



Pacific Northwest
NATIONAL LABORATORY

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Commercial Building Energy Asset Scoring Tool 2013 Pilot Training Session

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U.S. Department of Energy (DOE)

- Project oversight
- Strategic direction
- Policy perspective

Pacific Northwest National Laboratory (PNNL)

- Technical lead
- Scoring Tool development and maintenance

SRA International (SRA)

- Pilot management
- Outreach and communications

Pilot Participation Process

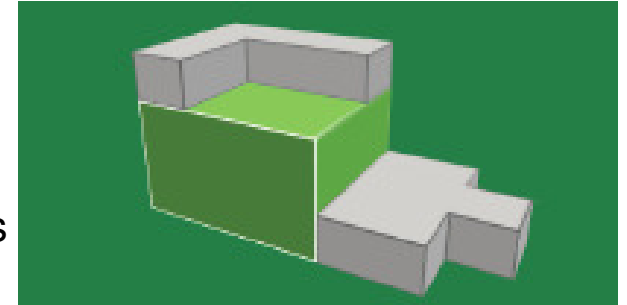
1. Sign the Pilot Participation Agreement by June 26
2. Provide DOE with points of contact for lead project coordinator and data collector(s)/tool user(s) by June 26
3. DOE provides Pilot Participants with username and password to access the Asset Scoring Tool (buildingenergyscore.energy.gov/)
4. DOE assigns each Pilot Participant an Account Manager
5. Account Manager stays in regular communication with Pilot Participants to provide assistance and obtain feedback
6. Pilot Participants (project coordinators AND Scoring Tool users) complete Pilot questionnaire

Questions? Email: asset.score@ee.doe.gov

What is New?

▶ **User Interface**

- Two-stage data entry process
 - Build your building component inventories
 - Build your building geometry and assign properties
- Inline help
- Multi-block



▶ **Data Collection**

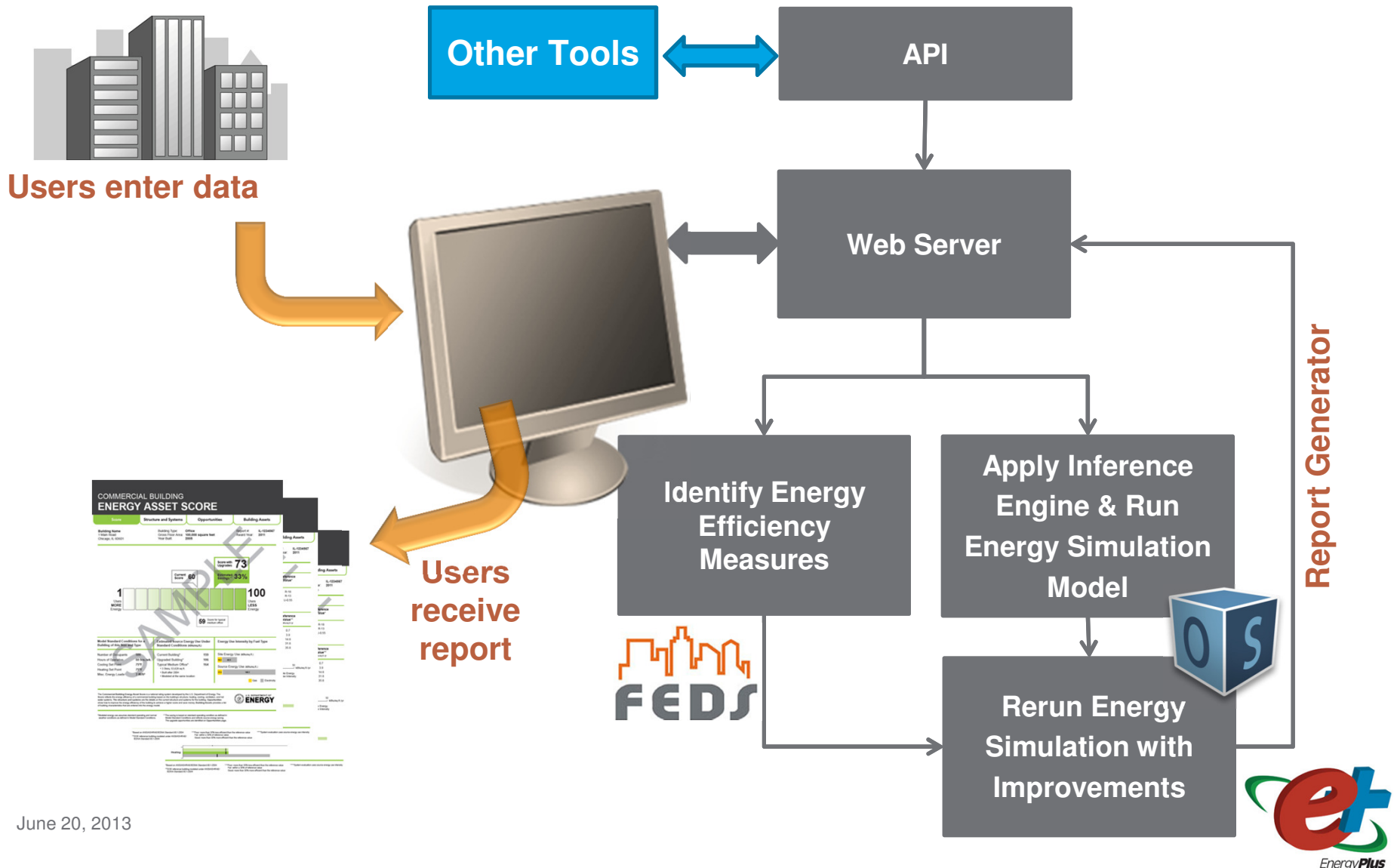
- Updated minimum data list based on sensitivity analysis
- Data collection priority map

