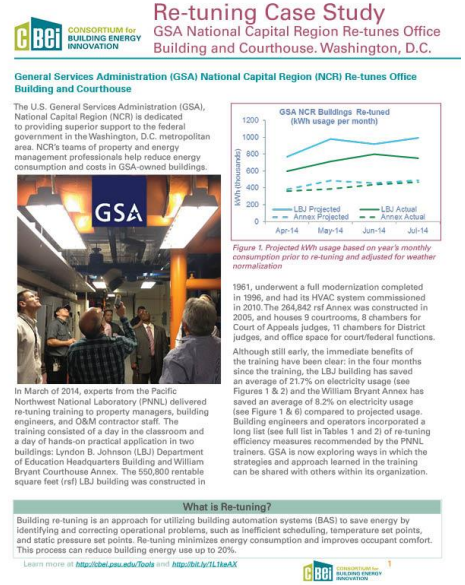
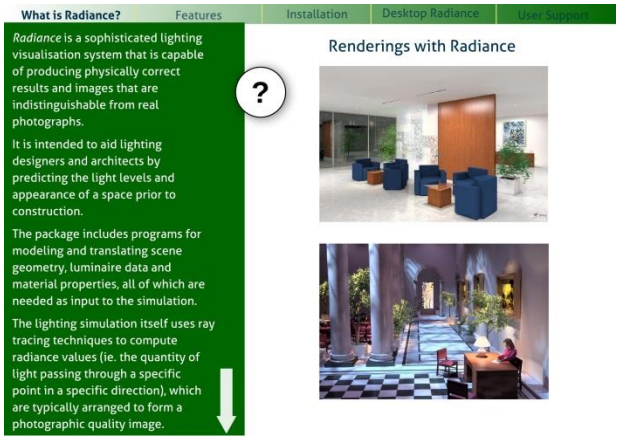
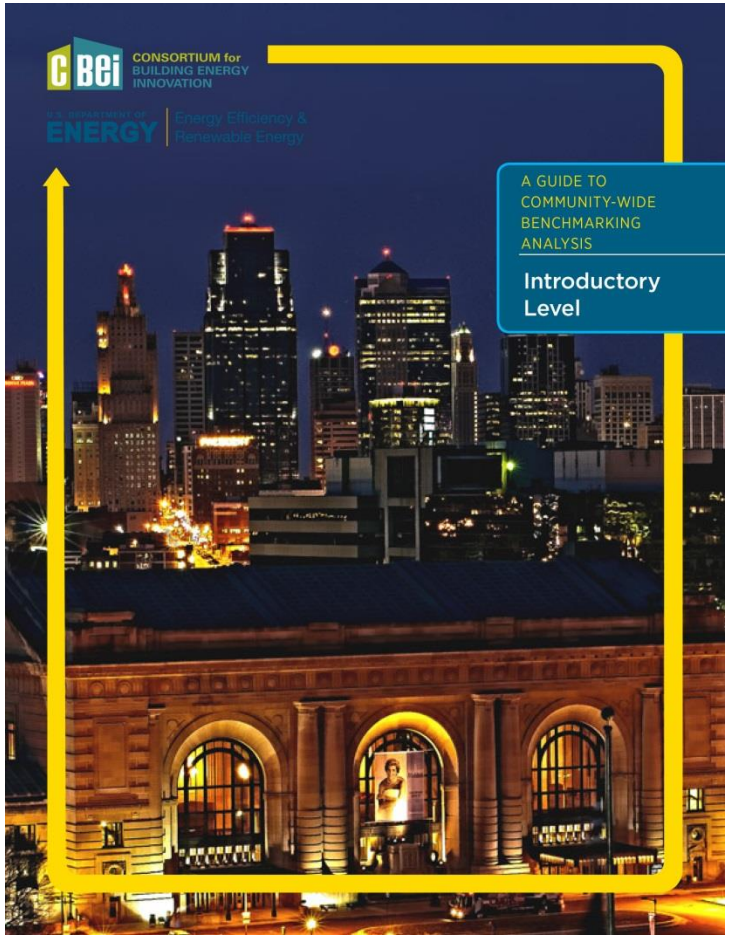
Using DOE Tools

2015 Building Technologies Office Peer Review







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

Erica Cochran PhD, EricaC@andrew.cmu.edu
CBEI, Carnegie Mellon University

Project Summary

Timeline:

Start date: 05/01/2014

Planned end date: 04/30/2016

Key Milestones:

- Provide 20 Guides describing DOE-sponsored resources; April, 2015
- Evaluate the usability and functionality of the Building Energy Asset Score Tool (AST) and provide report and case studies; April, 2015 & Dec. 2015
- Develop deployment plan to increase use of AST. Over 10M ft^2 and 60 organizations; May, 2016
- Increase market outreach for BuildingSync; April, 2016
- Development of iLEED module for AST; April, 2016

Budget:

Total DOE $ to date: $360,099

Total future DOE $: 200,000

Key Partners:

• **CBEI**
• PNNL
• BOMA – Philadelphia
• Multiple building owners

Project Goal:

Enhance market understanding, acceptance and deployment of DOE-sponsored resources by developing guides, evaluating functionality and assisting with deployment through CBEI and DOE channels

Target Market/Audience:

Building Owners

Facilities Managers

Energy Service Providers

Utilities

National Organizations

Purpose and Objectives

Problem Statement:

Need to disseminate DOE resources and solutions to a broader audience, e.g., DOE Building Energy Asset Score Tool to enable owners to assess the building characteristics and equipment.

Target Market and Audience:

- Building owners and operators (e.g. BOMA, Brandywine Realty Trust Hankin Group, Ciminelli Real Estate Corporation, Colliers, Keystone Property Group, etc…),
- Facility Managers
- Energy service providers
- Utilities (e.g. PECO)
- Design Professionals
- Local Governments and Municipalities
- Software Development Sector
- National Organizations (e.g. USGBC, AIA)

Purpose and Objectives - Impact of Project

Project endpoint and final products:

- 10M ft^2 of commercial building space using the AST to assess the building characteristics and equipment.
- Outreach to 60 organizations to use the AST.
- Improved functionality of the AST based on user feedback provided to PNNL.
- 20 Guides describing DOE-sponsored tools available on-line
- Increased market outreach for BuildingSync
- Development of BEAS+iLEED/PM Module development for AST.

Measure of achievement:

Near-term (during or up to 1yr after project):

- Major building owners partnered with during the duration of the project become **leaders throughout the country**, resulting in larger target audience using DOE tools and resources.

Intermediate-term (1-3yr after project):

- Usage of DOE tools such as AST become **standard practice throughout the US**.
- Integration of DOE tools with nationally recognized standards such as LEED.
- Increased collaboration from market partners from the software development sector.

Long-term (3yr + after project):

- Increased awareness and use of BTO tools and resources.
- Documented/quantified increase in the **energy savings, and EE retrofits** across different building portfolio as a result of widespread usage of DOE tools and resources.

Approach

Approach:

The project will engage target stakeholders selected in collaboration with DOE BTO Managers to ensure that key stakeholders and market partners understand both why and how to use the selected DOE tools and resources, with a focus on the Building Energy Asset Score Tool and BuildingSync.

Stakeholders will also provide feedback on the usage of tools & resources to aid in furthering their applications.

Key Issues:

Stakeholders are currently unaware of either the existence, usability, or benefits of BTO tools and resources, so they are unlikely to implement them in their consideration of building design, retrofit, and operations.

Distinctive Characteristics:

- Leveraged long term relationships with Building Owners, Operators, Design Professionals, and Energy Service Providers.
- Stakeholder engagement continues beyond the duration of the project as a result of the individually customized support, engagement, and services provided by CBEI.
- The CBEI team comprises of Architects, Engineers, Energy Modelers, Statisticians, Physicists, which enables us to provide holistic and integrated solutions.
- CBEI is a knowledgeable interface between the target audience and tool developers (PNNL) which helps address building owner concerns to enhance the overall usability and functionality.

Progress and Accomplishments: Lessons Learned

- Lack of interaction between the end users and tool developers.
  - CBEI acts as an intermediate to provide valuable feedback and insight from tool users to the tool developers to further the use of BTO tools and resources.
- The Building Energy Asset Score Tool (AST) does not cover all possible building scenarios and output requests from building owners.
  - CBEI's unique expertise provides input guidance to building owners to optimize the usability of the AST for the building owner.
- The tool users needed assistance and guidance in order to obtain meaningful data out of the tool.
  - CBEI's expert team provides building owner tool usage assistance on a one on one level to improve data entry quality and accuracy of data input.
  - CBEI will introduce a new project to advance the Asset Score by creating a new, training-based "certificate of proficiency" program that can be readily integrated with additional building energy assessment education and training programs.
- General lack of awareness about the available DOE tools and resources.
  - CBEI developed printed guides, webinars, an online educational tutorial, and provided workshops for several DOE tools and resources.

