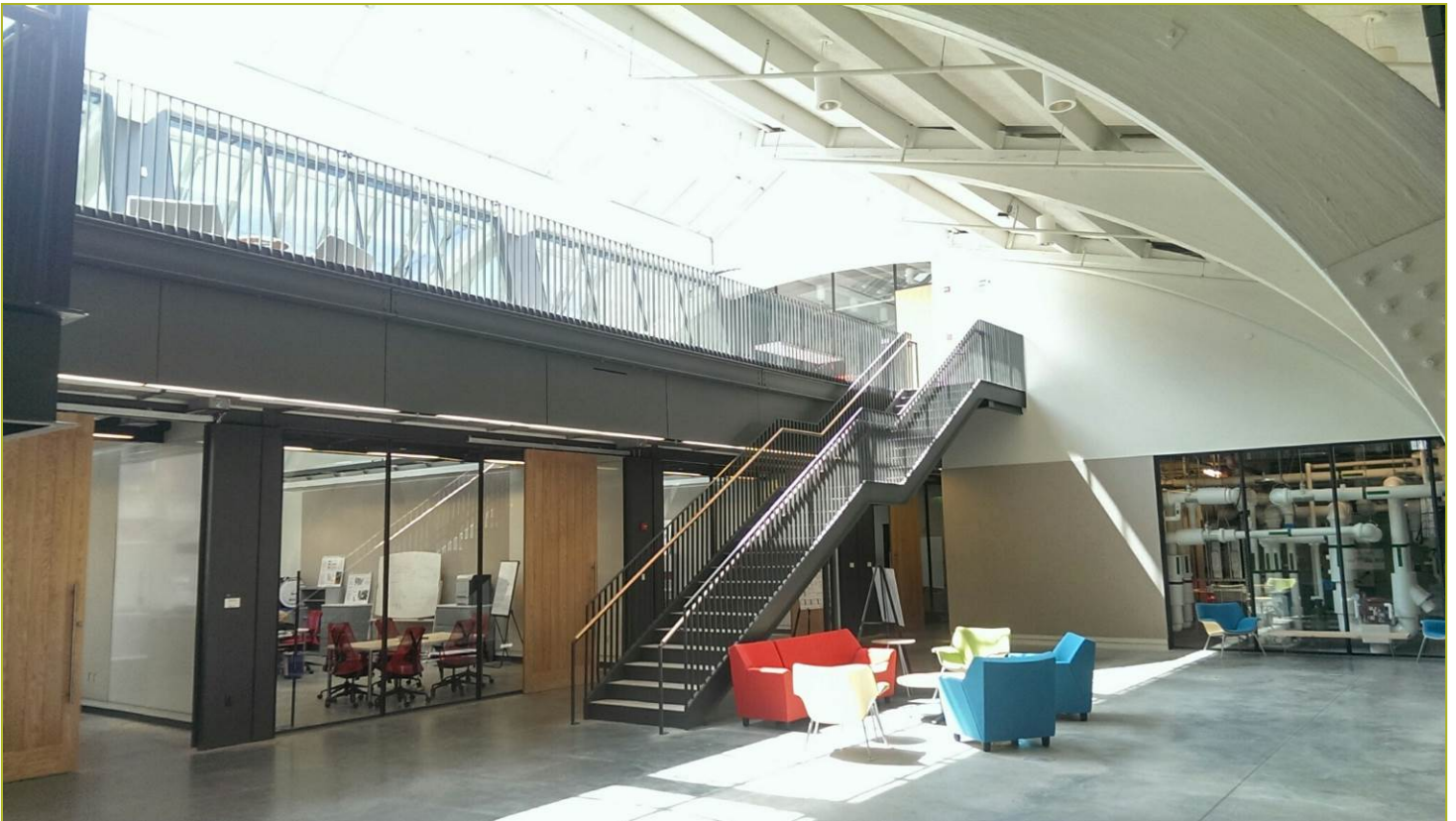


Title: Broadening Use of DOE BTO Tools in the SMSCB Market

Report Date: April 29, 2016

Report Author: Erica Cochran, Carnegie Mellon University and Alon Abramson, University of Pennsylvania



Report Abstract

CBEI outreach activities include development and deployment of various tools such as the Asset Score Tool (AST). The Department of Energy has developed the Asset Score Tool (AST) as an easy way to determine the energy performance of a building's physical characteristics independent of occupant behavior. Based on the existing performance of the building AST also provides upgrade recommendations for the relevant buildings systems and the possible savings with the proposed retrofit recommendations. On a score of 10, it assigns the building a current and potential future score if the suggested recommendations are implemented. CBEI initially created an easy-to-use interactive guide and video demonstration to introduce users to the Asset Score Tool.