▶ **Asset Score Report**

- Updated building system evaluation method
- Report appendices (how to read your report, operation assumptions, score table, etc.)
- Additional information on building upgrade opportunities (best practice, general implementation guide, etc.)

▶ **Updated scoring method (to be finalized)**

Asset Scoring Tool



PNNL will provide...

- ▶ **Data Collection Forms**
 - Minimum list for simple score
 - Full list for advanced score
- ▶ **Data Collection Priority Map**
- ▶ **Asset Scoring Tool Quick Start Guide**
- ▶ **Sample Report and Appendices**

Data Collection Form

- ▶ **Required Data**
 - In order to generate a score for the building, all shaded fields are required. While users are encouraged to provide information where available for the other data fields, these are optional.
- ▶ Instructions are provided for most data fields
- ▶ Users make additional copies as needed

General Building Information

ALL SHADED FIELDS ARE REQUIRED

Building Type <i>For mixed-use buildings, choose as many fields as apply.</i> <i>If this building includes use types not listed here, EXCLUDE that portion of the building when entering data.</i>	<input type="checkbox"/> Lodging <input type="checkbox"/> Medical Office <input type="checkbox"/> Senior Center <input type="checkbox"/> City Hall <input type="checkbox"/> Post Office <input type="checkbox"/> Education (K-12 School, College/University, Training Facilities)* <input type="checkbox"/> Courthouse <input type="checkbox"/> Retail <input type="checkbox"/> Library <input type="checkbox"/> Office <input type="checkbox"/> Community Center <input type="checkbox"/> Multi-family (4 stories +) <input type="checkbox"/> Warehouse — Non-refrigerated		
Year completed	YEAR IN WHICH THE BUILDING WAS COMPLETED		
Building location	STREET		
	CITY	STATE	POSTAL CODE
Gross floor area	ft ²		
<i>Total floor area of all floors of a building calculated with the external dimensions of the enclosing fixed walls of the building including structures, partitions, corridors, stairs, and conditioned below-grade spaces. All parking areas should be excluded. Atriums should only include the base floor area that it occupies.</i> <i>For mixed-use buildings that include a space not listed above, exclude the square footage of that space.</i>			
Footprint shape <i>Use a combination of the above footprint shapes to represent a complicated footprint shape.</i>	<input type="checkbox"/> Rectangular or square <input type="checkbox"/> L-Shape <input type="checkbox"/> T-Shape <input type="checkbox"/> H-Shape <input type="checkbox"/> U-Shape		
Footprint dimensions	See attached Footprint and Window Layout sheet to assist in recording data.		
Orientation	CLOCKWISE DEGREE FROM NORTH		
<i>Orientation of the main long axis. North=0, North East=45, East=90, South East=120, South=180, South West=225, West=270, North West=315.</i>			
Number of floors (above ground)			
<i>For mixed-use buildings that include a space not listed above, exclude the number of floors of that space if that space occupies the entire floor(s).</i>			
Number of floors (below ground)			
Average floor-to-ceiling height	ft		
Average floor-to-floor height	ft		

