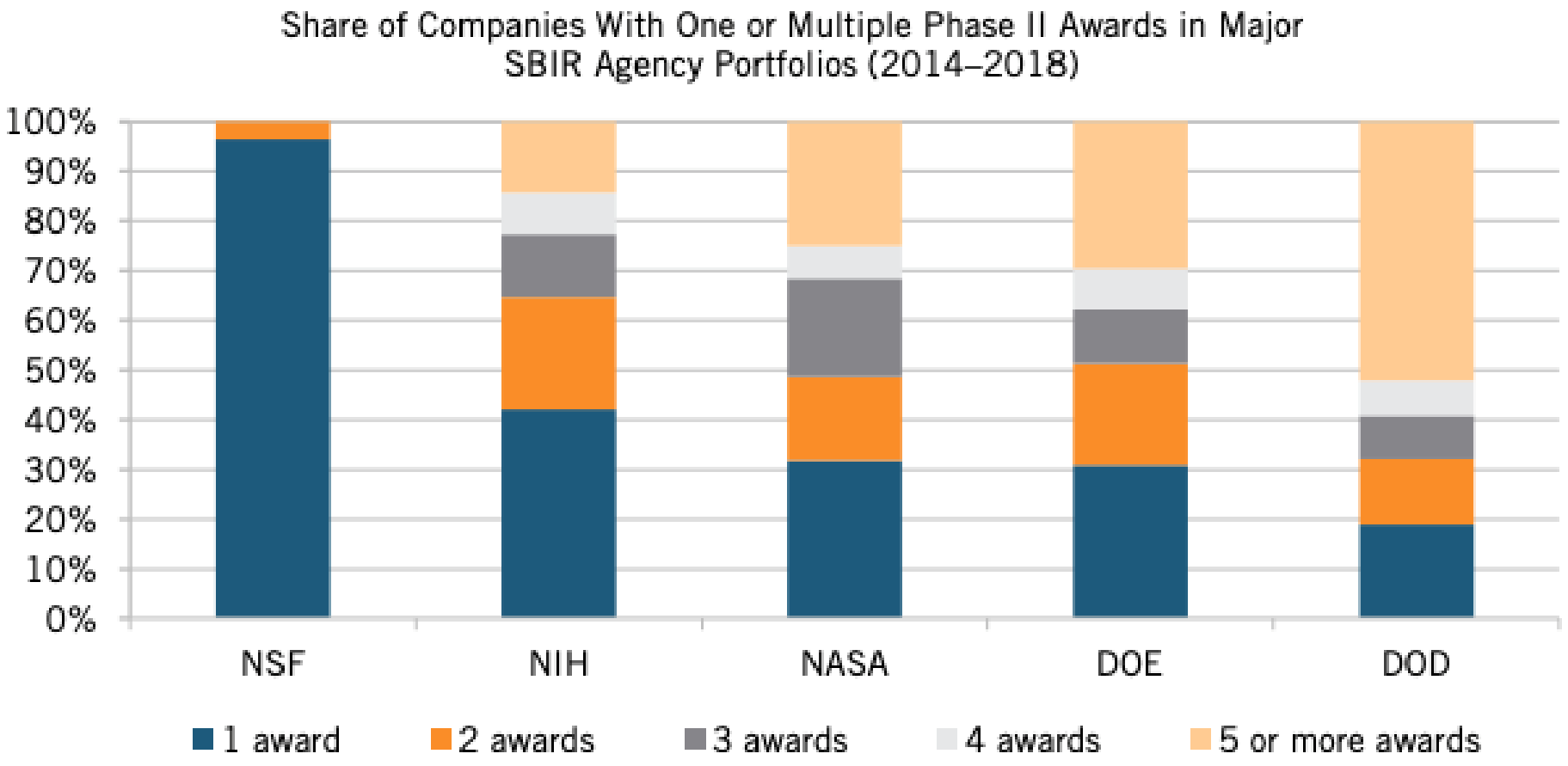
Department of Energy



Department of Energy

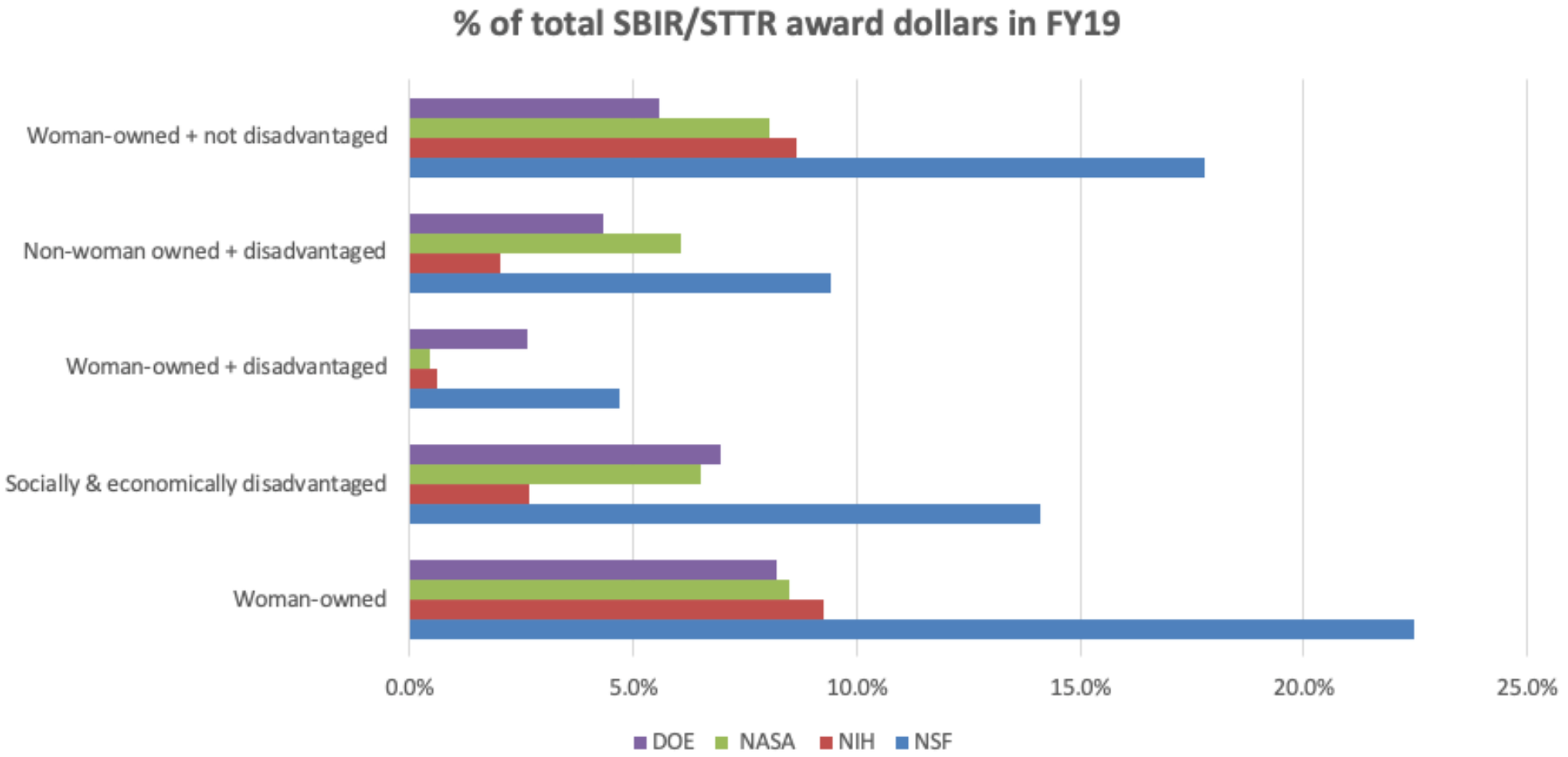


Agency comparisons



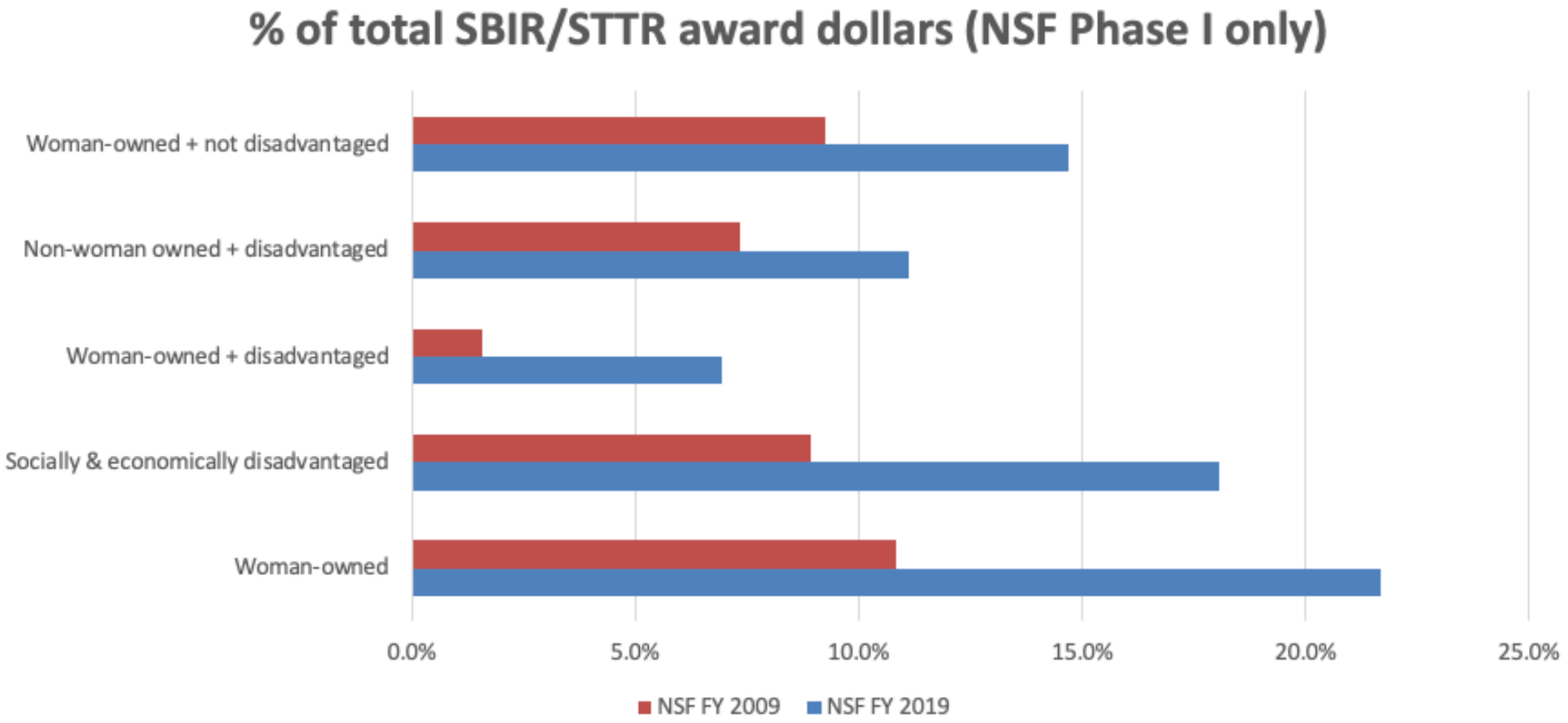
(Source: ITIF)

Agency comparisons



(Source: Author's analysis of SBIR award data.)

Agency comparisons



(Source: Author's analysis of SBIR award data.)

Further reading

- SBA annual reports
- SBIR data dashboard
- National Academies reports on SBIR by agency
- NSF SBIR featured companies
- DOE SBIR featured companies

[Appendix: Policy recommendations]

Suggested improvements (Congress)

Agency Excellence

- Recommendation: *Make the Administrative Funding Pilot Program permanent.*
- Background: Since 2011, agencies have been allowed to use 3% of SBIR/STTR funds for program improvements, yielding a profusion of innovative initiatives to diversify the applicant pool, upgrade data reporting systems, and provide high-impact entrepreneurship training. Agencies need long-term certainty to make these critical improvements to their SBIR/STTR programs, without the risk of this authority lapsing as it has done in the recent past.

