

RESEARCH CALL TO DOE/FEDERAL LABORATORIES



**Cybersecurity for Energy Delivery Systems Research Call
RC-CEDS-2012-02**

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SECTION I – GENERAL INFORMATION

A. SUMMARY

The Department of Energy's (DOE) National Energy Technology Laboratory (NETL) on behalf of the DOE, Office of Electricity Delivery and Energy Reliability (OE), is seeking proposals that will lead to improvements in energy delivery system cybersecurity as well as protect the electric grid and enhance integration of smart grid technologies. This research call includes six (6) project areas:

- Project 1 - Security Updates for Energy Delivery Control System Software and Firmware
- Project 2 - Sustain Critical Energy Delivery Functions While Responding to a Cyber Intrusion
- Project 3 - Detect Compromise of Supply Chain Integrity
- Project 4 - Cryptographic Key Management for the Energy Sector
- Project 5 - Secure Remote Access for the Energy Sector
- Project 6 - Innovative Technologies that Enhance Cybersecurity in the Energy Sector

B. BACKGROUND INFORMATION

The objective of this Laboratory Call is to conduct research, development, and demonstrations leading to next generation technology that will become widely adopted to enhance the cybersecurity of energy delivery system platforms specific-to the U.S. energy infrastructure in accordance with DOE's energy infrastructure role defined in Homeland Security Presidential Directive (HSPD) 7. This also includes the development of technologies to assist in the compliance with North American Electric Reliability Corporation-Critical Infrastructure Protection (NERC-CIP) requirements for cybersecurity.

Projects proposed in response to this Laboratory Call are expected to align with the strategic framework presented in the Roadmap to Achieve Energy Delivery Systems Cybersecurity (www.controlsystmsroadmap.net), and as such address key Roadmap milestones and objectives that must be met to achieve the Roadmap vision that by 2020 resilient energy delivery systems are designed, installed, operated and maintained to survive a cyber-incident while sustaining critical functions. Projects that use one or more of the Networking and Information Technology Research and Development (NITRD) Program Federal R&D themes as a means of addressing key Roadmap milestones are encouraged. These themes are Designed-in Security, Tailored Trustworthy Spaces, Moving Target, and Cyber Economic Incentives. More information regarding each of these themes can be found at http://www.nitrd.gov/Subcommittee/csia/Fed_Cybersecurity_RD_Strategic_Plan_2011.pdf.

Solutions should be interoperable, scalable, cost-effective advanced technologies that are innovative, and that implement common methods and best practices and must include a strategy for commercializing/implementing the solutions throughout the energy sector. Collaboration among multiple laboratories, vendors and asset owners is highly recommended. Collaborations should be clearly identified in the proposal. All proposals must include a comprehensive evaluation that confirms the identified research and development gap exists, and that demonstrates no other entity has addressed the identified research and development gap, in either the public or private sectors.

The Secure Control Systems for the Energy Sector Program Area of Interest requests applications that address one or more of the 6 topic areas outlined below.

C. PROJECT AREA

Project 1 – Security updates for energy delivery control system software and firmware

Design, develop and demonstrate tools or techniques needed to create security patches or upgrades that are tailored to the needs of energy delivery control systems. These must provide, but are not limited to, the following capabilities: provably verify the security update will perform exactly as intended and will do nothing else, most importantly that it will do no harm; do not interrupt availability, energy sector cyber-assets must remain available throughout the security update process; do not require personnel with specialized expertise to be present during the security update process; validate the security update as authentic and uncompromised; accommodate third-party software. These tools and techniques must be demonstrated at an end-user site to validate a clear industry acceptance.

Project 2 – Sustain critical energy delivery functions while responding to a cyber-intrusion

To sustain critical functions in the presence of an ongoing cyber intrusion, it is necessary to analyze the root cause, extent and consequences of the cyber intrusion without interrupting the availability of the energy delivery control system.

A comprehensive analysis often requires all cyber assets to be evaluated for possible compromise, and cyber assets to be taken offline during this process. However, energy delivery control systems comprise complex network architectures that may contain hundreds of specialized cyber components and may extend across wide geographical regions. This picture is becoming increasingly complex as the energy sector brings in technologies such as mobile and cloud computing, plug-in-hybrid vehicles, phasor measurement units and millions of smart meters. Also, reliable and safe energy delivery requires that energy delivery control system components remain available at all times. Tools and technologies are needed to perform a comprehensive analysis of the root cause, extent, and consequence of an ongoing cyber intrusion in an energy delivery system, that inform response decisions without impeding critical energy delivery functions. These tools and techniques must be demonstrated at an end-user site to validate a clear industry acceptance.

Project 3 – Detect compromise of supply chain integrity

Tools and techniques are needed to detect the presence of undesired functionality inserted upstream in the supply-chain with the intent to compromise the cybersecurity of energy delivery system components. The research can consider one or more of hardware, firmware or software, including third party. The tools and techniques will be used by the vendor during component development, and may include the capability for continuous detection during operation at the

energy asset end-user installation. These tools and techniques must be demonstrated at an end-user site to validate a clear industry acceptance.