* Choose "Office" for a college/university building containing mostly offices. Choose "Library" for a college/university library building.

Data Collection Form: Envelope

- ▶ If the roof, floor, or walls have been altered since the year of construction, it is preferable to provide additional relevant information in order to get credit for potentially improved envelope thermal performance.

Make additional copies of this page if your building has more than one type of roof, floor, or basement wall.

<p>Roof Type</p> <p><i>Choose all applicable roof types.</i></p>	<ul style="list-style-type: none"> <input type="radio"/> Metal Surfacing <input type="radio"/> Shingles/Shakes <input type="radio"/> Built-up/EPDM with Metal Deck <input type="radio"/> Built-up/EPDM with Concrete Deck <input type="radio"/> Built-up/EPDM with Wood Deck
<p>Roof Insulation and Assembly</p> <p><i>If the roof has been altered since construction date, it is preferable to provide one of the following data points and get credit for improved envelope thermal performance. If you elect to provide this information, fill in ONLY ONE of the following three data fields. If the building has multiple roof types, record each type separately.</i></p>	<p>ROOF INSULATION R-VALUE °F•ft²•h/Btu</p>
	<p style="text-align: center;">OR</p> <p>ROOF INSULATION THICKNESS in</p>
	<p style="text-align: center;">OR</p> <p>ROOF ASSEMBLY U-VALUE Btu/°F•ft²•h</p>

Data Collection Form: Window

- ▶ Window to wall ratio (WWR)
 - Continuous window
 - Discrete window with known WWR
 - Various windows (size and layout)
- ▶ Number and size of typical windows
 - Discrete window

Window layout

If your building has both Continuous and Discrete windows, Choose "Various."

- Continuous
- Discrete
- Various

Window to Wall Ratio

Select one of the following two approaches to calculate window-to-wall ratio for the building. If the window-to-wall ratio varies by orientation, you can use the attached Footprint and Window Layout sheet to assist in recording data.

FOR "CONTINUOUS" OR "VARIOUS" WINDOW LAYOUT

WALL-TO-WALL RATIO	%
--------------------	---

OR

FOR "DISCRETE" WINDOW LAYOUT

WIDTH OF A TYPICAL WINDOW	ft
HEIGHT OF A TYPICAL WINDOW	ft

Number of windows

Data Collection Form: Lighting

- ▶ **Two approaches to calculate lighting power density**
 - Option 1: Percentage of total floor area served
 - More applicable for ambient light
 - The total percentage does not necessarily to be 100%.
 - Option 2: Light counts
 - More applicable for task/accent lighting

Lighting Type

Choose all applicable lighting types.

- Incandescent/Halogen
- Compact fluorescent
- Fluorescent T12
- Fluorescent T8
- High Efficiency Fluorescent T8
- Fluorescent T5
- High Output Fluorescent T5
- Metal halide
- Mercury vapor
- High-pressure sodium
- LED

Data Collection Form: HVAC

- ▶ If year of manufacture is not specified by users, it is assumed that the vintage of the equipment is the same as that of the building
- ▶ Pay attention to the unit

Number of pieces of cooling equipment

Total number of equipment regardless of size.

