# FINANCIAL ASSISTANCE
# FUNDING OPPORTUNITY ANNOUNCEMENT

## U.S. Department of Energy

## Office of Science

## Annual Phase I Small Business Innovation Research (SBIR)
## Small Business Technology Transfer (STTR)
## Funding Opportunity Announcement

**Funding Opportunity Number: DE-FOA-0000161**

**Announcement Type: Initial**

**CFDA Number: 81.049**

**ISSUE DATE:** **September 24, 2009**

**PREAPPLICATION DUE DATE:** **Not Required**

**LETTER OF INTENT DUE DATE:** **Not Required**

**APPLICATION DUE DATE:** **November 20, 2009, 08:00 PM Eastern Time**

**Where to Submit:**

**NOTE: REQUIREMENTS FOR GRANTS.GOV**

**Where to Submit:** 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 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 (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See http://www.grants.gov/GetStarted. 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 POTENTIAL 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 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. DOE cannot answer these questions. Part VII of this announcement explains how to submit other questions to the Department of Energy (DOE).

Questions regarding the content of the announcement 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 release of the FOA as possible to have the benefit of all responses. More information is available at http://www.compusearch.com/products/fedconnect/fedconnect.asp and https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

**Modifications:** Notices of any modifications to this announcement will be posted on Grants.gov and 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 http://www.fedconnect.net and http://www.compusearch.com/products/fedconnect/fedconnect.asp.

## TABLE OF CONTENTS

**PART VIII – OTHER INFORMATION**

**A. Modifications**
**B. Government Right to Reject or Negotiate**
**C. Commitment of Public Funds**
**D. Proprietary Application Information**
**E. Evaluation and Administration by Non-Federal Personnel**
**F. Intellectual Property Developed under this Program**
**G. Notice of Right to Request Patent Waiver**
**H. Notice Regarding Eligible/Ineligible Activities**

**Appendices/Reference Material**

**A. Definitions**
**B. Technical Topic Descriptions**
**C. Working with National Laboratories, Universities, Research Institutions, and Other Subcontractors**
**D. Scientific and Technical Information Sources**

## PART I – FUNDING OPPORTUNITY DESCRIPTION

This notice describes Phase I funding opportunities for the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs for Fiscal Year 2010. This notice also includes some aspects of the Phase II process as reference information.

Phase I opportunities are announced annually pursuant to the Small Business Innovation Development Act of 1982 (Public Law 97-219), Small Business Innovation Research Program Reauthorization Act of 2000 (Public Law 106-554), the Small Business Research and Development Act of 1992 (Public Law 102-564), and the Small Business Technology Transfer Program Reauthorization Act of 2001 (Public Law 107-50). The SBIR and STTR Acts are set to expire September 30, 2009. 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 Notice).* 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*. In the remainder of the notice, *italics* will be used to identify information that pertains *exclusively* to the *STTR* program.

**Program Phases:**

**Phase I:** Phase I grants resulting from this competition will be made during Fiscal Year 2010 to small businesses, in amounts up to $100,000. Phase I is to evaluate, insofar as possible, the scientific or technical merit and feasibility of ideas that appear to have commercial potential and/or substantial applications in support of DOE mission research facilities. 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, awardees whose research or R&D has identifiable potential to meet market needs are encouraged to seek commitments from private sector or Federal non-SBIR/STTR funding sources for both 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. Having firm commitments in place at the time of a Phase II application will increase the likelihood of receiving full commercialization planning credit during the evaluation of the application. Full details will be provided in the Phase II Funding Notice.

**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 2011 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 $750,000. Supplemental applications to request additional funding above $750,000 at the end of the two-year period in Phase II will be sought only at the invitation and subsequent approval from the designated DOE Project Officer. A separate funding notice will be published for those invited to submit a supplemental application during the conduct of the Phase II research period to request supplemental applications. The period of performance under Phase II will depend on the scope of the effort, but normally will not exceed a 12-month initial budget period with an option for a continuation of up to an additional 12 months for a total of 24 months. Funds will be allocated over the two budget periods. Second year funding will be contingent on the demonstration of adequate year-one progress, evaluation of programmatic priorities, and availability of funds. Phase II applicants selected for a Phase II award will be issued a grant amendment covering a brief interim period of performance while the Phase II award is being negotiated. Should a Phase II applicant selected for a Phase II award and the DOE grant negotiator fail to agree on terms covering the Phase II effort, allowable costs incurred during the interim period will be paid in accordance with Federal and DOE commercial cost principles (See FAR, Part 31, www.arnet.gov/far/loadmainre.html). It is anticipated that one-third to one-half 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. 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 capital be used by the small business to pursue commercial applications of the R&D. That is, the SBIR/STTR 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 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 Armed Services Procurement Act, 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. As a result, in conducting actions relative to a Phase III SBIR/STTR award, it is sufficient to state for purposes of a Justification and Approval pursuant to FAR 6.302-5 that the project is an SBIR/STTR Phase III award that is derived from, extends, or logically concludes efforts performed under prior SBIR/STTR funding agreements and is authorized under 10 U.S.C. 2304(b) (2) or 41 U.S.C. 253(b) (2).

## PART II – AWARD INFORMATION

### A. TYPE OF AWARD INSTRUMENT.

DOE anticipates awarding grants under this program announcement.

### B. ESTIMATED FUNDING.

Approximately $36 Million is expected to be available for new Phase I awards under this announcement.

### C. MAXIMUM AND MINIMUM AWARD SIZE.

Ceiling (i.e., the maximum amount for an individual award made under this announcement): $100,000

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

### D. EXPECTED NUMBER OF AWARDS.

DOE anticipates making approximately 360 awards under this announcement. SBIR and STTR awards are subject to the availability of funds and this funding opportunity announcement does not obligate DOE to make any awards under either Phase I or Phase II.

### E. ANTICIPATED AWARD SIZE.

The average award size for this program in Fiscal Year 2009 was $ 99,599. DOE expects the average award size to be similar under this announcement.

### F. PERIOD OF PERFORMANCE.

DOE anticipates making awards that will run for up to 9 months with a project period begin date in June 2010.

### G. TYPE OF APPLICATION.

DOE will accept new Phase I applications under this announcement.

## PART III - ELIGIBILITY INFORMATION

### A. ELIGIBLE SBIR APPLICANTS.

Only United States 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:

**1.** Organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;

**2.** 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;

**3.** At least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States, 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 United States (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 United States); and

**4.** Has, including its affiliates, not more than 500 employees and meets the other regulatory requirements found in 13 C.F.R. 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 C.F.R. 121. The term "number of employees" is defined in 13 C.F.R. 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. ELIGIBLE STTR APPLICANTS.

Only United States small business concerns (SBCs) are eligible to submit STTR applications. An SBC is one that, at the time of award for both Phase I and Phase II STTR awards, meets all of the following criteria:

**1.** Organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;

**2.** 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;

**3.** At least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States, 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 United States; and

**4.** Has, including its affiliates, not more than 500 employees and meets the other regulatory requirements found in 13 C.F.R. 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 programs must meet eligibility requirements of both SBIR and STTR applicants.

## C. COST SHARING.

Cost sharing is permitted for proposals under this funding solicitation; however, cost-sharing is not required. Cost-sharing will not be an evaluation factor in consideration of your Phase I proposal.

