Building Technologies Office

FY 2017 National Laboratory Call for Proposals and Merit Review (BTOLMR0001719)

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Informational Webinar
February 6, 2015

Expected Schedule

Activity	Date
Lab Call Released	Feb 4, 2016
Informational Webinar	Feb 10, 2016, 12:30PM ET
Letters of Intent Due (submitted to EERE Exchange)	Feb 16, 2016, 5 PM ET
Proposals Due (submitted to EERE Exchange)	Mar 7, 2016, 5 PM ET
Reviewers' Initial Comments Due	Mar 23, 2016, 5 PM ET
Presentations Due (submitted to BTOLabCallFY16-18@EE.DOE.Gov)	Mar 30, 2016, 5 PM ET
Lab Call Merit Review Meeting (Falls Church, Virginia)	Apr 7-8, 2016
Reviewers' Final Comments Due	Apr 15, 2016, 5 PM ET
Notification of Decisions for FY17 – 19 Lab AOP Projects	Apr 29, 2016

Questions: Please address all questions about this Lab Call to BTOLabCallFY17@EE.DOE.Gov, and include 'ET,' or 'RBI' in the subject heading, as appropriate. Answers will be posted on EERE Exchange under this Lab Call's Frequently Asked Questions (FAQS) section. No questions should be addressed to BTO staff.

Building Technologies Office's Goals

BTO's overarching long-term goal is to reduce the energy use per square foot of U.S. buildings by 50% compared to 2010 levels. Based on current analysis of the building sector and BTO program planning, BTO has established a goal of reducing building energy use intensity (EUI) by 30% by 2030.

To support the achievement of this 2030 goal, each BTO program has identified market-focused interim goals:

- **Emerging Technologies Program**: By 2020, accelerated technology development will make available new, cost effective technologies capable of reducing the energy use of typical buildings by 30% compared to high-efficiency technologies available in 2010.
- **Residential Buildings Integration Program**: By 2025, improvements in the efficiency of space conditioning and water heating in typical single-family homes will reduce these energy uses by 40% from 2010 levels.
- **Commercial Buildings Integration Program**: By 2025, actions by market leaders, representing 20% or more of the sector, will cut the energy use of their buildings by at least 35% relative to typical commercial buildings in 2010.
- **Building Energy Codes Program**: By 2025, improvements in the typical design and construction of new buildings will be sufficient to reduce their energy use by 40% compared to typical new buildings in 2010.
- **Appliance and Equipment Standards Program**: By 2025, increases in the efficiency of new products will cut the energy use per square foot of the buildings sector by at least 20% from 2010 levels.

FY 2017 Lab Call

- The Department of Energy's Building Technologies Office (BTO) is seeking multi-year (3+ years) project proposals from national laboratories ('Labs') for activities to incorporate into the FY 2017, FY 2018, and FY 2019 Annual Operating Plans (AOPs). **Only proposals for which a DOE national laboratory is the prime recipient will be considered for funding; all other proposals will be returned without review.** This Lab Merit Review will evaluate funding proposals for direct lab work portions of the Residential Buildings Integration Program and Emerging Technologies' (ET) sensors and controls sub-program.

FY 2017 Lab Call - Eligibility

- Only DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) and DOE Government-Operated Government-Owned laboratories (GOGOs) are eligible to apply for funding as a prime recipient. These laboratories include all the "Labs and Technology Centers" listed on http://energy.gov/offices.
- Further eligibility restrictions will be dependent upon the topic area's designation as a core or enabling capability. Topic areas designated as a core and enabling capability will be restricted to proposals from prime recipients from the respective lab(s).
- In both cases, prime recipients are encouraged to include other entities as sub-recipients, and to form teams with other labs, as appropriate. Where several labs have designated enabling capabilities, it is desirable for these labs to work together to provide BTO one integrated project proposal.

