AMENDMENT NUMBER 0002
TO ONR 08-005 ENTITLED
"COMPACT POWER CONVERSION TECHNOLOGIES FUTURE NAVAL CAPABILITIES (FNC) ENABLING CAPABILITY PROJECT"

The purpose of Amendment 0002 is to amend BAA 08-005 as follows:

1. On page 2, under the section entitled, "5. Response Date," is revised as follows:

   Full Proposals Due: 16 June 2008 2 P.M. Eastern Time

2. On page 12, Section IV, Paragraph 1 entitled, "Application and Submission Process," is revised as follows:

   Full Proposals - The due date for receipt of Full Proposals is 2:00 P.M. (Local Eastern Time) on 16 June 2008. It is anticipated that initial selections will be made by 01 July 2008. As soon as the final proposal evaluation process is completed, the Offeror will be notified via email of its selection or non-selection for an award. Proposals exceeding the page limit may not be evaluated.

3. On page 17, under the section entitled, "3. Significant Dates and Times," the chart is revised as follows:

Full Proposal Due Date	16 June 2008 2 P.M. Eastern Time
Notification of Selection for Award	01 July 2008
Contract Awards	30 September 2008

4. On page 20, Section V, Paragraph 1, Subpoint E entitled, "The realism of the proposed cost and total amount adds the following language:

   It's the Government intent to use the Electric Ship Research and Development Consortium (ESRDC) as a Government resource available to all awardees for modeling and testing under this program. The use of ESRDC for any other tasks may be proposed, but will be evaluated on a case-by-case basis to assure no Organizational Conflicts of Interest (OCI) exists.

5. Clarifications and additional requirements related to Full Proposals per for Multifunction and Bidirectional Converters:

Provide Phase I proposals that adhere to a 6 month timeline for Phase I. It's anticipated the timeline is 12 Months for Phase II and an 18 month timeline for Phase III. Proposals should discuss ability of proposed technology to address all items listed below for each product. Phase I proposals should address scalability of the design to the various

applications and power levels listed below. Phase I efforts will be expected to determine the specific relationships listed and provide the level of detail for the two possible funding levels:

- Option 1: 500k
- Option 2: 250k

For Phase II and Phase III cost estimates, specifically address the following cost impacts (these should still be cost ROMs since an updated cost estimate for Phase II and III would be required as a product at the end of Phase I):

- Testing of the Phase II prototype at participating facility within the Electric Ship Research Consortium-ESRDC (POCs Dr. Steinar Dale, dale@caps.fsu.edu and Dr. Bob Hebner, r.hebner@mail.utexas.edu)
- Testing of the Phase III prototype at the LBES at NSWC-Philadelphia
- Design, build and testing of Phase III prototype(s) in more than one application (see potential applications below)

For MFPC products, the navy is interested in a design suitable to a wide range of applications. Discuss the ability of your proposed technology to meet two or more of the following applications; please address risks and associated mitigation strategies for each power level listed:

- Motor drive (5, 10, 15, 20, 40MW)
- Active Rectifier for HSG (5, 10, 15MW) [1]
- Pulse Power Converter (either ~10kV capacitor charger or high speed rotating machine drive) for EMRG (5, 10, 20MW) [2-3]
- Optional - Active Rectifier for MTG (40MW)
- Optional - RADAR power supply (high fidelity DC at 2, 5, 10MW)

For BDPC products, discuss the ability of your proposed technology to meet one or more the following applications; please address risks and associated mitigation strategies for each power level listed:

- Distr. Level energy storage interface (1-5MW @1-30minutes) [4]
- Interface between low and medium voltage ship service distribution level converter [4]
- Distributed generation (1-5MW) – Interface to distributed fuel cells
- Hybrid Motor Drive (1-5MW) – Addition of electrical propulsion means to an existing mechanical propulsion system. [5]
- Optional - Load derived regenerative energy (1-5MW)

For MFPC/BDPC products, discuss the ability/impact of your proposed MFPC/DBPC products technology to interface with the following power levels for each of the applicable product applications above: (these ranges are both for either input or output).

- Voltage ranges
    - AC: 1.5, 3.3, 4.16, 6.9, 13.8kV
    - DC: 1,5,10kV

- Frequency range – DC,60,233,400,500Hz.

For MFPC/BDPC products, discuss how the notional shipboard distribution grounding methodology will impact your proposed design **and vice versa**. Namely, what assumptions concerning the distribution system grounding are used with the proposed design for each of the applicable applications?

For MFPC/BDPC products, discuss how the notional shipboard distribution architecture methodology will impact your proposed design **and vice versa**. Namely, what assumptions concerning the distribution system architecture are used with the proposed design for each of the applicable applications?

