



# U.S. DEPARTMENT OF **ENERGY**

## FINANCIAL ASSISTANCE FUNDING OPPORTUNITY ANNOUNCEMENT

Small Business Innovation Research (SBIR)  
Small Business Technology Transfer (STTR)

FY 2012 Phase I (Release 3)

Funding Opportunity Number: DE-FOA-0000715  
Announcement Type: **AMENDMENT**

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LETTER OF INTENT DUE DATE:	Not Required
PRE-APPLICATION DUE DATE:	May 1, 2012, 11:59 PM EST
APPLICATION DUE DATE:	July 3, 2012, 11:59 PM EST

**Amendment to Topics Document:  
Topic 8b: Removal of reference to webinar.**

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To download the FY 2012 Phase I (Release 3) Topics in a searchable PDF file, please visit the U. S. Department of Energy (DOE) SBIR/STTR web site by clicking on the following link:

<http://www.science.energy.gov/sbir/>.

**Where to Submit:** All Phase I applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered with Grants.gov. Please read the registration requirements carefully and start the process immediately. Remember you have to update your Central Contract Registry (CCR) registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

**Registration Requirements:** There are several one-time actions you must complete in order to submit an application through Grants.gov (i.e., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the CCR, register with the credential provider, and register with Grants.gov). Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at **least 21 days** to complete these requirements. It is suggested that the process be started as soon as possible.

**IMPORTANT NOTICE TO APPLICANTS:** When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

**Questions:** Questions regarding the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). [Part VII](#) of this Funding Opportunity Announcement (FOA) explains how to submit other questions to the DOE.

Questions regarding the content of this Funding Opportunity Announcement (FOA), including the Phase I DOE SBIR/STTR Topics must be submitted through the [FedConnect](#) portal. [Part VII](#) of this FOA explains how to submit these types of questions to the DOE via [FedConnect](#). You must register with [FedConnect](#) to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at <https://www.fedconnect.net/FedConnect/PublicUserRegistration.aspx> and [https://www.fedconnect.net/FedConnect/PublicPages/FedConnect\\_Ready\\_Set\\_Go.pdf](https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf). DOE will respond to a question posed via the [FedConnect](#) website within three (3) business days, unless a similar question and answer has already been posted on the [FedConnect](#) website.

### Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

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Number 1 – Grants.gov Submission Receipt Number

Number 2 – Grants.gov Submission Validation Receipt for Application Number

Number 3 – Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 – Grants.gov Agency Tracking Number Assignment for Application Number

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## PART I – FUNDING OPPORTUNITY DESCRIPTION

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This Funding Opportunity Announcement (FOA) describes Phase I funding opportunities for the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs for Fiscal Year (FY) 2012 Phase I (Release 3).

DOE Phase I opportunities are announced pursuant to the Small Business Innovation Development Act of 1982 (Public Law 97-219), the Small Business Research and Development Act of 1992 (Public Law 102-564), and the SBIR/STTR Reauthorization Act of 2011 (Public Law 112-81). SBIR or STTR grants may not be awarded until the Programs are extended or renewed by Public Law. Small businesses (see definition in [Part III – Eligibility Information](#)) with strong research capabilities in science or engineering are encouraged to apply. Some topics may seek manufacturing-related innovations in accordance with Executive Order 13329, "[Encouraging Innovation in Manufacturing](#)."

The objectives of these programs include increasing private sector commercialization of technology developed through DOE-supported research and development (R&D), stimulating technological innovation in the private sector, and improving the return on investment from Federally-funded research for economic and social benefits to the nation. DOE will support high-quality research or R&D on advanced concepts concerning important mission-related scientific or engineering problems and opportunities that are likely to lead to significant public benefit from promising research.

Other than different eligibility requirements (see [Part III Eligibility Information](#)), the major difference between the SBIR and STTR programs is that STTR grants must involve substantial cooperative research collaboration between the small business and a single Research Institution (see definitions in [Appendices/Reference Material](#) at the end of this FOA). However, it should be noted that the SBIR program also permits substantial collaboration between the small business and other organizations, including Research Institutions. The difference is that in SBIR, the collaboration is optional, while in STTR, the collaboration is required and must be cooperative in nature.

### **SBIR/STTR Program Phases:**

Phase I – Phase I grants resulting from this competition will be made during Fiscal Year 2013 to small businesses, in amounts up to \$150,000. Phase I is to evaluate, insofar as possible, the scientific or technical merit and feasibility of ideas that have commercial potential. The grant application should concentrate on research that will contribute to proving scientific or technical feasibility of the approach or concept. Success in a DOE Phase I is a prerequisite to further DOE support in Phase II.

An important goal of these programs is the commercialization of DOE-supported research or R&D. Following the start of Phase I, DOE encourages its awardees to begin thinking about and seeking commitments from private sector or Federal non-SBIR/STTR funding sources in anticipation of Phases II and III. The commitments should be obtained prior to the Phase II grant application submission. The commitment for Phase III may be made contingent on the DOE-supported research or R&D meeting some specific technical objectives in Phase II, which, if met, would justify funding to pursue further development for commercial purposes in Phase III. Full details will be provided in the Phase II FOA.

Phase II – Phase II is the principal R&D effort, and only previous DOE Phase I grantees will be eligible to compete for subsequent Phase II continuation of their Phase I projects. Phase II awards are expected to be made during fiscal year 2014 to small businesses with approaches that appear sufficiently promising as a result of the Phase I effort. Phase II grant awards are expected to be in amounts up to \$1,000,000. The period of performance under Phase II will depend on the scope of the effort, but normally will not exceed 24 months. Approximately fifty percent of Phase I awardees submitting a Phase II application will successfully receive a Phase II award. Instructions and eligibility requirements for submitting Phase II grant applications will be posted at a later date on the internet at [www.grants.gov](http://www.grants.gov). The work proposed for Phase I and Phase II, assuming that it proceeds, should be suitable in nature for subsequent progress to non-SBIR/STTR funding in Phase III (see Phase III below for more details).

Phase III – Under Phase III, it is intended that non-SBIR funds be used by the small business to pursue commercial applications of the R&D. That is, the non-SBIR/STTR federal funding pays for research or R&D meeting DOE mission-related objectives identified by the DOE Phases I and II; non-SBIR capital provides follow-on developmental funding to meet commercial objectives or Phase III. Additionally, under Phase III, federal agencies may award non-SBIR/STTR funded follow-on grants or contracts to Phase I and Phase II awarded projects for (1) products or processes that meet the mission needs of those agencies, or (2) further research or R&D. The competition for SBIR/STTR Phase I and Phase II awards satisfies any competition requirement of the Federal Property and Administrative Services Act, and the Competition in Contracting Act. Therefore, an agency that funds an SBIR/STTR Phase III project is not required to conduct another competition in order to satisfy those statutory provisions.

## PART II – AWARD INFORMATION

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### A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding grants under this FOA.

### B. ESTIMATED FUNDING

Approximately \$7 Million is expected to be available for new Phase I awards under this FOA contingent on the availability of appropriated funds.

### C. MAXIMUM AND MINIMUM AWARD SIZE

Ceiling (i.e., the maximum amount for an individual award made under this FOA): \$150,000 for SBIR and STTR grants.

Floor (i.e., the minimum amount for an individual award made under this FOA): N/A

### D. EXPECTED NUMBER OF AWARDS

DOE anticipates making approximately 45 awards under this FOA. SBIR and STTR awards are subject to the availability of appropriated funds and this FOA does not obligate DOE to make any awards under Phase I.

### E. ANTICIPATED AWARD SIZE

The average award size for these programs in Fiscal Year 2011 (Release 1) was \$146,684

### F. PERIOD OF PERFORMANCE

DOE anticipates making awards that will run for up to 9 months with a project period begin date in November 2012.

### G. TYPE OF APPLICATION

DOE will accept new Phase I applications under this FOA.

## PART III - ELIGIBILITY INFORMATION

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### A. ELIGIBLE SBIR AND STTR APPLICANTS

Only U.S. small business concerns (SBCs) are eligible to submit SBIR applications. Joint ventures, as defined in "Appendices/Reference Material," may apply, provided the entity created also qualifies as a small business at the time of the award. An SBC is one that, at the time of award for both Phase I and Phase II SBIR awards, meets all of the following criteria:

- Organized for profit, with a place of business located in the United States (U.S.), which operates primarily within the U.S. or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor;
- In the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49% participation by foreign business entities in the joint venture;
- At least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the U.S., or it must be a for-profit business concern that is at least 51% owned and controlled by another for-profit business concern that is at least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the U.S. (except in the case of a joint venture, where each entity to the venture must be 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the U.S.); and
- Has, including its affiliates, not more than 500 employees and meets the other regulatory requirements found in 13 CFR Part 121. Business concerns, other than investment companies licensed, or state development companies qualifying under the Small Business Investment Act of 1958, 15 U.S.C. 661, et seq., are affiliates of one another when either directly or indirectly, (a) one concern controls or has the power to control the other; or (b) a third-party/parties controls or has the power to control both.

Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliates" is defined in greater detail in 13 CFR 121. The term "number of employees" is defined in 13 CFR 121.

Further information may be obtained by contacting the Small Business Administration Size District Office at <http://www.sba.gov/size>.

SBC's submitting to both the SBIR and STTR programs must meet eligibility requirements of both SBIR and STTR applicants.

### B. COST SHARING

Cost sharing under this FOA is not required and will not be an evaluation factor in consideration of your Phase I application.

### C. OTHER ELIGIBILITY REQUIREMENTS

The research or R&D must be performed in the U.S. for both Phases I and II. "U.S." means the 50 states, the territories and possessions of the U.S., the Commonwealth of Puerto Rico, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Palau, and the District of Columbia. Non-U.S. citizens are eligible to perform work on SBIR/STTR projects provided they are legally empowered to work in the U.S. at the time that an award is made and throughout the duration of the project. That is, a foreign national working on an SBIR/STTR project must NOT be an illegal alien and must be an immigrant alien or a foreign national visiting the U.S. on an approved VISA. Foreign nationals who have applied for and received a "green card" are considered permanent residents.

None of the employees or owners of the applicant Small Business may be Consultants. None of the employees or owners of the Applicant Small Business may be employees of a Subcontractor, except when the Subcontractor is a Research Institution. Consultants must not be employees of any proposed Subcontractor. Please note, an employee of a small business is required to either (a) be paid using a W-2 form or (b) possess an Internal Revenue Service determination that the person is an employee using Form SS-8. Persons paid by a 1099 (and not possessing an employee determination using Form SS-8) are to be treated as independent contractors.

