N0001426SBC001 Attachment #1. Questions and Answers

Question 1: Please confirm if GFI item 4 (DRAFT MIL-STD-1399 Section 300 Part 3: The Navy's New Low Voltage Direct Current Power Interface Standard) is superseded by the released version of MIL-STD-1399/300-3 (Released 9 April 2026).

Answer 1: The "Draft" MIL-STD is superseded by the release of MIL-STD-1399-300-3, which is available at https://quicksearch.dla.mil/qsDocDetails.aspx?ident_number=286982 and was included with the GFI provided. The GFI presentation is still applicable to the published MIL-STD and may provide clarifications.

Question 2: Baseline for Size & Weight Comparison: What specific baseline system should be used for evaluating size and weight reduction?

Answer 2: This initiative is developing improvements in technologies (components, architectures, methodologies, etc.) over the current state of the art. Each Offeror's baseline consists of their own derived TRAPS system configuration, without incorporating new technology/ methodologies being proposed to improve performance and power density. As stated in the special notice “The proposed Navy TRAPS is to be compared against a TRAPS using TRL7 or above components and system architecture in order to highlight the benefits of incorporation of the proposed advanced developments."

Question 3: Lifetime Definition & Evaluation: How should system and energy storage lifetime be quantitatively defined and evaluated? Would this be cycle life, calendar life, mission-profile-based degradation, or a combination?

Answer 3: Life is a combination of the effects of calendar, environment, and the cyclic loading due to the technology application to meet the mission profile. From Table 1 "Minimum useable energy storage life under continuous usage." Continuous usage assumes the mission profile in Figure 1, Figure 2, and the GFI.

Question 4: Validation Expectations for TRL Progression: What level of hardware validation is expected to support TRL progression (e.g., component-level testing, integrated prototype, or HIL-based system validation)?

Answer 4: "The overall Science and Technology (S&T) effort is envisioned to be conducted at Technology Readiness Level (TRL) 3-4." The TRL-3-4 is for the overall proposed system. However, some system components can be at higher TRL levels - TRL7+. The initiative is to

"demonstrate high risk topology subscale components, subsystems, and innovative technologies to validate feasibility for the overall system operational capability to meet defined TRAPS metrics". The method of TRL progression must be tailored to the technology risk reduction required such that the system result is considered TRL4+. TRL Definitions and Assessment Criteria is provided as GFI.

Question 5: Design Specifications: What are the requirements for efficiency, power-up sequencing, restart sequencing, fault management, and load management/shed functionalities, if an active or hybrid design is conducted for the proposed TRAPS?

Answer 5: For efficiency, higher is better. But the other aspects including power-up sequencing, restart sequencing, fault management, and load management/shed functionalities require tailoring to a specific Navy ship application. The offeror's unique TRAPS solution should propose how their system accounts for system power up and energy initial charging, system restart, fault management, and other standard functions and can be tuned for multiple ship applications.

Question 6: What will be the baseline for the overall system design? Could one use a notional system like the 4-zone system developed in ESRDC?

Answer 6: TRAPS is a sub-system to total ship electric plant architecture. It is intended to decouple the transients of the loads from the system and intended to be flexible to apply to different platforms and ship architectures. Notional TRAPS Topologies are provided in the GFI.

Question 7: We were able to locate all the references except the following and were wondering if it would be possible for you to provide this one to us if you have access to it: J.R. Miller, S.M. Butler, and S. McNeal, "Life Performance of Large Electrochemical Capacitors," In Proceedings of the 46th Power Sources Conference, 2014.

Answer 7: You can access the information via the Power Sources Proceedings at the following link. https://www.proceedings.com/37261.html

Similar information is contained in the GFI document: D. Wetz, C. Nybeck, "Study of Ultracapacitors under Pulsed Loading Condition," 2019

Question 8: The BAA identifies "MATLAB 2024a Simscape (Specialized Power Systems preferred)" as the desired libraries. The libraries for "Specialized Power Systems" are obsolete and being removed from MATLAB in future releases beginning with R2026a. To manage model

obsolescence and operating complexity/processing (due to needed conversions between Simscape & SPS blocks/toolboxes) going forward and for clarification: It is considered sufficient to submit a proposal/model omitting any use of “Specialized Power Systems” libraries? i.e. only using native Simscape (Electrical)

Answer 8: Given the phase out, the use of Specialized Power Systems is optional. However as indicated in the TRAPS BAA Call, the MATLAB 2024a Simscape transient electrical program should be utilized for the transient electrical model. Life models can utilize Simscape or other programs such as Matlab, Excel, etc. In addition, we want the ability to focus on Electrical only simulations if we so-choose as well as ensure the ability to operate in Fixed Time Step and Variable Time Step modes.