Cooling equipment efficiency

For multiple pieces of equipment with various efficiencies, enter the efficiency of the predominant equipment or the weighted average by equipment size.

CIRCLE THE APPLICABLE UNIT

COP, EER, or kW/ton

Year of manufacture

If any equipment was installed or replaced after the building was constructed, indicate the year of manufacture. Otherwise, the asset scoring tool will assume that the year of manufacture is the same as the year in which the building was completed. If cooling equipment efficiency is entered, the year of manufacture will not be used to estimate the equipment efficiency.

Cooling equipment capacity

For multiple pieces of equipment, enter the total capacity.

tons

Priority Map

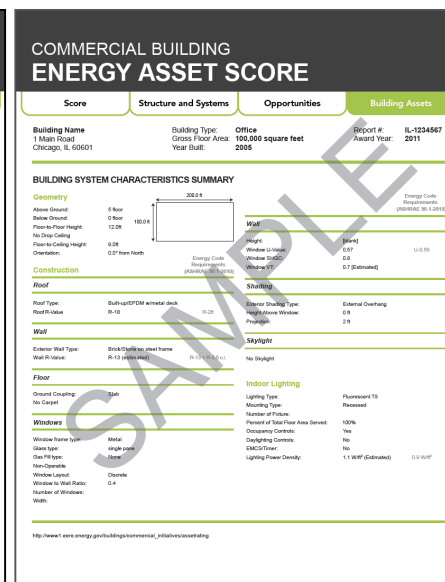
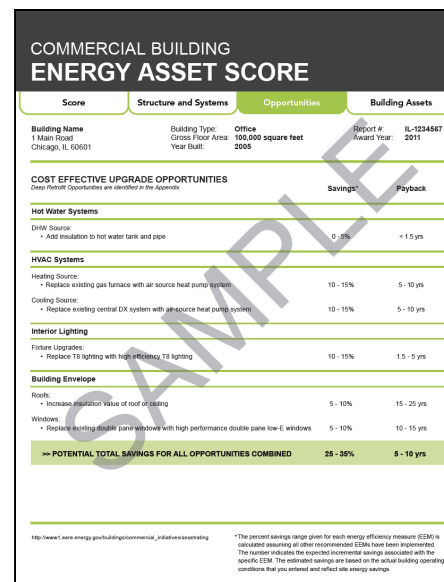
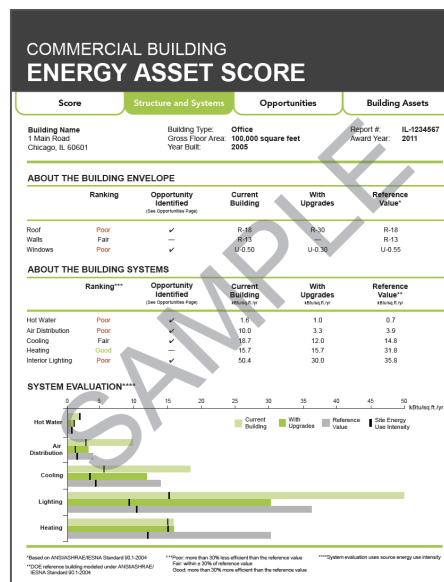
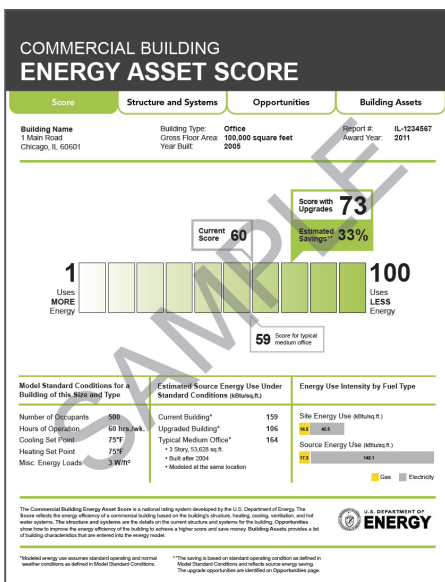
- ▶ Developed based on sensitivity analysis
 - 2004 prototype buildings (compliant with 2004 energy codes) as base models
 - Not a score predictor
- ▶ Example: Medium Office

