

Amendment 0004  
Solicitation Number: ONRBAA 13-009  
"Hybrid Energy Storage Module" (HESM)  
Date: 19 March 2013

The purpose of Amendment 0004 is to amend the BAA with responses to questions submitted prior to 13 March 2013.

BAA 13-009 is hereby amended as follows:

**Question 1:** I was wondering if ONR likes our idea, is there a possibility of conducting the Phase II, Full-scale demonstration (>200kW) in another facility selected by ONR?

**Answer 1:** All concepts should be submitted via white paper for evaluation. With respect to use of government facilities, the BAA indicates the following:

"Government research facilities and operational military units are available and should be considered as potential government-furnished equipment/facilities. These facilities, and resources contained within, are of high value and some are in constant demand by multiple programs. It is unlikely that all facilities would be used for any one specific program. The use of these facilities and resources will be negotiated as the program unfolds. Offerors submitting proposals for contracts, cooperative agreements and Other Transaction Agreements should indicate in the Technical and Cost Proposal Template, Section II, Blocks 8 and 9, which of these facilities or resources are critical for the project's success."

**Question 2:** Regarding partnership with ARPA-E AMPED award recipients, is there a possibility that ONR could recommend partnership with ARPA-E awardees?

**Answer 2:** There is no requirement to have a teaming relationship with a specified AMPED performer. It is acceptable to submit a concept that meets the objectives of the AMPED FOA. The AMPED FOA is hyperlinked in Appendix A of the BAA.

**Question 3:** I have to convince our management that the programs we pursue have a viable probability of being funded. We have seen solicitations for programs that are never awarded due to lack of funding, which makes it difficult to secure the resources needed to support a proposal effort, particularly in the sequestration environment. Can you point me to any budget supporting document or PE number where I can research the supporting R2 for your program?

**Answer 3:** Having a specific budget for this program does not guarantee funds will be available at the time the Government wants to make awards. This is true normally, but particularly in this environment.

**Question 4:** Our company policy states Proprietary and Competition Sensitive information are required to be encrypted; however this BAA does not allow password protected files. Can we use PGP Web Messenger to encrypt files?

**Answer 4:** The solicitation is hereby amended to allow for two types of white paper submission methods. First, Offerors can email their whitepapers. The email can't be encrypted. However, the attached files can be password-protected using functionality inherent in Adobe PDF or Microsoft Word 2007. The Offeror may also mail or hand-deliver the white paper on a CD-ROM or DVD to the following address:

Office of Naval Research  
Attn: Donald Hoffman  
ONR Department Code: 331  
875 North Randolph Street, Rm 271  
Arlington, VA 22203-1995

However, white papers can only be hand-delivered on Thursday, 3/21/2013, between the hours of 0900 and 1500 or Friday, 3/22/2013 from 0900 up to 1400 (Eastern Daylight Time).

**Question 5:** Under Development Area #3, are the requested designs limited to the cylindrical-shape Li-ion batteries only as shown in the Industry Day briefing picture? (and not rectangular, etc). Please clarify.

**Answer 5:** No. Cylindrical cells are of key interest because of two reasons - some variants can be obtained at very low cost and very high reliability from automated production lines; and, some very high performance, extremely low impedance cells with good thermal characteristics are available in that form factor. Other shape cans and pouches would be potentially acceptable; however it would be important to compellingly define how the approach would be amenable to various cell designs and shapes, not restricted to any one geometry. Keep in mind also that the challenge is not only various loading and conditions, but also protection given abusive and/or fault conditions where the chemical energy as well as the electrical energy must be considered as part of the safety burden.

**Question 6:** For white papers, do we create our own template, or use the (2) Technical Content (word)\* template found at <http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal.aspx>. Is the Technical Content (word) template is only for full proposals?

**Answer 6:** The Technical Content template is only for full proposals. Although there is no template file for white papers, all white paper content requirements are stated in the BAA, including requirements for the cover page.

**Question 7:** In Area #3, the "Design Charge Rate" requirement states the "System must be capable of buffering input power from an external source at a rate of 15C threshold, 30C objective..." Is the electronics or subsystem that is buffering this power supposed to be integrated into the battery pack and the subsystem to be provided by the Proposer as part of Area 3?

