

**Joint Service Small Arms Program (JSSAP)
Office of the Secretary of Defense (OSD)
22.4 Small Business Innovation Research (SBIR)
Direct to Phase II
Proposal Submission Instructions**

INTRODUCTION

The Joint Service Small Arms Program (JSSAP) is participating under the OSD SBIR Program on this SBIR 22.4 Broad Agency Announcement (BAA).

Proposers responding to the JSSAP topic listed in this Announcement must follow all instructions provided in the DoD SBIR 22.4 Annual Broad Agency Announcement (BAA) posted on the DoD SBIR/STTR website at: <https://www.dodsbirsttr.mil/submissions>, EXCEPT for the specific deviations listed below.

Specific questions pertaining to these instructions should be submitted to:

Firms with strong research and development capabilities in science or engineering in any of the topic areas described in this section, and with the ability to commercialize the results, are encouraged to participate. The OSD SBIR Program will support high quality research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector.

Objectives of the OSD SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting DOD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DOD-supported research and development results. The guidelines presented in the announcement incorporate and exploit the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DoD and the private sector.

CHART 1: Consolidated SBIR Topic Information

Applicable Topics	Direct to Phase II		
	Technical Volume (Vol 2)	Award Amount	Technical Duration
OSD224-D001: Small Arms Arctic Power Storage	30 pages (10 pages for feasibility documentation, and 20 pages for Phase II Technical Proposal)	Base Period: 1,723,436 Option Period: 115,000 Not to exceed total award amount: \$1,838,436	Base Period: 30 months Option Period: 6 months Total Duration: 36 months

DIRECT TO PHASE II

15 U.S.C. §638 (cc), as amended by NDAA FY2012, Sec. 5106, and further amended by NDAA FY2019, Sec. 854, PILOT TO ALLOW PHASE FLEXIBILITY, allows the Department of Defense to make an award to a small business concern under Phase II of the SBIR program with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an SBIR program with respect to such project. OSD is conducting a Direct to Phase II (DP2) implementation of this authority for this 22.4 SBIR Announcement and does not guarantee DP2 opportunities will be offered in future Announcements.

Proposers interested in submitting a DP2 proposal in response to an eligible topic must provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the PI.

OSD will not evaluate the proposer's related Phase II proposal if it determines that the proposer has failed to demonstrate that technical merit and feasibility has been established or the proposer has failed to demonstrate that work submitted in the feasibility documentation was substantially performed by the proposer and/or the PI.

Feasibility documentation cannot be based upon any prior or ongoing federally funded SBIR or STTR work and DP2 proposals MUST NOT logically extend from any prior or ongoing federally funded SBIR or STTR work.

The OSD SBIR Program reserves the right to not make any awards under this DP2 announcement. The Government is not responsible for expenditures by the offeror prior to award of a contract. All awards are subject to availability of funds and successful negotiations.

PROPOSAL SUBMISSION

Proposers are REQUIRED to submit UNCLASSIFIED proposals via the Defense SBIR/STTR Innovation Portal (DSIP) at <https://www.dodsbirsttr.mil/submissions/>. Firms submitting through this site for the first time will be asked to register. It is recommended that firms register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process. Submission deadlines are strictly enforced. Proposals submitted by any other means will be disregarded.

Full proposal packages must be submitted by the date and time listed in the DoD Program BAA.

DIRECT TO PHASE II PROPOSAL PREPARATION INSTRUCTIONS AND PROPOSAL REQUIREMENTS

The Technical Volume is limited to 30 pages, which includes 10 pages for the feasibility documentation and 20 pages for the Phase II Technical Proposal. The Cover Sheet, Cost Volume and Commercialization Report do not count toward the 30-page limitation. The Government will not consider pages in excess of the page count limitations.

Phase II proposals require a comprehensive, detailed submission of the proposed effort. OSD Direct to Phase II efforts are awarded up to a maximum value of the dollar amounts and duration listed in Chart 1.

A. Proposal Cover Sheet (Volume 1): Complete as specified in DoD SBIR BAA section 5.

B. Format of Technical Volume (Volume 2):

- The Technical Volume must include two parts, PART ONE: Feasibility Documentation and PART TWO: Technical Proposal.
- Type of file: The Technical Volume must be a single Portable Document Format (PDF) file, including graphics. Perform a virus check before uploading the Technical Volume file. If a virus is detected, it may cause rejection of the proposal. Do not lock or encrypt the uploaded file. Do not include or embed active graphics such as videos, moving pictures, or other similar media in the document.
- Layout: Number all pages of your proposal consecutively. Font size should not be smaller than 10-point on standard 8-1/2" x 11" paper with one-inch margins. The header on each page of the Technical Volume should contain your company name, topic number, and proposal number assigned by DSIP when the Cover Sheet was created. The header may be included in the one-inch margin.