BTO Lab Core & Enabling Capabilities (January 2016)

● Core Capability ◑ Enabling Capability

	State	Related Facility	ANL	LBNL	NREL	ORNL	PNNL	SNL	Cross-Walk to DOE Core Capabilities	Comments
Emerging Technologies Development (ET)									19, 22, 23	
HVAC, Appliances and Equipment	Existing	BTRIC				●				
Envelope	Existing	BTRIC				●				
Windows - Performance Testing & Simulation	Existing	FLEXLab		●						
Windows - Durability Testing	Existing	ESIF			◑					
Lighting-Testing	Existing	SSL					●			
Building Energy Modeling R&D	Existing	BTRIC, FLEXLab		◑	◑	◑				
Advanced Controls for Buildings	Emerging									
Sensors to Volume Manufacturing	Emerging	BTRIC				◑				
Interoperable Execution Platform for Controls*	Existing						◑			
*The Interoperable Execution Platform refers to VOLTTRON. This includes platform development and maintenance, but does not include application development utilizing the platform.										
Building Integration and Solution (RBI, CBI)									19, 22, 23	
Whole Building Energy Performance	Existing	FLEXLab		◑	◑	◑	◑			
Building Energy Modeling Deployment	Existing	BTRIC, FLEXLab		◑	◑	◑	◑			
HVAC	Existing	BTRIC, FLEXLab			◑	◑				
Envelope, Windows, Shading	Existing	BTRIC, FLEXLab		◑		◑				
Residential IAQ/Ventillation	Existing			●						
Lighting	Existing			◑	◑		◑			
Plug Loads	Existing				◑					
Energy Management and Demand Response	Existing	ESIF		◑			◑			
Integrated Renewables and Grid, Demonstration/Deployment	Emerging	ESIF								
Regulatory (Codes, Appliance and Equipment Standards)									19, 22, 23	
Code Development and Analysis	Existing						●			
Code Compliance, Adoption	Existing						◑			
Appliance Standards - Engineering Analysis	Existing			◑						
Standards Economic Analysis - Consumer Products	Existing			●						
Standards Economic Analysis - Commercial Equipment	Existing						◑			
Appliance Standards - Test Procedures	Existing			◑			◑			
Appliance Standards - Product Testing, Research	Existing			◑		◑				

A core capability is mission-critical, world class, and with unique elements. An enabling capability meets a mission need, and is typically shared by multiple labs, but not necessarily. In general, core and enabling capabilities identify lab AOP areas of stable, multi-year funding, with most proposed AOP work externally merit-reviewed prior to funding, and most AOP projects externally peer reviewed to assess progress and impact.

Process and Criteria

A four-step application process will be followed:

1. The first step is the submission of a letter of intent that will not be reviewed, but rather serves to assist BTO in organizing reviewers and the review sessions. BTO will also use letters of intent to determine eligibility.
2. The second step is the submission of a written proposal, with page lengths for the Technical Volume that vary depending on the program (ET or RBI).
3. The third step is the submission of a PowerPoint slide deck prior to the Merit Review. Note that applicants will have the benefit of seeing the reviewers' initial comments prior to submitting this slide deck.
4. The fourth step is the delivery of an oral presentation to an external review panel in a closed (private) setting, using the slide deck submitted earlier. The length of the presentation depends on the program (ET or RBI). The presentation period will include time for questions from the external review panel.

Program	Merit Review Technical Volume Length	Oral Presentation Duration†
Emerging Technologies (ET)	15	60 min*
Residential Buildings Integration (RBI)	7	40 min

† Presentation lengths include presentation from proposal team, Q&A with reviewers and proposal teams, and reviewer discussion without proposal team. 60 minute duration breaks out to 40 minute presentation from proposal team, 10 minute Q&A with proposal team, and 10 minute reviewer discussion without proposal team. 40 minute duration breaks out to 20 minute presentation from proposal team, 10 minute Q&A with proposal team, and 10 minute reviewer discussion without proposal team.

* Depending on the number of proposals received, the total time allotted for each presentation (including questions) may have to be reduced.

Submittal of 1-page Letter of Intent

Applicants are required to submit a 1-page letter of intent (LOI) by the submission deadline specified on the first page. The LOI must be submitted via EERE Exchange at https://eere-exchange.energy.gov/. The LOI should include the following information:

- Program area (ET or RBI)
- Sub-program and topic area
- Project title
- Lead laboratory and project director
- Partner institutions (if any), including labs, companies, universities, non-profits, etc.
- 1-paragraph description of the proposed project

Submittal of Written Proposal

- **Only applicants who submitted a Letter of Intent by the deadline of February 16, 2016 at 5:00PM (EST) are eligible to submit a written proposal.**
- The proposals must be submitted via EERE Exchange at https://eere-exchange.energy.gov/.
- Page limits for the written Technical Volumes vary depending on the program (ET, RBI, and CBI).
- The proposals will be reviewed by external reviewers, who will provide an initial evaluation of the proposals based on the review criteria.
  - The evaluators' comments, in turn, will be made available to the applicants in EERE Exchange at https://eere-exchange.energy.gov/ so that the applicants can take those comments into account as they prepare their PowerPoint slide deck for the oral presentation.

