Commercial Buildings Integration

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

NASEO Energy Policy Outlook
Feb. 10, 2016

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

CBI Updates

- **Energy Efficiency Improvement Act of 2015 "Tenant Star" Legislation**
  - Timeline
  - DOE Responsibilities & Progress
- **Launch of the SEED Collaborative**
- **Commercial Building Energy Asset Score**
  - Introducing "Preview"
  - National Leadership Network

Design and Construction; Occupancy- Based Recognition Timelines

Design and Construction Recognition (underscored dates specified by law)

April 30, 2015	July 30, 2015	September 30, 2015	April 30, 2016	After July 15, 2016
President Obama signs law.	DOE: Publish Fed. Reg. notice inviting public comment re: high performance D&C methods, practices and measures in leased spaces	*(Estimated 60 day comment period)* Public comment window closes.	DOE: Complete study on high performance measures and opportunities in leased spaces. Publish study on DOE website	EPA consulting w/ DOE: May develop a voluntary program to recognize owners and tenants that use high performance D&C measures in leased spaces, following public comment period

Occupancy-Based Recognition (all dates estimated)

April 30, 2015	2017 - 2018	2019	After 2020
President Obama signs law.	(*Estimated date of next CBECS)* EIA: Collect tenant energy use data as part of CBECS – or "develop capabilities" and start collecting such data.	EIA: Earliest date of "TBECS" completion. Publicly release and provide data to EPA.	*("Not later than 1 year" after "sufficient data" received and following public comment period)* EPA: Develop policies and procedures modeled after E* for voluntary tenant occupancy-based recognition. Establish categories of tenants eligible for recognition based on TBECS *"and other appropriate data sources."*

Separate Spaces Report – Early Takeaways

DOE is on track to release the report by the end of April. We are scheduling an advanced peak webinar for the beginning of April to share the findings and recommendations of the full report. You can download a copy of the report when it is available, and register for the webinar by going to www.betterbuildingssolutionscenter.energy.gov.

- **Submetering remains a barrier to increasing the energy efficiency of tenant spaces** – advancements have been made in wireless technologies which make it easier and less expensive to submeter individual tenant spaces, but most existing spaces do not currently have this capability installed and there is a persistent issue with who pays for the installation.
- **Market needs easier to compare packages of energy efficient technologies with better understood costs and returns** – off the shelf technologies exist today to increase the energy efficiency of tenant spaces, but implementing such technologies in build-outs proves to be complicated and time consuming. The ability to readily compare packages of technologies through interactive tools or prescriptive build-out checklists are potential ways to increase the uptake and reduce the time and cost of selecting more efficient options.
- **Opportunity for low-cost energy models for tenant spaces** – until recently, energy modelling was used to compare options for whole-building energy consuming equipment and the interaction of measures. Recently modelling has been applied to assessing good, better, and best options for tenant build-outs, but the process is not currently financially feasible for smaller tenant spaces.
- **Lease Language and Broker Engagement** are two additional areas that will aid in greater adoption of energy efficiency during the build-out process. GSA, IMT, BOMA, and others have developed good models of lease language, along with recognition and talking points for brokers to use during pre-leasing that mitigate the landlord-tenant split-incentive problem.

