

Special Notice N00014-17-R-SN01
Special Program Announcement for 2017 Office of Naval Research
Swampworks Research Opportunity:
Carbon Nanotube (CNT) Electrical Cabling

I. INTRODUCTION

This announcement describes an Advanced Technology Demonstration topic entitled “**Development, characterization, and demonstration of a CNT-based large-gage cable (with terminations)**” to be launched under the ONR FY 17 Long Range BAA, N00014-17-S-B001, entitled, “Long Range Broad Agency Announcement for Navy and Marine Corps Science and Technology” which can be found at <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>.

The advanced technology development opportunity described in this announcement falls under the following section of the BAA:

Section I, entitled “General Information,” sub-section F, entitled “Research Opportunity Description”, the “Sea Warfare and Weapons Department (Code 33)” item, paragraph 1), subparagraph c, entitled “Electrical and Thermal Systems”.

II. TOPIC DESCRIPTION

The Office of Naval Research (ONR) is interested in receiving proposals on the following Advanced Technology Demonstration topic:

“Development, characterization, and demonstration of a CNT-based large-gage cable (with terminations)”

The objective of this announcement is to encourage an advanced technology development effort culminating in a demonstration that will inform future transition efforts to multiple Navy platforms.

White papers and proposals should address technical challenges as described below:

A significant challenge to meeting current and future Navy and United States Marine Corps (USMC) power and energy needs is improving efficiency and power density of system elements including power distribution elements. The Naval Power & Energy Systems Technology Development Roadmap (NPES TDR)¹ encourages a reduction in the size, weight and cost of conductors used in electrical equipment on future ships, and an improvement in the efficiency of NPES and components. The Naval S&T Strategy² encourages increased efficiency and power density on platforms and reduced weight for personal power through advanced materials, devices, and architectures.

This program seeks to develop and demonstrate a prototype power distribution cable utilizing CNT-based conductors to provide a significant reduction in weight and equal or reduced volume relative to equivalent copper and aluminum-based cabling presently used on various platforms. Specifically, an improvement in the metric of mass/conductivity relative to current copper and aluminum-based cabling is desired. Applications of interest include:

- Shipboard - examples such as degaussing cables (DC, order 100A), cables rated for variable speed drives (0-60Hz, up to 6 kV) as well as very high current pulsed power cables (hundreds of kA, short pulses of msec duration), in coax configurations,
- Expeditionary (such as compact, lightweight, man-portable systems), and
- Airborne power system applications (such as power distribution in light and ultralight weight manned and unmanned air frames)

The examples given are not meant to limit or restrict the areas of interest but to highlight the broad range of applications of lightweight, high ampacity conductors to the Navy. These applications cover a wide range of power levels from kW to MW and voltage/frequency combinations as follows:

- 115/200 Vac, 60Hz and 400 Hz
- 440 Vac, 60Hz and 400 Hz
- 4160 Vac, 60Hz and 400 Hz
- 270 Vdc
- 1000 Vdc

MIL-DTL 24643C³ and SAE AS22759⁴ provide specifications for current US Navy copper-based cables which should be used for comparative purposes. Approaches should include an early technical evaluation/trade study to identify the optimum combination of power and voltage/frequency to maximize the benefit of CNT-based conductor cabling improvements to mass/conductivity. Approaches should also identify specific cable characteristics to be developed and tested (e.g., gauge, length, insulation, and termination) including the rationale/driving factors for the selected specific characteristics.

Technology development under this topic is envisioned to be conducted at the TRL 2-4 level. Development efforts that highlight particularly innovative implementations of CNT-based are of interest. Implementations that leverage the unique electrical conductivity vs. frequency & temperature, mechanical and fatigue strength, thermal conductivity, and corrosion characteristics of CNT-based materials vs. copper and aluminum-based conductors are of particular interest.

Applicable reference documents include:

¹ 2015 Naval Power and Energy Systems Technology Development Roadmap (NPES TDR) (http://www.navsea.navy.mil/Portals/103/Documents/Naval_Power_and_Energy_Systems_Technology_Development_Roadmap.pdf)

² 2015 Naval Science & Technology Strategic Plan (<http://www.onr.navy.mil/en/About-ONR/~media/Files/About%20ONR/Naval-Strategic-Plan.ashx>)

³ MIL-DTL-24643C Detail Specification, Cables, Electric, Low Smoke Halogen-Free, for Shipboard Use, General Specification for

⁴ SAE AS22759C Aerospace Standard, Wire, Electrical, Fluoropolymer-Insulated, Copper or Copper Alloy

III. No events are planned

IV. WHITE PAPER SUBMISSION

Although not required, white papers are strongly encouraged for all offerors seeking funding. Each white paper will be evaluated by the Government to determine whether the technology advancement proposed appears to be of particular value to the Department of the Navy. Initial Government evaluations and feedback will be issued via e-mail notification from the Technical Point of Contact. The initial white paper appraisal is intended to give entities a sense of whether their concepts are likely to be funded.