Program	Merit Review Technical Volume Length
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Content and Form of Full Proposals

Full proposals must include the following:

- Technical volume
- Budget information
- 2-page CVs
- Current or prior related support
- Letters of support/commitment (as needed)

Page lengths vary, but proposal format is consistent:

1. Project Title
2. Project Goal/Objective (High Level)
3. Technical Merit, Innovation, and Impact (50%)
    A. Project Description
4. Project Approach (30%)
    A. Work Plan
    B. Market Transformation
    C. Open Source Software Distribution and Interoperability Plan (for ET proposals developing software)
5. Team and Resources (20%)
    A. Total Budget
    B. Qualifications
    C. Project Performers
    D. Inter-Lab Collaboration (as appropriate)
    E. Facilities
    F. Teaming and Industrial/Market Partners

Content and Form of Full Proposals (cont…)

Budget Information

- A completed and signed Field Work Proposal (FWP, DOE O 412.1.A), supported by an SF-424-A Budget Information table (see final tab in EERE 335 Detailed Budget Justification document) is required as a part of the full proposal package. Applicants must use the forms available on EERE Exchange.

2-page CVs

- CV's are required for the Lead PI and all key personnel. CV's may not exceed 2 pages per person, and should include at least the following:
  A. Academic/professional qualifications
  B. Bibliography of relevant publications and intellectual property

Current or Prior Related Support

- Applicants should list any current or prior related funding support, including project title, beginning and ending dates, total funding amount, PI(s), and funding source. If any current or prior funding seems very closely related to the proposed work, the Applicants should discuss in the Technical Volume how the proposed work is distinct from the other project(s).

Letters of support/commitment

- Applicants may attach letters of support and/or commitment (i.e., cost share) from collaborators, as needed. There are no page limits for this section.

Submittal of a PowerPoint Slide Deck

- **Only applicants who submitted a written proposal by the deadline of March 7, 2016 at 5:00 PM (EST) are eligible to submit a PowerPoint slide deck.**
- All applicants to this Lab Call are required to make an in-person oral presentation to an external review committee, and the PowerPoint slide deck used for the presentation must be delivered to https://eere-exchange.energy.gov/ by 5:00pm (EST) on March 30, 2016.
- Applicants are free to choose the format and content of their presentation; **no template will be provided by BTO**.

While there is no format or content restrictions, applicant's presentations must:

1. Include a 'cover page' slide that includes the name of the lab, title of proposal, and indicate if it is a core or enabling technology;
2. Not exceed 20Mb file size;
3. Be provided as a .pdf to EERE Exchange at https://eere-exchange.energy.gov/ and be submitted no later than the deadline March 30, 2016; and
4. Conform to the time limits.

Program	Oral Presentation Duration†
Emerging Technologies (ET)	60 min*
Residential Buildings Integration (RBI)	40 min

† Presentation lengths include presentation from proposal team, Q&A with reviewers and proposal teams, and reviewer discussion without proposal team. 60 minute duration breaks out to 40 minute presentation from proposal team, 10 minute Q&A with proposal team, and 10 minute reviewer discussion without proposal team. 40 minute duration breaks out to 20 minute presentation from proposal team, 10 minute Q&A with proposal team, and 10 minute reviewer discussion without proposal team.

* Depending on the number of proposals received, the total time allotted for each presentation (including questions) may have to be reduced.

Submittal of a PowerPoint Slide Deck (cont…)

Some best practices to consider when developing presentations include:

- Understanding that reviewers have already reviewed your written proposals and will be familiar with your proposed work;
- Structuring presentations to focus on the review criteria (with weight consideration) provided in APPENDIX D;
- Using the presentation as an opportunity to discuss some key aspects in more detail that may not have come across in the written proposal; and
- Using the presentation as a rebuttal to reviewers' questions and comments from the written proposal, and not present the proposal from scratch.

Reviewers will be able to comment on both the written proposals and on the PowerPoint slide decks.

Making an Oral Presentation to External Review Panel

- During the merit review each applicant will make an oral presentation, using the slide deck provided earlier, to a review committee consisting largely of non-Federal experts.
- Each program area (ET and RBI) will assemble its own review committee. The oral presentations will take place one-by-one in a closed-door session (not open to the public, nor to other applicants).
- All members of the review committee will be encouraged to ask questions of the applicants, and to provide written comments and scores after the presentation.

