



***EERE SBIR/STTR FY 2016 Phase I (R2)
Funding Opportunity Announcement***

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EERE Overview

The **Office of Energy Efficiency and Renewable Energy (EERE)** is at the center of creating the clean energy economy today. EERE leads the U.S. Department of Energy's efforts to develop and deliver market-driven solutions for energy-saving homes, buildings, and manufacturing; sustainable transportation; and renewable electricity generation. EERE's Technology Offices have multiyear **plans** (<http://energy.gov/eere/about-us/plans-implementation-and-results#plans>), detailed **implementation processes** (<http://energy.gov/eere/about-us/plans-implementation-and-results#implementation>), and have demonstrated impressive **results** (<http://energy.gov/eere/about-us/plans-implementation-and-results#results>)

ENERGY EFFICIENCY

- Advanced Manufacturing
- Building Technologies

RENEWABLE POWER

- Geothermal Technologies
- Solar Energy Technologies
- Wind & Water Technologies

SUSTAINABLE TRANSPORTATION

- Bioenergy Technologies
- Hydrogen & Fuel Cell Technologies
- Vehicle Technologies

EERE SBIR/STTR Overview

<http://energy.gov/eere/sbir>

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- SERVICES
- EFFICIENCY
- RENEWABLES
- TRANSPORTATION
- ABOUT US
- OFFICES >

[Home](#) > [Small Business Innovation Research and Small Business Technology Transfer Programs](#)

SMALL BUSINESS INNOVATION RESEARCH AND SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAMS

[Technology-to-Market Home](#)

[About the Technology-to-Market Program](#)

[Cleantech University Prize](#)

[Energy Transition Initiative](#)

[Lab-Corps](#)

[Small Business Innovation Research](#)

[Eligibility](#)

[Funding Phases](#)

[Funding Schedule](#)

[Funding Topics](#)

[How to Apply](#)

[Selection Process](#)

[Current Portfolio](#)

[Success Stories](#)

[Blog](#)

[Contact Us](#)



The Office of Energy Efficiency and Renewable Energy's (EERE's) combined Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program is among many U.S. Department of Energy (DOE) SBIR/STTR programs that provide grants to small businesses or individuals who can form a small business within the required application timeline. Grants are competitively awarded for the development and commercialization of new ideas and innovative research. To date, DOE and EERE SBIR/STTR programs have provided funding to thousands of small businesses, including newly established small businesses, across the country.

EERE's SBIR/STTR program is aligned with the federal [Small Business Administration SBIR program](#) and EERE's mission to lead DOE efforts to develop and deliver market-driven solutions for energy-saving homes, buildings, and manufacturing, sustainable transportation, and renewable electricity generation.

While other federal or DOE SBIR/STTR programs may operate on different schedules, EERE provides funding to competitively selected clean energy technology small businesses once per year. New financial awards are known as Phase I awards. Follow-on awards made to previous Phase I awardees are known as Phase II awards. In rare cases, Fast-Track funding may be available, which is the simultaneous granting of a Phase I and Phase II award. All EERE SBIR/STTR awards follow the "Release 2" [schedule](#). Learn more about SBIR/STTR funding [phases](#).

POPULAR TOPICS

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[Eligibility](#)

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[Selection Process](#)

[Current Awardees](#)

[Other Federal Agency Programs](#)

Overview and SubTopic Summary

Topic/Subtopic	Topic Summary	Subtopic(s)
9/a,b,c,d	Advanced Manufacturing	4
10/a,b,c	Bioenergy	3
11/a,b	Buildings	2
12/a,b,c	Fuel Cells	3
13/a,b	Solar	2
14/a,b,c,d,e	Vehicles	5
15a	Water	1
16a	Wind	1

General Questions

Question 1: What are the requirements for Letters of Intent (LOIs)?

Answer: Everything you need to know about submitting an LOI is either in the FOA or in the List of Technical Topics that published November 2. Both are available on DOE's SBIR website at: <http://science.energy.gov/sbir/funding-opportunities/>

Please also bear in mind that the intent of the Phase I effort is to make proof of principle. The scale-up and commercialization activities may occur during Phase II and in some cases, beyond the completion of Phase II. You may want to focus your attention on developing methods to quantitative prove your price and performance improvements during Phase I. Your LOI should demonstrate that your are capable and knowledgeable on the subject so that we can determine if your full Phase I proposal is responsive to the technical topic, merits your time to prepare, and DOE's time to review.