## D. OTHER ELIGIBILITY REQUIREMENTS.

The research or R&D must be performed in the United States for both Phases I and II. "United States" means the 50 states, the territories and possessions of the United States, 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 he/she is legally empowered to work in the U.S. at the time that an award is made and throughout the duration of the project.

### Restrictions on Submitting Applications

**a.** 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, the applicant must decide which subtopic is the most relevant and submit the grant application under that subtopic only.

**b.** 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.

**c.** Submitting to Both 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 on the SBIR/STTR Information Form.

**d.** Duplicate Applications – Duplicate grant applications, even if submitted to different topics and/or subtopics, will be rejected without review. The application with the latest Grants.gov submission time will be the only version accepted for evaluation.

**e.** Multiple Applications – There is no limit on the number of different grant applications a small business may submit, even to the same subtopic. However, each application must be uniquely responsive to the topic and subtopic.

### Restrictions on the Principal Investigator (PI)

**a.** General PI Requirements and Restrictions – The Principal Investigator (PI) is the key individual designated by the applicant to direct the project. 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 3 hours per week for the duration of the project for both SBIR and STTR Phase I projects. For example a 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 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. Processing of applications that include co-PIs may be delayed while the error is corrected by the applicant. 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 he/she is legally empowered to work in the U.S. at the time that an award is made and throughout its duration.

**b.** Additional PI Restrictions when submitting to SBIR 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.

**c.** *Additional PI Restrictions when submitting to STTR 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, their primary employment (at least 20 hours per week) must be with the research institution in order to qualify under STTR.*

**d.** PI Restrictions when submitting to both SBIR and STTR – 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, 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). A level of effort worksheet may be found at http://www.sc.doe.gov/sbir/solicitations/FY%202010/level_of_effort.doc or http://www.sc.doe.gov/sbir/solicitations/FY%202010/level_of_effort.xls 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 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 Principal Investigator 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 subcontract for the single research institution is at least $30,000, 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. 5).

**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 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

### 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 Application Package". Enter the CFDA and/or the funding opportunity number located on the cover of this announcement 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.

   Pre-Applications are not required.

### C. CONTENT AND FORMS OF SBIR/STTR APPLICATION.

You must complete the mandatory forms and any applicable optional forms (e.g., SF-LLL Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. **SF 424 (R&R).**

   Complete this form first to populate data in other forms. Identify the technical topic and subtopic in the title field (Number 11) of this form. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the "Help Mode" (Icon with the pointer and question mark at the top of the form). The list of Certifications and Assurances referenced in Field 18 can be found on the DOE Financial Assistance Forms Page at http://management.energy.gov/business_doe/business_forms.htm, under Certifications and Assurances.

2. **RESEARCH AND RELATED Other Project Information.**

   Complete questions 1 through 6 and attach files.

   If the answer to question 3 is "Yes," you must identify proprietary information with a legend on the first page of your project narrative and on each page that contains proprietary information in accordance with instructions provided in Part VIII, Sections D and F.

   The files must comply with the following instructions:

   **Project Summary/Abstract (Field 7 on the form)**

   The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. This document must not include any proprietary or sensitive business information as the Department of Energy may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) with font not smaller than 11 point. Save this information in a file named "Summary.pdf," and click on "Add Optional Other Attachment" to attach.

   **The summary must include:**

   **Company Name**

   **Project Title**

   **Principal Investigator**

   **Topic Number / Subtopic Letter (example: Topic 11, Subtopic b)**

   **Statement of the problem or situation that is being addressed.** Describe the problem or situation being addressed. The DOE's and public's interest in the problem should be clearly stated. (Typically one to three sentences).

**Statement of how this problem or situation is being addressed.** Describe how this problem or situation is being addressed. The overall objective or approach of the combined Phase I and Phase II projects should be clearly stated. (Typically one to two sentences).

**Commercial Applications and Other Benefits.** Summarize the future applications and/or public benefits if the project is carried over into Phase II and beyond. Do not repeat information already provided above.

**Key Words.** Provide listing of key words that describe this effort.

**Summary for Members of Congress.** The DOE notifies members of Congress of awards in their respective districts. Therefore, please provide, in clear and concise layman's terms, a very brief summary of the project, suitable for a possible press release from a Congressional office. (This summary should be a maximum of two sentences, but no more than 50 words.)

**Project Narrative (Field 8 on the form)**

The project narrative must be no longer than 20 pages of text and should be in a single PDF file with the exception of the budget justification, level-of-effort worksheet, and project summary, which must be attached separately as directed in Grants.gov. It must be typed in 12-point font, with 1 inch margins. All grant applications must be submitted in response to a specific technical topic and subtopic announced in this notice. This information (topic number and subtopic letter) should be identified in a header on each page of the project narrative as well as on the SF 424 R&R in the title field (Number 11). The project narrative header should also include company name, and project title. Sequentially number each page of the project narrative.

Grant applications, submitted to DOE under SBIR/STTR programs, must provide sufficient information to convince DOE, and members of the research community who review the grant application, that the application is responsive to the topic and subtopic under which it is submitted, that the proposed work represents a sound approach to the investigation of an important scientific or engineering question, and that it is worthy of support under the stated criteria. The Phase I grant application should describe self-contained research that will contribute to proving scientific or technical feasibility of the approach or concept. It should be written with the care and thoroughness accorded papers for publication--direct, concise, informative, and free from grammatical, typographical, and spelling errors. Illustrations and charts should be clearly labeled and correctly referenced in the text. Promotional and non-project-related discussion detracts from the professional quality of the proposal. The work proposed for Phase I, assuming that it proceeds successfully, should be suitable in nature for subsequent progression to Phases II and III.

Technical reviewers will base their conclusions only on information contained in the grant application. Do not assume that reviewers are acquainted with the small business, key individuals, or any theory or experiments referred to, but not described. (This

includes material in refereed professional journals--those in which the articles have been subjected to peer review, and material referenced on the internet). Relevant journal articles should be summarized in the grant application. Information provided via internet links will not be reviewed.

Specifically excluded from this funding notice are grant applications principally for literature surveys, for compilations of the work of others, for technical assessments, or for technical status surveys. If any of these types of tasks are included in the work plan, the grant (if awarded) may be reduced in proportion to that effort. In addition, grant applications primarily for the development of already proven concepts will be declined, because such efforts are considered the responsibility of the private sector.

Narrative descriptions of the technical topics are provided in Appendix B of this document and at: www.sc.doe.gov/sbir/Solicitations/FY%202010/Table_of_contents_sub.htm. Download the technical topic descriptions pdf file. Each technical topic is subdivided into subtopics, designated by the letters a, b, c, d, etc. A grant application must respond to a specific technical topic and, within it, to only one subtopic. NOTE: The topic numbers change each year. Be sure to identify the correct topic number on the SF 424 R&R in the title field (Number 11). The application will be evaluated under the topic number identified. The DOE will not be responsible for reassigning applications to the correct topic number if identified incorrectly.

**The Project Narrative format should follow the outline below:**

**a. Cover page** – Provide company and project information including company name and address, principal investigator, project title, topic number and subtopic letter.

**b. Proprietary Data Legend** – If applicable. See Part VIII, Sections D and F.

**c. Identification and Significance of the Problem or Opportunity, and Technical Approach** – Define the specific technical problem or opportunity addressed by your application. Provide enough background information so that the importance of the problem/opportunity is clear. Indicate the overall technical approach to the problem/opportunity and the part that the proposed research plays in providing needed results.

