

Opportunity Title: Building-Grid Integration Research and Development Innovators Program (BIRD IP)
Opportunity Reference Code: EERE-BIRD-BTO-2015-1212

Organization U.S. Department of Energy (DOE)
Reference Code EERE-BIRD-BTO-2015-1212

How to Apply **Completed applications and supporting materials must be submitted by December 31, 2015 11:59 p.m. EST.**
Application - including responses to questions specific to the program, proposal and Cost Proposal and Justification.

Proposal - The proposal should contain a comprehensive discussion describing how the applicant will fulfill the program objectives and successfully perform the work, highlighting any aspects, which separate effort from the competition. Detailed information about the proposal components and format requirements are included on the application.

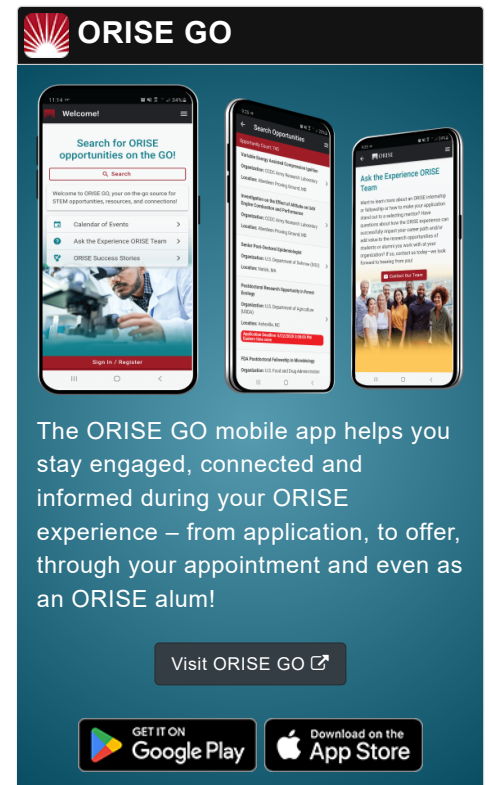
Cost Proposal and Justification - The cost proposal must include a total estimated cost for the work. In order to help establish cost realism, the estimate shall be supported by a cost proposal justification. Detailed information about the cost proposal components and format requirements are included on the application.

Transcripts - Transcripts may be unofficial transcripts issue to the students are accepted. Selected candidates must provide proof of their status as a graduate student before the appointment can start.

If you have questions, please send an email to DOE-RPP@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 12/31/2015 11:59:00 PM Eastern Time Zone

Description The [Building Technologies Office \(BTO\)](#) within the Department of Energy (DOE) is continuing its engagement with universities through the Building-Grid Integration Research and Development Innovators Program (BIRD IP). The goal of this program is to explore building-grid integration research and development (R&D) technology concepts that can improve the operating efficiency of buildings and increase penetration of distributed renewable energy generation, leading to more efficient buildings and cleaner generation of electricity. The intent of this program is to engage university professors and students directly to support BTO goals. Furthermore, this program links faculty members, graduate students, DOE national laboratory scientists and engineers, and BTO, to bring the innovation and discovery process of the university together with unmet needs in the building-grid integration marketplace. Over the past two years, the BTO has developed a software platform, VOLTRON™, to help deliver BTO's transactional energy vision. [1] This platform

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is being widely used by the national laboratories to develop agents/applications to provide transactional energy services in buildings (both commercial and residential). BIRD IP R&D topics are well suited for graduate student educational opportunities that can provide the student with invaluable exposure to energy efficient, clean energy and smart grid technologies. The R&D effort is anticipated to be up to 2 years, with the annual funding between \$50,000 per graduate student. DOE will negotiate the final award amount per project/graduate student. The proposal should include a work plan comprised of:

- A project timetable with a reporting schedule and milestones – project plan,
- A well-defined solution to one of the topics listed below, and
- A proposed technical solution – details of the solution.

Each project will be required to create a team with members in some or all of the following roles:

- A graduate student who acts as the team's project manager and is responsible for all technical goals (who is responsible for the technical solution),
- A university professor or university employee with expertise in the field, who acts as a technical consultant to the team – who can act as the Subject Matter Expert (SME)
- One or more national laboratory scientists or engineers willing to mentor the graduate student. DOE will review and assign a national laboratory mentor to the project.
- Other related faculty, staff, and students that the team designates as critical to the project's success (identified below as "others").

The team may choose to engage others as well, such as graduate students enrolled in classes or companies with an interest in the proposed technology or technical solution. Moreover, the university that the graduate student attends should demonstrate an existing infrastructure that supports not only a culture of R&D, but also has the requisite expertise and facilities to enable successful completion of the proposed project. BTO will assemble a Building Innovators Review Board to oversee the projects, provide ongoing feedback, and make periodic go/no go decisions. The underlying hypothesis is that an investment in the partnership will enhance innovation, solutions, and concepts.

Availability of Funds

Five (5) awards are anticipated for this competition. BTO anticipates that it will fund most of these projects at \$50,000 as in year 1 the topics are best suited for a single graduate student working full time. Funds will be awarded through a competitive proposal submission process. The Oak Ridge Institute for Science and Education (ORISE) will administer for DOE. Year 1 funds of up to \$50,000 will be provided upon award. Year 2 funds will be allocated based on the outcome of the year 1 progress,

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as well as future budget priorities, at the sole discretion of DOE.

All graduate students are encouraged to work with national laboratory, industry and their respective universities to find additional funding and resources, as needed, and note these in-kind investments on the application. DOE will negotiate the final award amount per project/graduate student.