Use type: Medium Office	Priorities by Climate Zones																
	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Lighting	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Lighting Controls	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Roof Insulation	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High
Wall Insulation	Low	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High	Mid	Mid	High	High	High	High
Window-Wall Ratio	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High	Mid	Mid	High	High	High	High
Window U-Value	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High	Mid	Mid	High	High	High	High
Orientation	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Floor-to-Floor Height	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High	Mid	Mid	High	High	High	High
Floor Insulation	Low	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	High	Mid	Mid	High	High	High	High
Fan Efficiency	Low	Low	Low	Low	Mid	Mid	Low	Low	Mid	Low	Low	Low	Low	Low	Low	Low	Low
Heating Efficiency	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Mid	Mid	Mid	Mid	Mid	Mid	Mid
Cooling Efficiency	Mid	Mid	Mid	Mid	Mid	Mid	Low	Mid	Mid	Low	Mid	Mid	Low	Low	Low	Low	Low
Water Heater Efficiency	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

- ▶ **Most buildings can be considered as one block unless at least one of the follow situations applies**
 - The building has different numbers of floors
 - Example: A portion of the building is 3 story and the other portion is 10 story.
 - The building is served by different HVAC systems
 - Example: A portion of the building uses a local chiller, the other portion uses packaged DX units.
 - The building is mixed-use building
 - Example: A portion of the building is retail, the other portion is office.
 - The building footprint cannot be simplified by the basic footprint shapes, such as rectangular, L-, U-, T-, or U-shapes.
- ▶ **NO need to build multiple blocks for**
 - Spaces within a use type
 - Example: lobby and conference rooms in an office building
 - Multiple pieces of HVAC equipment of the same type
 - Minor variations in construcion

Asset Score Report

- ▶ Report (four sections)
 - Score (multiple scores for mixed-use building)
 - Structure and Systems
 - Opportunities
 - Building Assets



Report Summary Page

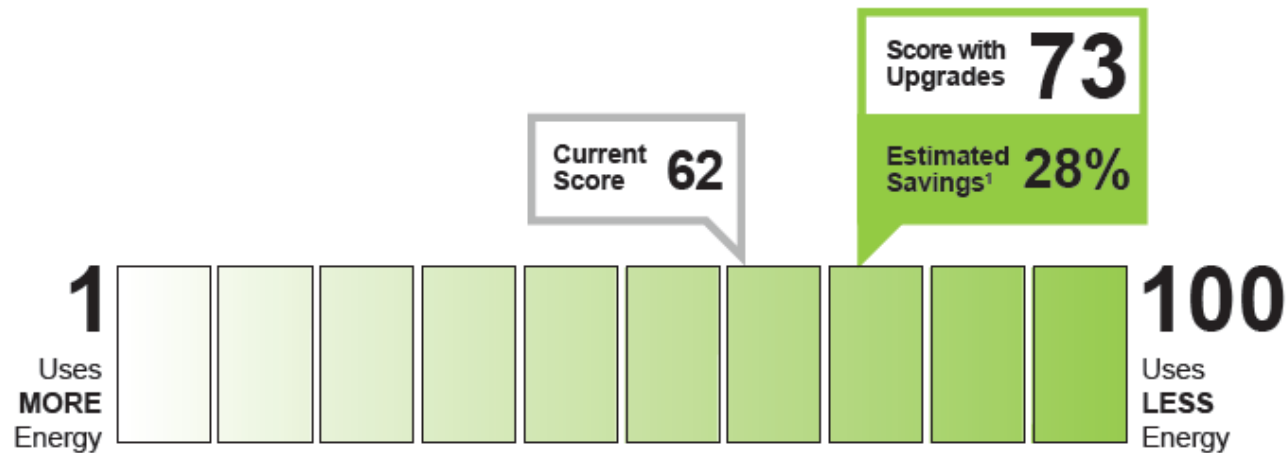
ASSET SCORE DATA LEVEL:

Simple Score

Advanced Score

Advanced Score is Verified

BUILDING ASSET SCORE



NUMBER OF USE TYPES IN MODEL: 2

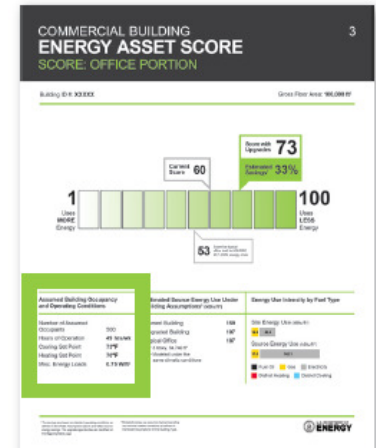
Each use type has a separate Score page included after the full building Score page.

CONTENTS

- Summary Page 1
- Score Page 2-4
- Upgrade Opportunities Page 5
- Structures and Systems Page 6
- Building Assets Page 7-8

Report Appendices

- ▶ What does energy asset score provide
- ▶ 3-steps to receive an energy asset score
- ▶ Report structure
- ▶ Interpret your score
- ▶ Standard operating conditions
- ▶ Calculate source energy



DEFINE STANDARD OPERATING CONDITIONS

Assumed Building Occupancy and Operating Conditions.

Number of Assumed Occupants	500
Hours of Operation	60 hrs./wk.
Cooling Set Point	73°F
Heating Set Point	70°F
Misc. Energy Loads	0.75 W/ft ²

The **Total Number of Occupants** is calculated using standard occupant densities (Table 1) and assuming the building is fully occupied. Your building energy use is correlated to the number of occupants, but the relationship is not linear.

If your building has more occupants, it would likely use more energy for cooling and ventilation and less energy for space heating. The energy use for lighting and plug load is most likely to increase with the number of occupants.

Table 1 – Standard Occupant Densities³

Building Types	Standard Occupant Densities (ft ² /person)
Court House	14
Education	40
Library	100
Lodging	250
Multi-family	380
Office	200
Retail	67
Warehouse	NA

Quick Start Guide


- ▶ 6 steps to score your building
- ▶ How to build multi-blocks
- ▶ Helpful hints

U.S. Department of Energy Commercial Building Energy Asset Score

Quick Start Guide

To create a commercial building energy asset score for your building you need to complete the following 6 steps. Although you are not required to carry out these steps in a specific order, the following sequence is most likely to save you time.

Step 1: Input Basic Building Information

- Click the New Building button  to begin.
- Enter building name, location, gross floor area, and year of construction.
- Click the  button to continue.

Step 2: Identify Building Use Type(s)

- Select all applicable use types
- Choose from a variety of options including office, retail, multi-family, education, and library, among many others

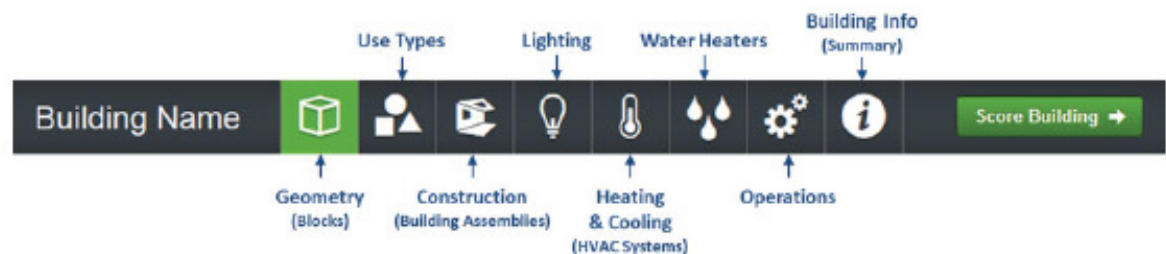
Step 3: Create an Inventory of Your Building's Features

- Enter information regarding the building's assembly components (roofs, skylights, windows, walls, floors) and its major energy systems (lighting, HVAC, hot water systems). The Data Collection Form can assist you in gathering your building information.