**d. Anticipated Public Benefits** – Discuss the technical, economic, social, and other benefits to the public as a whole anticipated if the project is successful and is carried over into Phases II and III. Identify specific groups in the commercial sector as well as the Federal Government that would benefit from the projected results. Describe the resultant product or process, the likelihood that it could lead to a marketable product, and the significance of the market.

**e. Technical Objectives** – State the specific technical objectives of the Phase I effort, including the questions it will try to answer to determine the feasibility of the proposed approach.

**f. Phase I Work Plan** – Provide an explicit, detailed description of the Phase I research approach and work to be performed. Indicate what will be done, by whom (small business, subcontractors, research institution, or consultants), where it will be done, and how the work will be carried out. If the applicant is making a commercial or in-kind contribution to the project, please describe in detail here. The Phase I effort should attempt to determine the technical feasibility of the proposed concept which, if successful, would provide a firm basis for the Phase II grant application.

Relate the work plan to the objectives of the proposed project. Discuss the methods planned to achieve each objective or task explicitly and in detail. This section should be a substantial portion of the total grant application.

**g. Phase I Performance Schedule** – Briefly describe the important milestones and the estimated percentage of time for completing each task described in the work plan.

**h. Related Research or R&D** – Demonstrate knowledge of key recent work conducted by others in the specific area of the proposed project. If not already addressed, describe significant research that is directly related to the grant application, including any conducted by the Principal Investigator or by the applicant organization. Describe how it relates to the proposed effort and any planned coordination with outside sources. Applicants should be or become familiar with the references provided following each topic description.

**i. Principal Investigator and other Key Personnel** – The Principal Investigator (PI) must be knowledgeable in all technical aspects of the grant application and be capable of leading the research effort and meet the requirements described in Part III, D. Describe the effort to be performed by the PI during the project.

**j. Facilities/Equipment** – Describe available equipment and physical facilities necessary to carry out the Phase I effort. Items of equipment to be leased or purchased must be described and justified in this section. Equipment is defined as an article of tangible, nonexpendable, personal property, including exempt property, charged directly to the award, having a useful life of more than one year, and an acquisition cost of $5,000 or more per unit. Title to equipment purchased under this award lies with the government. It may be transferred to the grantee where such transfer would be more cost effective than recovery of the property by the government. Awardees wishing to obtain title should contact their Contract Specialist prior to project completion for the procedure to follow.

If the equipment, instrumentation, and facilities are not the property of the applicant and are not to be purchased or leased, the source must be identified and their availability and expected costs specifically confirmed in this section. A principal of the organization that owns or operates the facilities/equipment must certify regarding the availability and cost of facilities/equipment and any associated technician cost. A copy of this certification must be submitted as part of the grant application.

To the extent possible in keeping with the overall purposes of the program, only American-made equipment and products should be purchased with funds provided by the financial assistance award.

**k. Consultants and Subcontractors *(including Research Institutions for STTR)***
Research Institution – If the grant application contains substantial collaboration with a research institution *(required for STTR, optional for SBIR)*, (1) identify the name and address of the institution; the name, phone number, and email address of the certifying official from the research institution; and the total dollar amount of the subcontract, and (2) describe in detail the work to be done by this institution in the Work Plan section. The research institution will be considered a subcontractor to the small business applicant. The research institution must provide a letter of commitment on official letterhead from an authorized representative of the institution which commits the institution to participate in the project as described in the grant application. The letter should be attached as an "other attachment" (see Part IV, Section C. 2). If selected for award, participation of the research institution will be verified by a Contract Specialist..

Other Consultants and Subcontractors – Involvement of consultants or subcontractors in the planning and research stages of the project is permitted provided the work is performed in the United States. If consultants and/or subcontractors are to be used, this section of the application must identify them by name, identify whether the party is being proposed as a consultant or as a subcontractor, and must provide a "Letter of Commitment" from an authorized representative of each subcontractor and/or consultant proposed. The letter must provide a detailed cost estimate [including costs for labor, equipment, and materials, if any] for the consultant or subcontractor, as well as a specific statement certifying that they have agreed to serve in the manner and to the extent described in the Work Plan section of the grant application. Each letter must be on official letterhead with the authorizing representative's contact information provided and submitted as an "other attachment" to the application (see Part IV, Section C. 2). If selected for award, a DOE Contract Specialist will verify the participation of any subcontractors and/or consultants and will require budget and budget explanations for subcontractors and verification of the proposed rates for consultants. Note: Consultants must not be employees of either the small business applicant or any proposed subcontractor. Non-U.S. citizens are eligible to perform work on SBIR/STTR projects provided he/she is legally empowered to work in the U.S. at the time that an award is made and throughout its duration. None of the small business applicant's personnel can also be a proposed consultant or an employee of a proposed subcontractor.

**Other Attachments (Field 12 on the form)**

If you need to elaborate on your responses to questions 1-5 on the "Other Project Information" document, provide the information in a single file named "projinfo.pdf." Click on "Add Attachments" in Field 12 to attach file.

Also, attach the following files, if applicable:

**Similar Grant Applications, Proposals, or Awards**

Please respond to question 5 and include the following:

- The name, address, and point of contact including telephone number of the agency(s) to which a proposal or grant application was submitted, or will be submitted, or from which an award is expected or has been received.
- The date of submission or the date of award.
- The title of the grant application.
- The name and title of the project manager or Principal Investigator for each proposal or grant application submitted or award received.
- The number and date of the funding opportunity notice under which the application was submitted or award was received.
- The title of the specific research topic to which the application was submitted or award was received.

In the event that a proposal or grant application is selected for award by more than one agency, a negotiation will be conducted among the parties to avoid duplication of effort.

**Documentation of Multiple SBIR Phase II Awards**

Public Law 102-564 requires that a small business that submits an SBIR Phase I grant application that has already received more than 15 Phase II SBIR awards, as totaled from all Federal agencies with SBIR programs during the preceding five fiscal years, must document the extent to which it was able to secure Phase III funding to develop concepts resulting from previous Phase II awards. Accordingly, such small business concerns shall submit, for each SBIR Phase II award, the name of the awarding agency, the date of the award, the funding agreement number, the funding amount, the topic and/or subtopic title, the amount of follow-on funding, the source and the date that the follow-on funding was provided, and the current commercialization status. This required information should be attached with the heading "Addendum--Phase II History" (see Part IV, Section C. 2 Other Attachments).

**3. RESEARCH AND RELATED Senior/Key Person Profile (Expanded).**

Complete this form before the Budget form to populate data on the Budget form. The PI is the key individual designated by the applicant to direct the project. Only one PI is acceptable per project. The PI does not need to be a U.S, citizen; however, all work must be performed in the United States. See “Restrictions on the Principal Investigator” in Part III, section D, Other Eligibility Requirements.

Beginning with the PI, provide a profile for each senior/key person proposed. Each senior/key person must be aware that he/she is included in the grant application and must agree to perform the work if selected for award. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project, whether or not a salary is proposed for this individual.