#### Restrictions on Submitting Applications

- Choice of Topic and Subtopic – Each grant application must be submitted to only one topic and, within the topic, to only one subtopic. DOE will not assign a topic and/or subtopic to grant applications; this must be done by the applicant. When a grant application has relevance to more than one subtopic within a topic, the applicant must decide which subtopic is the most relevant and submit the grant application under that subtopic only.
- Responsiveness – To be considered responsive, a grant application must fall within the description of the subtopic, and also satisfy any conditions contained in the introductory section of that topic. The language in both the topic introductions and the subtopics should be taken literally. Applications that do not directly address the subtopic statement will be declined for non-responsiveness, and will not be peer reviewed.
- Submitting to both SBIR/STTR Programs – Grant applications that include a substantial amount of cooperative research collaboration (at least 30%) with a single Research Institution may be considered for funding in both programs. Applicants may indicate their interest in being considered for both programs by selecting the appropriate box under "Program Type" on the "SBIR/STTR Information" form.
- Duplicate Applications – Duplicate grant applications, even if submitted to different topics and/or subtopics, will be rejected without review. That is, the application with the latest Grants.gov submission date and time will be the only version accepted for evaluation.
- Multiple pre-applications – Applicant small businesses are limited to submitting a total of 5 different pre-applications under this FOA and each pre-application must be uniquely responsive to the topic and subtopic to which it is submitted. If more than 5 pre-applications are received under this FOA, only the

last 5 pre-applications received will be accepted for evaluation. Applicants that do not submit pre-applications are not eligible for an award under this FOA.

### General Requirements and Restrictions on the Principal Investigator (PI)

- The PI is the key individual designated by the applicant to direct the project. Only one PI is acceptable per project. Co-PIs are not allowed and should not be proposed. The PI must be knowledgeable in all technical aspects of the grant application and be capable of leading the research effort. DOE's evaluation of the grant application is critically dependent on the qualifications of the PI. Any changes in the PI that are made after award selection are strongly discouraged and must be pre-approved by DOE. Requests for PI changes will be closely scrutinized and may cause delays in grant execution.

In addition, the PI is required to devote to the project a considerable part of his or her time.

"Considerable" means a minimum average of three (3) hours per week for the duration of the project for both SBIR and STTR Phase I projects. For example a nine (9) month project, lasting 39 weeks, would require a commitment of 117 hours. Applicants must state the duration of the project in weeks, if the project is to be completed in less than nine (9) months, in order to make it clear that this requirement is fully met. In order to ensure appropriate technical guidance for the project, only one PI will be accepted per project.

Before a grant is awarded, the PI will be required to sign a statement certifying adherence to these requirements. Non-U.S. citizens are eligible to perform work on SBIR/STTR projects provided they are legally empowered to work in the U.S. and perform the project work in the U.S. at the time that an award is made and throughout its duration. That is, a foreign national working on an SBIR/STTR project must NOT be an illegal alien and must be an immigrant alien or a foreign national visiting the U.S. on an approved VISA. Foreign nationals who have applied for and received a "green card" are considered permanent residents.

- Additional PI Restrictions when submitting to SBIR Program Only – To be awarded an SBIR grant, the applicant must meet the general requirements and the PI's primary employment must be with the small business applicant at the time of award and during the conduct of the proposed research. Primary employment means that no less than 20 hours per week is spent in the employment of the small business during the conduct of the project and no more than 19 hours per week spent in the employment of another organization.
- Additional PI Restrictions when submitting to STTR Program Only – To be awarded an STTR grant, the applicant must meet the general requirements and the PI's primary employment may be with the small business applicant or the Research Institution. However, the small business must still provide technical control and oversight of the project. If the PI is employed by the Research Institution, his or her primary employment (at least 20 hours per week) must be with the Research Institution in order to qualify under STTR and the Research Institution must provide at least 30% of the research effort.
- PI Restrictions when submitting to both SBIR and STTR Programs – Applicants submitting to both programs must adhere to the PI restrictions set forth. Therefore, if the PI is employed by the small business, the applicant is eligible to submit to both programs. However, in cases where the PI is employed by the Research Institution, the application will only be considered under the STTR Program.

## Restrictions on the Level of Small Business Participation

- For both SBIR and STTR Programs, there are requirements on the amount of the research or analytical effort that must be performed by the small business in order to be selected for and to receive a grant. The research or analytical effort is defined as the total requested funding minus the cost of any purchased or leased equipment, materials, and supplies (whether purchased by the applicant, a Research Institution, or by any other subcontractor). Please refer to the [Level of Effort Worksheet](#) on the DOE SBIR/STTR Programs home page, under Application Resources to assist you in assuring the application is in compliance. Work performed by a consultant, a DOE national laboratory, or any other subcontractor, will be considered as external to the applicant organization when complying with these requirements.
- SBIR Restrictions – To be awarded an SBIR grant, a minimum of two-thirds or 67% of the research or analytical effort must be carried out by the small business applicant during Phase I; correspondingly, a maximum of one-third or 33% of the effort may be performed by an outside party such as consultants or subcontractors. (In Phase II, a minimum of 50% of the research or analytical effort must be carried out by the small business applicant).
- STTR Restrictions – To be awarded an STTR grant, at least 40% of the research or analytical effort must be allocated to the small business applicant, and at least 30% of the effort must be allocated to a single Research Institution. (The same requirement is applicable for both STTR Phase I and Phase II.)

## Guidance for Submitting to both SBIR and STTR Programs:

Grant applications that include a substantial amount of cooperative research collaboration with a single Research Institution may be considered for funding in both programs, ONLY if the PI is employed by the small business applicant.

If you choose to be considered in both programs, prepare the grant application to meet the requirements of the SBIR program. It is unlikely that STTR requirements can be satisfied unless the subaward for the single Research Institution is at least one-third of the research effort; this figure does not include costs for purchased/leased equipment or materials/supplies. Applicants should indicate their interest in being considered for both programs by clicking the appropriate box on the SBIR/STTR Information Form (see [Part IV, Section C](#))."

## Restrictions on the Management of SBIR/STTR Projects

All SBIR and STTR funding agreements are made with the small business applicant regardless of the proportion of the work or funding of each of the performers (small business, Research Institution, subcontractor, etc.) under the grant. As the primary grantee, the small business applicant has the overall responsibility of the project, including financial management and the direction and control of the performance. For STTR projects, where the PI is employed by the Research Institution, the small business applicant will maintain the overall supervision of the project, while the PI will manage the research portion of the project.

It is recommended that all agreements between the small business applicant and any subcontractor (including the Research Institution collaborating in an STTR project) reflect the controlling management

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position of the small business applicant during the performance of the Phase I and/or Phase II project. This includes, but is not limited to, any business plan concerning agreements and responsibilities between the parties or for the commercialization of the resulting technology.

## PART IV – APPLICATION AND SUBMISSION INFORMATION

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### A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download a Grant Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this FOA and then follow the prompts to download the application package.

### B. LETTER OF INTENT AND PRE-APPLICATION

#### 1. Letter of Intent

Letters of Intent are not required.

#### 2. Pre-Application

A pre-application is a requirement of this Funding Opportunity Announcement. Applicants whose pre-applications meet the evaluation criteria as determined by DOE program managers will be notified and encouraged to submit *full* applications. Applicants who do not meet these criteria will also be notified. *Full* applications will only be accepted from applicants who are encouraged to submit *full* applications. No other applications will be considered for this Funding Opportunity Announcement.

The following elements **must** be included in a Pre-Application:

- a. Cover sheet containing the following information
  - i. Small business name and address
  - ii. The DOE technical topic and subtopic to which you intend to submit an application, e.g., 3b
  - iii. Project Title
  - iv. Principal Investigator name
  - v. Business Official name, signature, and contact information (telephone number and email address)
  - vi. Name(s) of any proposed subcontractor(s) or consultant(s), if any
- b. Technical project description that sufficiently describes your technology and application. The project description must not exceed 2,000 words and 5 pages in length.

DOE Program Managers will review pre-applications to ensure they meet the evaluation criteria below. DOE Program Managers may also enlist the assistance of additional technical experts to contribute to the evaluation of pre-applications.

- a. Evaluation Criteria for Pre-Applications
  - i. Meet all stated FOA requirements for a pre-application
  - ii. Are for research or research & development (R/R&D) with commercial potential. Basic research and demonstration projects will not be funded under this Funding Opportunity Announcement.

- iii. Are responsive to the topic and subtopic listed in the Topics' document for this FOA. The project description must specifically address how the proposed R/R&D will meet the objectives specified in the topic and subtopic listed in the Topics' document for this FOA.
- iv. Represent a significant advance over existing technologies or past and current R/R&D. The project description must clearly state the important factors that distinguish the proposed R/R&D from the state of the art.
- v. Are consistent with the DOE program area mission, policies and other strategic and budget priorities. Brief descriptions of DOE program (e.g. Office of Energy Efficiency and Renewable Energy) mission and policies are included in the Topics' document for this FOA.

Please email your pre-application to the DOE SBIR/STTR Programs Office at [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov) no later than May1, 2012 11:59 EST. Please include "Pre-Application for Phase I (Release 3)" in the email subject line. We will provide you with pre-application feedback on or about June 5, 2012. Please visit the DOE SBIR/STTR Programs web site under "[Application Resources](#)" for a Pre-Application Template.

**C. CONTENT AND FORMAT OF FORMAL APPLICATION**

Applications must be submitted using the forms provided by Grants.gov by July 3, 2012, 11:59 EST. Some of the information must be directly entered onto the forms and other information must be attached to the forms as directed. The table below lists the required forms and the attachments associated with each form.

**Please note:** Grant applications lacking the following required documentation, only as it applies to each respective research project, will be Administratively Declined without technical review. To assist you in submitting the necessary forms with your application, please refer to the DOE Phase I Application Checklist, located on the DOE SBIR/STTR Programs Office web site under "Application Resources" at <http://science.energy.gov/sbir/funding-opportunities/application-resources/>.