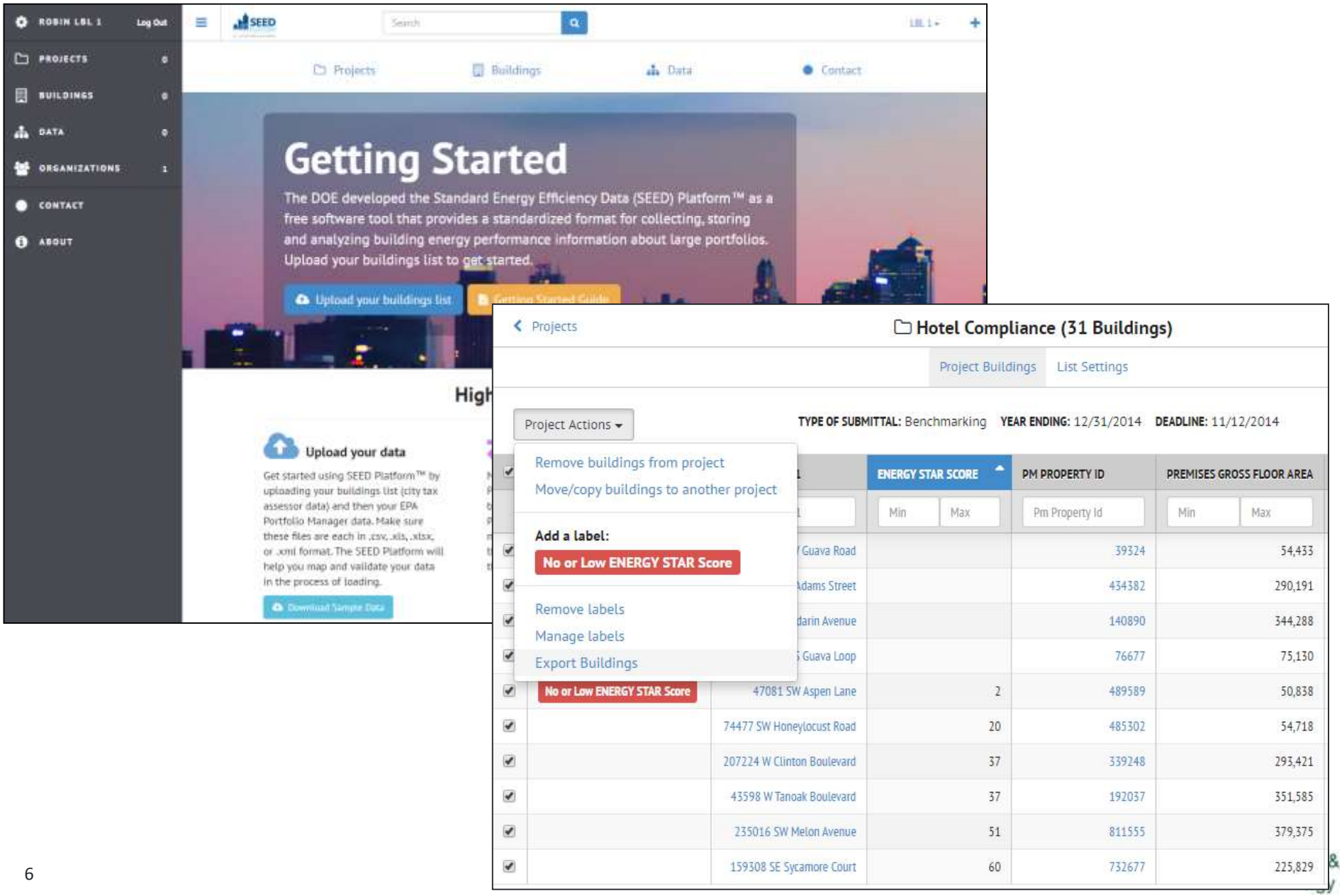
Market Problem - Challenges of Data Management

Stats

$.30 of every EE program dollar is spent on *administration* including data collection, management, and verification.

Cities are spending 0.5-1.0 FTEs each year at a cost of $50-100,000 on data needs related to energy benchmarking and compliance.

The Standard Energy Efficiency Data Platform



The SEED Platform Collaborative

Partners

- City of Atlanta, GA
- City of Berkeley, CA
- City of Cambridge, MA
- City of Houston, TX
- City of Kansas City, MO
- City of New York, NY
- City of Orlando, FL
- City of Philadelphia, PA
- Salt Lake City, UT
- California Energy Commission
- District of Columbia
- Montgomery County, Maryland

Allies

- C40 Cities Climate Leadership Group
- Institute for Market Transformation
- Natural Resources Defense Council
- National League of Cities
- National Association of State Energy Officials

Affiliates

- CakeSystems
- McQuillen Interactive
- Performance Systems Development
- Quick Left
- Maalka

