



Making the Case for Building Efficiency Using Modeled Savings Estimates

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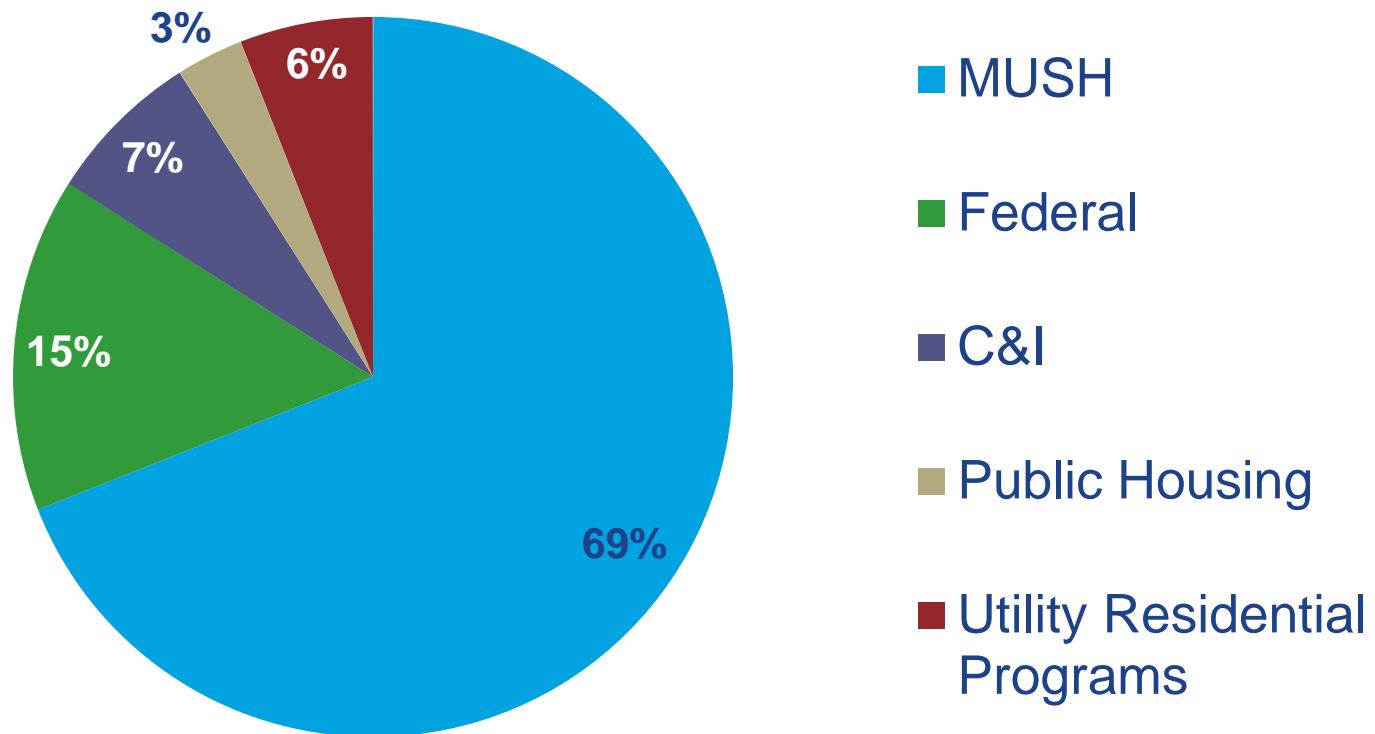