Suggested improvements (Congress)

Entrepreneurial Authority

- Recommendation: *Allow Technical and Business Assistance funds to be spent in-house, rather than mandating one or more external vendors.*
- Background: Recently, SBIR/STTR awardees have been allowed to spend up to $50,000 of their awards on non-R&D expenses such as technical and business expertise. Entrepreneurs should have the discretion to allocate these dollars in the most efficient way, so they should be allowed to choose between spending on their own employees who possess that technical and business expertise, or a contractor of their choice.

Suggested improvements (Congress)

Award Flexibility

- Recommendation: *Extend direct-to-Phase-II authority to all agencies, and make it permanent.*
- Background: For most agencies, only prior recipients of a Phase I (Feasibility and Proof of Concept) award are eligible to apply for Phase II (Research and Development) award. Every agency should be able to make a Phase II award without a prior Phase I award if the small business is ready for it.

Suggested improvements (Congress)

Award Size

- Recommendation: *Make the Commercialization Readiness Pilot Program for Civilian Agencies and the Commercialization Assistance Pilot Program permanent.*
- Background: Agencies have responsibly used their authority to make follow-on SBIR/STTR awards to promising companies after Phase II, when there is a clear but lengthy path to commercialization (e.g., completing the drug approval pipeline). Agencies need long-term certainty that these authorities will not lapse or expire.

Suggested improvements (Congress)

Short-Form Applications for First Round of Consideration

- Recommendation: *Ensure that agencies create a system for reviewing and greenlighting short-form project descriptions before requiring a more time-intensive full application.*
- Background: Preparing a high-quality application is a complex and time-intensive task for any small business. Reviewing lengthy applications that are a poor fit is also a waste of federal resources and staff time. Some federal agencies provide a short-form initial application that is only a few pages long and can be completed without professional assistance. This approach should be used by all agencies to screen submissions for eligibility and fit.

Suggested improvements (Congress)

Vouchers for Application Assistance, Particularly for Diverse Teams

- Recommendation: *Create an independent program administered by the SBA—or competitively bid to an external contractor—to review successful short-form applications on the basis of need and provide vouchers for professional assistance.*
- Background: Once selected to proceed with a full application, first-time applicants should be eligible to compete for $3,000-5,000 vouchers from SBA that pay for high-quality technical assistance from professional consultants or state/local assistance programs of their choosing. In allocating these awards, particular preference should be given to underrepresented populations, regions, and universities. This practice will ensure that the most promising technical ideas are able to compete for awards, regardless of the team's size or prior experience working with the federal government.

Suggested improvements (Congress)

Support for Science-Based Entrepreneurship Programs

- Recommendation: *Encourage agencies to allocate funding toward entrepreneurship programs within federal laboratories and universities.*
- Background: Over the past five years, innovative entrepreneurship training programs at universities and federal laboratories have generated above-average cohorts of promising SBIR/STTR awardees. Examples include Chain Reaction Innovations at Argonne National Lab, Cyclotron Road at Berkeley Lab, The Engine at MIT, Innovation Crossroads at Oak Ridge National Lab, and numerous incubators and accelerators across the country. Agencies should be encouraged to competitively allocate some of their funding to existing and future programs that build a pipeline of highly-educated entrepreneurs pursuing tough technical challenges.

Suggested improvements (Congress)

Investor Validation

- Recommendation: *Allow companies with venture capital (VC) majority ownership to qualify if they meet the small business intent of the SBIR/STTR program.*
- Background: Currently, companies that are majority-owned by venture capital funds are excluded from most SBIR/STTR awards. Agencies should have the discretion to waive this requirement, however, for companies that truly serve as independent businesses yet rely upon the financial backing of single or multiple VCs. These companies have been heavily validated during the VC screening process, and such ownership is frequently a natural stage of the progression toward commercialization.