A Detailed Full Proposal (Technical and Cost volumes) will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above referenced e-mail as being of "particular value" to the Government. However, any such encouragement does not assure a subsequent award. Full Proposals may also be submitted by any offeror whose white paper was not identified as being of particular value to the Government or any offeror who did not submit a white paper.

For white papers that propose efforts that are considered of particular value to the Navy, but either exceed available budgets or contain certain tasks or applications that are not desired by the Navy, ONR may suggest a full proposal with reduced effort to fit within expected available budgets or an effort that refocuses the tasks or application of the technology to maximize the benefit to the Navy.

The white paper should contain the following information:

- Cover Page: The Cover Page shall be labeled "WHITE PAPER" and shall include the BAA Number **N00014-17-R-SN01**, proposed title, technical points of contact, telephone number, facsimile number, and E-mail address.
- Technical Concept: A description of the technology innovation and technical risk areas.
- Operational Naval Concept: A description of the project objectives, the concept of operation for the new capabilities to be delivered, and the expected operational performance improvements.
- Operational Utility Assessment Plan: A plan for demonstrating and evaluating the operational effectiveness of the Offeror's proposed products or processes in field experiments and/or tests in a simulated environment.
- Rough Order of Magnitude (ROM) cost and schedule.
- Discussion of Manufacturability related to the proposed concept

In addition, the following information is requested:

- Principal Investigator(s);
- Technical objectives of the proposed effort;
- Technical approach that will be pursued to meet the objectives;
- A summary of recent relevant technical breakthroughs; and

- A funding plan showing requested funding per fiscal year.

White papers should be submitted via email to harold.coombe@navy.mil with “WHITE PAPER” in the subject line.

White Papers shall otherwise comply with requirements of the ONR Long Range BAA, N00014-17-S-B001.

To ensure full, timely consideration for funding, white papers should be submitted no later than 1 May 2017. White papers received after that date will be considered as time and availability of funding permit.

The planned date for completing the review of white papers is 1 June 2017.

V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

ONR anticipates that a single award will be issued for this effort. Proposals should be submitted by 15 July 2017. Proposals received after that date will be considered as time and availability of funding permit.

Proposal technical content shall not exceed 20 pages using 1” margins, 12 point Times New Roman or Arial font, and single spacing. The cover page, resumes, bibliographies, project schedule, and table of contents are excluded in the page count.

Full proposals shall be submitted in accordance with the instructions in FY17 Long Range BAA.

All full proposals must be submitted via AMRDEC SAFE to harold.coombe@navy.mil.

ONR plans to fund one (1) award with an approximate value of up to \$900,000 for a total period of performance not to exceed 24 months. Teaming between industry, academia, and other eligible performers as described in the BAA is encouraged.

Funding decisions should be made before **1 SEP 2017**. Selected projects will have an estimated award date of **1 FEB 2018**.

VI. SIGNIFICANT DATES AND TIMES

Event	Date	Time
White Paper Submission Date	1 MAY 2017	1400 Eastern Time
Notification of White Paper Valuation*	1 JUN 2017	
Recommended Full Proposal Submission	15 JUL 2017	1400 Eastern Time
Notification of Selection: Full Proposals *	1 SEP 2017	
Awards *	1 FEB 2018	

Note: * These are approximate dates.

VII. POINTS OF CONTACT

Technical Point of Contact:
Harold Coombe
Program Officer
harold.coombe@navy.mil>

Business Point of Contact:
AnShawn Lewis
Contract Specialist, Code 252
anshawn.lewis@navy.mil

VIII. SUBMISSION OF QUESTIONS

Any questions regarding this announcement must be provided to the Technical Point of Contact and/or the Business Point of Contact listed in Section VII above. All questions shall be submitted in writing by electronic mail.

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

- Federal Business Opportunities (FEDBIZOPPS) Webpage- <https://www.fbo.gov/>
- ONR Special Notice Webpage- <http://www.onr.navy.mil/Contracts-Grants/FundingOpportunities/Special-Notices.aspx>

Questions regarding White Papers or Full Proposals should be submitted NLT two weeks before the dates recommended for receipt of White Papers and/or Full Proposals. Questions after these dates may not be answered.