Subawardees and consultants must be included if they meet this definition. For each senior/key person provide:

**Biographical Sketch:** Complete a biographical sketch for each senior/key person and attach to the "Attach Biographical Sketch" field in each profile. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

**Education and Training:** Undergraduate, graduate and postdoctoral training; provide institution, major/area, degree, and year.

**Research and Professional Experience:** Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

**Publications:** Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

**Current and Pending Support:** Provide a list of all current and pending support (both Federal and non-Federal) for ongoing projects and pending applications.

**4. RESEARCH AND RELATED BUDGET.**

Complete the Research and Related Budget form in accordance with the instructions on the form (activate Help Mode to view instructions) and the following instructions.

Please make sure that you complete the form in full. For example, in the past, companies have failed to complete the column(s) for the number of person-months to be devoted to the project. Incomplete budgets may create delays if the applicant is selected for award.

A separate budget form must be completed by the applicant and each subawardee for the support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the "**NEXT PERIOD"** button is activated. You may request funds under any of the categories (other than "Participant/Trainee Support Costs") listed as long as the item and amount are necessary to perform the proposed work, meets all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV, section G).

**Budget Justification (Field K on the form)**

Provide the required supporting information for all proposed costs (see R&R Budget instructions). **Attach a single budget justification file that includes the hourly rate and number of proposed hours for the principal investigator and senior/key persons for the entire project period in Field K**. The file automatically carries over to each budget year. Please note, if you are selected for an award, additional budget information will most likely be required.

**Notes regarding Budget:**

- Although there is no absolute cap on indirect costs, grant applications will be evaluated for overall economy and value to DOE.
- Tuition expenses are only allowable if requested from a subcontractor that is a University and if the amount requested for tuition is reasonable and comparable to the amount a student would be paid for performing research during the grant period.
- Travel funds must be justified and directly related to the needs of the project. Travel expenses for technical conferences are not permitted unless the purpose of attending the conference directly relates to the project (e.g., to present research results of the project). Funds to cover travel expenses outside of the U.S. is considered an unallowable cost unless written approval has been obtained from the Contracting Officer.
- Grants may include a profit or fee for the small business.
- Any commercial and/or in-kind contribution to the project should be reflected in the project narrative and not included on the budget pages.
- Round all funds to the nearest dollar.
- Complete level-of-effort worksheet located at: http://www.sc.doe.gov/sbir/solicitations/FY%202010/Level_of_Effort.doc or http://www.sc.doe.gov/sbir/solicitations/FY%202010/level_of_effort.xls (Attach in Field 12 – Research & Related Other Project Information)

## 5. SBIR/STTR INFORMATION FORM.

Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instruction, turn on the "Help Mode" (Icon with the pointer and question mark at the top of the form).

**Question 7, Commercialization Plan**

**Commercialization Plan.** A succinct commercialization plan must be included in a Phase I grant application. Attach the file in Field 12 of the Research & Related Other Project Information Form because Question 7 will not accept the attachment for a Phase I grant application submission. The Commercialization Plan will be evaluated under the "Impact" criteria. The plan should include:

**(a) Company Information:** Describe core competencies; size; specialization areas; products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization (see question 8 for specific information requested).

**(b) Market:** Analyses of market size, and estimated market share after first year sales and after 5 years.

**(c) Intellectual Property:** Patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage.

**Question 8, Company Commercialization History**

If the answer to the this question is "yes," provide your commercialization history in a table which includes: company name, title of the project; source of funding (if Federal, indicate whether SBIR, STTR, or other); year the funding was received; total sales of the resulting product or service (include sales by your company and any licensee- identify the licensee); and total revenues obtained from commercialization (identify sources of these revenues). Attach in the block provided.

**6. Project/Performance Site Location(s).**

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided. **Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.** Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

**7. SF-LLL Disclosure of Lobbying Activities.**

If applicable, complete SF-LLL. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal grant, you must complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying."

**Summary of Required Forms/Files -**
**Your application must include the following documents:**

| Name of Document | Format | Attach to |
|---|---|---|
| SF 424 (R&R) | PDF | N/A |
| RESEARCH AND RELATED Other Project Information | PDF | N/A |
| Project Summary/Abstract | PDF | Field 7 |
| Project Narrative, including required appendices | PDF | Field 8 |
| Level of Effort Worksheet | PDF | Field 12 |
| RESEARCH & RELATED Senior/Key Person Profile (Expanded) | PDF | N/A |
| Biographical Sketch | PDF | Attach to appropriate block |
| RESEARCH & RELATED BUDGET | PDF | N/A |
| Budget Justification | PDF | Field K |
| SBIR/STTR Information | PDF | N/A |
| Commercialization Plan for Phase I (See Question 7) | PDF | Attach to appropriate block |
| Commercialization History, if applicable (See Question 8) | PDF | Attach to appropriate block |
| PROJECT/PERFORMANCE SITE LOCATION(S) | PDF | N/A |
| SF-LLL Disclosure of Lobbying Activities, if applicable | PDF | N/A |

## 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:

- Indirect cost information

- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Fee justification
- Representation concerning financial management system
- Consultant documentation/verification of rates

**SBIR/STTR Certifications**

If selected for an award, applicants will be required to sign and submit one or more of the following certifications. Forms will be provided by the DOE Contract Specialist during award negotiation. (The following links are provided for information purposes only. Please do not use these forms as changes/updates may be made prior to award negotiation.)

**a.** Principal Investigator Certification
http://www.science.doe.gov/sbir/solicitations/FY 2010/picert.htm

**b.** Property and Commercialization Rights Agreement Certification
http://www.science.doe.gov/sbir/Solicitations/FY%202002/model.htm

**E. SUBMISSION DATES AND TIMES.**

**APPLICATION DUE DATE.**

**Applications must be received by November 20, 2009, 08:00 PM Eastern Time. You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

Unsolicited grant applications will not be accepted in either Phase I or Phase II.
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.**

**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 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 Contract Specialist who will evaluate your proposal if you are selected.

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 a model indirect rate proposal spreadsheet.

http://www.science.doe.gov/sbir/solicitations/FY 2010/GuidanceIR0407.doc

http://www.science.doe.gov/sbir/solicitations/FY%202010/Copy_of_Simple_Indirect_Rate_Model.xls

**Pre-award Costs.** Recipients may charge to an award resulting from this announcement 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.

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

## H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS.

### 1. Where to Submit.

#### 1. Where to Submit.

**Where to Submit:** 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 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.

**All applications should be in a single PDF file.**

#### 2. Registration Process.

There are several one-time actions you must complete in order to submit an application (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See http://www.grants.gov/GetStarted. Use the Grants.gov Organization Registration Checklist at http://www.grants.gov/assets/OrganizationRegCheck.doc 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.

## PART V - APPLICATION REVIEW INFORMATION

### A. CRITERIA.

#### 1. Initial Review.

The SBIR/STTR Office will perform an initial administrative screening to ensure that the application meets the requirements described in Part III, Eligibility Information.

Phase I grant applications will be judged on a competitive basis against other applicants within the same technical program area in several stages. Those passing the initial administrative screening will be evaluated by DOE technical managers (either the topic author or a technical expert within the program area) to ensure that they (1) meet stated funding opportunity notice requirements, (2) are responsive to the topic and subtopic, (3) contain sufficient information for a meaningful technical review, (4) are for research or for research and development, (5) do not duplicate other previous or current work, and (6) are of high overall quality as compared to other grant applications received in the same topic. Grant applications which fail to pass this initial technical screening will be declined without further review.