**SBIR Phase I Application**

<u>Forms</u>	<b>Attachments (letters and numbers indicate sections of the form where attachments are added)</b>
Application for Federal Assistance, SF-424	
	18. SFLLL, Disclosure of Lobbying Activities, if applicable
Research and Related: Budget	
	A. 9. Additional Senior Key Persons, if applicable
	C. 11. Additional Equipment, if applicable
	K. Budget Justification
Research and Related: Senior/Key Person Profile	
	Biographical Sketch for each person
	Current & Pending Support for each person, if applicable
Research and Related: Other Project Information	
	7. Project Summary/Abstract

	8. Project Narrative
	9. Bibliography and References Cited, if applicable
	10. Facilities and Other Resources, if applicable
	11. Equipment, if applicable
	12. Other--Level of Effort Worksheet
	12. Other--Letter of Commitment for consultant or Subaward, if applicable
	12. Other-- Certification for Using a National Laboratory as a Subcontractor
	12. Other--Phase I Commercialization Plan
	Research and Related: Subaward Budget, if applicable
	Budget Justification for each Subaward
	Project/Performance Site Location(s)
	SBIR/STTR Information
	8. Commercialization History, if applicable,

Please be aware of the following specific requirements when preparing the forms and attachments:

1. Application for Federal Assistance, SF-424 (R&R)

Include the topic and subtopic with the project title in field 11. Each grant application must be submitted to a DOE SBIR/STTR technical topic and, within the topic, to only one subtopic. DOE will not assign a topic and/or subtopic to grant applications; this must be done by the applicant. (The topic and subtopic are also required on page 1 of the project narrative.)

By submitting an application in response to this FOA the Applicant certifies that:

- a. It is **not** a corporation that has been convicted (or had an officer or agent of such corporation acting on behalf of the corporation convicted) of a felony criminal violation under any Federal law within the preceding 24 months.
- b. It is **not** a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.
- c. If the Applicant's financial assistance application is chosen for award and the award is in excess of \$1,000,000, the applicant will, by the end of the fiscal year, upgrade the efficiency of their facilities by replacing any lighting that does not meet or exceed the energy efficiency standard for incandescent light bulbs set forth in Section 325 of the Energy Policy and Conservation Act (42 U.S.C. 6295).

2. Budget Justification
  - a. The budget justification must include the number of hours and the hourly rate for all employees associated with this project.
  - b. To assist applicants with providing the required information to justify their budget, a [Budget Justification Worksheet](#) can be found on the DOE SBIR/STTR Programs Office web site at <http://science.energy.gov/sbir/funding-opportunities/application-resources/>.
3. Project Summary/Abstract
  - a. The project summary/abstract is treated as publicly available information and must not contain any proprietary information.
4. Project Narrative
  - a. The project described in the Project Narrative must be the same as that described in the pre-application. Applications that do not meet this criterion may be declined without review.
  - b. The Project Narrative describing your technology must not exceed 14,500 words of text.
  - c. The Project Narrative format should follow the outline below:
    - i. Cover page
    - ii. Proprietary Data Legend
    - iii. Identification and Significance of the Problem or Opportunity, and Technical Approach
    - iv. Anticipated Public Benefits
    - v. Technical Objectives
    - vi. Phase I Work Plan
    - vii. Phase I Performance Schedule
    - viii. Related Research or R&D
    - ix. Principal Investigator and other Key Personnel
    - x. Facilities/Equipment
    - xi. Consultants and Subcontractors (including Research Institutions for STTR)
  - d. Proprietary Technical Information: If your application contains trade secrets or commercial or financial information, you must include the Notice of Restriction on Disclosure and Use of Data on the first page of your Project Narrative in accordance with guidance under [Part VIII, D. Proprietary Information - Trade Secrets, Commercial or Financial Information](#) of this FOA.
5. To protect such data, your proposal must be marked in the following manor utilizing the 3 step process outlined below:
  - a. The **Cover Page** of your proposal must contain the notice below (please cut and paste):

Pages [\_\_\_\_] of this document may contain trade secrets or commercial or financial information that is privileged or confidential and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the

Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.”

- b. To further protect such data, **each page** containing trade secrets or commercial or financial information that is privileged or confidential must be specifically identified and marked with text similar to the following (please cut and paste):

May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure.

- c. In addition, **each line or paragraph** containing trade secrets or commercial or financial information that is privileged, must be marked with brackets or other clear identification, such as highlighting.
  - i. Please ensure this information is consistent with question number three (3) of the Research and Related: Other Project Information.
  - ii. Include the topic and subtopic on page 1 of your Project Narrative.

#### 6. Letter of Commitment – Consultants

- a. The Letter of Commitment from a consultant must include the number of hours and the hourly rate for the consultant.

#### 7. Commercialization Plan

- a. A brief commercialization plan **MUST** be included in a Phase I grant application. The Commercialization Plan will be evaluated under the “Impact” criterion and should address the following elements:
  - i. Market Opportunity: Describe the market opportunity being addressed.  
You **MUST** include the following statement at the beginning of your Commercialization Plan:  
**“(COMPANY NAME HERE) estimates sales revenues of \$\_\_\_\_\_ and licensing revenues of \$\_\_\_\_\_ during the first 10 years of commercialization.”**
  - ii. Intellectual Property (IP): Describe the status of patents, trade secrets, and other steps you plan to take to protect your IP for commercialization.
  - iii. Company/Team: Describe the capability of your present personnel and/or planned additions to your staff that will enable you to successfully commercialize your innovation.
- b. Although Phase I applications must only address the elements listed above, Phase I Applicants are encouraged to examine the more detailed commercialization plan requirements for Phase II applications in our [FY12 Phase II Funding Opportunity Announcement](#) (page 25).
- c. At this time, Question 7 of the SBIR/STTR Information Form will not accept an attachment for a Phase I grant application submission. To address this form issue, please create a document

entitled, "Commercialization Plan" and attach this file in Field 12 of the **Research & Related Other Project Information Form**.

8. Commercialization History
  - a. If you have received SBIR/STTR Phase II awards from any Federal agency, then you must provide your company Commercialization History. To assist applicants in providing a Commercialization History, an MS Excel template can be found on the DOE SBIR/STTR Programs Office web site at <http://science.energy.gov/sbir/funding-opportunities/application-resources/>. Please create a document entitled, "Commercialization History" and attach this file too as another attachment in Field 12 of the **Research & Related Other Project Information Form**.
9. **Commercialization Assistance (Section F, Field 8 [Optional])**
  - a. In accordance with the SBIR/STTR Reauthorization Act of 2011, the DOE is able to fund discretionary commercialization assistance to all DOE SBIR and STTR Phase I awardees. Award recipients have two options for receiving commercialization assistance: (1) utilize services provided by a DOE vendor or (2) identify their own commercialization assistance provider.
  - b. If you wish to receive commercialization assistance from the DOE vendor, you do not need to include this in your budget. If you are awarded a Phase I grant, you will receive notification from DOE and follow-up contact from Dawnbreaker, the DOE commercialization vendor, on what services are available and how to obtain these services at no cost to your small business.
  - c. If you wish to utilize your own commercialization assistance provider, you are required to include this as a subcontract or consultant in your budget and to provide a detailed budget justification. You may include up to \$5,000 for assistance. Please note that this commercialization assistance does not count toward the maximum award size listed in Part II. C.; e.g., seeking commercialization assistance from your provider could result in a maximum award in the amount of \$155,000.00. Reimbursement is limited to services received that comply with 15 U.S.C. § 638(q). In the event some or the entire amount listed is not expended on a commercialization assistance services, the remaining funds **cannot** be budgeted to other project costs. Re-budgeting of these funds is not allowable.

For detailed application, forms, and other applicant information, please see the "[Instructions for Completing a DOE SBIR/STTR Phase I Grant Application](#)" located on the DOE SBIR/STTR Programs Office web site at <http://science.energy.gov/sbir/funding-opportunities/application-resources/>. If there are any inconsistencies between the information provided in the FOA and the Instructions for Completing a DOE SBIR/STTR Phase I Grant Application, the information contained in the FOA prevails. For questions regarding the preparation of a Phase I grant application, you may call the DOE SBIR/STTR Operations Support Staff at (301) 903-5707 or via email at [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov).

#### D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

1. Indirect Cost Information

2. Other Budget Information
3. Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See [10 CFR 1040.5](#))
4. Representation of Limited Rights Data and Restricted Software, if applicable
5. Representation Concerning Financial Management System
6. Consultant documentation/verification of rates

### SBIR/STTR Certifications

If selected for an award, applicants will be required to sign and submit one or more certification forms. These forms will be provided by the DOE Contract Specialist during award negotiation. For more information, please refer to [Section 5.1](#) Small Business Concern SBIR Verification Statement in the ["Instructions for Completing a DOE SBIR/STTR Phase I Grant Application."](#)

The following hyperlinked documents are provided for information purposes only and are subject to changes and updates prior to award negotiation:

1. [Principal Investigator Certification](#)
2. [Property and Commercialization Rights Agreement Certification](#)
3. [DOE STTR Model Agreement for Property and Commercialization Rights](#)

### E. SUBMISSION DATES AND TIMES

1. Letter of Intent

A Letter of Intent is not required.

2. Pre-Application

A Pre-Application is required and must be submitted to DOE by May 1, 2012, 11:59 EST. For details, please refer to [Part IV, Section B](#) of this FOA. Please email your pre-application to DOE SBIR/STTR Programs Office at [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov).

3. Formal Applications

Applications must be received by July 3, 2012, 11:59 PM EST. Please note, due to the Grants.gov system limitation of accepting applications in bulk on or near the deadline, you are highly encouraged to transmit your application well before the 11:59 PM EST deadline. Please be aware that applications received after the July 3, 2012, 11:59 PM EST deadline will not be reviewed or considered for award.

Unsolicited grant applications will not be accepted. Any submission incorporating data affecting the national security will not be accepted for evaluation.

F. INTERGOVERNMENTAL REVIEW

This program is not subject to [Executive Order 12372](#) – Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS

Grants may include a profit or fee for the small business, **not to exceed 7%**. Any fee proposed in excess of 7% will not be reimbursed.

Cost Principles – Costs must be allowable in accordance with the applicable Federal cost principles referenced in [10 CFR Part 600](#). The cost principles for commercial organizations are found in Federal Acquisition Regulation ([FAR Part 31](#)).

Indirect Costs – Indirect costs are normally a component of a project budget and derive from an applicant's Indirect Rate(s), established in accordance with its financial management system. Experience has shown that creating and supporting these rates can be one of the most problematic elements of a budget, and the subsequent negotiation of costs for the project. Applicants are encouraged to be proactive in ensuring that all proposed rates are established in a timely manner and in accordance with applicable cost principles. If you are selected for award, establishing the acceptability of your proposed indirect costs, if any, is essential to the review of your budget and may take various forms, including: 1) An Indirect Cost Rate Agreement (ICRA) in effect with your cognizant Federal agency which covers the period of performance of this award and supports the indirect rate(s) proposed; 2) If no ICRA exists, an Indirect Cost Rate Proposal may be submitted to DOE for evaluation; or 3) indirect rates which have been accepted for estimating purposes by DOE or another Federal agency for the period of performance of this award.