Asset Score Overview

National, free software tool that diagnoses opportunities to improve EE

- Assesses the efficiency of structural, mechanical, and electrical building components
- Diagnostic tool, not an energy management tool

Demand is expanding

- Asset scores generated for 825 buildings totaling 80 million SF nationwide


COMMERCIAL BUILDING 1
ENERGY ASSET SCORE
OVERALL BUILDING SCORE

BUILDING INFORMATION
Example Building
2000 A St.,
Chicago, IL 60601
Building Type: Office
Gross Floor Area: 100,000 ft²
Year Built: 2005
Score Date: 02/21/2013
Building ID #: XXXXX

Potential Score 7.5
Estimated Savings 33%
Current Score 6
1 Uses MORE Energy
10 Uses LESS Energy
High-Efficiency

Assumed Occupancy and Operating Conditions
Number of Assumed Occupants 500
Hours of Operation 49 hrs/wk
Cooling Set Point 75°F
Heating Set Point 70°F
Misc. Energy Loads 0.75 W/ft²

Estimated Source Energy Use
Current Building 159
Upgraded Building 107

Energy Use Intensity by Fuel Type
Site Energy Use
Source Energy Use
Electricity Gas Fuel Oil
District Heating District Cooling

The Commercial Building Energy Asset Score is a national rating system developed by the U.S. Department of Energy. The Score reflects the energy efficiency of a commercial building based on the building's structure, heating, cooling, ventilation, and hot water systems. The building's Structure and Systems are individually evaluated and ranked. The Opportunities page provides recommendations for how to improve the building's energy efficiency, increase the building's Asset Score, and save money.

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Asset Score Full Version

COMMERCIAL BUILDING
ENERGY ASSET SCORE
OVERALL BUILDING SCORE

1

BUILDING INFORMATION

Example Building
2000 A St.,
Chicago, IL 60601

Building Type: **Office**
Gross Floor Area: **100,000 ft²**
Year Built: **2005**

Score Date: **02/21/2013**
Building ID #: **XXXXX**

Potential Score **7.5**
Current Score **6**
Estimated Savings[1] **33%**

1 Uses **MORE** Energy — 10 Uses **LESS** Energy
High-Efficiency

Assumed Occupancy and Operating Conditions		Estimated Source Energy Use[2] (kBtu/ft²)		Energy Use Intensity by Fuel Type
Number of Assumed Occupants	500	Current Building	159	Site Energy Use (kBtu/ft²)
Hours of Operation	49 hrs/wk	Upgraded Building	107	Source Energy Use (kBtu/ft²)
Cooling Set Point	75°F			Electricity, Gas, Fuel Oil, District Heating, District Cooling
Heating Set Point	70°F			
Misc. Energy Loads	0.75 W/ft²			