For MFPC/BDPC products, discuss if/how any of the following features impact your design for each of the listed applicable product applications:

Single point failures – Can they be eliminated in the proposed design, and what is the impact.

Galvanic Isolation vs. Non- Isolated

Design to EMI/Vibration/Shock Military Specifications

Achieve high operational reliability/availability/maintainability (high Mean Time Between Failures-MBTF and low Mean Time To Repair-MTTR).

Hot Swappable Modules – Ability to maintenance faulty modules while unit is energized

For each applicable application listed above that your proposed design will satisfy, address the impact of the following parameters to the overall converter, and the individual module, size and weight:

- THD (0.1, 1, 5, 10%)
- MW rating of the application (as listed above)
- Associated voltage range (as listed above)
- Associated frequency range (as listed above)
- Overload Capability (1.5, 2, 2.5pu Current for 5-10 seconds)
- Chilled, Sea or Fresh Water Cooling (based on NVR Specifications)
- Air Temperature (based on NVR Specifications)
- Efficiency (95-99%)
- DC Voltage Regulation (+-1, 5, 10, 20%)
- Relative cost of the different perturbations

Make as part of Phase 1 deliverables the complete set of interface parameters required to accommodate the use of the products you develop (both for load interfaces as well as power distribution component interfaces). Namely, the input/output interface parameters needed to characterize and enable an **Open Architecture** both in the power module and in the associated device/converter controllers.

References:

[1] R. Calfo, M. Smith, J. E. Tessaro, "High Speed Generators for Power Dense, Medium-Power, Gas Turbine Generator Sets", 2008 ASNE Naval Engineers Journal, Vol. 119, No. 2, pg.63-82

[2] Wolfe, T.; Riedy, P.; Drake, J.; Macdougall, F.; Bernardes, J., "Preliminary Design of a 200 MJ Pulsed Power System for a Naval Railgun Proof of Concept Facility", 2005 IEEE Pulse Power Conference, June 2005, pg.70-74.

[3] J. McFarland, I. McNab, "Long Range Naval Railgun", IEEE Transactions on Magnetics, Volume 39, Issue 1, pg. 289-294.

[4] Next Generation Integrated Power System Technology Development Roadmap,NAVSEA Ser 05D/349, 2007.

[5] T. McCoy, J. Zgliczynski, N Johansen, F. Puhn, T. Martin, "Hybrid Electric Drive for DDG-51 Class Destroyers", 2008 ASNE Naval Engineers Journal, Vol. 119, No. 2, pg.83-91

6. Clarifications and Additional Requirements related to Full Proposals per Power System Management Controllers:

Provide Phase I proposals that adhere to a 12 month timeline for Phase I. It's anticipated the timeline is 12 Months for Phase II and a 24 month timeline for Phase III. Proposals should discuss ability of proposed technology to address all items listed below for each product. Phase I proposals should address scalability of the design to address the various applications and power levels listed below. Phase I efforts will be expected to determine the specific relationships listed and provide the level of detail for the two possible funding levels:

- Option 1: 500k
- Option 2: 250k

For Phase II and Phase III cost estimates, specifically address the following cost impacts:

- Testing of the Phase II prototype at participating facility within the Electric Ship Research Consortium (POCs Dr. Steinar Dale, dale@caps.fsu.edu and Dr. Bob Hebner, r.hebner@mail.utexas.edu)
- Testing of the Phase III prototype at the LBES at NSWC-Philadelphia

For the power system management controller product, discuss how the notional shipboard distribution/load architecture methodology will impact your proposed design **and vice versa**. Namely, what assumptions concerning the distribution/load system architecture are used with the proposed design? These inputs should also address the Multifunction and Bidirectional converter applications listed above where applicable.

Discuss how the proposed solution will incorporate an **Open Architecture** methodology, and how the proposed approach will map into the overall notional ship control methodology. What standards will be employed?

Discuss how the following features will/can impact your proposed design, in terms of implementation, system integration and cost:

- Fault management (load and distribution level)
- System Recoverability (load and distribution level)
- Operational Efficiency
- Load shedding and Management
- Power flow ramp rates to meet mission needs while accommodating the capabilities of the installed system equipment - this discussion should be based on the ramp rates provided in the previous sections of the BAA.
- System Stability considerations

Discuss the overall control hierarchy with the proposed power system management controllers, from the load side up to the user operation. Detail what assumptions are made of the individual component control capabilities. This input should address the applicable applications listed above for the Multifunction and Bidirectional Power Converter products.

Discuss the overall derived system performance metrics that the proposed solution will meet. Both qualify and quantify these metrics.