**Answer 7:** The intent is a battery module capable of operating under those rates in an intrinsically safe and non-propagating manner, should a fault occur. If there is a requirement for electronics internal to the pack as part of the approach, then they should be included. Certainly any

monitoring, BMS or related equipment would be part of the deliverable. However, there is not an expectation of a full external power electronic system feeding the battery to be delivered. However, one should give consideration to the electronics requirements necessary to perform testing and analysis of the design such that capability is proven.

**Question 8:** In Area #3, should this demo be primarily focused on only Li Ion Battery, as listed in summary or be a hybrid battery as well?

**Answer 8:** This effort emphasizes the safe design for handling the energetics associated with the total chemical and electrical energy contained in high density batteries. There is no requirement for a hybrid battery under the Area #3; the emphasis is on the energetics of high density chemical storage. If a hybrid battery is included in the approach, there should be compelling indication that the high energy battery component safety has been thoroughly considered, and that all aspects of design, test and evaluation to prove the concept are provided.

**Question 9:** What is the power rating and operating voltage of the aircraft main backup batteries?

**Answer 9:** Given that the hybrid energy storage module system is a from-scratch approach, one could be free to choose any operating voltage for the storage system they want. The existing battery consists of a string of lithium ion cells arranged into a battery configuration that exhibit Mil-Std 704(e) performance while loaded.

**Question 10:** What would be the allowed power draw?

**Answer 10:** Allowable power draw is more difficult to answer. There is no specified allowance, but the goal of convection and conduction cooling only somewhat limits the total amount of continuous power draw possible. The governing factors include (a) how much you use the HESM to supplement the generator's output; and (b) total energy required to perform any other function (i.e. how quickly do you need to recharge?).

**Question 11:** Can you verify that the output voltage of the generator and output interface of the HESM is 270 Vdc?

**Answer 11:** Yes, the generation system (generator then ICC) and HESM will be connected directly to the 270Vdc bus.

**Question 12:** For the 60 Hz and high frequency load support, do these harmonics come from the generator output being rectified? Or other 60 Hz ac loads off the 270 Vdc bus?

**Answer 12:** Some of the harmonic content will be from the rectification process, although the generator system's operating frequency is much higher than 60Hz. In fact, there are very few (if any) 60Hz fundamental operating frequency devices on a typical 270 Vdc distribution aircraft. Much of the harmonic content is derived from starting and stopping motor drives. Keep in mind that the motor drive operating frequency is changing continuously as the motor accelerates and then decelerates. And, complicating matters, the drives (and most other loads that use a DC/DC or DC/AC converter input) are constant power loads.

**Question 13:** Is it correct that the HESM has no ac interface, only the 270 Vdc, and Mil-std-704f is referenced for the 270 Vdc specs?

**Answer 13:** Yes, this is correct.

**Question 14:** No force air cooling is allowed. Is it correct that water cooling is also not allowed (only convection and conduction inside the enclosure)?

**Answer 14:** From the BAA: "System should minimize reliance on forced air, and maintain operation in ambient conditions provided in Table A2." No forced air cooling is a goal and no liquid cooling is a hard requirement.

**Question 15:** Under Large Power, does the system power flow start with the ac interface, then move to the energy storage system, then two load outputs (hi voltage and 140 Vdc), with bi-directional capability provided by the electronics?

**Answer 15:** Yes. It is anticipated that the electrical distribution system, which includes the generators, will be AC, thus the source of all power will be from the AC side. There will be a hybrid storage system suitable to meet load requirements as discussed in the BAA, on both the high voltage and the 140VDC connections. Bi-directionality implies the ability to feed power back to the AC bus as needed, as well as service the two DC outputs. It is possible that if technically feasible, one of the DC outputs may be directly off of the storage system, but that is dependent upon the analysis and design performed by the offeror.

**Question 16:** Can the system draw power from the dc load interface during charging? Or must all power be drawn from the ac interface?

**Answer 16:** No. It is not anticipated that there will be a DC source (generator) to support charging. It is anticipated that there are other reasons for allowing power flow on the DC side as part of the hybrid system operation, and that is acceptable, but should be well defined.