C. Content of the Technical Volume (Volume 2)

PART ONE: Feasibility Documentation

- Provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results.
- **Maximum page length for feasibility documentation is 10 pages.** If you have references, include a reference list or works cited list as the last page of the feasibility documentation. This will count towards the page limit.
- Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the PI.
- If technology in the feasibility documentation is subject to Intellectual Property (IP), the proposer must either own the IP, or must have obtained license rights to such technology prior to proposal submission, to enable it and its subcontractors to legally carry out the proposed work. Documentation of IP ownership or license rights shall be included in the Technical Volume of the proposal
- **DO NOT INCLUDE** marketing material. Marketing material will NOT be evaluated.

PART TWO: Technical Proposal

Maximum page length for the technical proposal is 20 pages. If you have references, include a reference list or works cited list as the last page of the technical proposal. This will count towards the page limit.

- (1) Significance of the Problem. Define the specific technical problem or opportunity addressed and its importance.
- (2) Phase II Technical Objectives. Enumerate the specific objectives of the Phase II work, and describe the technical approach and methods to be used in meeting these objectives.

- (3) Phase II Statement of Work. The statement of work should provide an explicit, detailed description of the Phase II approach, indicate what is planned, how and where the work will be carried out, a schedule of major events and the final product to be delivered. The methods planned to achieve each objective or task should be discussed explicitly and in detail. This section should be a substantial portion of the total proposal.
 - a) Phase II Option Statement of Work The statement of work should provide an explicit, detailed description of the activities planned during the Phase II Option, if exercised. Include how and where the work will be carried out, a schedule of major events and the final product to be delivered. The methods planned to achieve each objective or task should be discussed explicitly and in detail.
- (4) Related Work. Describe significant activities directly related to the proposed effort, including any conducted by the PI, the proposer, consultants or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must persuade reviewers of the proposer's awareness of the state of the art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following: (1) short description, (2) client for which work was performed (including individual to be contacted and phone number) and (3) date of completion.
- (5) Relationship with Future Research or Research and Development.
 - a) State the anticipated results of the proposed approach if the project is successful.
 - b) Discuss the significance of the Phase II effort in providing a foundation for Phase III research and development or commercialization effort.
- (6) Key Personnel. Identify key personnel who will be involved in the Phase II effort including information on directly related education and experience. A concise resume of the PI, including a list of relevant publications (if any), must be included. All resumes count toward the page limitation. Identify any foreign nationals you expect to be involved on this project.
- (7) Foreign Citizens. Identify any foreign citizens or individuals holding dual citizenship expected to be involved on this project as a direct employee, subcontractor, or consultant. For these individuals, please specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).
- (8) Facilities/Equipment. Describe available instrumentation and physical facilities necessary to carry out the Phase II effort. Items of equipment to be purchased (as detailed in the cost proposal) shall be justified under this section. Also state whether or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name) and local Governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices and handling and storage of toxic and hazardous materials.
- (9) Subcontractors/Consultants. Involvement of a university or other subcontractors or consultants in the project may be appropriate. If such involvement is intended, it should be identified and described according to the Cost Breakdown Guidance. Please refer to section 4 of the DoD BAA for detailed eligibility requirements as it pertains to the use of subcontractors/consultants.

- (10) Prior, Current or Pending Support of Similar Proposals or Awards. If a proposal submitted in response to this topic is substantially the same as another proposal that was funded, is now being funded, or is pending with another Federal Agency, or another or the same DoD Component, you must reveal this on the Proposal Cover Sheet and provide the following information:
- a) Name and address of the Federal Agency(s) or DoD Component to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
 - b) Date of proposal submission or date of award.
 - c) Title of proposal.
 - d) Name and title of the PI for each proposal submitted or award received.
 - e) Title, number, and date of BAA(s) or announcement(s) under which the proposal was submitted, will be submitted, or under which award is expected or has been received.
 - f) If award was received, state contract number.
 - g) Specify the applicable topics for each proposal submitted or award received.

Note: If this does not apply, state in the proposal "No prior, current, or pending support for proposed work."

- (11) Commercialization Strategy. Discuss key activities to achieve commercialization of the funded research into a product or non-R&D service with widespread commercial use – including private sector and/or military markets. Note that the commercialization strategy is separate from the Commercialization Report required in Volume 4. The strategy addresses how you propose to commercialize this research, while the Company Commercialization Report covers what you have done to commercialize the results of past Phase II awards.