Project 4 – Cryptographic key management for the energy sector

Tools and techniques are needed to provide cryptographic key management solutions that are tailored to the generation, transmission and distribution domains of the energy sector, and that accommodate legacy devices as well as current day devices including millions of smart meters. The research must address, but is not limited to addressing, the great diversity of communications media and protocols in the energy sector, as well as bandwidth constraints and the imperative of uninterrupted availability. These tools and techniques must be demonstrated at an end-user site to validate a clear industry acceptance.

Project 5 – Secure remote access for the energy sector

New tools and techniques are needed to advance the cybersecurity of communications that use remote wired or wireless access to energy delivery systems. Secure remote access to field devices is necessary to perform timely maintenance, retrieve data and update firmware. Legacy field devices that typically have limited bandwidth and computational resources, reside in the same architecture with modern devices that are equipped with more advanced communication and computational capabilities and that may number in the millions, such as smart meters. Next-generation capabilities are needed to establish secure remote access tailored across the diversity of communication modes and computational capabilities of devices that comprise energy sector architectures. These tools and techniques must be demonstrated at an end-user site to validate a clear industry acceptance.

Project 6– Innovative technologies that enhance cyber security in the energy sector

The 2011 Roadmap to Achieve Energy Delivery Systems Cybersecurity provides a strategic framework that directs research and development of cybersecurity solutions for the energy sector. The cybersecurity landscape is dynamic. New technologies are being rapidly deployed and legacy technologies are being used in ways that were not previously envisioned, introducing new security considerations. While significant research and development has been accomplished and is currently underway to meet the Roadmap goals, some gaps remain in the research and development efforts needed to satisfy all Roadmap goals. This project requests a proposal that identifies, and proposes a technical solution to fill, a gap in research and development coverage of the Roadmap goals. Proposals for this category **MUST BE INNOVATIVE TECHNICAL SOLUTIONS.**

SECTION II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates providing DOE funding for selected projects to National Laboratories. Any project awarded as a result of the Research Call will be processed through NETL as a Field Work Proposal, an Inter Entity Work Order, Interagency Agreement or any other allowable method deemed appropriate by the Government.

B. ESTIMATED FUNDING

Approximately \$15 Million is expected to be available for awards under this announcement.

C. EXPECTED NUMBER OF AWARDS

DOE anticipates making up to 8 awards under this announcement. The Government reserves the right to fund, in whole or in part, any, all, or none of the proposals submitted in response to this Research Call and will award that number of instruments which serves the public purpose and is in the best interest of the Government.

D. ANTICIPATED AWARD SIZE

DOE anticipates that it will issue several awards of varying size with up to \$3 million per award. This includes awards that have more than one laboratory participation. This information is for estimating purposes only and in no way commits the Government.

E. PERFORMANCE PERIOD

DOE anticipates making awards within 60 days from the date of release of this Research Call with an anticipated performance period not to exceed 3 years. Projects must be divided into phases, with go/no-go decision points at end of each phase. A decision will be made regarding continuation, redirection, or termination of the project at each decision point.

F. TYPE OF PROPOSAL

DOE will accept only new proposals under this Research Call. Projects awarded under RC-CEDS-2010 (the FY10 Research Call) will not be considered for renewal or continuation.

SECTION III – ELIGIBILITY INFORMATION

A. ELIGIBLE OFFERORS

Only DOE National Laboratories are eligible to apply as prime. Collaboration involving multiple DOE National Laboratories and other entities (such as educational institutions, vendors, research and development organizations, utilities, etc.) is highly encouraged.

SECTION IV – SUBMISSION REQUIREMENTS

A. SUBMISSION INSTRUCTIONS

Proposals shall be submitted electronically to the following email address no later than July 3, 2012 at 03:00:00 PM Eastern Daylight Time:

CEDSLabCall@netl.doe.gov

Phone: (304) 285-4524

Fax: (304) 285-4403

The applicant is encouraged to request a return notification to verify receipt of proposal.

SECTION V – EVALUATION AND SELECTION

A. INITIAL REVIEW CRITERIA

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the Research Call has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the Research Call. Proposals that do not meet the initial criteria may be excluded from review.

B. MERIT REVIEW CRITERIA

Proposals submitted in response to this Research Call will be evaluated and scored in accordance with the criteria and weights listed below:

Criterion 1: Technical Approach and Project Management (45%)

- This criterion will evaluate the approach taken by the applicant and the degree to which the proposed technology or methodology meets the stated objectives of the funding opportunity announcement:
- Feasibility that the proposed technology or product will address the need or problem.
- Soundness of the proposed approach and likelihood of success as demonstrated through scientific or engineering merit of the proposed approach.
- Reasonableness and completeness of the proposed Statement of Project Objectives (SOPO) to achieve project objectives and measure success.