Question 2: When are Letters of Intent due?

Answer: Letters of Intent, which are mandatory if you want to submit a proposal later, are due on December 21, 2015 at 5:00 p.m. ET. This is different that the deadline time for applications, which is 11:59 p.m. ET

Question 3: How many Phase 1 awards are intended to be awarded?

Answer: The FOA states the estimated amount of awards.

9. ADVANCED MANUFACTURING

The Advanced Manufacturing Office (AMO) (www1.eere.energy.gov/manufacturing/) partners with industry, small business, universities, and other stakeholders to identify and invest in emerging technologies with the potential to create high-quality domestic manufacturing jobs and enhance the global competitiveness of the United States.

a. Technology for the US Petroleum Refining Industry.

Contact: brian.valentine@ee.doe.gov.

b. Natural Gas and Manufacturing.

Contact: brian.valentine@ee.doe.gov.

c. Energy-Water Nexus.

Contact: david.forrest@ee.doe.gov.

d. Atomically Precise Structures and Devices for Catalysis.

Contact: david.forrest@ee.doe.gov.

10. BIOENERGY

The Bioenergy Technologies Office is focused on forming cost-share partnerships with key stakeholders to develop, demonstrate, and deploy technologies for advanced biofuels production from lignocellulosic and algal biomass.

a. Design and Fabrication of Solids Handling for Biomass Conversion Systems.

Contact: mark.elless@ee.doe.gov.

Question 1: The 2 design reports are similar in cost (80 v. 75 \$/dry ton, PNNL v NREL, resp.), but very different in ash content (0.9% v. 5.93%), moisture content (10% v. 25%), and particle size (2-6mm v. pellets of un-specified size). The FOA description is clear that continuous solids handling is the primary topic, but discussion of pre-processing steps to meet reactor throat requirements (comminution, blending, ash removal, metals removal, dirt washing, pelletization) is missing. Are we to understand that the topic is exclusively for materials movement?

Answer: The topic is for materials handling of feedstocks that would meet the in-feed specifications for either biochemical or thermochemical conversion.

Question 2: Would preconversion(heating) be beneficial for this Topic?

Answer: If this is to help the solids handling into the conversion throat, that would be acceptable.

10. BIOENERGY (cont.)

Question 3: Why are you holding the topic to 10% less for a robust solids handling system that can feed any material. Such a system would garner a premium price or if allowed to use such a system or method would require licensing fees, etc. Hence the reason my company spent lots of money designing a solids handling system using off-the-shelf components to feed into the PlasmaWhirl® Reactor.

Answer: In order to achieve a minimum fuel selling price that can be cost competitive with petroleum derived fuels, many costs have to be absorbed into the per-gallon production price. The intent of this topic area is to show how a robust solids handling system can improve not just the operability of fuels production facilities but also to ensure that the resulting products are cost competitive.

Question 4: An immediate commercial application is to feed ag residues to a farm-scale biochar reactor, but it would seem the SBIR interest is only for circa 2000 MT/day central plant biomass conversion systems. Can you please either confirm this; or expand on whether smaller applications with the ability to scale up would be responsive?

Answer: Smaller applications that can scale to 2000 MT/day would be responsive.

b. Liquefaction of Wet Organic Waste Streams using Sub- and Supercritical Fluids.

Contact: daniel.fishman@ee.doe.gov.

10. BIOENERGY (cont.)

c. Co-utilization of CO₂ and CH₄ to Produce Biofuel and Bioproduct Precursors. Contact:
daniel.fishman@ee.doe.gov

Question 1: Specifically, we have been developing an efficient low-temperature plasma reformer that can be used for dry reforming of CO₂ + CH₄ to syngas + C₂'s. The C₂'s produced by plasma dry reforming are primarily C₂H₂ and C₂H₄ with perhaps a small yield of C₂H₆ depending on operating conditions.