Question 9: Due to the nature of other points within the BAA encompassing thermal, volume/weight, performance life, and types of components (i.e. generators & batteries): Is there any preclusion of using other Simscape toolboxes/libraries such as fluids, driveline, and battery or are they permitted?

Answer 9: We do encourage the use of other Simscape toolboxes/libraries. Given the phase out, the use of Specialized Power Systems is optional. However as indicated in the TRAPS BAA Call, the MATLAB 2024a Simscape transient electrical program should be utilized for the transient electrical model. Life models can utilize Simscape or other programs such as Matlab, Excel, etc. In addition, we want the ability to focus on Electrical only simulations if we so-choose as well as ensure the ability to operate in Fixed Time Step and Variable Time Step modes.

Question 10: Can additional GFI information be provided on Navy power conversion and energy storage modules accounting for size, weight, and summary of performance specs/interfaces?

Answer 10: Unfortunately, we cannot provide further GFI than what is stated in the solicitation to assist in the generation of your white paper and proposal. Further GFI may be provided upon a potential award as needed. This initiative is developing improvements in technologies (components, architectures, methodologies, etc) over state of the art. Each Offeror's baseline consists of their own derived TRAPS system configuration, without incorporating new technology/ methodologies being proposed to improve performance and power density. As stated in the special notice “The proposed Navy TRAPS is to be compared against a TRAPS using TRL7 or above components and system architecture in order to highlight the benefits of incorporation of the proposed advanced developments."

Question 11: Clarification requested: 4160 VAC is listed in the Threshold column of Table 1 (program metrics) for AC-DC topologies. Does this mean that a solution that delivers to any subset of AC input voltage interfaces in the objective column, must have some flexibility to also be configurable to operate at 4160 VAC? In other words, if we propose a 13.8 kVAC solution, and compare it to a 13.8 kVAC reference point, does the white paper and work scope also have to speak to, eventually demonstrate, or otherwise address, applicability to 4160 VAC? Different optimization choices may be made depending on the flexibility desired.

Answer 11: Solution must be applicable, at a minimum, to 4160VAC for AC to DC system topologies as a threshold requirement and provided in your white paper. Solutions also meeting objective capabilities, such as a 13.8kVAC AC interface compatibility, will be viewed as more favorable.

Question 12: We are evaluating high-risk, high-payoff energy-storage concepts, including Superconducting Magnetic Energy Storage (SMES). Would cryogenic energy-storage approaches be considered responsive to this call if the proposed concept fully accounts for system-level size, weight, and thermal-management burden? Relatedly, should offerors assume that all cryogenic balance-of-plant, such as the cryostat, cryocooler, thermal insulation, current leads, quench protection, controls, and associated hardware, must be included in the TRAPS size, weight, and thermal-management estimates? Or are there any relevant platform-level assumptions regarding available cooling or cryogenic infrastructure?

Answer 12: SMES solutions are not prohibited. The interfacing power electronics, superconducting magnet energy storage system, and cryogenic balance-of-plant would be considered part of the system technology SWAP-C, readiness level, and risk at the power level identified in Table 1. It is important to ensure that the overall Science and Technology (S&T) for this effort be conducted at Technology Readiness Level (TRL) 3-4 for the overall system.

Question 13: To the extent this information can be shared, could you clarify how many contracts ONR plans to fund under this call? Does ONR anticipate a down-selection after the base period? We would also appreciate any guidance on the expected transition path from the base TRL 3/4 effort to TRL 5/6 and beyond. Is there a planned follow-on program for full-scale prototype fabrication and testing?

Answer 13: As indicated in the TRAPS BAA Call, "ONR plans to fund multiple contracts for the base program. Each individual contract base program will not exceed $2.5M. However, lower and higher cost proposals will be considered." With respect to any planned follow-on program for full-scale prototype fabrication and testing, an optional full scale prototype “detailed design” period of performance is two years from the date of the option phase award. Further guidance may be provided for full-scale prototype fabrication and testing after potential contract award.

Question 14: The BAA mentions demonstration of “high-risk topology subscale components, subsystems, and innovative technologies.” Could you provide any guidance on the expected power level and fidelity for these demonstrations? For example, would a 50-kW subscale hardware demonstration be considered appropriate if it is supported by validated modeling and a clear scaling path to the BAA threshold of 650 kW per mission load?