#### 2. Merit Review.

Evaluation Criteria for Phase I applications only:

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:

a. 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.

b. 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.

c. 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.

**Merit Review Criteria for Phase II applications only:**

The Phase II grant application must contain enough information on progress accomplished under Phase I, by the time of Phase II grant application submission, to enable an evaluation of the project's promise if continued into Phase II.

**Phase II grant applications will be evaluated using the following criteria:**

a. Strength of the scientific/technical approach as evidenced by: (1) the strength and innovativeness of the overall idea and approach for the combined Phase I/Phase II project, (2) the significance of the scientific or technical challenge, and (3) the thoroughness of the presentation**.**

b. Ability to carry out the project in a cost effective manner as evidenced by: (1) the qualifications of the Principal Investigator, other key staff, consultants and subcontractors, if any, and the level of adequacy of equipment and facilities; (2) the soundness and level of adequacy of the work plan to meet the problem or opportunity; (3) with regard to the Phase I objectives, the degree to which Phase I has proven feasibility of the concepts; and (4) the degree to which the DOE investment in the project would be justified by the level of proposed research effort.

c. 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. The following evidence is also evaluated: (4) the information contained in the company's commercialization plan, including past history of commercializing SBIR/STTR or other research, (5) the existence of Phase II funding commitments from the applicant, other private sector, or non-SBIR/STTR funding sources, and (6) Phase III follow-on funding commitments for the subject of the research.

   Each criterion will be assigned a rating based on the evidence provided. The overall score of the application is determined by the average of the ratings for the three criteria. The Impact criterion is evaluated in two parts; technical potential and business capability. Technical potential as evidenced by 1, 2, and 3 is evaluated during peer review and is provided a rating. Business capability as evidenced in 4, 5, and 6 is evaluated internally by DOE experts and provided a rating. The ratings for technical potential and business capability are then averaged into one rating for the Impact criterion.

## B. REVIEW AND SELECTION PROCESS.

### 1. Merit Review.

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 decisions will be made by the DOE SBIR/STTR Program Manager based on the evaluation criteria and consideration of other factors, such as budget and program balance.

### 2. Selection.

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of 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, as determined by the review process. In addition, because the DOE supports only high quality R&D, grant applications will be considered candidates for funding only if they receive strong endorsements with respect to at least two of the three criteria. From those grant applications considered candidates for funding, each of the participating DOE program areas will select up to a pre-determined number for funding. (The pre-determined number is proportional to a program area's monetary contribution to the SBIR/STTR programs.)

### 3. Discussions and Award.

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 OF SELECTION AND AWARD DATES.

DOE anticipates notifying applicants selected for Phase I award by mid-to-late May 2010 and making awards by mid-to-late June 2010.

## PART VI - AWARD ADMINISTRATION INFORMATION

### A. AWARD NOTICES.

This Funding Opportunity Notice 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, section G with respect to the allowability of pre-award costs.) Organizations whose applications have not been selected will be advised as promptly as possible.

Written comments from the technical evaluators will be provided to all awardees (SBC business official) automatically with the award notification via email. Unsuccessful applicants may request written evaluator comments up to 30 days after the public announcement of the final selections. The identity of reviewers and their affiliation will not be disclosed.

If an application is selected for award under the SBIR program that includes a subcontract to a Federally-owned, contractor-operated lab (such as Argonne National Laboratory), the SBIR office will require the awardee to complete a Certification for Using a National Laboratory. This certification form will be provided to the awardee with the award notification.

#### 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; 7) Budget Summary (Phase II only); and 8) Federal Assistance Reporting Checklist and Instructions, which identifies the reporting requirements.

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

## B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.

### 1. 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 Grants, the DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements, and the National Policy Assurances To Be Incorporated As Award Terms are located at http://management.energy.gov/business_doe/business_forms.htm

### 2. Cooperative Research and Development Agreements.

SBIR/STTR grant recipients who have chosen a DOE laboratory as a subcontractor may be required to implement a Cooperative Research and Development Agreement (CRADA). CRADAs are collaborative research agreements between DOE laboratories and their partners, 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 laboratory 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.

Implementation of a CRADA begins with project definition and milestones, and leads to a statement of work. Standard terms and conditions, with a total of 60 options to provide maximum flexibility, are available from the laboratory for use by partners and laboratories. A streamlined, short-form CRADA document that can reduce the need for legal review is also available.

### 3. Work-For-Others Agreements.

"Work-for-Others" 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 Work-For-Others 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.

### 4. When To Negotiate These Agreements.

It is recommended that small business applicants to the SBIR/STTR programs attempt, to the maximum extent practicable, to negotiate these agreements before submitting the grant application. It is during this period that the small business will have maximum leverage in conducting negotiations. 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 would only be a short time available for conducting these negotiations before the grant would begin.

## C. REPORTING.

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

## PART VII - QUESTIONS/AGENCY CONTACTS

### A. QUESTIONS.

Questions regarding the content of the announcement 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 release of the FOA as possible to have the benefit of all responses. More information is available at http://www.compusearch.com/products/fedconnect/fedconnect.asp and https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the 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. DOE cannot answer these questions.

### B. Agency Contact.

Name: Carl Hebron
E-mail: sbir-sttr@science.doe.gov
Telephone: 301-903-1414

## PART VIII - OTHER INFORMATION

### A. MODIFICATIONS.

Notices of any modifications to this announcement will be posted on Grants.gov and 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 http://www.fedconnect.net and http://www.compusearch.com/products/fedconnect/fedconnect.asp.

### 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.

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the Government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

## 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 www.science.doe.gov/sbir/Solicitations/FY%202002/model.htm, 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 United States 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

**a.** 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.

**b.** 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.

**c.** 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 solicitation, 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.

**d.** 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.

**e.** 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.

# APPENDICES/REFERENCE MATERIAL

## A. Definitions:

### 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.

### INNOVATION

Something new or improved, having marketable potential, including (1) development of new technologies, (2) refinement of existing technologies, or (3) new applications for existing technologies.

### SMALL BUSINESS

### 1. ELIGIBLE SBIR APPLICANTS

Only United States small business concerns (SBCs) are eligible to submit SBIR applications. "United States" means the 50 states, the territories and possessions of the United States, 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. Joint ventures, as defined in "Appendices/Reference Material," may apply, provided the entity created also qualifies as a small business. A small business concern is one that, at the time of award for both Phase I and Phase II SBIR awards, meets all of the following criteria:

**a.** Organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;

**b.** 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;

**c.** At least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States, 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 United States -- (except in the case of a joint venture);

**d.** Has, including its affiliates, not more than 500 employees and meets the other regulatory requirements found in 13 C.F.R. 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 C.F.R. 121. The term "number of employees" is defined in 13 C.F.R. 121.

## 2. ELIGIBLE STTR APPLICANTS

Only United States small business concerns (SBCs) are eligible to submit STTR applications. A small business concern is one that, at the time of award for both Phase I and Phase II STTR awards, meets all of the following criteria:

**a.** Organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;

**b.** 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;

**c.** At least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States.

**d.** Has, including its affiliates, not more than 500 employees and meets the other regulatory requirements found in 13 C.F.R. 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

## SOCIALLY AND ECONOMICALLY DISADVANTAGED SMALL BUSINESS

A socially and economically disadvantaged small business is one:

**a.** 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,

**b.** 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).

## 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.

## 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.

## 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)(l) 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 Small Business Administration at its HUBZone Contracting Website: https://eweb1.sba.gov/hubzone/internet/general/findout.cfm.