Progress and Accomplishments: Accomplishments

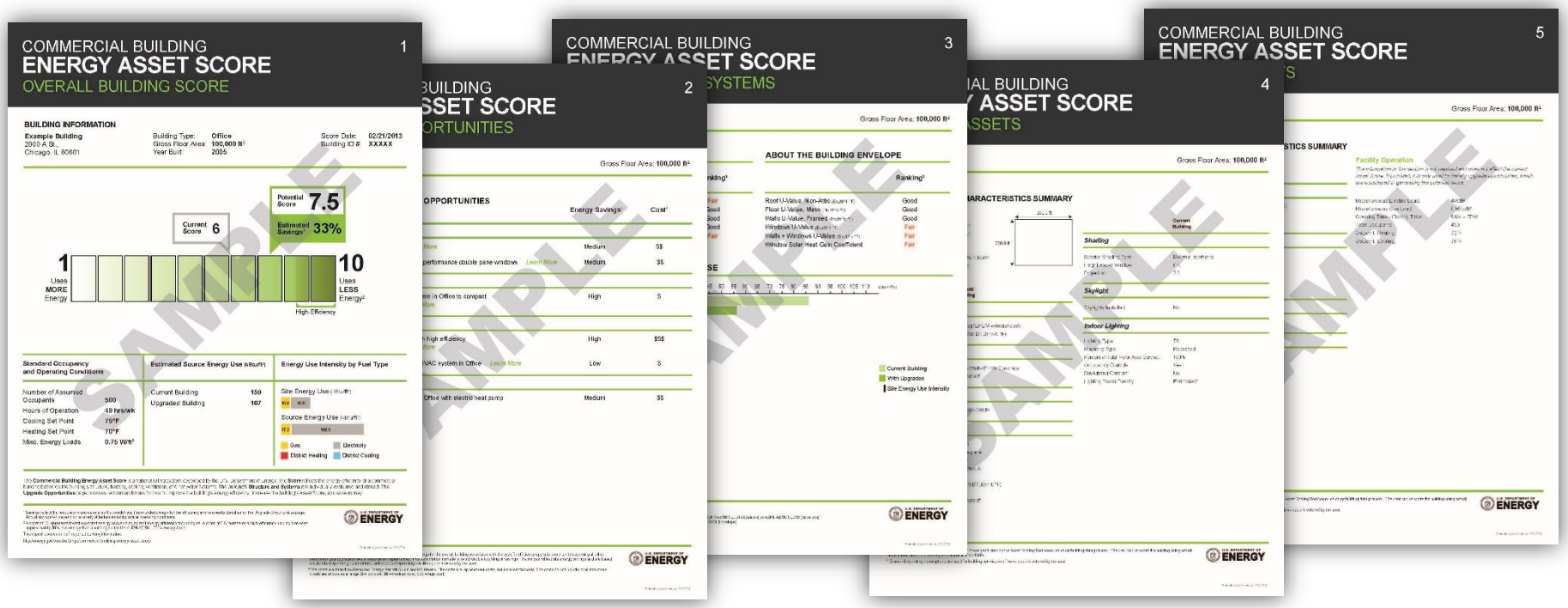
- In collaboration with BTO, reviewed over 100 tools and resources to arrive at a short list of DOE tools and resources that needed additional market engagement activities and resources.

- On track to provide over 20 guides for DOE tools and resources (by end of April, 2015):
  - Asset Scoring Tool **(> 600 views online)**
  - Energy Data Accelerator
  - On Bill Financing
  - Benchmarking data analytics
  - Building retuning training
  - Brief for BuildingSync
  - Stakeholder engagement check list
  - Case studies highlighting successful city-utility partnerships
  - Building benchmarking analysis guides
  - Navy Yard On-Bill Financing Case Study
  - CBEI Monitoring and Verification (M&V) data sets
  - 8 CBEI Demonstration Projects
  - 5 case studies on Building Retuning applications

- Developed tool comparison matrix and guide.