Registration to attend is required - ww.yesevents.com/BTO_2016_Peer/Merit_Review

Funding* Decisions and Next Steps

- BTO will make funding decisions, by April 29, 2016, that are informed by the written comments and scores provided by the external review committees.
- BTO may choose to fund all, some, or none of the applicants.
- After funding decisions are announced, successful applicants will be asked to develop corresponding multi-year Statements of Work (SOWs) based on their proposals, feedback from the external reviewers, and feedback from BTO.

***All funding is subject to the availability of annual appropriations.**

Topics of Interest

Emerging Technologies

- Sensors & Controls

Residential Buildings Integration

- High Performance, Moisture-Managed Envelope Solutions
- Optimal Comfort for Low Load Homes
- Optimal Ventilation and Indoor Air Quality Solutions

Emerging Technologies – Sensors and Controls

Proposals are sought for direct lab work in three topic areas within ET's sensors and controls sub-program.

1. Occupant-driven Sensing and Controls
2. Building Equipment Sub-metering
3. Adaptive and Fault Tolerant Building Controls

- The anticipated maximum annual budget for the sub-program is $2 million. Individual proposals for each topic area are sought that may vary between $500k and $2 million per year.
- BTO may issue awards in one, multiple, or none of the three topic areas.
- **Although individual proposals are sought for each topic area, each proposal should address how the project will enable achieving the goals of the entire sub-program**.
- Each lab can apply to more than one topic area as the lead, **but only one proposal will be accepted by an individual lab as lead within a specific topic area**. Labs are also strongly encouraged to partner with external organizations and/or with one another to incorporate all the capabilities and facilities needed to meet the needs of the sub-program and maximize impact and success for the specified topic area.

All applicants are strongly encouraged to review the existing ET portfolio http://energy.gov/eere/buildings/emerging-technologies.

Emerging Technologies – Sensors and Controls Sub-program

- The Sensors and Controls sub-program in ET is focused on developing sensor and control solutions to achieve building energy savings and to unlock new building market and financial opportunities for owners, operators, and end uses.
- The goal of the Sensors and Controls sub-program is to develop low-cost, self-powered wireless sensor platforms and automated commissioning, configuration, and optimization of controls that will lead to energy savings by optimizing building performance.
- The sub-program also coordinates with the Department's Grid Modernization Initiative in order to enable integration of buildings with the rest of the electric grid.
- BTO invests in open-source software solutions in order to accelerate market penetration and address the key requirements for sensing and monitoring in commercial and residential buildings: interoperability, scalability, ease of deployment, availability, and affordability.
- The topics are intended to augment and build off of ET's existing sensors and controls portfolio, as well as the FY16 BENEFIT FOA topics on plug-and-play sensor systems and human-in-the-loop sensor and control solutions with the goal of enabling affordable and low cost manufacturing, installation, and ongoing operation of sensors and controls within buildings.
- In addition to the targets provided in the topic area descriptions, **applications should include performance metrics and targets specific to the proposed approach targeted within a topic area and incorporate as SMART milestones**.

Emerging Technologies – Sensors and Controls Topic Areas

Topic Area 1: Occupant-driven Sensing and Controls

- This topic area seeks applications for either improved occupancy detection and counting-based sensors, incorporation of such sensors to optimize control strategies, or a combination thereof.

Topic Area 2: Building Equipment Sub-metering

- This topic area seeks applications for sub-metering solutions for all building equipment, systems, and plug loads that will enable monitoring-based commissioning to optimize building operations.

Topic Area 3: Adaptive and Fault Tolerant Building Controls

- This topic area seeks applications for developing self-correcting control solutions through data-driven or model-driven adaptive controls that will optimize building operation in response to environmental changes or the manifestation of faults and failures in building operation or equipment.

Lab performer(s) is expected to coordinate work closely with industry, FOA awardees, and SBIR awardees to advance open-source sensors and controls solutions to the marketplace. **Research collaborations that take the form of or result in CRADAs by the end of the project period are especially encouraged.**

Given that sensors and controls intersect with a large part of the ET, CBI, and RBI programs, it is essential that the lab performer(s) establish and maintain excellent communications with their counterparts funded by other parts of BTO and develop strong market transformation and commercialization plans. This is to ensure that the sensors & controls solutions will lead to widespread application in lighting, HVAC, dynamic windows, etc., in both commercial and residential buildings.