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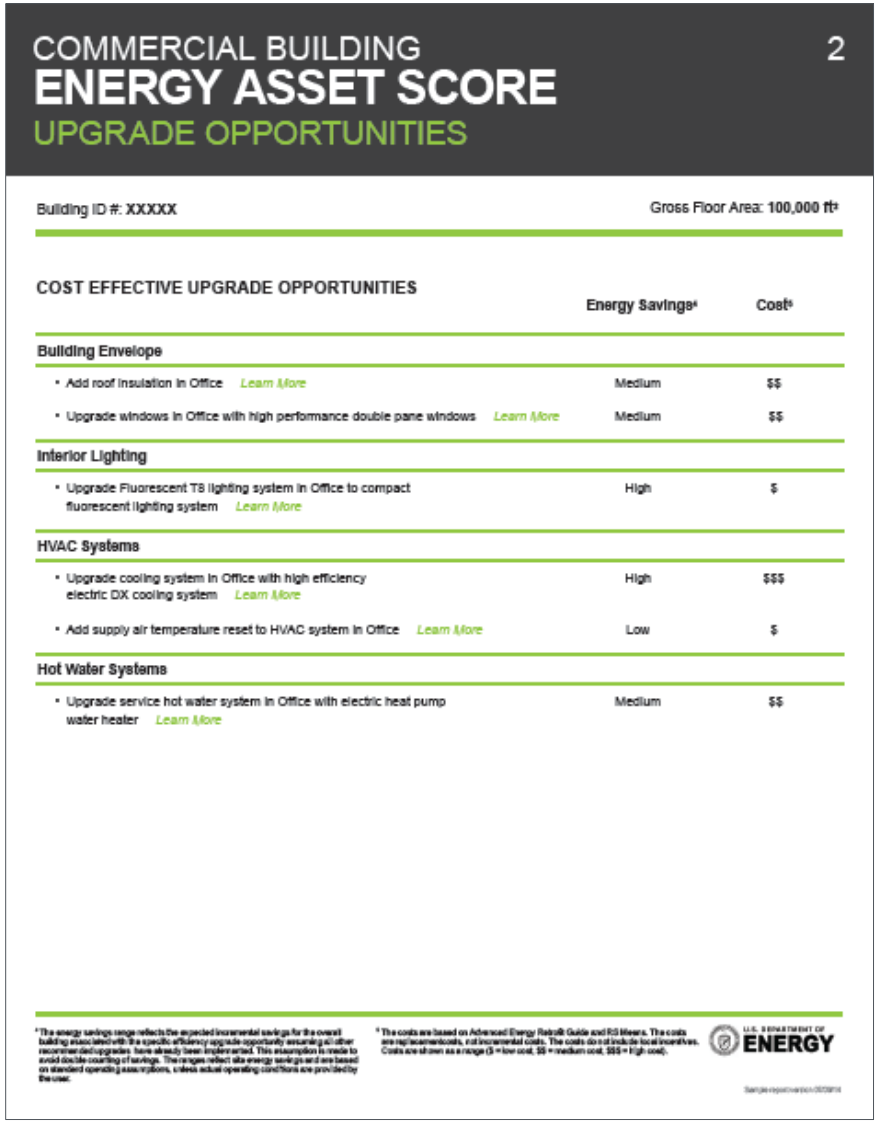

COMMERCIAL BUILDING
ENERGY ASSET SCORE
UPGRADE OPPORTUNITIES

2

Building ID #: **XXXXX**

Gross Floor Area: **100,000 ft²**

COST EFFECTIVE UPGRADE OPPORTUNITIES

	Energy Savings[a]	Cost[b]
Building Envelope		
• Add roof insulation in Office *Learn More*	Medium	$$
• Upgrade windows in Office with high performance double pane windows *Learn More*	Medium	$$
Interior Lighting		
• Upgrade Fluorescent T8 lighting system in Office to compact fluorescent lighting system *Learn More*	High	$
HVAC Systems		
• Upgrade cooling system in Office with high efficiency electric DX cooling system *Learn More*	High	$$$
• Add supply air temperature reset to HVAC system in Office *Learn More*	Low	$
Hot Water Systems		
• Upgrade service hot water system in Office with electric heat pump water heater *Learn More*	Medium	$$

[a] The energy savings range reflects the expected incremental savings for the overall building associated with the specific efficiency upgrade opportunity ensuring all other recommended upgrades have already been implemented. This assumption is made to avoid double counting of savings. The ranges reflect site energy savings and are based on standard operating assumptions, unless actual operating conditions are provided by the user.

[b] The costs are based on Advanced Energy Retrofit Guide and RS Means. The costs are rough estimates only, not incremental costs. The costs do not include local incentives. Costs are shown as a range ($ = low cost, $$ = medium cost, $$$ = high cost).

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Asset Score Preview

BUILDING ENERGY 1

ASSET SCORE Preview

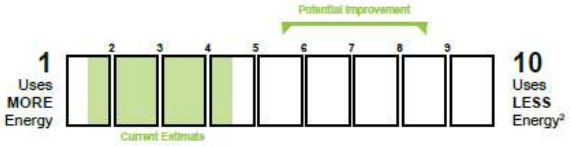
OVERALL BUILDING SCORE

BUILDING INFORMATION

Preview Test
321 Easy St.
Pasco, WA 99301

Building Type: **Office**
Gross Floor Area: **5,000 ft²**
Year Built: **2010**

Score Date: **08/18/2015**
Building ID #: **1**



Score range note:

Current score: Your building is likely to receive an Asset Score between **1.5** and **4.5** in Full Input Mode.
Potential score: On average, similar buildings may improve **4.0** point(s) with cost-effective upgrades.
Energy savings: On average, similar buildings may use **40%** less energy[1] with cost-effective upgrades.