Thus, the CBEI project surpassed the target outreach of 60 organizations by reaching out to a total of 77 different organizations. The team supported 19 building owners by applying AST for a total of 32 buildings, which account to around 6.5 million square feet.

CBEI is responsible for the development and deployment of market outreach activities of tools such as the Building Sync. The Department of Energy (DOE) and National Renewable Energy Laboratory (NREL), with input from over 50 industry experts developed Building Sync (BSXML) which is an XML based standardized data scheme for energy audit process. BSXML is based on DOE data dictionary BEDES – the Building Energy Data Exchange Specification. A major market barrier for Energy Efficiency (EE) market transformation is the use of non-standard data. Use of simplified and standardized data format for whole building energy audit process across utilities, audit companies, and their partners can result in increased energy savings in buildings. For these purposes, BSXML was developed as a vendor-neutral open source standard to make sharing building audit data between public and proprietary databases and software seamless.

The measurable outcomes from the market outreach activities conducted by CBEI team include: 1). two case studies – one on challenges with early adoption of the tool, and the second on a market study of BSXML and Asset Score Tool together. 2). the development of a strategic outreach plan consisting of a presentation with graphics and text explaining the current market conditions and the capabilities of the tool to overcome the existing market drawbacks, 3). Organized a webinar in collaboration with NREL that is focused towards utilities, 4). verbal commitment on adoption of BSXML from at least three organizations, and 5). Introducing BSXML to various utilities, ESCOs, and local governments. Thus, the market outreach activities conducted by CBEI over years resulted in development of some important future steps for successful implementation of BSXML. Verbal commitments from organizations, shortlisting of specific utilities that will be interested in the tool, designing an introductory presentation and webinar for the tool will all act as key takeaways for future work on BSXML. CBEI teams will further make sure to organize and transfer all this knowledge base to NREL to create a seamless workflow with the targeted stakeholders.



Contact Information for lead researcher

Name: Eugenie Birch

Institution: University of Pennsylvania

Email address: elbirch@upenn.edu

Phone number: 215-573-8386

Contributors

Carnegie Mellon University: Erica Cochran (Lead), Flore Marion, Surekha Tetali, Parul Gulati, Akash Goliyan, Anjana Sharma, Hetal Manish Parekh

University of Pennsylvania: Alon Abramson, Amanda Lloyd, Amy Montgomery, Deborah Lang, Cara Griffin



CBEI Task 4.1: Broadening Use of DOE BTO Tools in the SMSCB Market

Project Objective and Outcomes: This project is focused on content deployment and stakeholder engagement to promote adoption of Building Energy Asset Score by conducting market outreach activities for 60 organizations. Enhanced market engagement was successful in reaching out to **77 organizations** and analyzing **32 buildings** which is equals to **6.5 million square feet of building space** in the Asset Score Tool.

CBEI outreach activities include development and deployment of various tools such as the Asset Score Tool (AST). The Department of Energy has developed the Asset Score Tool (AST) as an easy way to determine the energy performance of a building’s physical characteristics independent of occupant behavior. Based on the existing performance of the building AST also provides upgrade recommendations for the relevant buildings systems and the possible savings with the proposed retrofit recommendations. On a score of 10, it assigns the building a current and potential future score if the suggested recommendations are implemented. CBEI initially created an easy-to-use interactive guide and video demonstration to introduce users to the Asset Score Tool.