7 Top 10 Challenges for Funding Efficiency



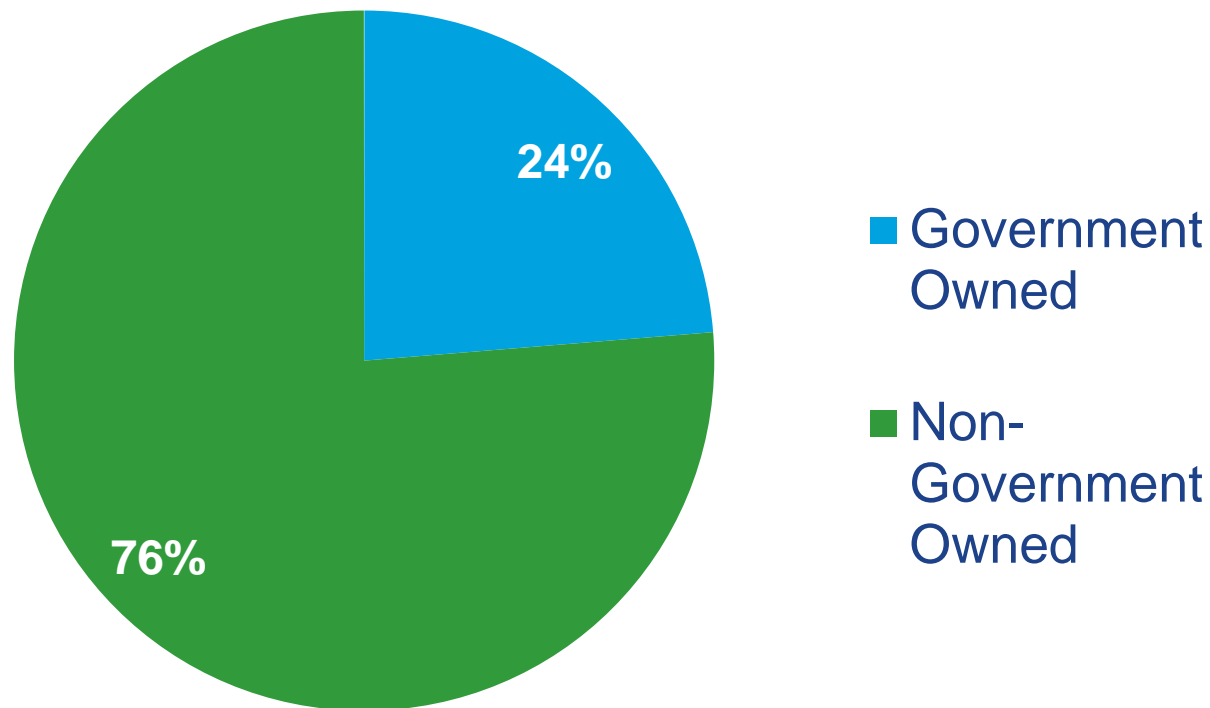
Industry Market Activity

ESCo Market Activity by Segment (2008)



Privately Owned Building Market

Relative Size of Built Environment by Ownership (Square Feet)



Privately Owned Assets

Restrictive
Lender
Covenants

Split
Incentives

Uncertain
Hold
Periods

Debt
Constraints

Competing
Priorities for
Available
Capital

New Tools

Funds and structures aimed at opening up private building market manage risk differently.



[Very large
bank TBA]

Impact on Engineering Methods

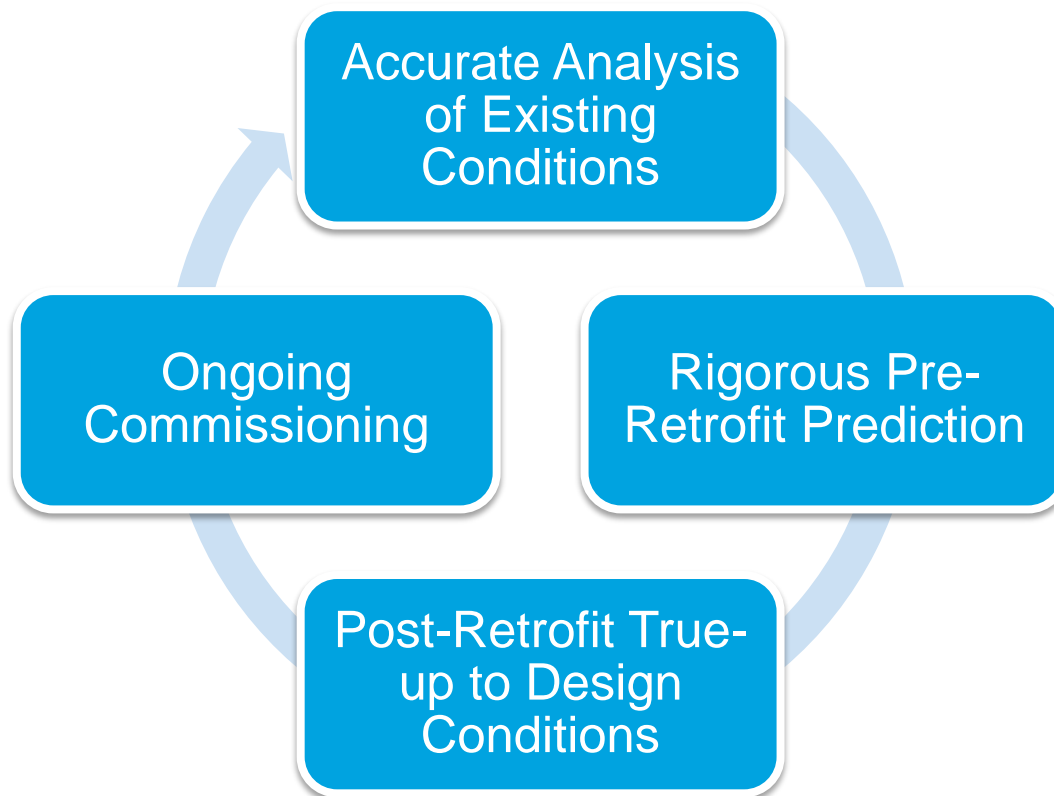
For some, the connection between energy savings and investor return is much more direct than EPC.