- Adequacy, appropriateness, and reasonableness of the budget. This includes the labor distribution, purchases, and effort by work breakdown budget structure to accomplish the stated objectives.
- Degree to which the applicant demonstrates sound management principles, and plans for project oversight in the Extended Field Work Proposal to achieve the project objectives on time and within budget.

Criterion 2: Industry Impact (40%)

- This criterion will evaluate the degree to which the proposed technology or methodology will impact the energy infrastructure cybersecurity industry:
- Significance of the benefits and impact of the proposed technology or product compared with state-of-the-art technologies, products or practices.
- Extent to which the proposed effort meets a gap in the state-of-the art.
- Extent to which the benefits and impact of anticipated performance improvements, including technical, operational and environmental performance; cost savings; societal benefits; and potential for the project to meet or exceed the DOE program goals or program vision.

Criterion 3: Collaboration (15%)

- This criterion will evaluate the degree to which the Applicant builds on past efforts and collaborations to achieve the best possible outcomes at the best value for the government including.
- Reasonableness of the proposed approach to provide a path for industry acceptance and commercialization.
- Effectiveness of the proposed strategic approach to establish a partnership with Federally Funded Research and Development Centers (FFRDCs), industry and vendors for collaborations and cooperation.
- Extent to which the Applicant’s approach would lead to dissemination of lessons learned and foster collaboration with entities not immediately involved with the project.
- Degree to which commitment of the collaboration to the proposed project is demonstrated by including letters of intent from all proposed team members.

Program Policy Factors

The following Program Policy Factors may be used by the Selection Official to assist in determining which of the ranked application shall receive DOE funding support:

1. It may be desirable to select project(s) that has collaborative effort between FFRDC's, academia, industry and vendor.
2. It may be desirable to select project(s) that demonstrate solutions that are scalable and cost-effective with a clear industry acceptance for commercialization
3. It may be desirable to select complementary project(s) and/or duplicative efforts or projects, which, when taken together, will best achieve the research goals and objectives;
4. It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;
5. It may be desirable to select a group of projects which represent a diversity of technologies and Topic Areas in order to provide a balanced programmatic effort and a variety of different technical perspectives;
6. It may be desirable to select project(s) of less technical merit than other project(s) if such a selection will optimize use of available funds by allowing more projects to be supported and not be detrimental to the overall objectives of the program.
7. It may be desirable to select project(s) that reduce Federal investment and maximize corporate commitment as demonstrated by cost sharing or industry participation.
8. It may be desirable to select project(s) that demonstrate the proposed technology in a real-time environment and includes a commercialization entity and an electric utility (investor owned, municipal or rural electric cooperative).

C. SUBMISSIONS FROM SUCCESSFUL OFFERORS

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information;
- Other budget information;
- Name and contact information of the cognizant Contracting Officer.
- National Environmental Policy Act Questionnaire and supporting documentations

SECTION VI – PROPOSAL PREPARATION

A. PREPARATION

It is requested that the entire proposal be single spaced, 1" margins (top, bottom, left, right), and when printed will fit on size 8 1/2" by 11" paper. The type must be legible and not smaller than 11 point. In order to produce a comprehensive proposal for this Research Call, the offeror shall

address, at a minimum, the areas listed in the Table of Contents below. The offeror shall use the following Table of Contents:

Section	Page
Table of Contents	I
List of Tables (if applicable)	II
List of Figures (if applicable)	III
List of Acronyms (if applicable)	IV
Extended Field Work Proposal	#
Resume File	#
Commitment Letters	#

- The entire proposal, that includes all materials included in the Table of Contents, should be saved as a single PDF file under the following file name: “*Lab Name* - *PI*”, e.g., “NETL – Smith”

B. EXTENDED FIELD WORK PROPOSAL

The applicants under this research call shall prepare an Extended Field Work Proposal. **See Attachment 1 – NL Extended Field Work Proposal and Attachment 2 – Budget Justification**

C. RESUME FILE

Provide a resume for each key person proposed, including subawardees and consultants if they meet the definition of key person. A key person is any individual who contributes in a substantive, measurable way to the execution of the project.

Each resume must not exceed 2 pages when printed on 8.5” by 11” paper with 1” margins (top, bottom, left, and right) with font not smaller than 11 point and should include the following information, if applicable:

Education and Training: Undergraduate, graduate and postdoctoral training, including institution, major/area, degree and year.

Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications: Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or instead of publications.

Synergistic Activities: List no more than 5 professional and scholarly activities related to the effort proposed.

D. COMMITMENT LETTERS

Commitment Letter from partnership with Federally Funded Research and Development Centers (FFRDCs and AMI or other participating vendors, if applicable)

SECTION VII – OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this Research Call will be sent via e-mail directly to the National Laboratories. The e-mail will contain a web link to the modified version located at NETL and OE website.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all proposals received in response to this Announcement and to select any proposal, in whole or in part, as a basis for negotiation and/or award.

C. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The offeror, by submitting its proposal, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing a proposal. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

D. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.