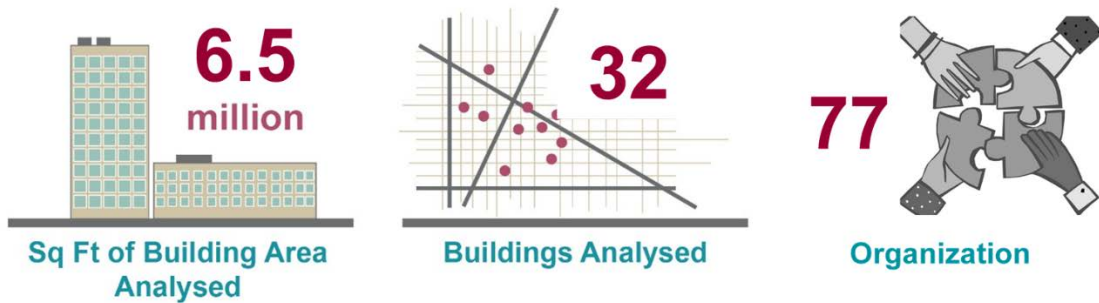


In May of 2015, CBEI started the outreach and deployment activities of AST by identifying market leaders and organizations who can adopt AST to assess their own building stock. CBEI targeted to interact with at least 60 organizations by the end of April 2016, which has been successfully accomplished by our teams. CBEI project teams conducted extensive outreach activities in three main ways: 1). Outreach activities -organized presentations to introduce the tool and explain its capabilities to potential organizations and users, 2). Market penetration and adoption - conducted AST training sessions which provided hands-on experiences of the tool to several organizations and stakeholders, and 3). Technical assistance - Assisted in scoring the buildings of the local government, and different private organizations.



In the first two cases, various national organizations, industries, and institutions were introduced to AST and are provided with relevant information for adoption of the tool. Some of these organizations include but are not limited to: Schneider Electric- Integrated Systems, UPMC, Philadelphia University, Georgia Tech, UPenn Health System, Hilton Realty Co, Connecticut Department of Energy & Environmental Protection, City of Newark, etc. CBEI lead training sessions to educate building stakeholders about the tool capabilities include outreach to multiple key organizations with a national presence. These organizations

include the AIA, various U.S. Green Building Council (USGBC) chapters, Building Owners and Managers Association (BOMA), etc. With these activities, our team was able to complete AST outreach to 30 organizations by end of August 2015, surpassing the target of 20 organizations in the first 6 months (milestone due October 31st 2015). After finishing the training sessions in summer of 2015, the teams extended their outreach activities further by contacting various local governmental and private organizations mostly in and around Pittsburgh, and Philadelphia cities. This third step of providing assistance to various organization in scoring their building stocks is multiple day/week/months process. The CBEI teams conducted site visits, interacted with building facility managers to understand the existing systems within the buildings, and collected relevant data such as: drawings, and information on existing building systems. With all this available information the teams spent time on understanding the building blueprints and existing systems to convert them into the modeling language of AST. Since September 2015 till date, our teams assisted in scoring a total of 27 properties. This building stock includes several City of Pittsburgh buildings such as: City County Building, Municipal Court, Civic Building, Police Station, etc. Further the team is interacting with other organizations such as DOD, and NOAA to develop a methodology to enter their respective building stocks into the Asset Score Tool.



Outcomes achieved through AST market outreach activities

Thus, the CBEI project surpassed the target outreach of 60 organizations by reaching out to a total of 77 different organizations. The team supported 19 building owners by applying AST for a total of 32 buildings, which account to around 6.5 million square feet.

Buildings Assisted with Asset Scoring

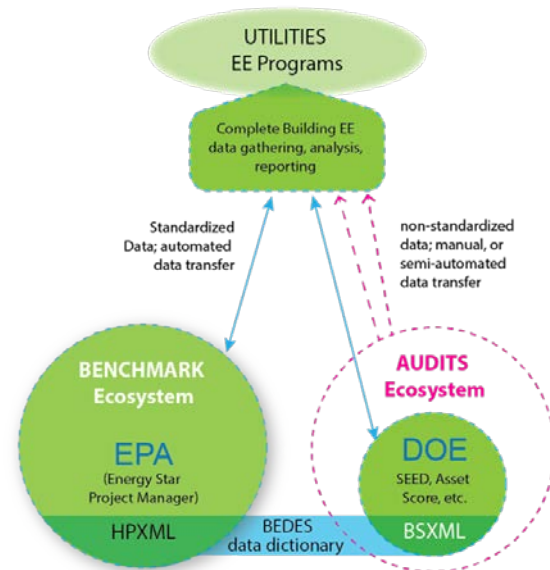
S.NO	Owner/Property	Buildings	Location
1	City of Pittsburgh	City County Building	Pittsburgh
2		Municipal Court Building	Pittsburgh
3		Ammon Community Recreation Center	Pittsburgh
4		Brookline Recreation Center	Pittsburgh
5		Civic Building	Pittsburgh
6		Hazlett Theatre and Senior Center	Pittsburgh
7		Police Station Zone 1 Building	Pittsburgh
8		Public Safety Training (Zone 5 Police Station)	Pittsburgh
9	Multi-owners	Benedum Tree Building	Pittsburgh
10	Mi Sook Kim	OK Food Market	Philadelphia
11	Jose V Jimenz	Cedar Food Market	Philadelphia
12	Amado Abreu	Abreu Market and Deli	Philadelphia
13	Panjak Dasani	Dasani's	Philadelphia
14	Linda Smith	Esposito's	Philadelphia
15	Liberty Property Trust	Building 1 (address withheld to protect owner privacy)	Hanover
16		Building 2 (address withheld to protect owner privacy)	Hanover
17		Building 3 (address withheld to protect owner privacy)	Hanover
18		Building 4 (address withheld to protect owner privacy)	Greensboro
19		Building 5 (address withheld to protect owner privacy)	Charlotte
20		Building 6 (address withheld to protect owner privacy)	Breinigsville
21		Building 7 (address withheld to protect owner privacy)	Carlisle
22	BOMA members (name withheld for privacy)	Building 8 (address withheld to protect owner privacy)	Harleysville
23	BOMA members (name withheld for privacy)	Building 9 (address withheld to protect owner privacy)	Emmau
24	Fredricks Company	Building 10 (address withheld to protect owner privacy)	Huntingdon Valley
25	Phipps Conservatory	Center for Sustainable Landscape	Pittsburgh
26	Public and Private owners	One Montgomery Plaza	Norristown, PA