## 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 funding notice, 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 INSTITUTION

**A research institution is a U.S. research organization that is:**

**1.** 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

**2.** A non-profit college or university, or

**3.** A non-profit medical or surgical hospital, or

**4.** 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.

**5.** A government-owned, government-operated facility, such as the National Energy Technology Laboratory (NETL), is <u>not</u> eligible to act as either a partner or subcontractor in DOE SBIR/STTR projects.

## COMMERCIALIZATION

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

An individual who provides professional advice or services for a fee.

## 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.

## B. Technical Topic Descriptions

Download the technical topic descriptions pdf file.

## OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

**1. Hydrogen, Fuel Cells, and Infrastructure Technologies Program**

a. Energy Storage for Intermittent Renewable Resources
b. Fuel Cell Balance-of-Plant
c. Advanced Hydrogen Storage for Early Market Applications
d. Low-Cost Dispensing for Material Handling and Specialty Vehicles

**2. Advanced Solar Technologies**

a. Manufacturing Tools for Reliability Testing
b. Module and System Manufacturing Metrology and Process Control
c. Photovoltaics (PV) System Diagnostic Tools

**3. Advanced Thermoelectric Technologies**

a. Cooling in Buildings, Industry, and Vehicles
b. Advanced Waste Heat Recovery

**4. Geothermal Energy Technology Development**

a. High Temperature Downhole Logging and Monitoring Tools
b. Cements for EGS Applications
c. Drilling Systems
d. Fracture Characterization Technologies
e. Working Fluids for Binary Power Plants
f. GHP Component R&D
g. Innovative System/Loop Designs

**5. Production of Biofuels from Cellulosic Biomass**

a. Biomass Moisture Management and Drying
b. Least-Cost Biomass Format for Efficient Logistics
c. Separation Technologies for Biochemical Conversion of Lignocellulosic Feedstocks
d. Oil Extraction from Microalgae
e. Pyrolytic Conversion of High Moisture Content Biomass to Bio-Oil
f. Distributed Sorted Municipal Solid Waste Conversion to Biofuels

**6. Advancements for Subcomponents Critical to Electric Drive Vehicle Power Inverters and Motors**

a. High-Performance DC Bus Capacitors for Power Inverters in Electric Drive Vehicles
b. Alternative Production Techniques for Homogenous Magnet Alloys
c. High Temperature Packaging
d. Non Obtrusive Semiconductor Die Temperature Measurements

**7. Wind Energy Technology Development**

a. Manufacturing and Assembly
b. Component Reliability
c. Condition Monitoring

## OFFICE OF BASIC ENERGY SCIENCES

**8. Technologies Related to Energy Storage for Hybrid and Plug-in Electric Vehicles**

a. Technologies that Allow the Use of a Lithium Metal Negative Electrode in a Rechargeable Cell
b. Multi-Electron Redox Materials for High Energy Batteries
c. Technology to Allow the Recovery and Reuse of "High-Value" Materials from Used Lithium-Ion Batteries
d. New Electrolytes for Lithium-ion Cells

**9. Transitional Technologies for Solid State Lighting**

a. Transitional Technology for Light Emitting Diodes (LEDs
b. Transitional Technology for Organic Light Emitting Diodes (OLEDs)
c. Supporting Technologies for Off-Grid SSL Applications

**10. Energy Efficient Membranes for Industrial Applications**

a. Membrane Materials with Improved Properties
b. Biofuels and Bioproducts
c. Hydrogen Production
d. Industrial Membrane Process Systems

**11. Catalysis**

a. Selective Catalytic Conversion of Fossil Feedstocks
b. Biomass Deconstruction and Catalytic Conversion to Fuels
c. Photo- and Electro-Driven Conversion of Carbon Dioxide and Water

**12. Hydrogen Safety, Storage, Delivery, and Production**

a. Materials and Processing for Lower-Cost High Pressure Gaseous Fuel Tanks
b. Reducing the Cost of Fiber Reinforced Polymer Pipelines
c. Hydrogen Odorant Technology
d. Hydrogen Production Process Intensification Technology

**13. Technology to Support BES USER Facilities**

a. Synchrotron Radiation Facilities
b. Beam Diagnostic Instrumentation for Free Electron Lasers and 3rd Generation Light Sources
c. High Power Mercury Spallation Targets
d. Instrumentation for Ultrafast X-ray Science

**14. Radio Frequency (RF) Devices and Components for Accelerator Facilities**

a. Klystrons and Inductive Output Tubes (IOTs)
b. Gridded Tubes and Cavities
c. Higher Order Mode Damper Integrated into Beam Pipes
d. RF Cavity Input Couplers
e. RF Power Devices and accessories
f. Modulators for High Level Radio Frequency (RF) Accelerator Systems
g. Low Level Radio Frequency (LLRF) Accelerator Systems
h. Devices for the Manipulation of Electron Beams

**15. Advanced Sources for Accelerator Facilities**

a. Electron Gun Technology
b. High Brightness Sources of Negative Hydrogen Ions
c. Undulator Radiation Sources

**16. Ancillary Technologies for Accelerator Facilities**

a. Accelerator Modeling and Control
b. Superconducting Technology for Accelerators
c. Cooling of Superconducting Systems
d. Advanced Laser Systems for Accelerator Applications

**17. Instrumentation for Electron Microscopy and Scanning Probe Microscopy**

a. Electron Microscopy and Microcharacterization
b. Scanning Probe Microscopy (SPM

**18. Instrumentation for Materials Research using Synchrotron Radiation**

a. Beam Line Optics
b. Control of Sample Environment
c. Detectors

**19. Instrumentation and Tools for Materials Research Using Neutron Scattering**

a. Advanced Optical Components
b. Advances Sample Environment
c. Software Infrastructure:

**20. Novel Membrane and Electrode Development for Advanced Electrochemical Energy Storage**

a. Cost Effective, Highly Selective Membranes for Redox Flow Batteries
b. Novel Synthesis Approaches for Low Cost, Long Life Li-Ion Batteries

**21. High Performance Materials for Nuclear Application**

a. Specialty Steels
b. Refractory, Ceramic, Ceramic Composite, Graphitic, or Coated Materials
c. Assessment and Mitigation of Materials Degradation

**22. Advanced Coal Research**

a. a. Carbon Dioxide ($CO_2$) Conversion to Fuels & Chemicals
b. Alternative Fuels: Catalytic Reaction Processing of Coal and Biomass in Ionic Liquids
c. Solid Oxide Fuel Cells: Analytical Tools for *In Situ* Electrocatalyst Research
d. Development of Air Capture of Carbon Dioxide

## OFFICE OF FOSSIL ENERGY

**23. Fossil Energy Advanced Research**

a. Development of Gas Composition Sensor System for Use on Full Scale Power Generation Systems
b. Advanced Concepts for Powering Wireless Sensors
c. Computer-Aided Development of Novel New Materials for Energy Conversion from Coal
d. Central Processing Unit (CPU) and Graphical Processing Unit (GPU) Parallel Development of an Eulerian-Lagrangian Multiphase Model
e. Development and Demonstration of Advanced Process Engineering Co-Simulator (APECS) Process/Computational Fluid Dynamics (CFD) Co-Simulations for Advanced Energy Systems