If you are proposing indirect costs and do not already have an Indirect Cost Rate Agreement with your cognizant Federal agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, it is recommended that you begin preparing an Indirect Cost Rate Proposal to be submitted, upon request, to the DOE Contracting Specialist who will evaluate your proposal if you are selected for award.

For your convenience in preparing an Indirect Cost Rate proposal, links are provided below to the document titled "*Guidance for Indirect Rate Submission*" and to the "*Simple Indirect Rate Model*" in MS Excel format.

- [Guidance for Indirect Rate Submission](#)
- [Simple Indirect Rate Model in Excel format](#)

Pre-Award Costs – Recipients may charge to an award resulting from this FOA, pre-award costs that were incurred within the ninety (90) calendar-day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in [10 CFR Part 600](#). Recipients must obtain the prior approval of the DOE Contracting Officer for any pre-award costs that exceed this 90 calendar day period. Phase I recipients are not required to seek prior approval.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the

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applicant expected, or if the costs are found to be unallowable, unreasonable, or not allocable to the project.

## H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

### APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD

To download the FY 2012 Phase I (Release 3) Topics in a searchable PDF file, please visit the DOE SBIR/STTR web site by clicking on the following link: <http://www.science.energy.gov/sbir/>.

**Where to Submit:** All Phase I applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your Central Contract Registry (CCR) registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

**Registration Requirements:** There are several one-time actions you must complete in order to submit an application through Grants.gov (i.e., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the CCR, register with the credential provider, and register with Grants.gov). Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at **least 21 days** to complete these requirements. It is suggested that the process be started as soon as possible.

**IMPORTANT NOTICE TO APPLICANTS:** When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

**Questions:** Questions regarding the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). [Part VII](#) of this Funding Opportunity Announcement (FOA) explains how to submit other questions to the DOE.

Questions regarding the content of this Funding Opportunity Announcement (FOA), including the Phase I DOE SBIR/STTR Topics must be submitted through the [FedConnect](#) portal. [Part VII](#) of this FOA explains how to submit these types of questions to the DOE via [FedConnect](#). You must register with [FedConnect](#) to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at <https://www.fedconnect.net/FedConnect/PublicUserRegistration.aspx> and [https://www.fedconnect.net/FedConnect/PublicPages/FedConnect\\_Ready\\_Set\\_Go.pdf](https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf). DOE will respond to a question posed via the [FedConnect](#) website within three (3) business days, unless a similar question and answer has already been posted on the [FedConnect](#) website.

### Application Receipt Notices

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After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

Number 1 – Grants.gov Submission Receipt Number

Number 2 – Grants.gov Submission Validation Receipt for Application Number

Number 3 – Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 – Grants.gov Agency Tracking Number Assignment for Application Number

## PART V - APPLICATION REVIEW INFORMATION

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### A. CRITERIA

#### 1. Initial Review

The DOE SBIR/STTR Office will perform an Initial Administrative Screening to ensure that the application meets the requirements described in [Part III, Eligibility Information](#), and [Part IV C, Content and Format of Formal Application](#).

Those passing the Initial Administrative Screening will be technically reviewed by DOE experts within the DOE program area to ensure that the project described in the application is the same as that described in the pre-application; DOE program managers may decline applications without further review if they fail to meet this evaluation criterion.

#### 2. Merit Review

DOE plans to make selections for Phase I awards from those grant applications judged to have the highest overall merit within their technical program area, with approximately equal consideration given to each of the following criteria:

- 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.
- Ability to Carry out the Project in a Cost Effective Manner as evidenced by (1) the qualifications of the PI, other key staff, subcontractors 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 DOE investment in the project would be justified by the level of proposed research effort.
- 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 or STTR project ends. Please refer to [Part IV, C.](#) of this FOA for guidance on what to include in your Commercialization Plan and Commercialization History.

**B. REVIEW AND SELECTION PROCESS**

Grant applications that pass the Initial Review criteria as stated above will be further evaluated by independent scientific and engineering experts to determine the most promising technical and scientific approaches. Each grant application will be judged competitively against the Phase I evaluation criteria on its own merit. Final award decisions will be based on the evaluation criteria and consideration of other factors, such as budget and program balance, program policy factors, and the amount of appropriated funds available. The DOE will not fund any grant application for which there is a reservation with respect to any of the three evaluation criteria stated above, as determined by the review process.

The DOE may enter into discussions with a selected applicant for any reason deemed necessary, including, but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the DOE needs additional information to determine that the recipient is capable of complying with the requirements in [10 CFR Part 600](#); and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

**C. ANTICIPATED NOTICE AND SELECTION AND AWARD DATES**

It is anticipated that selections for award will be completed by mid-to-late October 2012.

## PART VI - AWARD ADMINISTRATION INFORMATION

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### A. AWARD NOTICES

This FOA is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR or STTR award, the terms of the award shall control.

#### 1. Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance ([See Part IV, G](#)) with respect to the allowability of pre-award costs. Small business organizations whose applications have not been selected will be advised as promptly as possible.

Written comments from the technical evaluators are automatically provided to all awardees (SBC Business Official) with the award notification via email. For those applicants not selected for award, you may request written comments from DOE within 30 calendar days of the official notification. DOE will respond to all email requests for comments within 30 business days. Please send all requests for reviewer comments via email to [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov).

#### 2. Notice of Award

An Assistance Agreement issued by the DOE Contracting Officer is the authorizing award document. It normally includes, either as an attachment or by reference: (1) General Terms and Conditions for DOE SBIR and STTR Phase I and Phase II Grants; (2) Special Terms and Conditions for Use in SBIR/STTR Awards; (3) Applicable program regulations, if any; (4) Application as approved by DOE; (5) DOE assistance regulations such as [10 CFR Part 600](#); (6) "National Policy Assurances To Be Incorporated As Award Terms"; and (7) "Federal Assistance Reporting Checklist and Instructions for RD&D Projects", which identifies the reporting requirements.

The small business applicant must be registered with FedConnect at the time of award.

### B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

#### 1. Administrative Requirements

##### DUNS and CCR Requirements

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR, Part 215 (See: <http://ecfr.gpoaccess.gov>). Prime awardees must keep

their data at CCR current. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

### **Subaward and Executive Reporting**

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act (FFTA) of 2006 are contained in 2 CFR, Part 170. (See: <http://ecfr.gpoaccess.gov>). Prime awardees must register with the FFATA Federal Subaward Reporting System (FSRS) database on the FSRS web site at <https://www.fsrs.gov/> and report the required data on their first-tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the CCR.

## **2. Terms and Conditions and National Policy Requirements**

Successful applicants must comply with the terms and conditions in the award document. The “General Terms and Conditions for DOE SBIR and STTR Phase I and Phase II Grants”, the “Special Terms and Conditions for Use in SBIR/STTR Awards”, and the “National Policy Assurances To Be Incorporated As Award Terms” can also be found at <http://energy.gov/management/office-management/employee-services/forms>.

## **3. Cooperative Research and Development Agreements (CRADA)**

SBIR/STTR grant recipients who have chosen a DOE laboratory as a subcontractor may be required to implement a CRADA. CRADAs are collaborative research agreements between DOE laboratories and their partners (SBC in this case), and are approved by a DOE Contracting Officer with the cognizant national laboratory. In many cases, the CRADA could be used as a vehicle for the [Property and Commercialization Rights Agreement](#) required by the STTR program.

Immediately after the small business applicant is notified that it has been chosen for an SBIR/STTR grant, the company should contact the appropriate laboratory business official to confirm award status and to determine if a CRADA will be required. If the DOE laboratory requires a CRADA, no work may be initiated by the laboratory under the grant until the CRADA has been approved.

## **4. Work-For-Others Agreements**

Work-for-Others (WFO) agreements are used by DOE national laboratories when performing tasks that are less cooperative in nature than tasks that require a CRADA (i.e., the work is directed by the primary contractor rather than being fully collaborative). Nonetheless, it is recommended, even when operating under a WFO agreement, that the small business

negotiate a written agreement for the disposition of intellectual property that laboratory employees may develop during the course of their work for the grantee.

It is recommended that SBIR/STTR small business applicants begin to negotiate CRADA or WFO agreements before submitting the grant application. It is during this period that the small business will have maximum leverage in conducting negotiations. That is, if satisfactory terms cannot be agreed upon at this time, the small business still would have the option of finding an alternative Research Institution or subcontractor. Once the grant application has been submitted to the DOE, and subsequently reviewed and selected for award, the small business may be locked-in to the subcontractor identified in the grant application. Also, after selection for award, there is only a short time available for conducting these negotiations before a grant begins.

### **C. REPORTING**

Reporting requirements are identified on the Federal Assistance Reporting Checklist and Instructions for RD&D Projects, DOE F 4600.2, attached to the award agreement.

## PART VII - QUESTIONS/AGENCY CONTACTS

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### A. QUESTIONS

As discussed on Page 2 of this FOA, questions regarding the content of this FOA must be submitted through the FedConnect portal. You must register with [FedConnect](#) to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after the release of the FOA as possible to have the benefit of viewing all responses.

**Applications submitted through FedConnect will not be accepted.**

More information is available at the following FedConnect web page at [https://www.fedconnect.net/FedConnect/PublicPages/FedConnect\\_Ready\\_Set\\_Go.pdf](https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf) and DOE will respond to a question within three (3) business days, unless a similar question and answer has already been posted on the [FedConnect](#) website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to [Grants.gov](#) at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). DOE cannot answer these questions.

### B. AGENCY CONTACT

All other questions regarding the DOE SBIR/STTR processing of applications may be directed to:

Name: Carl Hebron  
E-mail: [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov)  
Telephone: 301-903-5707

### C. DEPARTMENT OF ENERGY, OFFICE OF INSPECTOR GENERAL HOTLINE

The Office of Inspector General (OIG) maintains a hotline to facilitate the reporting of allegations of fraud, waste, abuse, or mismanagement in doe programs or operations. If you wish to report such allegations, you may call, send a letter, or email the OIG Hotline [ighotline@hq.doe.gov](mailto:ighotline@hq.doe.gov). Allegations may be reported by doe employees, doe contractors, or the general public. OIG contact information is available at <http://energy.gov/ig/services>.