Step 4: Create 3-D Block(s) of Your Building

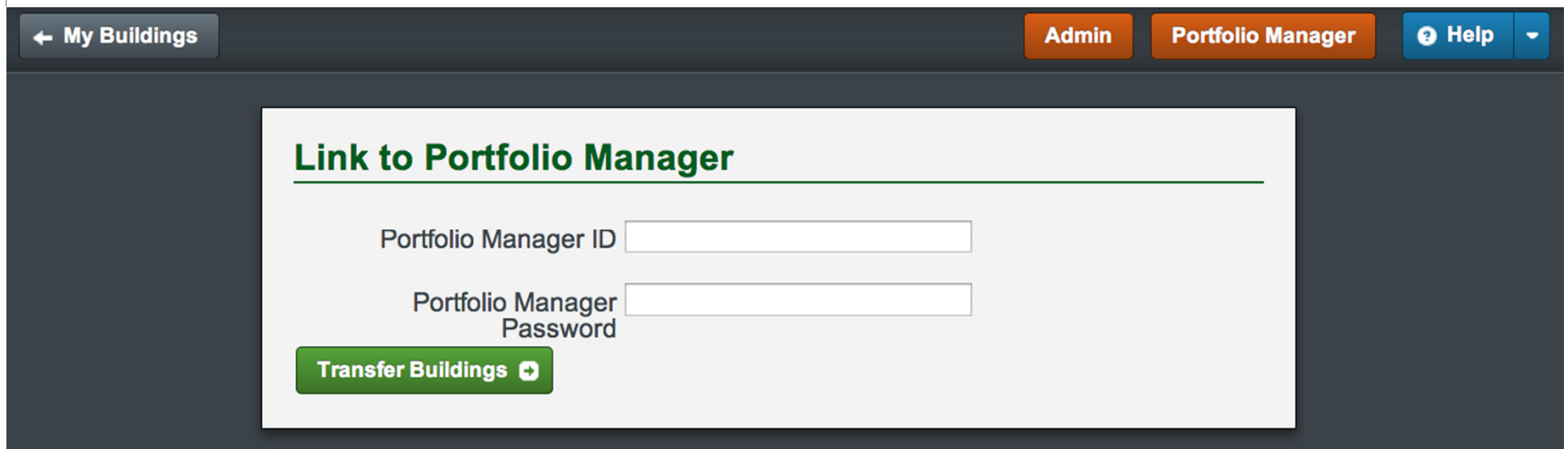
- Create "blocks" to construct a 3-D image that approximates the building's geometry, configuration, and orientation. You can find more information below on how to build blocks.

Step 5: Apply Use Types and Features to Your Building Block(s)



Portfolio Manager Link

- ▶ The Portfolio Manager upgrade will launch on July 10, 2013
- ▶ Link to Portfolio Manger will be active in about 2 weeks after the upgrade
- ▶ Enter your Portfolio Manager account information and import your building(s) to Asset Scoring Tool



The screenshot shows a web interface with a dark grey header. On the left is a button labeled "← My Buildings". On the right are three buttons: "Admin", "Portfolio Manager", and "Help" with a dropdown arrow. Below the header is a white box with the title "Link to Portfolio Manager" in green. Inside the box are two input fields: "Portfolio Manager ID" and "Portfolio Manager Password". Below the fields is a green button labeled "Transfer Buildings" with a plus icon.

NEW Asset Scoring Tool Demo

Questions?

Energy Asset Score website

<http://www1.eere.energy.gov/buildings/commercial/assetscore.html>

Energy Asset Scoring Tool

<https://buildingenergyscore.energy.gov/>

Please email us at asset.score@ee.doe.gov for more information.