Private capital is buying a variable stream of cash flows.

Impact on Engineering Methods

They are driving more rigorous methodologies at all stages of the retrofit process.



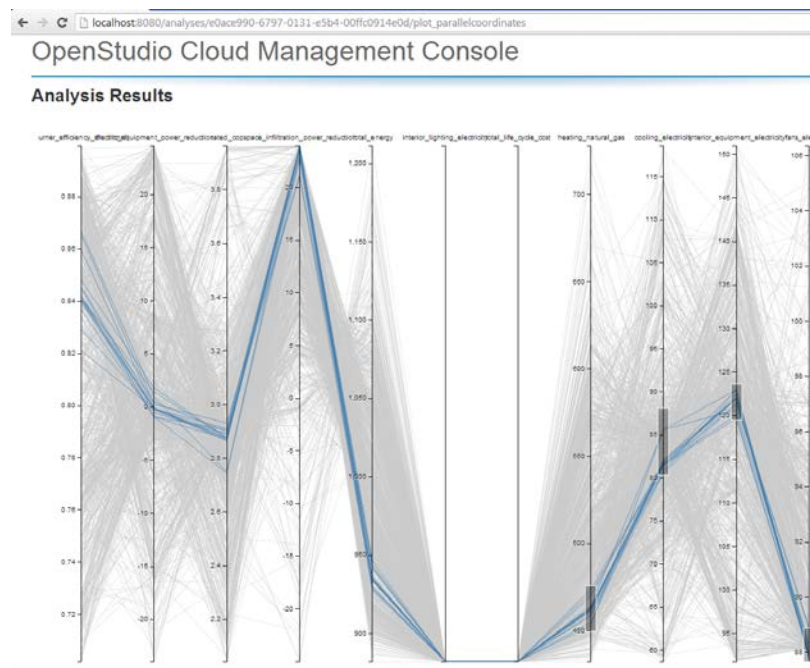
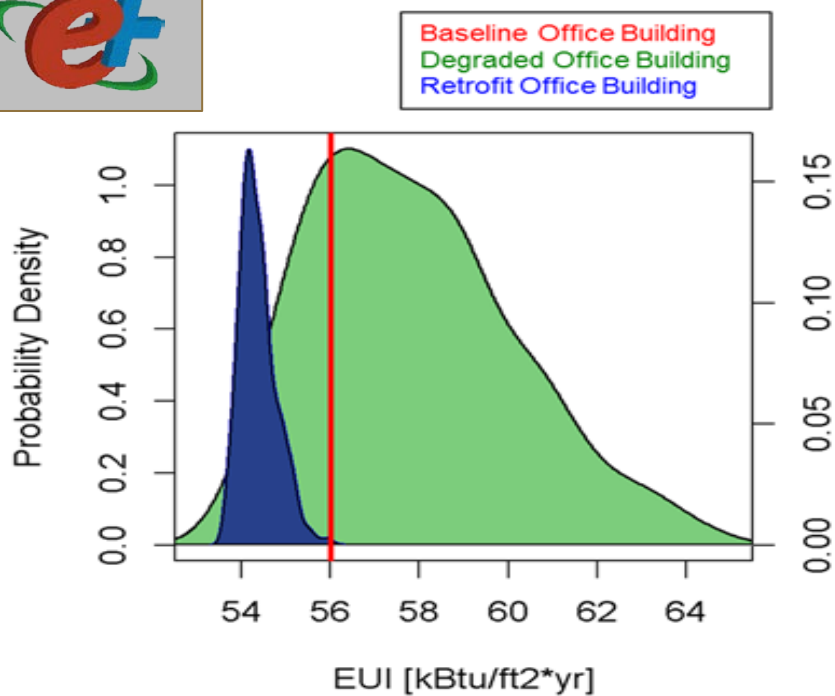
Challenge 1