27	Department of Defense	Ft Belvoir	Virginia
28	New Spruce Market	New Spruce Market	
29	Polo Food Market	Polo Food Market	Philadelphia
30	Pittsburgh Mayors Office	Pittsburgh Mayors Office	Pittsburgh
31	Tara Tape	Tara Tape	
32	Ciminelli Real Estate Corporation	Building 11 (address withheld to protect owner privacy)	

CBEI Task 4.1: Broadening Use of DOE BTO Tools in the SMSCB Market

Project Objective and Outcomes: This project is focused towards market deployment and outreach activities to promote adoption of Building Sync. The target is to secure commitments from a total of five market partners on the adoption of the tool. The project had mixed success. However, CBEI team made tremendous progress in introducing the tool and its capabilities to the utilities and local governments. The teams developed a strategic market outreach plan and got verbal commitments from **three** organizations.

CBEI is responsible for the development and deployment of market outreach activities of tools such as the Building Sync. The Department of Energy (DOE) and National Renewable Energy Laboratory (NREL), with input from over 50 industry experts developed Building Sync (BSXML) which is an XML based standardized data scheme for energy audit process. BSXML is based on DOE data dictionary BEDES – the Building Energy Data Exchange Specification. A major market barrier for Energy Efficiency (EE) market transformation is the use of non-standard data. Use of simplified and standardized data format for whole building energy audit process across utilities, audit companies, and their partners can result in increased energy savings in buildings. For these purposes, BSXML was developed as a vendor-neutral open source standard to make sharing building audit data between public and proprietary databases and software seamless.



Existing market and non-standardized processes across different tools and methods

The key task of CBEI team is to get commitment from five market partners on the adoption of BSXML. Initially, the CBEI team worked on conducting market outreach amongst several local governments and energy service companies (ESCOs). This outreach yielded strong interest and a commitment to be involved from representatives from the City of Newark Department of Engineering and Connecticut Department of Energy and Environmental Protection. Washington State Department of Enterprise Services, Energy Program and the Washington Department of Commerce were both also interested in employing the standard, but wanted to know that others were already using it before becoming involved. This feedback from Washington State contacts reflected a desire for general assurance that the standard was being adopted by their peers. Beyond that, they also needed to better understand the level of effort of implementation in terms of the costs to their contractors (i.e. time, effort, and capital) and the level of work on their part to ask for, enforce, and use the newly formatted data. CBEI could only offer some basic assurances without having actual case studies to base them on. Stage two of outreach involved developing an outreach plan targeted towards the utilities in collaboration with the team at NREL. The teams identified 36 utilities based on the ongoing audit programs within the companies. From this list of utilities, 14 professionals were further contacted. An introductory BSXML webinar was designed and all the local utilities were invited to this webinar. Though only two utility companies – Xcel Energy and Austin Energy participated in the webinar, the designed introductory presentation on BSXML, future steps towards

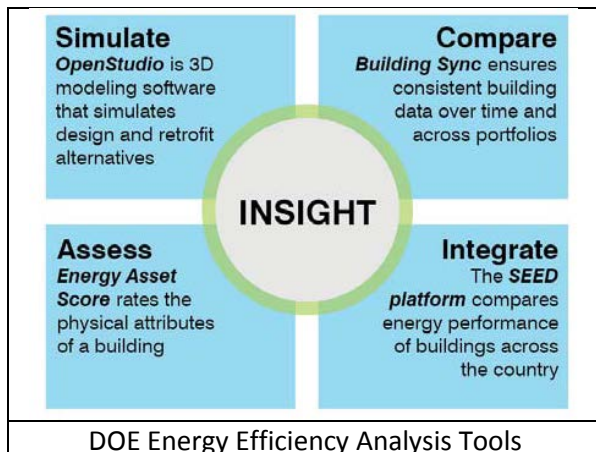
implementation of BSMXL, and the strategic market outreach plan, all together define direction for future work.