The commercialization strategy must address the following questions:

- a) What DoD Program and/or private sector requirement does the technology propose to support?
- b) What customer base will the technology support, and what is the estimated market size?
- c) What is the estimated cost and timeline to bring the technology to market to include projected funding amount and associated sources?
- d) What marketing strategy, activities, timeline, and resources will be used to enhance commercialization efforts?
- e) Who are your competitors, and describe the value proposition and competitive advantage over the competition?

D. Content of the Cost Volume (Volume 3)

Complete the Cost Volume by using the on-line cost volume form on the Defense SBIR/STTR Innovation Portal (DSIP). Some items in the Cost Breakdown Guidance may not apply to the proposed project. If that is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow us to understand how you plan to use the requested funds if a contract is awarded.

- (1) List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
- (2) While special tooling and test equipment and material cost may be included, the inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Component

Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with the DoD Component, unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

- (3) Cost for travel funds must be justified and related to the needs of the project.
- (4) Cost sharing is permitted for proposals under this BAA; however, cost sharing is not required nor will it be an evaluation factor.
- (5) A Phase II Option should be fully costed separately from the Base approach.
- (6) All subcontractor costs and consultant costs must be detailed at the same level as prime contractor costs in regard to labor, travel, equipment, etc. Provide detailed substantiation of subcontractor costs in your cost proposal. Enter this information in the Explanatory Material section of the on-line cost proposal form.

If the proposal is selected for a potential award, you must be prepared to submit further documentation to the Component Contracting Officer to substantiate costs (e.g., an explanation of cost estimates for equipment, materials, and consultants or subcontractors). For more information about cost proposals and accounting standards, see <http://www.dcaa.mil>. Click on “Guidance” and then click on “Audit Process Overview Information for Contractors.”

E. Company Commercialization Report (Volume 4) The Company Commercialization Report (CCR) must be uploaded in accordance with the instructions provided in the DoD Annual Program BAA. Information contained in the CCR will not be considered during proposal evaluations.

METHOD OF SELECTION AND EVALUATION CRITERIA

Phase II proposals will be evaluated based on the criteria outlined in the DoD SBIR Program BAA.

NOTIFICATION OF SELECTION OR NON-SELECTION

Proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of the closing date of the BAA. The individual named as the Corporate Official on the Proposal Cover Sheet will receive an email for each proposal submitted from Corey D. Hall, Joint Services Small Arms Program, with their official notification of proposal selection or non-selection.

PROTEST PROCEDURES

Refer to the DoD SBIR Annual Program Announcement for procedures to protest the Announcement.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to:

Army Contracting Command - New Jersey (ACC-NJ)

**OSD JSSAP SBIR 22.4 Topic Index
Release 1**

OSD224-D001 Small Arms Arctic Power Storage

OSD224-001 TITLE: Small Arms Arctic Power Storage

OUSD (R&E) MODERNIZATION PRIORITY: Directed Energy

TECHNOLOGY AREA(S): Electronics

OBJECTIVE: Research, develop, prototype and demonstrate an innovative energy storage technology that can be integrated to a weapon's architecture and possesses an ability to withstand basic cold to extreme cold temperature ranges.

DESCRIPTION: Soldiers and their equipment are required to operate and survive battlefield conditions with long battery run times (for example 72 hours) based on operational mode summaries (OMS). The OMS is based upon the mission profile (MP), and the more intense the mission, the more they will be required to utilize the fire control and ancillary electronics on the weapon system. These electronics on the weapon system would benefit from a robust energy storage device in basic cold and extreme cold operating environments as material properties continue to improve. The necessity for these technologies continues to grow as the battlefield moves towards locations where extreme operational environments exist in low temperature and high altitude regions of the world. Discoveries and advancements in storage for batteries to provide opportunities for long-lasting power and increased energy capacity. An improved energy storage capacity system that is inherently hardened to survive battlefield conditions consisting of basic cold and extreme cold temperatures would satisfy many desired capabilities identified in the Joint Capabilities Integration and Development System (JCIDS) analysis, Joint Small Arms Capabilities Analysis (JSACA), Small Arms Capability Based Assessment (CBA), National Small Arms Technology Consortium (NSATC), DEVCOM AC S&T Needs and Opportunities, and Center for Army Lessons Learned (CALL). The Army requires technologies that enables survivability and power generation for IT systems, processors, and other equipment to operate in Arctic, ECW (Extreme Cold Weather), and HA (high-altitude) conditions (-54 degrees Celsius). The solutions shall be relatively lightweight, robust, and durable to extreme cold temperature conditions, and have minimal or no moving parts to maximize durability. The system size and weight shall be optimized. The electric power will be used to optimize the operational capability of batteries required for ancillary fire control devices during operational scenarios. Integration with outside components shall be considered and defined. This topic is NOT restricted to traditional lithium-ion, battery storage technology.