Residential Buildings Integration

- The RBI Program's goal is to reduce, by 2025, the energy used for space conditioning and water heating by 40% in single family homes, from 2010 levels. RBI's focus on space conditioning and water heating offers the best opportunities for influencing residential energy use.
- RBI's Building America program conducts applied research, development, and demonstration (RD&D) in residential buildings. DOE selects strategic Building America projects that can simultaneously develop and demonstrate better technologies and practices while overcoming critical market barriers to adoption, such as real and perceived technical and business risks and codes and standards limitations.
- In November 2015, the RBI Building America Program released the Building America Research-to-Market Plan, which details the program's strategy over the coming years. The Plan provides a clear strategic framework for guiding future program investments and setting project objectives for overcoming the highest-priority RD&D challenges facing the high-performance housing industry by 2020. These challenges and objectives are detailed in three integrated Research to Market Roadmaps.

Residential Buildings Integration - Topics

- Proposals are sought for direct lab work in three topic areas corresponding to the Building America Research to Market Roadmaps, as follows:
  1. High Performance, Moisture-Managed Envelope Solutions
  2. Optimal Comfort for Low Load Homes
  3. Optimal Ventilation and Indoor Air Quality Solutions

- RBI is NOT interested in proposals for this FY17 Lab Call in areas not covered in the RBI mission and strategic plan, or do not directly correlate with objectives in the Building America Research to Market Plan. **The anticipated annual budget for RBI's topic areas is up to $2.5 million. Individual proposals for each topic area are sought that may vary in funding, up to $2.5 million per year.** BTO may issue awards in one, multiple, or none of the three topic areas.

- Each lab may apply to more than one topic area as the lead, **but only one proposal will be accepted by an individual lab as lead within a specific topic area (roadmap)**. Labs are expected to coordinate and/or partner directly with one another, Building America FOA awardees, and external organizations to meet roadmap objectives and program needs. Labs are also expected to establish and maintain excellent communications with their counterparts funded by other parts of BTO, especially the ET and Building Energy Codes programs, as appropriate.

Residential Buildings Integration - Topics (cont…)

Topic Area 1: High Performance, Moisture-Managed Envelope Solutions

- DOE seeks to resolve perceived cost and risk barriers to broad market acceptance of optimized, high-R building envelope systems. This requires addressing both knowledge gaps about moisture risk management and validating performance of priority high-R envelope systems. See Building America Research to Market Plan - Envelope Roadmap - for detailed objectives.

Topic Area 2: Optimal Comfort for Low Load Homes

- DOE seeks to guide RD&D, standards, and market stimulation that will reduce the barriers to designing and installing high-performance space conditioning systems in low-load homes that meet occupant comfort expectations during all occupied hours so they will be voluntarily adopted by industry and ultimately addressed in building codes. See Building America Research to Market Plan – Comfort Roadmap - for detailed objectives.

Topic Area 3: Optimal Ventilation and Indoor Air Quality Solutions

- DOE seeks to guide RD&D to ensure that the development of best practices, specifications, and standards for existing home improvements and high-performance new home construction account for the effects that the building and its systems may have on the health of occupants and the durability of the building itself, while minimizing energy usage. The end objectives of this roadmap are smarter ventilation and IAQ solutions, more flexible and robust industry standards (e.g., future editions of ASHRAE 62.2), and IAQ valuation methods that enable market adoption of high-performance homes with optimal IAQ and minimal energy use. See Building America Research to Market Plan – IAQ Roadmap - for detailed objectives.

Merit Review Criteria

Criterion 1: Technical Merit, Innovation, and Impact (Weight: 50%)

- 1(a) Degree to which the project addresses program barriers, contributes to achieving Office targets/goals, and has potential to advance state-of-the-art or achieve substantial market impact;
- 1(b) Extent to which the proposed project addresses EERE questions;
- 1(c) Sufficiency of technical detail to assess whether the proposed work is scientifically meritorious and make sense for the market; and
- 1(d) For deployment activities, the extent to which the proposal describes a clear target market, market barriers, target use case, problem statement, and deployment path.

Merit Review Criteria (cont…)

Criterion 2: Project Approach (Weight: 30%)

- 2(a) Relevance and appropriateness of the approach and critical path and description of key tasks, metrics (including baseline), and SMART milestones;
- 2(b) Degree of likelihood that the work plan will succeed in meeting project goals;
- 2(c) Identification of key technical risks and the quality of management and mitigation strategies to address them;
- 2(d) Level and appropriateness of partnerships (e.g., "openness"), and the clarity in the description of roles and responsibilities; and
- 2(e) Degree to which the project identifies and addresses the current and/or potential opportunities to move EERE technologies towards eventual transition to the market (i.e., Market Transformation), including but not limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. manufacturing plan, and product distribution.