CBEI team had put in efforts to identify the current limitations and market barriers, and some of the potential methods to overcome these barriers. The most important of such barriers include: 1) lack of case studies due to the fact that the development phase of the tool is overlapping with the Introductory phase (in contrast, Asset Score Tool is in the Growth Phase of its product lifecycle), 2) lack of endorsement by the key industry organization ASHRAE, which the industry looks to for standards guidelines (endorsement is expected in second quarter of 2016), 3) the perception of early adopter hidden costs and learning curves for energy program managers and ESCO providers; and 4) the low-risk nature of state and federal organizations that resist “early adopter” technology efforts. Based on market research and the experience with BSXML outreach activities, our team also developed a set of strategies that can be used to overcome the aforementioned market barriers. These strategies include:

1) Converting enthusiasm into implementation: Estimating the time and effort necessary to find and support early adopters and gain the support of industry organizations are major challenges and part of a catch-22 problem: A voluntary standard is only valuable if it is widely used, but it needs to be perceived as valuable in order to be adopted throughout a sector. In the case of Building Sync there are two groups of potential early adopters: Other DOE research teams and energy service companies. Key to marketing to these early adopters is their common customer base: federal, state and local government agencies. These agencies can be leveraged to build demand if their low risk threshold for specifying standard data formats can be addressed.



2). Early Adopter- DOE Nation Labs: National Lab teams are tasked with coordinating with Building Sync as a matter of DOE strategy. Coordinating teams across an entire ecosystem of tools creates great marketing and outreach opportunities. Eventually, Building Sync will become a standard import/export format for hundreds of customers that use the Standard Energy Efficiency Data (SEED) Platform, Asset Score Tool (AST), eProject Builder (ePB), and other software that relies on the BEDES data dictionary.



3). Early Adopter – Energy Service Companies (ESCOs): ESCOs are the second potential pool of early adopters, and have been much harder to find. The risk profile for this group is very different and incentives to adopt Building Sync will take longer to establish than with National Lab teams. These firms are trying hard to differentiate themselves from their competitors and maintain profit margins in this fragmented market, including developing proprietary audit software. For firms with proprietary audit software, Building Sync can, in the short-term, simply conflict with existing

investments. The unknown sunk costs of incorporating Building Sync, as well as the concern that the proposed standard could become obsolete or irrelevant, can outweigh

4). Early Customers – Government Agencies: Due to energy efficiency mandates local, state, and federal agencies as well as energy utilities will be important early customers for Building Sync. Government agencies acknowledge a responsibility to lead by example making them natural advocates for audit data standards, particularly Federal agencies which already work with DOE and EPA energy efficiency programs. However, with a mandate to be fiscally responsible with tax payer money, agencies have a low risk profile. They will need to be assured that Building Sync is an industry-approved turnkey solution that can be integrated into their workflow without a lot of time, cost, or complicated coordination.

A detail of these challenges and the methods to overcome them are further discussed in form of a case study analysis titled – “Building Sync: The Early Adopter Challenge, which is developed by the team. Identifying these challenges and potential methods to overcome them could be used in future for development of BSXML implementation and market penetration strategies.

The measurable outcomes from the market outreach activities conducted by CBEI team include: 1). two case studies – one on challenges with early adoption of the tool, and the second on a market study of BSXML and Asset Score Tool together. 2). the development of a strategic outreach plan consisting of a presentation with graphics and text explaining the current market conditions and the capabilities of the tool to overcome the existing market drawbacks, 3). Organized a webinar in collaboration with NREL that is focused towards utilities, 4). verbal commitment on adoption of BSXML from at least three organizations, and 5). Introducing BSXML to various utilities, ESCOs, and local governments. Thus, the market outreach activities conducted by CBEI over years resulted in development of some important future steps for successful implementation of BSXML. Verbal commitments from organizations, shortlisting of specific utilities that will be interested in the tool, designing an introductory presentation and webinar for the tool will all act as key takeaways for future work on BSXML. CBEI teams will further make sure to organize and transfer all this knowledge base to NREL to create a seamless workflow with the targeted stakeholders.