PHASE I: Showcase capabilities of the technology in current applications which outline the performance characteristics, technical merit and steps to achieve the metric values described in the proposal. The required Phase I deliverables will include information related or pertaining to performance characteristics that shall be documented in a feasibility study to determine suitability of the proposal. The small business shall demonstrate preliminary performance and understanding of the steps required to research, develop and experiment with innovative energy storage technologies that provide energy to power ancillary fire control devices on a man portable individual (M4) or crew served weapon (M249/M240) in extreme temperature ranges. Verify through modeling, simulation and limited lab testing that the Small Arms Arctic Power Storage concept will provide an electrical charging/power source that is beneficial to the OMS/MP. The contractor shall consider system interfaces to a powered rail system while minimizing additional size and weight to the weapon and battery housing. Analyze the possible benefits provided by the technology towards increasing device/battery life and associated device/battery performance. The improved performance at extreme temperature ranges will be assessed and mitigation techniques for design faults will be considered. Trade-off analyses shall be conducted to support design decisions, including where this technology would be most beneficial (crew served or individual weapons, ancillary charging stations).

Climactic Design Type	Daily Cycle	Operational Conditions	Operating Voltage (V)	For A Non-Rechargeable Solution Energy:Weight Ratio Minimum-Maximum (Whr:Ounces)			For A Rechargeable Solution Energy:Weight Ratio Minimum-Maximum (Whr:Ounces)		
		Ambient Air Temperature							
		Daily Low in Degrees C							
Basic	Mild cold (C0) Basic cold (C1)	-19 -32	1.5	9:1 to 12:1			4.5:1 to 6:1		
				Supplied Energy Capacity (mAh)			Supplied Energy Capacity (mAh)		
				At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge	At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge
				3000	3400	4000	1500	1700	2000
Cold	Cold (C2)	-43	1.5	7.5:1 to 10.8:1			3.75:1 to 5.4:1		
				Supplied Energy Capacity (mAh)			Supplied Energy Capacity (mAh)		
				At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge	At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge
				2500	2900	3600	1250	1450	1800
Severe cold	Severe cold (C3)	-51	1.45	4.35:1 to 10.15:1			2.175:1 to 5.075:1		
				Supplied Energy Capacity (mAh)			Supplied Energy Capacity (mAh)		
				At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge	At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge
				1500	1800	3500	750	900	1750
Extreme cold	Extreme cold (C4)	-57	1.4	2.8:1 to 8.96:1			1.4:1 to 4.48:1		
				Supplied Energy Capacity (mAh)			Supplied Energy Capacity (mAh)		
				At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge	At 1000 mA Constant Current Discharge	At 250 mA Constant Current Discharge	At 25 mA Constant Current Discharge
				1000	1500	3200	500	750	1600

Table 1. Extract from Army Regulation (AR) 70-38, Research Development, Test and Evaluation of Materiel for Worldwide Use converted to degrees C with added requirements (Operating Voltage, Energy:Weight Ratio, and Supplied Energy Capacity).

PHASE II: Evolve the technology to maximize performance. Optimize the design to the extent the technology can be applied to an individual weapon system where this technology would provide the greatest benefit and would provide a viable transition path to fielding. Verify technology performance through extensive laboratory testing in extreme temperature environments. Power performance characteristics (energy to weight ratio, milliamp hours) will be measured and reported based on different wartime mission profiles and environments provided by the government stated in SAFC sections 1.1-1.8 and MIL-HDBK-310. Video documentation of the testing and test reports shall be provided by the contractor.

PHASE III DUAL USE APPLICATIONS: Optimize the design developed in Phase II to harden the technology to survive in extreme military environments and maximize production cost benefit. Refine the design to minimize integration complexity and maximize system compatibility. Create a partnership with industry to manufacture the proposed technology.

REFERENCES:

1. http://en.wikipedia.org/wiki/Energy_harvesting
2. <https://techxplore.com/news/2020-09-decades-old-mystery-lithium-ion-battery-storage.html>
3. <https://www.sciencedirect.com/science/article/abs/pii/S2352152X21013268>
4. <https://scitechdaily.com/new-processing-technology-for-maximizing-energy-densities-of-high-capacity-lithium-ion-batteries/>
5. <https://www.sciencedirect.com/science/article/abs/pii/S2352152X2101402X>
6. <https://relionbattery.com/blog/lithium-cold-temperature?msclkid=5c20dfd5c17e11ecb733b74f711daafe>
7. <https://onlinelibrary.wiley.com/doi/full/10.1002/advs.202002590>

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