Report

Advanced Energy Retrofit Opportunity

The EEB Hub Enables Demonstration Projects for the Retrofit Market

Philadelphia Navy Yard Building 669 from the roof during a site assessment. The adjacent dry drock is visible to the right.
Source: *EEB Hub*

Securing the funds to finance building energy retrofits remains a challenge to building owners and property managers, in part because of the lack of successful case studies in the greater Philadelphia region. To overcome this, the Energy Efficient Buildings Hub (EEB Hub) announced the Advanced Energy Retrofit Opportunity (AERO) demonstration program, aimed at demonstrating Advanced Energy Retrofits (AERs) in average-size commercial buildings in the Philadelphia region. The AERO program will develop and document examples of AERs in buildings typical of the region, helping to ease this barrier to entry for building owners and financiers.

The Energy Efficient Buildings Hub (EEB Hub), charged with the task of reducing the regional commercial buildings sector's energy use by 20% by 2020, has chosen to concentrate its efforts on promoting and helping to develop AERs of commercial buildings in the ten-county region surrounding Philadelphia. A 2011 survey indicated that although almost seven in ten executives identified energy

management as “extremely important” or “very important,” significant barriers in the form of project financing and planning remain [1]. Specifically, many owners and property managers of small- and medium-size commercial buildings (20,000 to 250,000 square feet) do not have room in their budgets for design professionals and energy efficiency specialists. According to a 2011 report from the American Council for an Energy-Efficient Economy, the market for retrofit financing has yet to establish uniform guidelines for assessing the potential risks and benefits of these loans, although some lenders are beginning to review this form of underwriting [2] [3]. Promoting carefully conducted case studies will help to establish these guidelines and allow greater access to the private capital necessary to fund retrofits.

The EEB Hub is soliciting individuals and firms to submit renovation projects that are planned or under consideration for the purpose of providing financial and technical support to pursue an AER tailored to the specific building. The EEB Hub hopes to identify suitable sites for test bed demonstrations in commercial buildings ranging in size from 20,000 to 250,000 square feet that are broadly representative of the commercial building stock in the Philadelphia region. In addition to improving energy efficiency through this program, the EEB Hub hopes to promote regional economic growth and job creation by stimulating investment in retrofit construction projects.

Advanced Energy Retrofits Explained

An energy retrofit is an intervention to update or replace older or inefficient building systems with more energy efficient technologies. Examples of basic energy retrofit projects include upgrading to a high-performing lighting system or updating a building’s HVAC system. Building owners typically choose to keep basic energy retrofit jobs in-house, relying on themselves, their staff, or a trusted contractor to manage a single, discrete project from design through installation. This approach can miss opportunities offered by a more holistic, performance-based method.

In contrast, an AER emphasizes an Integrated Design approach meant to improve the energy efficiency of multiple systems simultaneously with the goal of attaining greater energy efficiency overall. In Integrated Design, buildings are assessed and analyzed as complete units rather than as accumulations of separate parts and systems. An essential component of Integrated Design is open and ongoing communication, engagement, and cooperation between the owner/operator and their agents (designers and contractors). The Integrated Design approach seeks to integrate two or more

building systems to maximize the energy efficiency. For example, if a building owner plans to improve insulation of the building envelope, it may be to their advantage to consider installing double- or triple-glazed windows as well; a smaller and less expensive HVAC system may be then be required to condition the building, resulting in lower utility bills.

To date, the Integrated Design approach has been limited to large and often iconic building projects, such as the Empire State Building. The EEB Hub hopes to streamline, scale, and adapt integrated design to small- and mid-size commercial retrofits and has introduced the AERO program to promote demonstration projects.

Because building energy profiles vary based on age, size, and usage, among other factors, each AER is uniquely engineered to fit a particular building. An AER can take the form of either a single project or a series of smaller projects undertaken over time that together work toward a specific energy-saving goal. In addition to reducing energy usage, a successful AER project can improve operating cash flow, increase asset value, improve occupant comfort and indoor environmental quality, and reduce the environmental impact of building operations.

Regional Examples of Advanced Energy Retrofits

The EEB Hub is providing technical assistance to a number of AERs in the Greater Philadelphia region, including Building 669 at the Navy Yard and One Montgomery Plaza in Norristown, PA.

Philadelphia Navy Yard Building 669 during a site assessment.
Source: *EEB Hub*

Building 669

Located at the Navy Yard, the AER project at Building 669 covers approximately 10,000 square feet of office space on the second story of this early 1940s building. The building, which is currently owned by the Philadelphia Industrial Development Corporation (PIDC), is under a long-term lease to Rhoads Industries. The office space is slated to become the primary headquarters for Rhoads Industries' expanding Maritime Services business in the adjacent dry-dock. The EEB Hub's HVAC and Envelope Integration team plans to work together with PIDC and Rhoads to recommend an optimized combination of replacement roof, lighting systems, HVAC, and window systems.

One Montgomery Plaza

One Montgomery Plaza
Source: *EEB Hub*

This 200,000+ square foot office building, located in Norristown, PA, is slated to undergo replacement of the exterior curtain wall and roof, as well as masonry repair – all upgrades required to safely operate the building. The project will include an Advanced Energy Retrofit with technical assistance from the EEB Hub. The Montgomery County Director of Assets and Infrastructure has obtained support from County officials to develop this extensive planned building renovation as an AER project. A building site assessment was completed and a measurement and verification system has been designed and installed. Montgomery County is also considering renovating interior office space,

HVAC controls, and air distribution systems.

Specifics of the AERO Demonstration Program Work

The AERO Demonstration Program is not a grant program. Activities that may be covered by the program include

- the review and analysis of utility bills and existing energy audits and engineering assessments for the building;
- forming a team comprising EEB Hub researchers and/or qualified regional contractors to provide advice to the building owner regarding the integrated design process;
- building energy modeling, retrofit integrated technology solutions, economic and financial analysis, and support for the project and other issues as they arise;
- developing an energy model of the building for the purpose of evaluating and recommending cost effective energy retrofit strategies;
- reviewing relevant bid specifications and providing comment;
- providing assistance writing bid specifications when warranted;
- assisting building owner in evaluating competing competitive bids;
- and designing and installing measurement and verification (M&V) instrumentation to develop a baseline and to verify performance of all installed energy retrofit components and systems.

Selected projects will start with a planning and negotiation phase between the EEB Hub and the owner. Individual projects will receive up to $150,000 in EEB Hub services, not to exceed 25% of the total renovation budget.

Interested parties are encouraged to download and read the AERO Request for Information (RFI). While the deadline for the current round of projects is January 31, 2013, interested parties are encouraged to submit a Letter of Interest and project description. Please address all technical questions to Mark Stutman (mbstutman@engr.psu.edu), the EEB Hub's Advanced Energy Retrofit Project Manager, and all procedural questions to Laurie Actman (lactman@engr.psu.edu), Deputy Director for Management and Administration.

References

[1] Institute for Building Efficiency. (2011). 2011 Energy Efficiency Indicator Global Survey Results, from http://www.institutebe.com/InstituteBE/media/Library/Resources/Energy%20Efficiency%20Indicator/2011-EEI-Global-Results-Executive-Summary.pdf.

[2] American Council for an Energy-Efficient Economy. (2011). What Have We Learned from Energy Efficiency Financing Programs, from http://www.aceee.org/sites/default/files/publications/researchreports/u115.pdf.

[3] Deutche Bank, USA. (2012). Recognizing the Benefits of Energy Efficiency in Multifamily Under writing, from https://www.db.com/usa/img/DBLC_Recognizing_the_Benefits_of_Energy_Efficiency_01_12.pdf.