Answer 14: Subscale demonstrations at a lower power level are acceptable given that they quantitatively validate models and designs developed for full scale systems. The judgement on TRL will be based on the application of technology within the context of the overall system. Excerpts from NASA Systems Engineering Handbook "Note that the issue of integration affects the TRL of every system, subsystem, and component. All of the elements can be at a higher TRL, but if they have never been integrated as a unit, the TRL will be lower for the unit. How much lower depends on the complexity of the integration. The assessed complexity depends upon the combined judgment of the engineers."

Question 15: The BAA mentions on page 2 "White papers for potential FY26 Applied Research (Budget Category 6.2) projects are sought to achieve the following:". Then, there are 3 bulleted points 1-3. E.g., "1" is Develop a conceptual Transient Reducing Active Power System (TRAPS) topology design and corresponding MATLAB models that provide the functional and performance capabilities required to convert continuously transient LVDC mission load power demand profiles into a MIL-STD-1399 Section 300 compliant demand profile compatible with current Navy ship electric power generating systems.

- Does the whitepaper need to address all of the 3 points and at what TRL level?

Answer 15: Yes. You need to address all 4 points including the option phase description. Additionally, the overall Science and Technology (S&T) effort is envisioned to be conducted at Technology Readiness Level (TRL) 3-4.

Question 16: Are there other load profiles of specific interest for TRAPS to mitigate (and if so, would GFI be expected to become available for that pre- or post-award)? Put another way, how much consideration should be paid towards optimization of the ES media itself

Answer 16: The load profiles of interest for this specific effort are identified in the BAA Call and GFI. Focus should be on optimizing the ES for the GFI load profiles. There may be additional loads of interest identified after a potential contract award.

Question 17: If a Shunt DC TRAPS architecture is selected, can we assume an MVAC-to-LVDC converter is outside the scope of the TRAPS solicitation?

Answer 17: As identified in the BAA Call, the developed Shunt DC TRAPS architecture will operate with a baseline high TRL Navy MVAC-to-LVDC converter. However, a "high power density" MVAC-to-LVDC converter can be included in place of the baseline high TRL Navy MVAC-to-LVDC converter in the system design if it improves the overall density of the solution. The baseline Navy MVAC-to-LVDC converter does include a 60HZ transformer necessary to provide galvanic isolation and voltage conversion.

Question 18: If a Shunt DC TRAPS architecture is selected, and the MVAC-to-LVDC converter is outside the scope of the TRAPS solicitation, how should the Table 1: TRAPS Program Metrics relating to "Nominal source interface" be addressed? If would seem that these requirements are only applicable if a TRAPS topology that includes an MVAC converter is selected. Is this correct?

Answer 18: The nominal source AC voltages would be addressed by changes to the 60HZ transformer associated with the baseline high TRL Navy MVAC-to-LVDC converter.

Question 19: The preferred solutions for the DC-DC TRAPS shown in the figures of Slides 5 and 6 are likely significantly different than the preferred solutions for the MVAC-DC TRAPS shown in Slide 7. Given the 5-page limit of the white paper and the objective / threshold guidance given in Table 1, is the MVAC-DC solution ultimately what is of greatest interest to the USG?

Answer 19: Ultimately the Navy expects to field a MVAC-DC system from a single system supplier or multiple suppliers. This effort is to focus on the primary technology enablers of the system, which may be the full MVAC-DC or more focused on the DC-DC system aspects. The Navy has deployed MVAC-DC converters for multiple applications. The Navy does not have available technologies to mitigate the transient profiles. For this effort, the Navy does not have a preference for the topology.

Question 20: For the four-outputs, is independent sequencing/shedding needed, and/or output circuit protection?

Answer 20: Yes. Ultimately, individual start up, protection, and shut down of each load is needed.

Question 21: Is there some specific technology or architecture available for the TRL7 comparison? Perhaps 60-Hz Transformer rectifier with a Li-ion battery and individual load regulation converters?

Answer 21: Unfortunately, we cannot provide further GFI than what is stated in the solicitation to assist in the generation of your white paper and proposal. Further GFI may be provided upon a potential award as needed. The baseline Navy MVAC-to-LVDC converter does include a 60HZ transformer necessary to provide galvanic isolation and voltage conversionThis initiative is developing improvements in technologies (components, architectures, methodologies, etc.) over state of the art. Each Offeror's baseline consists of their derived TRAPS system configuration, without incorporating new technology/ methodologies being proposed to improve performance and power density. As stated in the special notice “The proposed Navy TRAPS is to be compared against a TRAPS using TRL7 or above components and system architecture in order to highlight the benefits of incorporation of the proposed advanced developments.