## PART VIII - OTHER INFORMATION

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### A. MODIFICATIONS

Notices of any modifications to this FOA will be posted on the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

More information is available at

[https://www.fedconnect.net/FedConnect/PublicPages/FedConnect\\_Ready\\_Set\\_Go.pdf](https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf).

### B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

### C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

### D. PROPRIETARY APPLICATION INFORMATION – TRADE SECRETS, COMMERCIAL, OR FINANCIAL INFORMATION

An application may include technical data and other data, including trade secrets and commercial or financial information that are privileged or confidential, which the applicant does not want disclosed to the public or used by the Government for any purpose other than application evaluation. To protect such data, the submitter must include the following Notice on the first page of the Project Narrative:

“Page(s) [ ] of this document may contain trade secrets or commercial or financial information that is privileged or confidential and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.”

To further protect such data, each page containing trade secrets or commercial or financial information that is privileged or confidential must be specially identified and marked with the following:

“May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure.”

In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged must be marked with brackets or other clear identification, such as highlighting.

#### **E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL**

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

#### **F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM**

##### **Property and Commercialization Rights Agreements**

When using subcontractors, including Research Institutions, the small business is responsible for protecting its own interests with regard to the retention of intellectual property and commercialization rights.

It is in the best interest of the small business, when collaborating with a Research Institution or other subcontractors, to negotiate a written agreement for allocating, between the parties, intellectual property rights, and rights to carry out any follow-on research, development, or commercialization. For STTR awards only, the small business and the Research Institution must certify that this agreement has been completed. This certification will be requested by the Contract Specialist after award selection, but before the grant is signed.

A model agreement, found at <http://www.science.energy.gov/sbir/funding-opportunities/application-resources/>, may be used or revised through negotiation between the small business and the Research Institution. The completed agreement should not be submitted with the grant application, but retained by the parties to the agreement. The Federal government will not be a party to any agreement between the small business and any subcontractor, including the STTR Research Institution. However, applicants are reminded that nothing in such agreements should conflict with any provisions setting forth the respective rights of the U.S. and the small business with respect to both intellectual property rights and any rights to carry out follow-on research.

##### **Intellectual Property Including Innovations, Inventions, and Patents**

- Proprietary Information – Information contained in unsuccessful grant applications will remain the property of the applicant. The government will retain for three years one file copy of each unsuccessful grant application. Public release of information in any grant application submitted will be subject to existing statutory and regulatory requirements, such as the Freedom of Information and Privacy Acts.

If proprietary information is provided in a grant application that constitutes proprietary technical data, confidential personnel information, or proprietary commercial or financial information, it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the applicant in accordance with paragraph D. above, and provided appropriate page numbers are inserted

into the Proprietary Notice legend printed on the first page of the project narrative. Applications will not automatically be withheld in their entirety unless justified by the applicant. The government will limit dissemination of such information to official channels to the extent permitted by law. Any other legend may be unacceptable to the government and may constitute grounds for removing the grant application from further consideration and without assuming any liability for inadvertent disclosure.

- Protection of Grant Application Information – DOE's policy is to use data included in grant applications for evaluation purposes only and to protect, to the extent allowed by law, such information from unauthorized use or disclosure. In addition to government personnel, scientists and engineers from outside the government may be used in the grant application evaluation process. The decision to obtain outside evaluation will take into consideration requirements for the avoidance of organizational conflicts of interest and the competitive relationship, if any, between the applicant and the prospective outside evaluator. The evaluation will be performed under an agreement with the evaluator that the information contained in the grant application will be used only for evaluation purposes and will not be further disclosed.
- Rights in Data Developed Under SBIR/STTR Funding Agreements – Rights in technical data, including software developed under the terms of any funding agreement resulting from grant applications submitted in response to this FOA, shall remain with the grantee, except that the government shall have the limited right to use such data for government purposes and shall not release such proprietary data outside the government without permission of the grantee for a period of not less than four years from delivery of the last deliverable under that agreement (either Phase I, Phase II, or Federally-funded SBIR Phase III). Agencies are released from obligation to protect SBIR data upon expiration of the protection period except that any such data that is also protected and referenced under a subsequent SBIR award must remain protected through the protection period of that subsequent SBIR award. However, effective at the conclusion of the four-year period, the government shall retain a royalty-free license for government use of any technical data delivered under an SBIR/STTR award whether patented or not.
- Copyrights – With prior written permission of the cognizant DOE Contracting Officer, the awardee may copyright and publish (consistent with appropriate national security considerations, if any) material developed with DOE support. DOE receives a royalty-free license for the Federal government and requires that each publication contain an appropriate acknowledgment and disclaimer statement.
- Patents – Small businesses may retain the principal worldwide patent rights to any invention developed with Federal support. The government receives a royalty-free license for Federal use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell must normally manufacture it domestically. Information regarding patent rights in inventions supported by Federal funding can be found in the Code of Federal Regulations, 37 CFR Part 401.

**G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER**

Not applicable.

**H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES**

Eligible activities under these programs include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

**I. AVAILABILITY OF FUNDS**

Funds are not presently available for this award. The Government's obligation under this award is contingent upon the availability of appropriated funds from which payment for award purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Contracting Officer for this award and until the awardee receives notice of such availability, to be confirmed in writing by the Contracting Officer.

**J. AUDIT REQUIREMENTS**

In addition to the A-133 single audit requirements for non-profits, etc, potential applicants should be aware that for-profit organizations now have a DOE specific requirement that they have an annual compliance audit performed. For further details, see 10 CFR 600.316 and the For-Profit audit guidance documents posted under the 'Coverage of Independent Audits' heading at: <http://energy.gov/management/downloads/draft-profit-audit-guidance-fy-2011>.

## APPENDICES/REFERENCE MATERIAL

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### A. DEFINITIONS

**Commercialization** – This concerns the process of developing markets and producing and delivering products for sale (whether by the originating party or by others). As used here, commercialization includes both government and private sector markets.

**Consultant** – A consultant is an individual who provides professional advice or services for a fee.

**Employee** – A person listed on the budget form (Section A—Key/Senior Person or Section B—Other Personnel) as an employee of the small business concern is required to either (a) be paid using a W-2 form or (b) possess an Internal Revenue Service determination that the person is an employee using Form SS-8. Persons paid by a 1099 (and not possessing an employee determination using Form SS-8) are to be treated as independent contractors and should be listed on the budget form in Section F—Other Direct Costs.

**Historically Underutilized Business Zone (HUBZone)** – A small business concern meeting the following criteria:

1. Located in a “historically underutilized business zone” or HUBZone area located in one or more of the following:
  - a. A qualified census tract (as defined in section 42 (d)(5)(c)(i)(I) of the Internal Revenue Code of 1986; or
  - b. A qualified “non-metropolitan county” (as defined in section 143(k)(2)(B) of the International Revenue Code of 1986) with a median household income of less than 80% of the state median household income or with an unemployment rate of not less than 140% of the statewide average, based on U.S. Department of Labor recent data; or
  - c. Lands within the boundaries of federally recognized Indian reservations.
2. Owned and controlled by one or more U.S. Citizens.
3. At least 35% of its employees must reside in a HUBZone.

To find out if your business is in a HUBZone, use the mapping utility provided by the U. S. SBA at its HUBZone Contracting Website at <https://eweb1.sba.gov/hubzone/internet/general/findout.cfm>.

**Innovation** – Something new or improved that has marketable potential, including (1) development of new technologies, (2) refinement of existing technologies, or (3) new applications for existing technologies.

**Intellectual Property** – The separate and distinct types of intangible property that are referred to collectively as “intellectual property,” including but not limited to: patents, trademarks, copyrights, trade secrets, SBIR/STTR technical data, ideas, designs, know-how, business, technical and research methods,

and other types of intangible business assets, and including all types of intangible assets either proposed or generated by a small business as a result of its participation in the SBIR or STTR program.

**Joint Venture** – A joint venture is an association between two or more firms to participate jointly in a single business enterprise. There must be a community of interests, a sharing of profits and losses, and, for the purposes of this FOA, the new entity must qualify as a small business. If a joint venture is selected for award, a DOE Contract Specialist will request a signed agreement from the parties involved. The agreement must state which company will negotiate the grant and serve as the main point of contact.

**Research or Research and Development (R&D)** - Research or R&D is any scientific or engineering activity which is (1) a systematic, intensive study directed toward greater knowledge or understanding of the subject; (2) a systematic study directed specifically toward applying new knowledge to meet a recognized need; and/or (3) a systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

**Research Institution** – A Research Institution is a U.S. research organization that is:

- A non-profit Research Institution as defined in Section 4. Definitions, (5) of the Stevenson-Wydler Technology Innovation Act of 1980 (i.e., an organization owned and operated exclusively for scientific or educational purposes, no part of the net earnings of which inures to the benefit of any private shareholders or individual), or
- A non-profit college or university, or
- A non-profit medical or surgical hospital, or
- A contractor-operated Federally-funded research and development center (FFRDC), as identified by the National Science Foundation in accordance with the government-wide Federal Acquisition Regulation issued in accordance with section 35(c) (1) of the Office of Federal Procurement Policy Act (or any successor legislation thereto). DOE FFRDCs include Ames Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Idaho National Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, National Renewable Energy Laboratory, Oak Ridge Institute for Science and Education, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, Sandia National Laboratories, Savannah River Technology Center, Stanford Linear Accelerator Center, and the Thomas Jefferson National Accelerator Facility.
- A government-owned, government-operated facility, such as the National Energy Technology Laboratory (NETL), is not eligible to act as either a partner or subcontractor in DOE SBIR/STTR projects.

**Socially and Economically Disadvantaged Small Business** - A socially and economically disadvantaged small business is one:

- That is at least 51% owned by (i) an Indian tribe or a native Hawaiian organization, or (ii) one or more socially and economically disadvantaged individuals; and,

- Whose management and daily business operations are controlled by one or more socially and economically disadvantaged individuals. A socially and economically disadvantaged individual is defined as a member of any of the following groups: African Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Subcontinent Asian Americans, other groups designated from time to time by the Small Business Administration (SBA) to be socially disadvantaged, or any other individual found to be socially and economically disadvantaged by SBA pursuant to section 8(a) of the Small Business Act, 15 U.S.C. 637(a).

**Subcontract** – A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by the primary recipient of a Federal Government grant, calling for supplies or services required solely for the performance of the original grant award.

**Woman-Owned Small Business** – A woman-owned small business is a small business that is at least 51% owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management.