**Question 17:** What is the maximum power available from the ac interface? Dc interface?

**Answer 17:** It is anticipated that this system would interface with a shipboard or large FOB (forward operating base) power system which is rated at multiple MW (megawatts) of power likely derived from multiple generators. The amount available is dependent upon other factors that are not available within the construct of this BAA. It can be assumed that the available power is in excess of the power rating of the unit defined under the BAA requirements.

**Question 18:** What are the size and weight constraints for the aircraft hybrid energy storage module (HESM)? Is there a specific class of aircraft that this system is intended for?

**Answer 18:** There are no specific size and weight requirements. We would like the module to fit in MEA systems. The module should be as small and light as possible. Numerous similar, but lower TRL demonstrations have been accomplished with larger-than-desirable devices.

There is no specific platform for this program, but a target platform is the F-35. As such, anything that detracts volume and weight margin from the aircraft must "buy its way onto the aircraft." The benefits must be very great if weight and volume margin is used for its installation.

**Question 19:** One of the requirements for the aircraft system is to store regenerated energy. What is the source of this energy and is the development of an energy conversion system part of this research effort? In addition to regenerated energy, can the HESM be charged by the generator?

**Answer 19:** The regenerated energy will typically come from the electric actuation system. Actuators in general are the most common load for the main bus. In order to stop the actuator quickly, the motor drive briefly makes the motor become a generator. The stored rotational energy in the actuator motor is then translated into electrical energy. That electrical energy will then be placed on the main aircraft electrical distribution system. It is expected that the HESM unit developed for this effort will have sufficient conversion equipment to take the regenerated energy from the aircraft distribution bus and store it. The HESM can be charged by the generator.

**Question 20:** Based on the requirements outlined in Table A1, is the continuous operation of the system supposed to be less than a minute?

**Answer 20:** The duration of continuous operation will depend on the loads and may be longer than a minute to satisfy the operating requirement. Please note that Table A1 contains the following information: "System should be capable of operating continuously under EAU mode, with capability of sourcing emergency power in the event of generator failure (45 kW, 2MJ) and must also source necessary current for the engine starting system (45 kW, 2MJ)."

**Question 21:** I understand the submittal format requirement to be that the document needs to be received via email. Due to the proprietary nature of the material being submitted I will need to submit the document to you either via secure portal or via encrypted email with a password sent separately. Please advise an acceptable path forward to allow us to comply with the submittal requirement.

**Answer 21:** See Question and Answer 4.

**Question 22:** Is it preferred that a separate cover letter be submitted by our contracts department or should the cover page of the white paper be all inclusive negating the need for a separate letter from the contracts department? If a separate cover letter is required to support the submittal would this count against our page limitation under the submittal requirements?

**Answer 22:** See Question and Answer 6.

**Question 23:** Due to my company internal sign off process, I cannot provide cost numbers in time to provide by the white paper due date. Can a waiver for this information be provided?

**Answer 23:** No, a Rough Order of Magnitude (ROM) will need to be provided. This would include an overall amount anticipated for both Phase I and Phase II, with any related assumptions. A breakout of the amount is not required. The need for a ROM cost number in the white paper is only to assess the feasibility that the concept proposed can be achieved within the limitations of available

funding for the BAA. A more detailed analysis of proposed cost will be performed during the review of full proposals.

**Question 24:** Are FFRDCs eligible to be a team member to another eligible organization under this BAA?

**Answer 24:** Yes. FFRDCs are eligible to be a team member, under subcontract, to a prime organization so long as they are permitted under the sponsoring agreement between the Government and the specific FFRDC.

**Question 25:** Are there any cost share requirements?

**Answer 25:** No. There are no cost share requirements associated with this BAA.

**Question 26:** May the period of performance be shortened?

**Answer 26:** Yes. The performance period can be shortened as long as the full extent of performance characteristics can be demonstrated and deliverables provided to the government.

**Question 27:** What are the partnering requirements? Is there a preferred team lead?

**Answer 27:** There are no partnering requirements for this BAA. As written in the BAA, teams are encouraged and may submit proposals in any and all areas. However, Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors, as well as with system integrators, selected by ONR. In addition, there are no requirements with respect to team organization as long as it can be shown to fully meet or exceed all BAA specifications.