Answer: The topic expressed interest in C₂ and higher compounds with double bonds, which was a specific reference to ethylene. To the degree that a proposal focused on ethylene as a primary product, it would likely be considered responsive. C₂H₆ is not of material interest under this topic. Acetylene is responsive as the topic was written, but it is clearly a lower priority than ethylene.

Question 2: Our concept is take the biogas produced by anaerobic digesters operating on agricultural wastes and use an advanced membrane to separate the CO₂ from the CH₄. The CO₂ is used to accelerate the growth of algae in bioreactors that enable high CO₂ capture and high growth rates. A new technology under development enables algae to be harvested and dewatered to a cake with very low energy consumption. Oil is extracted from the algae and can be used to produce biodiesel and the algae cake recycled to the digester. A portion of the enriched methane from the membrane is used to provide heat for drying of algae cake prior to oil extraction as needed. The residual methane is used in an engine-generator to produce electric power which provides the power requirement for algae culturing, harvesting and oil extraction. Any left over power is exported to grid.

Answer: Proposals that utilize algae are specifically called out as non-responsive. Applicants are encouraged to explore solicitations from the DOE's algae program.

10. BIOENERGY (cont.)

Topic c continued

Question 3: According to the instruction, there is an option about dry (utilizing CO₂) reforming of methane. This process converts CO₂ and CH₄ to syngas, which is conflicting with another instruction “Proposals that produce syngas, ethanol, or methanol as a final product will be considered non-responsive, although all of those substances are acceptable as process intermediates”. Do we have to include both dry reforming and FT to convert CO₂ and CH₄ to wax and liquid fuel in the proposal? If so, we are not sure if it is too big to achieve for a Phase I program. Would you please provide some advice?

Answer: This is a very fair point, and the language probably could have been clearer. The questioner is correct that dry reforming and relevant upgrading processes together are a bit much for a phase I effort. The intent of the language that prohibits syngas as a final product is to ensure that responsive proposals take the next step in conversion to a biofuel or bioproduct. So, an application that proposed dry reforming in phase I and upgrading in phase II would likely be considered responsive. Even so, that is intentionally a stretch goal, so applications that proposed substantial progress towards a final product in phase II would probably merit consideration, even if they did not take the process all the way to a pilot-ready product.

Question 4: We are developing an exciting new chemical platform to produce fermentable sugar from methane, CO₂ or biogas. We are also developing a biological platform to metabolically engineer microorganism to utilize our sugar as a sole carbon source for the production of biofuels. Our platform is a Part known. We are looking for a seed funding to test the proof of concept in some of the key areas of our technology.

Answer: The question here is not clear. In particular, it is difficult to parse "Our platform is a Part known". In general, applications that propose a credible value proposition from both the CO₂ and CH₄ in biogas will merit consideration.

11. BUILDINGS

DOE's [Building Technologies Office \(BTO\)](#) advances building energy performance through the development and promotion of efficient, affordable, and high impact technologies, systems, and practices. BTO's long-term goal is to reduce energy use by 50%, compared to a 2010 baseline. To secure these savings, research, development, demonstration, and deployment of next-generation building technologies are needed to advance building systems and components that are cost-competitive in the market.

- a. **Energy Efficient Solid-State Lighting Luminaires, Products, and Systems. Contact:**
james.brodrick@ee.doe.gov or edp@lincolntechnicalservices.com

Question 1: Is your program is interested in low-cost lost-profile motion sensing devices that can be integrated into SSL systems?

Answer: We can never be completely sure get the full application. It would be important to include details of how your approach fundamentally and innovatively differs from others that are already on the market.

Question 2: Would a SSL lighting system that incorporates daylight harvesting, DC spectral and lighting controls along with solar photovoltaics be responsive? Provided the system meets DOE 200lumen per watt requirement.

Answer: You have provided only technical data but the subtopic requires both price and performance goals. A lighting technology that is of very high efficiency but that cannot compete in price is unacceptable.

11. BUILDINGS

Topic a continued

Question 3: Will DOE include labor and material savings when calculating the cost comparisons to meet the SSL R&D price goal?

Answer: There are no formal DOE guidelines to calculate installation costs or first costs of any lighting system, SSL, legacy or otherwise. You should use calculations that include all installation and component costs. If your innovation eliminates wiring and labor, you should include that cost savings in your analysis.

b. Technologies for Sensing and Managing Indoor Air Quality in Buildings. Contact:
mohammed.khan@ee.doe.gov.