Question 22: What are the hardware expectations in the base contract and in the option contract? (Several places seem to be referring to “detailed design” rather than hardware)

Answer 22: The base option objective calls for demonstration of high risk subscale components, subsystems, and innovative technologies to validate the feasibility of the overall proposed system to meet TRAPS requirements. This demonstration requires hardware design and development. The option phase is for a detailed design for the follow on full scale prototype only.

Question 23: The base period of performance is listed as being two years with the option POP also listed as two years. Are proposals that anticipate being ready to begin the option effort earlier than two years after award of the base feasible under this program?

Answer 23: It may be feasible to begin the option program earlier than two years. Further guidance on this will be given after a potential contract award.

Question 24: Is the use of the Mathworks Simscape toolbox for modeling a strict requirement or will alternate toolboxes that run in the MATLAB 2024a environment be acceptable?

Answer 24: We do encourage the use of other Simscape toolboxes/libraries. Given the phase out, the use of Specialized Power Systems is optional. However as indicated in the TRAPS BAA Call, the MATLAB 2024a Simscape transient electrical program should be utilized for the transient electrical model. Life models can utilize Simscape or other programs such as Matlab, Excel, etc. In addition, we want the ability to focus on Electrical only simulations if we so-choose as well as ensure the ability to operate in Fixed Time Step and Variable Time Step modes.

Question 25: For the energy storage life targets, must these be met with no maintenance / down time or can there be some level of scheduled maintenance / downtime during the life of the unit?

Answer 25: The energy storage component total Mean Time Between Replacement (MTBR) should be a threshold of 6+ years or objective value of 10+ years. The total energy storage system life incorporating thermal management and other components may allow for maintenance in that period.

Question 26: Given the extensive data provided on existing UCAP / LiCAP cells / modules, is this effort specifically seeking ESDs with performance significantly beyond the reported data or should this be taken to be "state-of-the-art" ESD and solutions must incorporate ESDs with at least comparable performance?

Answer 26: The TRAPS system incorporates energy storage devices whether state of the art or advanced technology as part of the overall system solution. Overall, performance should be accounted for at the total system solution level as long as metrics such as ESD life are accounted for. Additionally, thermal management, controls, conversion, and power management components/subsystems will impact overall performance, life, and power density utilizing any energy storage technology.

Question 27: Are there any isolation requirements between the ESD and the bus? SSPC vs. mechanical contactor for disconnect? Galvanic isolation during operation?

Answer 27: Yes. Disconnect switches that provide galvanic isolation are required to enable maintenance and replacement of components as needed.

Question 28: Are there any requirements regarding the time between turning on the unit and the unit being capable of full-rated performance (i.e., initial charging time required for the ESD)?

Answer 28: There is not a specific requirement at this time. Shorter charge up time is preferable. Further guidance may be provided after contract award.

Question 29: Are there any requirements regarding the time / method of discharging the ESD in the unit?

Answer 29: There is not a specific requirement at this time. Shorter discharge time is preferable to support energy storage safe maintenance. Other means to reduce voltage levels to achieve safe maintenance may be acceptable for some energy storage media. Further guidance may be provided after contract award.

Question 30: For the objective source interface, is it expected that a single unit would be capable of hitting full power at each of the stated voltages or is the desire that there would be a family of solutions covering each of the source interface levels? If a single unit:

- Is it expected that the unit would be capable of full power when interfacing with a 440V source or would some level of power derating be expected?

- Would the unit need to interface with these different sources without any reconfiguration or would solutions that required reconfiguring of module interconnection to achieve target source input levels be acceptable?

Answer 30: There should be a common TRAPS configuration design to meet full power operation. However, the interface converter and/or transformer design may change to adapt to various voltages. Solutions demonstrating how the design could be adapted to meet objective capabilities, such as a 13.8kVAC AC interface compatibility, will be viewed as more favorable.

Question 31: Are you looking for one TRAPS system solution to satisfy all load voltage and power ranges or could we develop multiple system configurations at various scales to meet individual needs? For example, are you looking for one system to do 375 vdc, 850 vdc and 1000 vdc or could we develop separate variants for each bus? Could we develop small scale systems for smaller loads and larger scale systems for larger loads?

Answer 31: Technologies applicable to a system that is scaled or modified to meet various interfaces and type/quantities of loads is acceptable. Where compromises may result, this technology development effort must progress the threshold capabilities to support the defined load profile.