**24. Climate Control Technology for Fossil Energy Application**

a. Characterization of $CO_2$ Geologic Repositories
b. Monitoring of $CO_2$ Geologic Storage
c. Performance of $CO_2$ Storage
d. Alternative Use and Reuse of $CO_2$
e. Advanced Membranes for $CO_2$ Capture from Existing Coal-fired Power Plants
f. Advanced Sorbents for $CO_2$ Capture from Existing Coal-Fired Power Plants

**25. Coal Gasification Technologies**

a. Concepts for Methane-Production in Gasifiers
b. Concepts for Feeding Coal and Coal/Biomass Mixtures into a High-Pressure Gasifier
c. High Temperature Heat Recovery IGCC

**26. Technologies for Clean Fuels and Hydrogen from Coal**

a. Concepts for Novel, Non-Precious-Metal-Based Processes or Membranes for Recovering Hydrogen from Coal
b. Concepts for Enhanced Catalysts for Water-Gas-Shift and Fischer-Tropsch Processes for Gases from Co-Mingled Coal and Biomass Gasification
c. Concepts for Direct Liquefaction of Coal/Biomass Mixtures
d. Concepts for Extracting Oil from Algae

**27. Advanced Turbine Technology for Igcc Power Plants**

a. Advanced Alloy Development for High Temperature Turbines
b. Innovative Cooling Approaches
c. Novel Coating Methods for Unique TBC/Bond Coat Architectures that Can Operate at Higher Temperatures
d. Rapid Manufacturing and Prototyping of Gas Turbine Components

**28. Fuel Cell Technologies for Central Power Generation with Coal**

a. Direct Utilization of Coal in Fuel Cells
b. Design and Analysis of Manufacturing Systems for SOFC Cells and Stacks
c. Post-SOFC Residual Fuel Oxidizer for $CO_2$ Capture

**29. Oil and Gas Technologies**

a. Methane Hydrates
b. Development of Petroleum and Natural Gas Fields
c. Enhanced Recovery of Unconventional Resources

## OFFICE OF BIOLOGICAL AND ENVIRONMENTAL RESEARCH

**30. Carbon Cycle Measurements of the Atmosphere and the Biosphere**

a. Sensors and Techniques for Measuring Terrestrial Carbon Sinks and Sources
b. Novel Measurements of Carbon, $CO_2$, and Trace Greenhouse Gas Constituents of Terrestrial and Atmospheric Media

**31. Enhanced Availability of Climate Model Output**

a. Accessibility of Climate Model Data to Non-Researchers

**32. Atmospheric Measurement Technology**

a. Stabilizer Platforms for Radiometers
b. Oxygen-Band Spectrometer
c. Measurements of the Chemical Composition of Atmospheric Aerosols
d. Measurements of the Chemical Composition of Atmospheric Aerosol Precursors
e. Aerosol Size Distributions
f. Aerosol Scattering and Absorption (*in situ*)

**33. Technologies for Subsurface Characterization and Monitoring**

a. Mapping and Monitoring Hydrogeologic Processes in the Shallow Subsurface
b. Real-Time, *In Situ* Measurements of Geochemical, Biogeochemical and Microbial Processes in the Subsurface

**34. Imaging and Radiochemistry**

a. Radiochemistry and Radiotracers for Imaging
b. Advanced Imaging Technologies

**35. Genomic Science and Related Biotechnologies**

a. Software Tools for the Systems Biology Knowledgebase (SBK)
b. Software tools for Export to the Commercial Sector
c. Systems for Growth of Fastidious Microbes
d. Dueterated Macromolecule Resources

## OFFICE OF ADVANCED SCIENTIFIC COMPUTING RESEARCH

**36. Smart Facilities and Green Networks**

a. Standardized Energy Measurement Interfaces, Integration with Facility Infrastructure, and Energy-Aware Algorithms
b. Green Computer Networks
c. Low Power Portable Platforms Using Intelligent Sensor Processing

**37. Cloud Computing**

a. Turn-Key HPC in the Cloud

**38. Data Management and Storage**

a. Green Storage for HPC with Solid State Disk Technologies: From Caching to Metadata Servers
b. Data Management Tools for Automatically Generating I/O Libraries
c. Integration of Scientific File Representations with Object Database Management Systems

**39. Modeling and Simulation of Industrially-Relevant Problems**

a. Simulation of Engineering Problems

**40. Cyber-Security and Networking**

a. NIDS Front-End for Load Balancing at 100 Gbps

**41. High Performance Computing Systems**

a. Computing Applications Porting
b. Multicore OS Technology
c. Compiler Research for Code Instrumentation
d. Journal-based Storage for Parallel I/O
e. Advanced, Multi-platform Build Systems
f. Commercialization of HPC Programming Environments
g. Portable Linux Distributions for HPC
h. Software Fault Detection

**42. Collaboration, Scientific Visualization and Data Understanding**

a. Collaborative Data Analysis and Visualization
b. Comparative Visualization
c. Distance/Remote Visualization
d. Interactive Visualization and Analytics
e. Techniques for Integration and Interactive Visual Analysis of Multi-Disciplinary Scientific Data

## OFFICE OF NUCLEAR PHYSICS

**43. Nuclear Physics Software and Data Management**

a. Large Scale Data Storage
b. Large Scale Data Processing and Distribution
c. Grid and Cloud Computing

**44. Nuclear Physics Electronics Design and Fabrication**

a. Advances in Digital Electronics
b. Circuits
c. Advanced Devices and Systems
d. Active Pixel Sensors
e. Manufacturing and Advanced Interconnection Techniques

**45. Nuclear Physics Accelerator Technology**

a. Materials and Components for Radio Frequency Devices
b. Radio Frequency Power Sources
c. Design and Operation of Radio Frequency Beam Acceleration Systems—
d. Particle Beam Sources and Techniques
e. Polarized Beam Sources and Polarimeters
f. Rare Isotope Beam Production Technology
g. Accelerator Control and Diagnostics

**46. Nuclear Physics Instrumentation, Detection Systems and Techniques**

a. Advances in Detector and Spectrometer Technology
b. Position Sensitive Charge Particle and Gamma Ray Tracking Devices
c. Technology for Rare Particle Detection
d. Large Band Gap Semiconductors, New Bright Scintillators, Calorimeters, and Optical Elements
e. Specialized Targets for Nuclear Physics Research
f. Technology for High Radiation environment of Rare Isotope Beam Facility

**47. Nuclear Physics Isotope Science and Technology**

a. Novel or improved production techniques for radioisotopes or stable isotopes
b. Improved radiochemical separation methods for preparing high-purity radioisotopes

## OFFICE OF ENVIRONMENTAL MANAGEMENT

**48. Site Remediation and Deactivation & Decommissioning in the Doe Complex**

a. Technologies for *In Situ* Measurements of Geochemical, Biogeochemical, and Microbial Processes in the Subsurface
b. New or Improved Waterproof Personnel Protective Clothing/Equipment (PPC/PPE)—
c. New or Improved Mechanical Shredding Equipment for Piping
d. New or Improved Technologies to Stabilize Friable Asbestos for Deactivation and Decommissioning Activities