## B. WORKING WITH NATIONAL LABS, UNIVERSITIES, RESEARCH INSTITUTIONS, AND OTHER SUBCONTRACTORS

### DOE User Facilities

The DOE operates a number of major scientific user facilities to serve researchers from universities, national laboratories, and industry. These facilities enable the acquisition of new knowledge that often cannot be obtained by any other means. Thousands of researchers collaborate with these facilities and analyze their respective data from the experiments to publish new scientific findings in peer-reviewed journals. These facilities may be found at the following web addresses:

<http://science.energy.gov/bes/suf/user-facilities/> and <http://science.energy.gov/ber/facilities/>.

Potential applicants to the SBIR or STTR programs should consider whether the use of any of these facilities would contribute to the scientific efforts proposed in either Phase I or II. For approved experiments (access to these facilities is through a peer-reviewed system), operating time is available without charge to those scientists whose intent is to publish their results in the open literature. If the investigator wishes to perform proprietary research, the user must pay the full-cost recovery rate for facility usage (in which case, the cost could be charged to the SBIR/STTR project); in return, the facility will treat all technical data generated as proprietary, and the user may take title to any inventions resulting from the research. Information on other laboratory facilities which may be available on a case-by-case basis may be obtained through the Federal Laboratory Consortium Locator or directly from the DOE laboratory involved.

### Identifying Institutions

Experts at institutions such as DOE contractor-operated national laboratories, universities, colleges, or other Research Institutions, may be consulted during the preparation of the grant application. Any of these institutions may also serve as a subcontractor to SBIR/STTR Phase I or Phase II projects, providing technical expertise, facilities, or equipment. In such cases, the small business must have the necessary expertise to direct the project.

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For STTR, the small business must conduct cooperative R&D with a Research Institution (see definition list). An alliance between the small business and a Research Institution must be formed before submitting the grant application. Grants will be awarded to the small business, which will receive all funding for the project and disperse the appropriate funds to the Research Institution.

A list of DOE National Laboratories is available at <http://science.energy.gov/laboratories/>. Also, inquiries may be made at a local library to locate supporting expertise or facilities from an appropriate university or other Research Institution to assist with the proposed project. For help in contacting personnel at DOE and other Federal agency laboratories, go to [www.federalallabs.org](http://www.federalallabs.org) or contact the FLC Management Support Office by, Phone: (856) 667-7727 or E-mail: [flcmso@utrs.com](mailto:flcmso@utrs.com).

### C. SCIENTIFIC AND TECHNICAL INFORMATION RESOURCES

Applicants may want to obtain scientific and technical information related to their proposed effort as background or for other purposes. Sources of this information are listed in the references for each technical topic and below.

National Technical Information Service – Reports resulting from Federal research and those received from exchange agreements with foreign countries and international agencies are available to the public in both paper copy and microfiche through the National Technical Information Service (NTIS). They may be ordered electronically from <http://www.ntis.gov> or by phone at 1-800-553-6847.

DOE Office of Scientific and Technical Information (OSTI) – OSTI is responsible for fulfilling the requirements of the Energy Policy Act of 2005 to maintain "... publicly available collections of scientific and technical information resulting from research, development, demonstration, and commercial application activities supported by the Department." OSTI collects, preserves, and disseminates research results via Web-based information systems developed on behalf of DOE.

SBIR and STTR applicants may obtain information from the following OSTI sources, available via the web at [www.osti.gov](http://www.osti.gov) or at the specific web addresses below.

- Information Bridge ([www.osti.gov/bridge](http://www.osti.gov/bridge)) over 125,000 searchable full-text documents reporting results of DOE-funded research.
- Energy Citations Database ([www.osti.gov/energycitations](http://www.osti.gov/energycitations)), over 2 million searchable citations covering disciplines of interest to DOE from 1948 to the present, with links to full-text when available.
- DOE R&D Project Summaries (<http://www.osti.gov/rdprojects/AdvancedSearchScreen.jsp>), a searchable database of descriptions of approximately 22,000 ongoing or recently completed DOE research projects.
- E-print Network ([www.osti.gov/eprints](http://www.osti.gov/eprints)), which offers single-query access to a network of scientific and technical information and communication, searching more than 900,000 manuscripts, scholarly papers, and other scientific documents residing on approximately 35,300 websites and databases worldwide, containing over 5.5 million e-prints in basic and applied sciences.
- EnergyFiles ([www.osti.gov/energyfiles](http://www.osti.gov/energyfiles)), a virtual library utilizing subject pathways for searching more than 500 science and technology databases and Web sites covering disciplines of interest to DOE.

- Science Conferences ([www.osti.gov/scienceconferences](http://www.osti.gov/scienceconferences)), a portal providing a unified search of 26 Web sites for science and technology conference proceedings and conference papers of interest to DOE.
- DOE R&D Accomplishments ([www.osti.gov/accomplishments](http://www.osti.gov/accomplishments)), a central forum for information about the outcomes of past DOE R&D.
- Federal R&D Project Summaries ([www.osti.gov/fedrnd](http://www.osti.gov/fedrnd)), a searchable portal to 750,000 Federal research project summaries at DOE and five other leading science agencies.

#### D. OTHER RESOURCES

Literature and database searches for abstracts, publications, patents, lists of Federal research in progress, and names of potential consultants in the specific research area can be obtained at good technical libraries (especially those of universities), and from some state organizations.

Science.gov ([www.science.gov](http://www.science.gov)), a Web portal providing single-query search of more than 50 million pages of science information and research results from DOE and 11 other Federal science agencies.

Technical Assistance for Proposal Preparation and Project Conduct – SBCs may wish to contact their local National Institute of Standards and Technology (NIST) Hollings Manufacturing Extension Partnership (MEP) for manufacturing and other business-related support services. The MEP works with small and mid-sized companies to help them create and retain jobs, increase profits, and save time and money. The nationwide network provides a variety of services, from business development assistance to innovation strategies to process improvements and the identification of commercialization opportunities. MEP is a nationwide network of locally managed extension centers with over 1,400 technical experts – located in every state. To contact an MEP center, call 1-800-MEP-4-MFG (1-800-637-4634) or visit MEP's website at [www.mep.nist.gov](http://www.mep.nist.gov).



# U.S. Department of Energy

Small Business Innovation Research (SBIR) and  
Small Business Technology Transfer (STTR) Programs

## Topics

**Amended 4/18/2012**

FY 2012

Phase I

(Release 3)

**Amendment: Topic 8b: Removal of reference to webinar.**

### Participating DOE Research Programs

- Office of Energy Efficiency and Renewable Energy

## Schedule

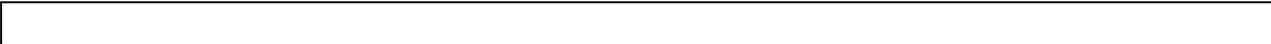
<u>Event</u>	<u>Dates</u>
• Topics Released:	Monday, March 5, 2012
• Funding Opportunity Announcement Issued:	Tuesday, April 3, 2012
• Pre-Application Due Date:	Tuesday, May 1, 2012, 11:59 PM EST
• Feedback Provided on Pre-Applications:	Tuesday, June 5, 2012
• Application Due Date:	Tuesday, July 3, 2012, 11:59 PM EST
• Award Notification Date:	October 2012*
• Start of Grant Budget Period:	November 2012*

\*Preliminary Dates Subject to Change

<b>Table of Changes/Edits/Corrections to Topics</b>	
<u>Date</u>	<u>Change Made</u>
3.15.12	Topic 4b: Description clarified.
3.15.12	Topic 5b. Replaced program manager email contact
3.15.12	Topic 7a: First sentence clarified.
3.23.12	Topic 6d: Subtopic title should be "Differential Compression and Expansion Technologies" and not "Combustion."
4.02.12	Topic 5, 5a, 5b, and 5c: Titles and/or descriptions changed for clarification.
4.18.12	Topic 8b: Removal of reference to webinar.

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  - a. Solid State Lighting (SSL) Devices and Packages ..... 3
  - b. Cold Climate Air Source Heat Pumps ..... 3
  - c. High COP Electric Water Heaters ..... 3
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## PROGRAM AREA OVERVIEW: OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

The Office of Energy Efficiency and Renewable Energy (EERE) leads the Federal government's research and development (R&D) efforts in energy efficiency and renewable energy. It invests in clean energy R&D designed to reduce the cost of technologies that enable the efficient use of energy and/or the generation of renewable energy. EERE's SBIR/STTR efforts are part of an integrated portfolio that will lead to economic and environmental benefits.

The U.S. Department of Energy (DOE) EERE program is interested in receiving proposals for research and development projects that offer potential for achieving EERE technology cost and performance targets. Applications must include a detailed explanation, with analytical data, to describe how the proposed technology and approach will enable substantial progress toward the identified technology target. In addition to cost reduction analysis, applications must describe how technology or system performance will be maintained or improved compared to the state of the art. Prior to the opening of the Funding Opportunity Announcement (FOA), potential applicants may contact the EERE program point of contact (POC) to discuss the proposed technology development effort. After the FOA opens, all questions regarding the topics must be submitted via the FedConnect Portal. Please refer to the respective SBIR/STTR FOA for guidance on submitting questions about the topics through FedConnect. Applicants are strongly encouraged to visit the SBIR/STTR Programs and the EERE website for information about program goals and priorities. Each application may address one topic only.

For additional information regarding EERE priorities, [click here](#) or visit [www.eere.energy.gov](http://www.eere.energy.gov).

Technical Narratives submitted in response to EERE topics must: (1) include a review of the state-of-the-art of the technology and application being targeted; (2) provide a detailed evaluation of the proposed technology and place it in the context of the current state-of-the-art in terms of performance, lifecycle cost, reliability, and/or other key attributes; (3) analyze the proposed technology development process, the pathway to commercialization, the large potential markets it will serve, and the attendant potential public benefits that would accrue; and (4) address the ease of implementation of the new technology.

All applicants must demonstrate how energy savings, energy production, performance and materials and manufacturing costs are estimated to justify how their technology holds promise to approach, meet or exceed the targets given in this document for the different sub-topics, as applicable. All calculations must be explained and supported with sources, where applicable. Unsupported calculations or unsubstantiated claims regarding meeting performance targets are not acceptable.

Phase I projects must complete (1) a preliminary design, (2) a characterization of laboratory devices using the best measurements available, including a description of the measurement methods, and (3) the preparation of a road map with major milestones, that would lead to a production model of a system that would be built in Phase II. In Phase II, devices suitable for near-commercial applications must be built and tested, and issues associated with manufacturing the units in large volumes at a competitive price must be addressed.