Question 32: Can we assume access to thermal management systems typically available on Navy ships (chilled water or raw seawater loops for cooling)?

Answer 32: Yes. Standard Navy interfaces should be assumed.

Question 33: Do you envision the system being deployed on a common DC bus for all 4+ loads or would each load need its own TRAPS?

Answer 33: Determining common, dedicated, and/or layering of the energy storage, conversion, controls, and distribution is part of the TRAPS system technology development effort.

Question 34: Could you give a few examples of the type of loads you are considering? For example, would electric propulsion systems, DEWs, Rail guns, EMALS, and AAG systems be representative?

Answer 34: The load profiles of interest for this specific effort are identified in the BAA Call and GFI. Focus should be on optimizing the solution for the GFI load profiles. There may be additional loads of interest identified after a potential contract award. The notional list of loads contained in the Question captures several future loads that TRAPS may be considered to support alone or in combination with other energy storage systems.

Question 35: Is there a Small Business participation requirement? If so, what percentage of the scope is the SB required to perform?

Answer 35: No. Small Business participation is not a requirement. However, as stated in the TRAPS BAA Call, " Innovative technology components and approaches leveraged from universities and small businesses will be given favorable consideration." There is no set percentage for small business participation.

Question 36: For a university-led submission, could you please clarify the small business subcontracting expectation at the white paper stage? Does the white paper need to identify a specific small business subcontractor, or is it sufficient at that stage to describe a preliminary subcontracting plan or teaming approach?

Answer 36: Please see Answer 35. If you choose to incorporate a small business partner, then you should indicate who will be part of your team and your subcontracting approach as part of your white paper.

Question 37: The second bullet point under "2" on page 3 mentions "Innovative technology components and approaches leveraged from universities and small businesses will be given favorable consideration." Is this the only aspect universities and small businesses can be involved with and the proposal needs to be led by a defense subcontractor or will you consider realistically a proposal led by university with industry members as well?

Answer 37: The white-paper, proposals and potential contracts can be led by University or industry. However, it should be noted that the ability “to commercialize, deploy and maintain technologies” will be accounted for in the evaluation. Also note that Controlled Unclassified Information (CUI) handling will be a requirement of the contract.

Question 38: For the ROM cost estimate to be submitted with the White Paper, is this a ROM cost associated with the Full Proposal execution?

Answer 38: Yes, the ROM is the cost of the Full Proposal.

Question 39: Regarding the $2.5M budget per single award. Does that budgeted amount cover Objectives 1-3? Or Objectives 1-4? It was unclear if Objective 4 (Provide an option phase in the provided white paper and full proposal to develop a detailed design for a full scale TRAPS prototype) was going to be funded with additional money beyond the $2.5M budget.

Answer 39: The $2.5M budget ROM was for objectives #1-#3. #4 is an option phase that would be associated with additional funds.

Question 40: May the same university PI participate in more than one submission under this BAA Call, as long as the proposed efforts are technically distinct?

Answer 40: Yes

Question 41: Are there any PI eligibility or citizenship requirements for this BAA Call? Also, is the anticipated work expected to involve classified information, and would there be any restrictions on publication of the research results?

Answer 41: Yes. Performers must be U.S. citizens or permanent residents and be eligible to work under CUI, Department of War (DoW) contracts. The work is anticipated to be at an unclassified level. Additionally, publications will be subject to ONR approval prior to publishing IAW DFARS 252.204-7000 Disclosure of Information.

Question 42: Are there any restrictions to foreign nationals working on the project, or any restriction on collaboration with non-US universities?

Answer 42: Please see Answer 41.

Question 43: Do you welcome national lab participation?

Answer 43: National Lab participation is welcomed. It should be noted that the ability “to commercialize, deploy and maintain technologies” will be accounted for in the evaluation. ONR anticipates that contracts will be issued for this effort. However, processing requirements may

vary in dealing with national labs. Additionally, performers will need to be U.S citizens and controlled unclassified information handling will be a requirement of the contract.

Question 44: How many awards does ONR intend to make?

Answer 44: ONR plans to fund multiple contracts for the base program. Each individual contract base program will not exceed $2.5M. However, lower and higher cost proposals will be considered.

Question 45: Are there any marking beyond Distro A associated with the TRAPS RFP? With the GFI?

Answer 45: No

Question 46: Can we submit more than one 5-page proposal in which we have different team members with variations of the solution?

Answer 46: Yes