## OFFICE OF DEFENSE NUCLEAR NONPROLIFERATION

**49. Remote Sensing**

a. Radiological Material Isotopic Attribution Sensor
b. Temperature/Emissivity Separation in Simple Geometries
c. Mid-Infrared Transparent Glass with Optical Index, n = 2
d. Megapixel Low Light Level Imager for Remote Sensing
e. Remote Spectroscopic Detection of Nuclear Reaction Byproducts
f. Waveguide-Coupled Optical Modulator for W-Band Up-Conversion
g. Time History of Optical Emissions

**50. Radiation Detection**

a. Growth of Radiation Detection Materials
b. Radiation Detector Development

**51. Global Nuclear Safeguards R&D**

a. Tags and Seals
b. Safeguards Measurement Sensors

**52. Simulation And Software Tools for Nonproliferation R&D**

a. Proliferation History and Knowledge Base Visual Design
b. Radiation Detection Scenario Simulator
c. Data Processing Toolbox

**53. Research to Support Nuclear Explosion Monitoring**

a. Waveform Communication Technology
b. Measurement of Xe Background, Transport, and Fate

**54. Nuclear Forensics**

a. Codes for Radiation Transport and Particle Scattering in Urban Settings

## OFFICE OF NUCLEAR ENERGY, SCIENCE AND TECHNOLOGY

**55. Advanced Technologies for Nuclear Energy**

a. New Technology for Improved Nuclear Energy Systems
b. Advanced Technologies for the Fabrication, Characterization of Nuclear Reactor Fuel for Generation IV Reactor Designs, and Fuel for Advanced Fuel Cycle Research and Development
c. Materials Accounting and Control for Domestic Fuel Cycles

## OFFICE OF SCIENCE – R&D KNOWLEDGE DIFFUSION

**56. Search, Discovery, and Communication of Scientific and Technical Knowledge in Distributed Systems**

a. Identifying, Searching, Accessing, and Communicating Science (Especially as Presented in Scientific and Technical Databases, Data Sets, and Multimedia)

## OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY

**57. Advanced Diagnostic Techniques for Electricity Systems**

a. Novel Techniques for Power Line Sag and Temperature Monitoring
b. Development of Advanced Diagnostic Techniques for Underground Cables

**58. Advanced Energy Storage**

a. Innovative Compressed Air Energy Storage

## OFFICE OF HIGH ENERGY PHYSICS

**59. High-Speed Electronic Instrumentation for Data Acquisition and Processing**

a. Special Purpose Chips and Devices for Large Particle Detectors
b. Circuits and Systems for Processing Data from Particle Detectors
c. Systems for Data Analysis and Transmission c. Systems for Data Analysis and Transmission
d. Enhancements to Standard Interconnection Systems

**60. High Energy Physics Computer Technology**

a. Large Scale Computer Systems
b. Computational Methods for Petascale Physics
c. Software to Support Collaborations of Dispersed Researchers
d. Web Tools and Associated Infrastructure to Support Collaborations
e. Simulation and Modeling Techniques and Systems

**61. High Energy Physics Detectors**

a. Particle Detection and Identification Devices
b. Detector Support and Integration Components

**62. High-Field Superconductor and Superconducting Magnet Technologies for High Energy Particle Colliders**

a. High-Field Superconducting Wire Technologies for Magnets
b. Superconducting Magnet Technology
c. Starting Raw materials and Basic Superconducting Materials
d. Ancillary Technologies for Superconductors

**63. Accelerator Technology for the International Linear Collider**

a. Superconducting Radiofrequency Cavities
b. Instrumentation for SRF Cavities
c. Cryogenic and Refrigeration Technology for SRF Systems
d. Beam Instrumentation and Feedback Systems
e. Undulators
f. Magnet and Fast Kicker Technology
g. Polarized RF Photocathode Sources

**64. Advanced Concepts and Technology for High Energy Accelerators**

a. Advanced Accelerator Concepts and Modeling
b. Technology for Muon Colliders and Muon Beams
c. Novel Device and Instrumentation Development
d. Laser Technology for Accelerators
e. Inexpensive High Quality Electron Sources
f. Hardware and Software Solutions for Accelerator Control
g. Computational Tools and Simulation of Accelerator Systems

**65. Radio Frequency Accelerator Technology for High Energy Accelerators and Colliders**

a. New Concepts and Modeling Techniques for Radio Frequency Acceleration Structures
b. Materials and Fabrication Technologies for SRF Cavities
c. Concepts and Components for Producing Radio Frequency Power
d. Modulators for Pulsed RF Systems
e. Switching Technology for Pulsed Power Applications
f. Energy Storage for Pulsed Power Systems
g. Deflecting Cavities (AKA "Crab Cavities") for Luminosity Enhancement in Colliders

## OFFICE OF FUSION ENERGY SCIENCES

**66. Advanced Technologies and Materials for Fusion Energy Systems**

a. Plasma Facing Components
b. Blanket Materials and Systems
c. Superconducting Magnets and Materials—
d. Structural Materials and Coatings

**67. Fusion Science and Technology**

a. U.S. ITER Diagnostics
b. Components for Heating and Fueling of Fusion Plasmas
c. Fusion Plasma Simulation and Data Analysis Tools
d. Components and Modeling Support for Innovative Approaches to Fusion

**68. High Energy Density Laboratory Plasma (Hedlp)**

a. Beam Generation, Compression, and Focusing
b. Fast Ignition

## C. Working with National Laboratories, 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. In the last year, over 9,800 scientists conducted experiments at these user facilities. Thousands of other researchers collaborate with these users and analyze the data from the experiments at the facilities to publish new scientific findings in peer-reviewed journals. These facilities may be found at www.sc.doe.gov/bes/besfacilities.htm and www.sc.doe.gov/ober/facilities.html.

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 Phases 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.

*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 and points of contact is available at http://www.science.doe.gov/sbir/newweb/labcontacts.htm. 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.federallabs.org, or contact the FLC Management Support Office by, Phone: (856) 667-7727 or E-mail: flcmso@utrs.com.

## D. Scientific and Technical Information Sources

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.

### 1. 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.

### 2. DOE Office of Scientific and Technical Information

The Office of Scientific and Technical Information (OSTI), within the Office of Science, advances science and sustains technological creativity by making R&D findings available and useful to DOE researchers and U.S citizens. OSTI's systems directly support the goals of the American Competitiveness Initiative by maximizing the exposure and dissemination of the knowledge emanating from research in the physical sciences. OSTI's innovation in knowledge discovery and diffusion accelerates this process.

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.

Potential SBIR applicants may obtain information from the following OSTI sources, available freely via the Web at www.osti.gov or at the specific URLs below.

- Information Bridge (www.osti.gov/bridge), over 125,000 searchable full-text documents reporting results of DOE-funded research.
- Energy Citations Database (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), 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 22,000 Web sites, as well as a deep Web search across 52 major e-print databases.

- **EnergyFiles** (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), 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), a central forum for information about the outcomes of past DOE R&D.
- **Federal R&D Project Summaries (www.osti.gov/fedrnd)**, a searchable portal to 750,000 Federal research project summaries at DOE and five other leading science agencies.
- **Science.gov** (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.

### 3. Other Sources

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.