## 1. ADVANCED MANUFACTURING

The DOE Office of Energy Efficiency and Renewable Energy, Advanced Manufacturing Office (AMO) (<http://www1.eere.energy.gov/manufacturing/>) seeks transformational manufacturing and materials technologies that reduce primary energy use in manufacturing by 50% without sacrificing product quality, production throughput or life cycle cost. The technology should provide a pathway to a doubling of energy productivity in a U.S. industry through innovative manufacturing and novel materials concepts, including (a) manufacturing process and (b) advanced materials technologies.

Grant applications are sought in the following subtopics:

### a. Manufacturing Process

Manufacturing technologies of interest include innovations in: reactions and separations such as high performance membranes and catalysts; alternatives to conventional high-temperature processing technologies; and waste heat recovery and recycling that reduce energy use  $\geq 50\%$ .

### b. Advanced Materials

Materials technologies of interest include: thermal and degradation resistant materials such as advanced ceramics and coatings; highly-functional, high-performance materials, such as advanced composites, engineered polymers, and low-density and relatively high-strength metals; and lower cost materials for solid state energy technologies such as photovoltaic and thermoelectric materials that reduce energy use  $\geq 50\%$ .

## 2. BIOMASS

The Office of Energy Efficiency and Renewable Energy, Office of the Biomass Program (OBP) (<http://www1.eere.energy.gov/biomass/>) supports research, development, deployment, and demonstration activities to support diverse, cost-effective bioenergy technologies including (a) Cellulosic and Algal Biofuels and (b) Biobased Products.

Grant applications are sought in the following subtopics:

### a. Cellulosic and Algal Biofuels

Technologies for the use of cellulosic and algal biomass in the production of drop-in biofuels, such as renewable gasoline, diesel, and JP-8 to less than \$3 per gallon at the plant gate (in 2007 dollars and in gallons of gasoline equivalent (gge)).

### b. Biobased Products

Product diversification through technologies relevant to the production of biobased products that (a) can increase the feasibility of fuel production in a biorefinery by reducing the minimum fuel sales price (MFSP) by at least \$0.35/gge at the plant gate and (b) have a market potential of 500,000 metric tons/year. To ensure competitiveness, the projected sales price of any non-fuel, biobased products must be shown to be lower than from existing sources.

### 3. BUILDINGS

Buildings use more energy than any other sector of the U.S. economy, consuming more than 70% of electricity and 50% of natural gas. The Office of Energy Efficiency and Renewable Energy Building Technologies Program (BTP) ([www1.eere.energy.gov/buildings/](http://www1.eere.energy.gov/buildings/)) seeks technologies that have the potential to contribute to a 50% reduction in energy demand by residential and commercial buildings at less than the cost of the energy saved (800 Trillion BTUs in annual savings by 2020; 3,000 in 2030). In particular, BTP seeks projects in the following areas: (a) Solid State Lighting Devices and Packages, (b) Cold Climate Air Source Heat Pumps (c) High COP Electric Water Heater, (d) GSHP Loop Cost Reduction, (e) Fast Payback Solar Water Heaters, (f) Building Envelope Materials (g) Building Controls and (h) Commercial Building Power Meters.

Grant applications are sought in the following subtopics:

**a. Solid State Lighting (SSL) Devices and Packages**

Improvements in SSL devices suitable for existing and future domestic building use are sought that will increase package efficacy beyond the SSL 2015 Multi-Year Program Goals of 224 lumens per watt (LPW) for packaged LEDs or 125 for OLED panels, while simultaneously improving light quality by increasing the color rendering index (CRI) above 90, reducing color variations by 10X (i.e., Duv < 0.0014) and by reducing manufacturing costs 10X for both OLED and LED packaged products and components. These goals may be achieved by solving technical barriers such as light extraction and panel production for OLEDs, or by improving the efficiency of LED monochromatic light production in the red, green and amber regimes or by creating entirely novel geometries or materials systems for both LEDs and OLEDs. Complete technical details, performance goals and metrics can be found in the most recent program plan available at:

[http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/ssl\\_mypp2011\\_web.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/ssl_mypp2011_web.pdf)

**b. Cold Climate Air Source Heat Pumps**

Innovative technologies for High Performance Air Source Cold Climate Heat Pumps with a maximum capacity degradation of  $\leq 25\%$  between  $-13^{\circ}\text{F}$  and  $47^{\circ}\text{F}$  are sought.

**c. High COP Electric Water Heaters**

Innovative technologies for electric water heating that would result in a system having a coefficient of performance (COP) of at least 1.1 and the potential of achieving a first cost target of no more than \$500 (mass produced, 50 gallon residential electric water heater unit) are needed.

**d. GSHP Ground Loop Cost Reduction**

Innovative technologies for low cost ground source heat pump (GSHP) systems that specifically address a significant reduction (e.g. for Illinois be able to demonstrate a ground loop installation cost that is  $\ll \$1100/\text{ton}$  that is typical for that region) in the current high cost of the ground loop installation.

**e. Fast Payback Solar Hot Water**

Innovative technologies for solar water heating systems with simple payback of no greater than 5 years.

**f. Building Envelope Materials**

Advanced building envelope materials that can dramatically improve energy efficiency are needed including: innovative higher performing insulations ( $\geq R8$ /inch or  $\geq 30\%$  higher R-value than existing materials); advanced window coatings (e.g.  $< \$7$ /sq ft dynamic control, Solar Heat Gain Coefficient  $< 0.10$  to  $> 0.55$ , transparent conducting glazings that cost  $\geq 30\%$  less than existing indium tin oxide glass with glazings comparable electrical characteristics, variable emissivity coatings (emissivity  $< 0.2$  to  $> 0.60$ ), vacuum glazing with glass bonding able to withstand ASTM2190), and dynamic roof surfaces (e.g. with variable solar reflectance  $< 0.20$  to  $> 0.55$ ).

**g. Building Controls**

Innovative interoperable controls software for self-commissioning; optimization and/or demand-response of buildings, including control of HVAC, lighting, daylighting and advanced facades that yield  $\geq 20\%$  annual reduction in energy demand are needed.

**h. Commercial Building Power Meters**

Innovative low-cost, wireless, three-phase, true power meters that measure and report electricity consumption for commercial office buildings with a target cost of \$20 per meter are needed.

**References**

**Subtopic h:**

1. Brambley, M. R., et al. "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways, April 2005, [http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149\\_market\\_assessment.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149_market_assessment.pdf).

**4. HYDROGEN AND FUEL CELL TECHNOLOGIES**

Key objectives of EERE's Hydrogen and Fuel Cell Technologies (FCT) Program include (<http://www1.eere.energy.gov/hydrogenandfuelcells/index.html>) reducing fuel cell system cost to \$30/kW (equivalent to the cost of a gasoline internal combustion engine) and improving durability to 5,000 hours (equivalent to 150,000 miles of driving) for automotive fuel cell systems by 2017, and meeting the hydrogen fuel threshold cost of \$2–4/gallon gasoline equivalent (gge) by 2020.

**Grant applications that enable the following are sought:**

**a. Transportation Fuel Cells**

Transportation fuel cell system components that could contribute to an 80 kW (net) fuel cell system cost of \$30/kw, produced at high volume (500,000 systems per year), and 5,000 hours durability (the projected time to 10% voltage degradation).

**b. Hydrogen Storage**

Development of fibers, resins and/or composite additives that will result in composites for gas cylinders for hydrogen storage that meet or exceed the performance specifications of today's cylinders manufactured with composites using T700 carbon fiber (e.g., greater than 600 ksi

ultimate tensile strength) but with costs at least 25% lower than the currently projected cost of the carbon fiber layer for a 700 bar tank system (\$ 2720) when manufactured in high volumes.

## References

### Subtopic a:

1. An overview of the Fuel Cells subprogram can be found in the DOE Hydrogen and Fuel Cells program's annual progress report, with the subprogram's section found on [http://www.hydrogen.energy.gov/annual\\_progress11\\_fuelcells.html](http://www.hydrogen.energy.gov/annual_progress11_fuelcells.html). These progress reports summarize the year's fuel cell R&D activities and accomplishments. This work was conducted by industry, academia, and national laboratories for the DOE Hydrogen and Fuel Cells Program and the Office of Energy Efficiency and Renewable Energy.

### Subtopic b:

1. System Level Analyses of Hydrogen Storage Options, Proceeding of 2010 DOE Annual Merit Review, available on the DOE/FCT website: [http://www.hydrogen.energy.gov/pdfs/review10/st001\\_ahluwalia\\_2010\\_o\\_web.pdf](http://www.hydrogen.energy.gov/pdfs/review10/st001_ahluwalia_2010_o_web.pdf).
2. Analyses of Hydrogen Storage Materials and On-Board Systems, Proceeding of 2010 DOE Annual Merit Review, available on the DOE/FCT website: [http://www.hydrogen.energy.gov/pdfs/review10/st002\\_lasher\\_2010\\_o\\_web.pdf](http://www.hydrogen.energy.gov/pdfs/review10/st002_lasher_2010_o_web.pdf).
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6. High Strength Carbon Fibers, Proceeding of 2010 DOE Annual Merit Review, available on the DOE/FCT website: [http://www.hydrogen.energy.gov/pdfs/review10/st093\\_paulauskas\\_2010\\_p\\_web.pdf](http://www.hydrogen.energy.gov/pdfs/review10/st093_paulauskas_2010_p_web.pdf).

## 5. SOLAR

The DOE SunShot Initiative ([www.energy.gov/SunShot](http://www.energy.gov/SunShot)) aims to achieve subsidy-free, cost competitive solar by the end of the decade. That translates to about \$1/watt installed system price at the utility scale or 5-6 cents per kilowatt-hour. SunShot seeks proposals for the development of innovative technologies the broad areas of: (a) Photovoltaic (PV) modules, (b) Power Electronics & Balance of System (Hardware) (c) Balance of System (Non-hardware), and (d) Concentrating Solar Power.

Grant applications are sought in the following subtopics:

**a. PV module**

Photovoltaic module cost reductions which achieve an installed system cost of \$0.50/W by 2020 are needed. Silicon, copper indium gallium selenide (CIGS), cadmium telluride (CdTe), multi-junction, concentrating photovoltaics, transparent conductive oxide (TCO), and building-integrated photovoltaics (BIPV) are example PV module types.