Question 1: I have a question regarding proposals for “Accurate sensors for indoor air quality” in SBIR topic 11b. I wonder whether the “other pollutants relevant to the indoor air environment” desired to be sensed might include particle suspensions such as smoke or dust?

Answer: We can never be sure until we get the full application, but this appears to be viable.

12. FUEL CELLS

The Office of Energy Efficiency and Renewable Energy Fuel Cell Technologies Office (FCTO) <http://www1.eere.energy.gov/hydrogenandfuelcells> works in partnership with industry (including small businesses), academia, and DOE's national laboratories to establish fuel cell and hydrogen energy technologies as economically competitive contributors to the U.S. transportation needs.

- a. **TECHNOLOGY TRANSFER OPPORTUNITY: Durable, High Activity Electrocatalyst with Low Platinum Content and Low Cost for Polymer Electrolyte Membrane Fuel Cell Applications.**
Contact: nancy.garland@ee.doe.gov.

Question 1: For a TTO topic, does the lab enter into a CRADA with the applicant or does the lab become a sub?

Answer: The Labs will put some type of agreement in place to support the collaboration, typically a CRADA or WFO depending on the nature of the relationship. In addition, BNL would be a subcontractor to the applicant.

12. FUEL CELLS

b. Magnetocaloric Materials Development.

Contact: erika.Sutherland@ee.doe.gov

c. TECHNOLOGY TRANSFER OPPORTUNITY: H2 Safety Sensors for H2 Infrastructure Applications.

Contact: charles.james@ee.doe.gov.

A collection of Q&As on this subtopic can be found at:

<http://www.lanl.gov/projects/feynman-center/collaboration/collaboration-opportunities/eere-sbir-tech-transfer-opportunity-h2-safety-sensors.php>.

13. SOLAR

The DOE SunShot Initiative (www.energy.gov/SunShot) aims to achieve subsidy-free, cost competitive solar power by the end of the decade. **NOTE:** Solar is the only Topic in EERE that allows Fast Track applications thus the question below apply only to Solar.

a. Controls and Systems for the On-Site Consumption of Solar Energy.

Contact: solar.sbir@ee.doe.gov.

b. Shared Solar Energy Development Tools.

Contact: solar.sbir@ee.doe.gov.

14. Vehicles

a. Electric Drive Vehicle Batteries.

Contact: brian.cunningham@ee.doe.gov.

b. SiC MOSFETs for Electric Drive Vehicle Power Electronics.

Contact: steven.boyd@ee.doe.gov.

c. Reduction of PGM Loading in Automotive Emission Control Systems.

Contact: ken.howden@ee.doe.gov.

d. Variable Compression Ratio or Variable Stroke Internal Combustion Engine With Real-Time Controllability.

Contact: breton.leo@ee.doe.gov.

e. Alternative Crank Mechanisms for Internal Combustion Engines Leading to Improved Energy Efficiency.

Contact: breton.leo@ee.doe.gov.

15. Water

The Water Power Program, part of **the Wind and Water Power Technologies Office**, researches, tests, evaluates, and develops innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from water resources. This includes hydropower, as well as marine and hydrokinetic energy technologies, which capture energy from waves as well as riverine, tidal, and ocean currents.

a. Innovative Very Low-head and Instream Current Water Power Turbine-Generator Technologies.

Contact: rajesh.dham@ee.doe.gov.

Question 1: Can you clarify if the 10-foot limit on head is for gross head, or if it includes any losses such as intake, or exit velocity losses?

Answer: The technology office website has a complete set of performance criteria. Please visit:

<http://energy.gov/eere/renewables/water>

Question 2: Are there any specific ranges for Levelized Cost of Energy, which should be achievable by competitive proposals?

Answer: It should be at the price performance frontier.

16. Wind

The Wind Program, part of the **Wind and Water Power Technologies Office**, works to enable rapid expansion of clean, affordable, and reliable domestic wind power to promote national security, economic vitality, and environmental quality.

a. Advancing Technology for Offshore Wind Resource Characterization.

Contact: joel.cline@ee.doe.gov.