Switch to Full Input Mode to add additional building data and generate an Asset Score report with cost effective upgrades

The Building Energy Asset Score is a national rating system developed by the U.S. Department of Energy. The **Score** reflects the energy efficiency of a building based on the building's structure, heating, cooling, ventilation, and hot water systems. On Asset Score Full Version Reports, the building's **Structure and Systems** are individually evaluated and ranked. The **Upgrade Opportunities** page provides recommendations for how to improve the building's energy efficiency, increase the building's Asset Score, and save money.

[1] Savings reflect the reduction in source energy that would result from undertaking all of the efficiency improvements identified on the Opportunities page of a Full Asset Score Report. Actual savings will depend on a variety of factors including actual operating conditions.

[2] A score of 10 represents lowest expected energy usage using current energy efficiency technologies. A score of 8.5 represents a high-efficiency building that uses approximately 30% less energy than a building built to the ANSI/ASHRAE 90.1-2004 energy code.

This report is based on self-reported building information. http://energy.gov/eere/buildings/building-energy-asset-score

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BUILDING ENERGY 2

ASSET SCORE Preview

BUILDING ASSETS

Building Name: **Preview Test**

Gross Floor Area: **5,000 ft²**

BUILDING SYSTEM CHARACTERISTICS SUMMARY

Building Details

Building Shape	Rectangle*
Number of Floors	1
Orientation	North/South
Use Type	Office
Major retrofits since construction	Yes

Roof

Roof Type	Built-up w/ concrete deck

Floor

Floor Type	Slab-on-Grade*

Walls and Windows

Wall Type	Brick/Stone on steel frame*
Window Framing Type	Metal
Window Glass Type	Double Pane*
Window Layout	Continuous*
Window-to-Wall Ratio	0.33*

Lighting

Lighting Type	Surface Fluorescent T8
Percent of Total Floor area	50.0%
Lighting Type	Recessed Compact Fluorescent
Percent of Total Floor area	20.0%
Lighting Type	Recessed Fluorescent T5
Percent of Total Floor area	30.0%
Year of last major retrofit	2015

Service Water Heating

Fuel Type	Gas

Heating/Cooling

HVAC System Type	Packaged Rooftop VAV with Electric Reheat*
Cooling Source	Central DX*
Heating	Central Furnace*
Fuel Type	Electricity*

Operations

Using Standard Operations**

Standard operating assumptions for this building are used for building optimization. Operation inputs may edited in Full Input Mode to be used to identify upgrade opportunities, which are considered in generating the potential score.

Assumed Occupants	25
Hours of Operation	48.6 hrs/wk
Setpoint Cooling	75.0 F*
Setpoint Heating	70.0 F*
Misc. Energy Loads	0.75 W/ft²

* This value was not directly entered by the user. It was generated by the Asset Scoring Tool based on other building data provided. The user can re-score the building using actual information about this building characteristic if available.

** Standard operating assumptions are used for building optimization if no values are entered by the user.

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Asset Score National Leadership Network

Launched in January 2016, the Leadership Network includes 21 organizations that will work with DOE to use the Asset Score, conduct case studies, and help improve the tool

- AECOM
- Arup
- Association of Energy Engineers
- CH2M Hill
- City of Milwaukee
- DNV GL
- FS Energy
- Ingersoll Rand
- JBG Companies
- Liberty Property Trust
- Marriott International
- Marx Okubo
- National Oceanic and Atmospheric Administration
- Performance Systems Development
- Skidmore, Owings & Merrill
- State of Missouri
- State of Rhode Island
- Steven Winter Associates
- Transwestern
- U.S. General Services Administration
- YR&G

THANK YOU