Suggested improvements (agencies)

Dedicated Program Managers

- Recommendation: *Encourage agencies to develop teams of dedicated program managers who possess relevant private-sector experience and the ability to work closely with awardees both before and after awards are made.*
- Background: Many SBIR/STTR programs are administered as a small portion of an R&D portfolio managed by agency staff with numerous competing priorities. To cater to the unique needs of small businesses with early-stage technologies, it is often ideal to deploy a team of program managers with relevant private-sector experience who focus exclusively on SBIR/STTR awards, akin to the approach used by typical ARPA-E and DARPA program managers.

Suggested improvements (agencies)

Broad, Goal-Oriented Topics

- Recommendation: *Encourage agencies to design solicitations based on broad technologies of interest rather than narrow pre-defined research topics.*
- Background: Some agencies, such as the National Science Foundation, request more broadly-defined, goal-oriented proposals, whereas others are highly prescriptive in their solicitation topics and may miss highly-impactful, mission-relevant technology solutions proposed by entrepreneurs themselves.

Suggested improvements (agencies)

Speed and Flexibility

- Recommendation: *Encourage the use of prizes and other flexible types of transactions to shorten award times. Having dedicated program managers would also help increase speed and flexibility.*
- Background: Fast-moving small businesses cannot wait months or a year to hear about funding sources. To the extent possible, agencies should shorten selection and award times, and offer multiple—or even continuous—funding opportunities each year.

Suggested improvements (agencies)

Phase III Opportunities

- Recommendation: *Encourage agencies to educate and solicit successful SBIR/STTR awardees to seek and win contracts across the federal government based on agencies' missions and needs.*
- Background: While many agencies offer Phase III (non-SBIR/STTR funding) opportunities, this is typically not widely advertised or understood. Successful SBIR/STTR technologies may have broad applications across the federal government, and facilitating their procurement to serve agency missions is in the best interest of taxpayers.

Other potential improvements (Congress)

Set-Aside Percentages

- Recommendation: Making SBIR permanent and increasing the set-aside percentage would be helpful, but it is more important to optimize agencies' use of current SBIR/STTR funds.
- Background: Agencies are currently required to allocate 3.65% of their extramural R&D budgets to SBIR/STTR, which in aggregate exceeded $3 billion in Fiscal Year 2019. The program also must be reauthorized every few years. Congressional debate has focused on increasing the percentage and making the programs permanent. However, feedback from SBIR recipients thus far has focused more on improving implementation.

STAKEHOLDER DISCUSSION QUESTIONS

For each of these, identify which agencies you are referencing as they each have subtle differences in their SBIR programs.

- How did the letter of intent format work for you? Was the structure optimal or could it be improved in any way?
- Would you prefer to spend your commercialization assistance dollars (generally around $50,000) in-house or on an external vendor?
- Would it be helpful to have a database of external vendors that prior recipients have leveraged for business/commercialization/technical expertise?
- As a first-time applicant, did you use any federal application assistance programs (e.g., Dawnbreaker)? Was this helpful? Are there any ways you would like to see it improved? What kind of assistance would be most helpful to you?
- In the full application, what kinds of information do you think is most critical for agencies to advance applicants? What questions are most confusing? Are there any questions that place larger burdens on applicants that may not be critical?
- Are you aware of the Lab Partnering Service platform? Are there any other resources that you are aware of that could be helpful for applicants?
- For those that have successfully won Phase II awards, what did you find most helpful about the program? Do you see any areas where the system can be improved?
- For those that have successfully won an SBIR Award, was your experience with your program manager positive, neutral, or negative? Did you have the same program manager through the course of your award timeline? For those that had positive experiences, what makes for a good program manager? For those that had negative experiences, where could things have gone better?
- Are there any blind spots in the proposals we have put forward? Could you see any of these recommendations being counterproductive?
- Are there any recommendations we should be looking at that have not been covered? If you had the authority to improve the SBIR program, what would you prioritize given your experience?
- Is there anything that you know now that you wish you would have known about the process/program at the outset of your SBIR application?
- What other non-SBIR federal funding have you applied for and/or received? Are there any attributes of those programs that you think would be useful considerations for SBIR?