Progress and Accomplishments: Accomplishments

- Usage of AST for **over 5.5million sf (Set target – 2 million sf):**
  - Phipps Center for Sustainable Landscape (CSL) ~23,000 sf
  - Ft Belvoir ~48,000 sf
  - BOMA (multiple buildings) -~2 million sf
  - Liberty Property Trust (multiple buildings) 3.2 millions sf
  - Franklin Building
  - One Montgomery Plaza ~300,000 sf

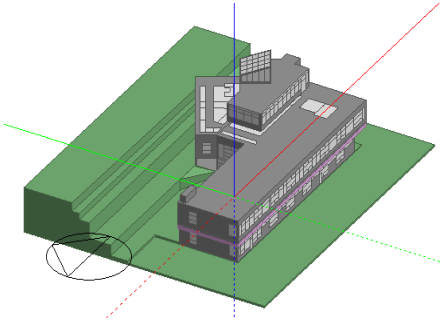


Progress and Accomplishments: Accomplishments

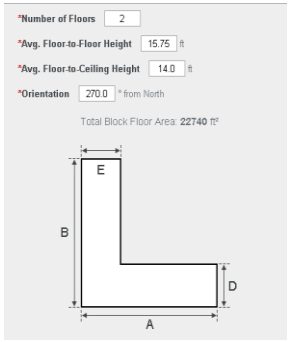
- **Provided 2 Case studies** prepared highlighting success stories of the AST and identified multiple use cases describing the benefits and usages of the tool. Results communicated to the tool developers (PNNL).

Select Findings:

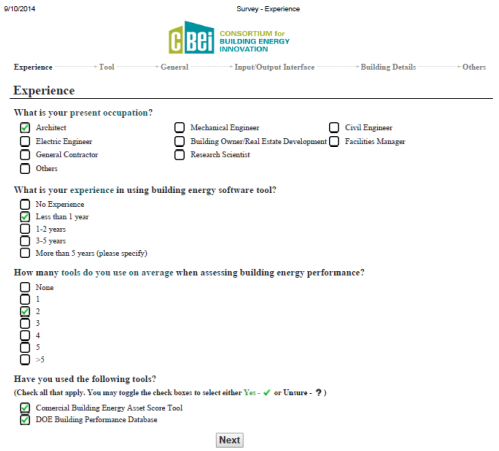
- AST is easy to use and takes comparatively less time than many building assessment tools.
- Simplified input criteria valued by building owners who wish to obtain a fast building assessment.
- Limited in modeling complex HVAC systems.
- Instantaneous grading seen as a key benefit.
- Use of the tool by building owners who do not have access to tenant utility data.
- Easy to comprehend retrofit recommendations with relative energy savings and cost outputs.
- Building owners with large portfolios desire streamlined upload functionality for multiple buildings from internal spreadsheet documents.
- Building owners with large portfolios desire spreadsheet output options that include the AST score and recommendations across the entire portfolio.



Actual Project Building Geometry



Simplified Building Geometry utilized in Energy Asset Scoring Tool



AST Survey

Progress and Accomplishments

Market Impact:

Efforts to accelerate impact:

- Targeting leaders in the commercial building owner community to create traction and usage of BTO tools and resources.
- Provided multiple means of assistance to building owners which resulted in an accurate and beneficial assessment of multiple properties.
- Feedback for the AST usability survey resulted in helping tool developers (PNNL) prioritize tool upgrades.
- Collaboration and market engagement activities with national organizations increases the dissemination of knowledge to different stakeholders.

Measurement against planned impacts:

- Exceeded the CBEI goal of 2 million ft^2 of building area covered
  - accomplished to date: >5.5 million ft^2
- 20 guides available by April, 2015

Awards/Recognition:

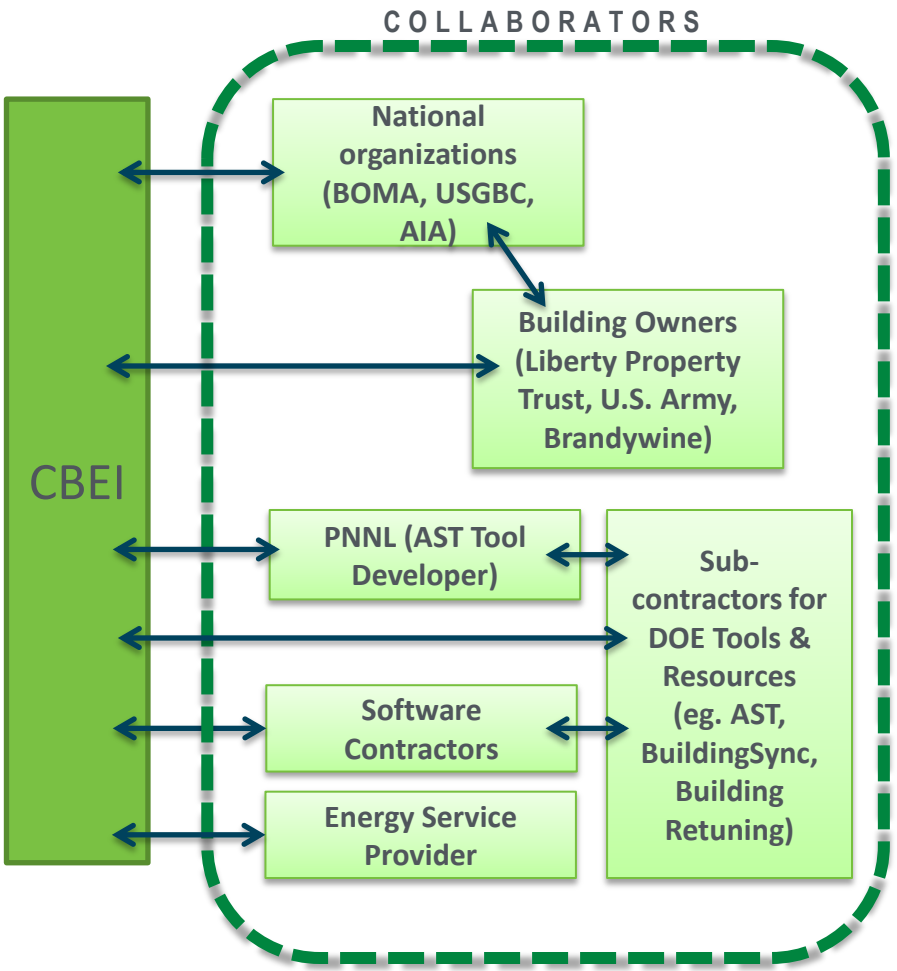
N/A

Project Integration and Collaboration

Project Integration:

- CBEI developed a strategic communication and outreach strategy to engage market partners.
- CBEI devised and executed multiple educational and communication material (eg. webinars, videos, workshops, conference calls, printed guides, in person meeting, and handouts) to increase usage and understanding of BTO tools and resources.
- Regular conference calls with DOE and AST developer (PNNL) to ensure consistent messaging and increase tool usability

Partners, Subcontractors, and Collaborators:



Next Steps and Future Plans

Building Energy Asset Score Tool:

- Expand Market outreach and communication strategy developed in collaboration with DOE and CBEI to include over 60 stakeholders including:
  - Building owners
  - Energy service providers
  - Contractors
  - Professional Organizations (AIA, BOMA)
- Continue to provide feedback on tool usability and functionality and to PNNL
- Design a module to assess LEED credits/points by utilizing output files directly from simulation results of Building Energy Asset Score.
- Provide additional case studies documenting best practices and tool benefits
- Update Asset Score tool use guide as Asset Score is updated

- Establishing leaders to continue the uptake of DOE tools and resources.

- Secure commitments from stakeholders to use BuildingSync from 5-10 organizations

- Develop additional outreach materials to engage a wider audience

REFERENCE SLIDES

Project Budget

Project Budget: BP4 $360,099 and BP5 $200,000
Variances: None
Cost to Date: $360,099 (BP4)
Additional Funding: Cost share from Carnegie Mellon University

Budget History

CBEI BP3 (past) 2/1/2013 – 4/30/2014		CBEI BP4 (current) 5/1/2014 – 4/30/2015		CBEI BP5 (planned) 5/1/2015 – 4/30/2016	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
		360,099	$40,000	200,000	39,400

CBEI – Consortium for Building Energy Innovation (formerly EEB Hub)
BP – Budget Period

Project Plan and Schedule