**b. Power Electronics & Balance of System (Hardware)**

Power electronics cost reduction (inverter, micro-inverters, reduction in components, DC/DC converters, plug and play innovations, etc.) which achieves an installed system price of \$0.10/W by 2020. A hardware balance of system cost reduction (innovative racking systems, penetrating and non-penetrating mounting solutions, BIPV designs, wire management) which achieves an installed system price of \$0.18/W by 2020 is sought.

**c. Balance of System (Non-Hardware)**

Non-hardware balance of system cost reduction (customer acquisition, permitting, installation, inspection, interconnection, operations and maintenance, etc.) which achieves an installed system price of \$0.22/W by 2020.

**d. Concentrating Solar Power**

Concentrating Solar Power breakthroughs (heliostat, trough, molten salt, power cycle, materials reduction, etc.) which achieve a levelized cost of electricity of \$0.05-0.06 kWh are needed.

## 6. VEHICLES

EERE's Vehicles Technologies Program (VTP) (<http://www1.eere.energy.gov/vehiclesandfuels/>) is focused on developing technologies to enable average new vehicle fuel economy of more than 60 miles per gallon for cars and more than 43 miles per gallon for trucks by 2025. VTP seeks projects in the following areas: (a) High-energy, high-power electric drive vehicle batteries (b) Catalyst materials for exhaust aftertreatment (c) Engine boosting technologies (d) Differential compression and expansion technologies, (e) Subsystem component technologies (f) Thermoelectric technologies, and (g) Materials for traction drive motor laminations, cores, or structures.

Grant applications are sought in the following subtopics:

**a. Electric Drive Vehicle Batteries**

Applicants are sought to develop electrochemical energy storage technologies which support commercialization of micro, mild, and full HEVs, PHEVs, and EVs. Some specific improvements which are of interest, but are not limited to, include: new low-cost materials, improvements in manufacturing processes, speed or yield, improved cell/pack design minimizing inactive material, significant improvement in specific energy (Wh/kg) or energy density (Wh/L), and improved safety. Proposals must clearly demonstrate how they advance the current state of the art and address the relevant performance metrics listed at [www.uscar.org/guest/article\\_view.php?articles\\_id=85](http://www.uscar.org/guest/article_view.php?articles_id=85). When appropriate, evaluation of the technology should be performed in accordance with applicable test procedures or

recommended practices as published by the Department of Energy (DOE) and the U.S Advanced Battery Consortium (USABC). These test procedures can be found at, [www.uscar.org/quest/article\\_view.php?articles\\_id=86](http://www.uscar.org/quest/article_view.php?articles_id=86). Phase I feasibility studies must be evaluated in full cells (not half cells) greater than 200mAh in size while Phase II technologies should be demonstrated in full cells greater than 2Ah. Proposals will be deemed non-responsive if the proposed technology is prohibitive to market penetration due to high cost; requires substantial infrastructure investments or industry standardization to be commercially viable; cannot accept high power recharge pulses from regenerative braking. Proposals deemed to be duplicative of research that is already in progress or similar to proposals already reviewed this year will not be funded; therefore all submissions should clearly explain how the proposed work differs from other work in the field.

**b. Exhaust Aftertreatment Materials**

In order of priority, low temperature exhaust after-treatment catalysts are needed for the reduction of Oxides of Nitrogen (1, NO<sub>x</sub>), Carbon Monoxide (2, CO), or unburned hydrocarbons (3, HCs) from internal combustion engines. To meet the demands of future high efficiency engines new low temperature catalyst materials for exhaust after-treatment having the ability to reach 90% efficiency at or below 150°C are needed.

**c. Innovative Engine Boosting Technologies**

Innovative technologies for engine boosting (turbocharger and supercharger) systems that will improve the FTP cycle fuel economy by 3 percent, expand the effective operating range by 15-20 percent over current production systems with improved transient response, and decreased system cost are needed.

**d. Differential Compression and Expansion Technologies**

Innovative technologies to enable differential compression and expansion in piston engines resulting in significantly improved efficiencies compared to state-of-the-art engines (currently 38% for gasoline and 42% for diesel engines).

**e. Subsystem Component Technologies**

Innovative subsystem component technologies in the areas of high resolution low cost sensors:

1. NO<sub>x</sub> Sensor
  - a. Measurement of 10-1000 ppm NO<sub>x</sub> in engine exhaust upstream of active NO<sub>x</sub> catalysts for the purpose of controlling active regeneration with a response time of less than 50ms.
  - b. Measurement of 1-10 ppm NO<sub>x</sub> in engine exhaust at tailpipe positions to insure emission regulation compliance with a response time of less than 1 sec.
2. NH<sub>3</sub> Sensor
  - a. Measurement of 10-1000 ppm NH<sub>3</sub> in engine exhaust upstream of active NO<sub>x</sub> catalysts for the purpose of controlling active regeneration with a response time of less than 1 sec.
  - b. Measurement of 1-100 ppm NH<sub>3</sub> in engine exhaust at tailpipe positions to insure emission regulation compliance with a response time of less than 1 sec.

**f. Thermoelectric Technologies**

The efficiency of thermoelectric couples is determined by the Figure of Merit (ZT) which is defined as the Seebeck Coefficient (S) squared multiplied by the electrical conductivity (e) divided by thermal conductivity (k). The current state of the art couples have a  $ZT=1.3$ . The applicant must demonstrate how the technology can lead to thermoelectric couples that have a  $ZT>1.6$  across a thermal gradient of 650°C to 30°C. Applicant also must demonstrate a reasonable context of commercial viability. In Phase II, the applicant must develop an assembly or module that could lead to \$1.00/Watt installed in a vehicle thermoelectric generator at high volume production.

**g. Materials for Traction Drive Motor Laminations, Cores, or Structures**

New materials for automotive traction drive motor laminations, cores, or structures that could achieve significant cost savings and contribute to achieving the DOE motor cost target of \$4.7/kW in 2020 are needed. Applications should propose specific material innovations in one of these three areas and address how they can lead to reduced costs with respect to currently available materials.

**h. Engine Friction Reduction**

Applicants are sought to develop innovative technologies to enable the reduction of friction in engine/driveline systems of existing vehicles. Technology must be able to be used as a drop-in or be retrofitted into existing on road vehicles and demonstrate at least a 3% reduction in energy required to propel the vehicle. Incremental costs associated with the technology must be shown to be absorbed by the associated fuel use reduction

**7. WATER**

EERE is seeking the development of innovative technologies in targeted broad areas identified by its the Water Power Technology Program ([www.eere.energy.gov/topics/water.html](http://www.eere.energy.gov/topics/water.html)) seeks proposals for large cost reductions in the deployment of U.S. water (hydro- and marine) power resources to enable water power to provide 15% of our nation's electricity by 2030, including (a) Marine Energy and (b) Hydropower and Hydrokinetic Applications.

**Grant applications are sought in the following subtopics:**

**a. Marine and Hydrokinetic Energy**

For Marine Energy (Water and Off-shore Wind) and Hydrokinetic Applications: Rapid and adaptable subsea geotechnical survey methods and techniques to accelerate the deployment of foundations (e.g. piles) or moorings (e.g. anchors) for marine energy devices. Site investigation is a significant cost driver for commercial marine energy installations. Proposals are sought for innovative methods that reduce costs by quickly and accurately delivering sufficient geotechnical information to properly characterize the seafloor under variable environmental conditions (e.g. currents, tides, waves). Applicants must provide a basis of estimate demonstrating technology capable of reducing the time for investigation of a single piling site by 50% relative to use of conventional geotechnical survey methods (e.g. penetration testing, core sampling ) (water depth at applicant's discretion). Proposed

technologies should be applicable to inland waterways and/or offshore sites: shallow water (0-30 m), transitional depth (30-60 m), or both.

**b. Hydropower Applications**

Development of cost-effective (targeting a levelized cost of energy (LCOE) of less than 6¢ per kWh), modular civil works package for hydropower applications including innovative, non-metallic hydropower turbine designs; innovative turbines that increase the range of peak or near peak efficiency for various head and flow conditions; modular turbines for small hydropower applications (100kw – 5MW); alternative pipe material for small hydropower applications; and advanced tunneling methods for hydropower stations.

**8. WIND**

The Office of Energy Efficiency and Renewable Energy Wind Technology Program (<http://www1.eere.energy.gov/wind/>) seeks proposals for innovations that significantly advance the goal of large cost reductions in the deployment of U.S. wind power resources, including (a) Logistics for Land-Based Wind Power and (b) Development of a Met-Ocean Package for Offshore Wind.

**Grant applications are sought in the following subtopics:**

**a. Logistics for Land-Based Wind Power**

Innovations are needed that overcome the logistical limits of current methods for the transportation, assembly and installation of land-based wind power and lead to land-based turbine size increases beyond 3.5 MW in land-based turbine systems. Technologies used to achieve > 3.5 MW include 25% higher hub heights, 26% larger swept area (larger blades) and access to areas with class 5 or better wind resource. These can be achieved with: innovative designs for larger blades and towers that permit transportation by current methods; new transportation methods for large blades and tower sections; approaches to the assembly and installation of land-based wind turbines that overcome logistical and cost barriers; higher hub heights; larger swept areas; and access to areas with higher class wind resource leading to an overall >20% reduction in the cost of energy for land-based turbines.

**b. Development of a Met-Ocean Package for Offshore Wind**

Development of a Standardized Met-Ocean Monitoring Package which would serve as one of the core elements of a standardized backbone data collection network for the offshore renewable energy industry is urgently needed. Projects are sought to develop one or more standardized, commercially viable monitoring equipment package configurations to address met-ocean data needs, with emphasis on offshore wind, along with support likely needed for full validation. Key requirements are that measurements must support improved assessment of wind speed and direction, atmospheric stability, ocean waves, swells and currents, data sampling and communication rates consistent with advanced rapid refresh weather modeling data assimilation needs. These monitoring packages must also be able to serve as companion measurement platforms to specialized floating LIDAR systems for now in early stages of application. Applicants are required to justify the economic viability of the proposed package assuming near term (< 5 years) industry deployment for project resource characterization.

Examples of current standard met-ocean packages include the NOAA Automated Surface Observing System (ASOS) and the NDBC Coastal-Marine Automated Network stations ([www.nws.noaa.gov/asos/](http://www.nws.noaa.gov/asos/)); NOAA National Data Buoy Center (NDBC) buoys (<http://www.ndbc.noaa.gov/>); and the University of Maine NERACOOS buoy package (<http://gyre.umeoce.maine.edu/buoyhome.php>).