Merit Review Criteria (cont…)

Criterion 3: Team and Resources (Weight: 20%)

- 3(a) Degree to which the project leverages a core or enabling capability;
- 3(b) Capability of the Principal Investigator(s) and team to address all aspects of the work – qualifications, expertise, and time commitment of the team;
- 3(c) Sufficiency of the facilities to support the work (if applicable);
- 3(d) Degree to which the team demonstrates the ability to facilitate and expedite further development and commercial deployment of the proposed technologies (or wider implementation of the proposed deployment activity);
- 3(e) Degree to which inter-lab collaboration is occurring, as appropriate; and
- 3(f) Reasonableness of budget and spend plan for proposed project and objectives. Sufficiency of the budget for the innovation proposed.

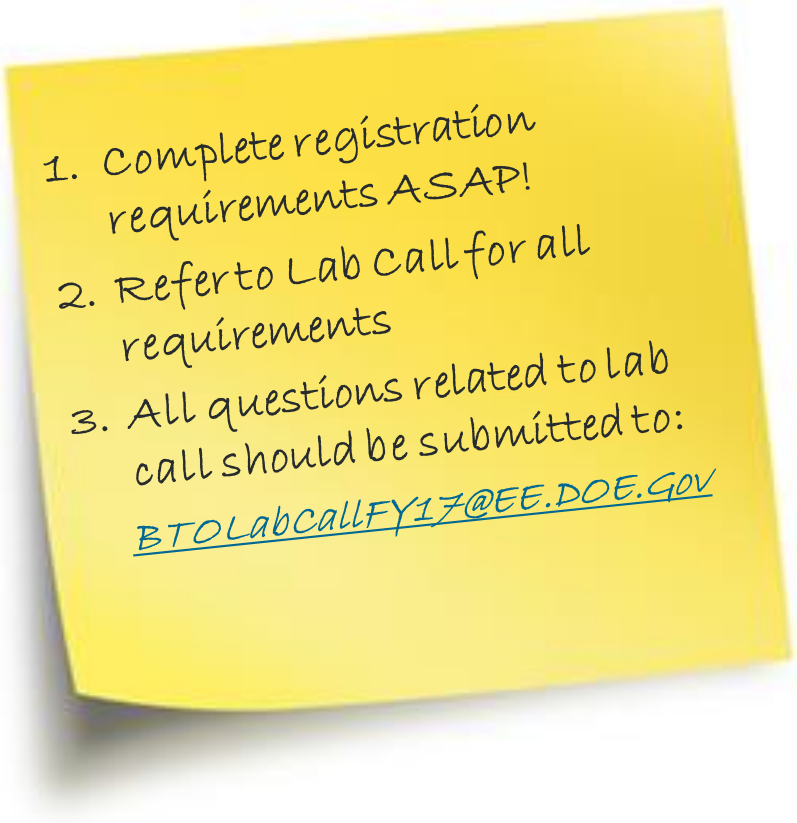
Open Source Software Distribution Plan

Applicants that are applying to one or more Topic Areas for which open source software distribution is required must submit a plan describing how software produced under this Lab Call will be distributed. For a DOE National Laboratory or a FFRDC, the data rights clause, including rights and requirements pertaining to computer software, in its Management and Operating (M&O) Contract shall apply and shall take precedence over any requirement set forth in this Appendix. The plan must include the following elements:

1. A complete description of any existing software that will be modified or incorporated into software produced under this Lab Call, including a description of the license rights. The license rights must allow the modified or incorporated software to be distributed as open source.
2. A discussion of the open source license that the applicant plans to use for the software it plans to produce under the Lab Call, and how that choice furthers the goals of this Lab Call. The discussion must also address how the license conforms to the conditions listed below.
3. A method for depositing the software in a source code repository.
4. A method for sharing and disseminating the software and other information to team members or others when multiple parties will contribute to the development of the software or the Lab Call requires that the software or other information be shared or disseminated to others.

**ET proposals should also submit an Interoperability Plan covering each hierarchical level at which systems interact. As a minimal requirement, where possible all device(s) to be controlled should be accessed by open communication standards, and using open or consensus-based information and data standards.

Thank you



Lab call can be downloaded at EERE Exchange at http://eere-exchange.energy.gov