Individual Award Amount

Not to exceed \$50,000 for year 1. Funds may be budgeted for student stipend, travel, tuition, materials/equipment, or for internal services expenses (e.g. equipment usage, machine shop or prototyping costs, etc.). Indirect costs may also be applied to the award. The graduate student will be expected to travel to meet with the advisory board in Washington, DC one time per year. Appropriate travel funds should be allocated for this activity. Funds must be spent according to the finalized budget for the purpose of accelerating the potential commercialization of the innovation. **Qualified proposals that present reduced budgets may be given greater consideration** (particularly those proposals with budgets that are matched by in-kind university or industry investments).

Project Period

The project period includes a 9-12 month engagement phase followed by an optional 1 year advancement phase. At the 6 month point in year 1, the team will be required to present to BTO and their representatives/guests a 6 month future work plan comprised of, at a minimum, a detailed technical solution, timetable, reporting schedules and projected milestones to achieve various technical goals. At that time, the BTO representatives will assess progress, provide feedback or recommend redirection to the team. At the 9 month point, if sufficient progress is being made towards the goals, up to one additional year of funding may be awarded.

Qualifications Eligibility

The lead applicant must be currently pursuing a Master's or PhD degree in a science or engineering discipline at an accredited university and be sponsored by a faculty member at the same institution. The graduate student must identify one of the specified BTO priority areas (see below) as the focus of the project.

Project Topics

Applicants are required to select one of the building-grid integration topics below as the focus of their innovation project. All projects are required to use VOLTTRON [2] software to demonstrate the technical solution. The proposal should contain

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a comprehensive discussion describing how the applicant will fulfill the program objectives and successfully perform the work, highlighting any aspects, which separate effort from the competition.

1. Enabling Volttron - demonstrate integration of the VOLTTRON software platform with existing building automation systems (BAS) to conduct campus scale transactionbased controls (graduate students should demonstrate an ability to install Volttron and communicate how to install Volttron)
2. Investigate how building loads and storage (thermal and electrochemical) in campus buildings can be used to mitigate short-term imbalances in distributed renewable energy generation from photo-voltaics and wind (graduate students should demonstrate a capability of developing Volttron applications to utilize connected loads as “virtual” storage).
3. Investigate how a community-scale micro-grid with extensive PV and energy storage (thermal and electrochemical) can be used to support grid services (graduate students should demonstrate a capability of understanding grid services and needs to develop potential solutions leveraging controls).
4. Investigate how residential buildings can support the transactive energy vision (graduate students should demonstrate an understanding of interoperability/IoT, residential appliance/device control, and user/usability needs).
5. Investigate how to deliver transactional energy solutions for small commercial buildings (e.g. convenience stores and supermarkets) (graduate students should demonstrate an ability to develop applications and controls of small buildings and commercial building opportunities).
6. Conduct a rigorous penetration testing of VOLTTRON security features (graduate students should demonstrate an understanding of cyber security of IT system, cyber security best practices for appliances/equipment/buildings, etc).

Submission Limits

An institution may submit an unlimited number of proposals. This year, there is no restriction on how many projects can be submitted per graduate student.

Award Process

A competitive award process will be employed to select the qualified innovation projects. The BTO Advisory Board will review all proposals and make final selections. Applications will be reviewed on a rolling basis and awards may be distributed on a rolling basis; please submit applications as early as possible. Awardees are expected to start their project any time after

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notification of receiving the award. Please indicate anticipated start date on the proposal.

[1] DOE reserves the right to make changes to this program throughout and add/alter topics as deemed appropriate.

[2] For more information on VOLTTRON, see the DOE/BTO website: <http://energy.gov/eere/buildings/buildings-grid-integration>.

Conditions of the Award

- Students will be considered participants in an education program and will not enter into an employer/employee relationship with DOE. No commitment with regard to future employment should be inferred or expected by the acceptance of a proposal.
- Students will be required to commit to continuous participation for the duration of the appointment and to avoid obligations that will interrupt their research during the term of appointment. Students will be expected to maintain a full schedule during the appointment except for normal holidays recognized by the host facility and authorized vacation approved by the research mentor.
- Students will be expected to adhere to the hosting institutions laws, policies, and procedures, including standards of competency, conduct, safety, and integrity.
- Awards, prizes, review, panel honoraria, scholarships, Veterans Administration benefits, sabbatical leave, and any other payments may be accepted by a student provided that these payments do not represent dual payment for the same activity.
- Legal and administrative management of IP should be handled by the institution's Technology Transfer Office (TTO) in consultation with other relevant parties.
- Students must acknowledge the support of EERE on publications and presentations that are related to their participation in the BTO program and provide a copy of such publications to EERE. Pursuant to Title 35 U.S. Code, Section 212 ([http://frwebgate.access.gpo.gov/cgi-bin/usc.cgi?ACTION=RETRIEVE&FILE=\\$\\$xa\\$\\$busc35.wais&start=578408&SIZE=705&TYPE=TEXT](http://frwebgate.access.gpo.gov/cgi-bin/usc.cgi?ACTION=RETRIEVE&FILE=$$xa$$busc35.wais&start=578408&SIZE=705&TYPE=TEXT)), the DOE-BTO terms will not require the student to forfeit any rights to inventions made through the course of this program; however, the host university may have restrictions on IP ownership – students are encouraged to check with their university before applying to this program. Students are expected to comply with subsequent Federal policies regarding the intellectual property rights and dissemination of information.

Eligibility

- **Degree:** Currently pursuing a Master's Degree or Doctoral

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Requirements

Degree.

- **Discipline(s):**

- **Chemistry and Materials Sciences** (12 )
- **Computer, Information, and Data Sciences** (16 )
- **Engineering** (27 )
- **Mathematics and Statistics** (10 )
- **Physics** (16 )
- **Science & Engineering-related** (1 )