Doubt/uncertainty around savings estimates and actual performance



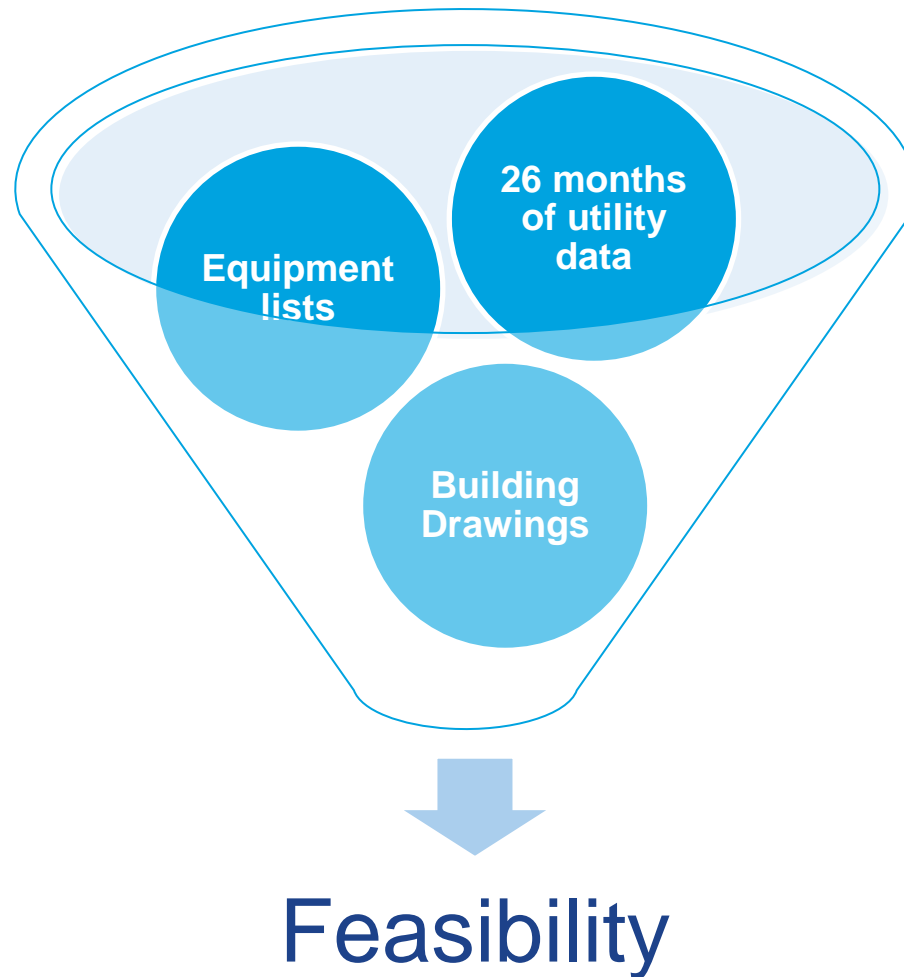
Challenge 1 – Barrier Buster

Incorporate uncertainty analysis into performance and savings estimates



Challenge 2

Data availability



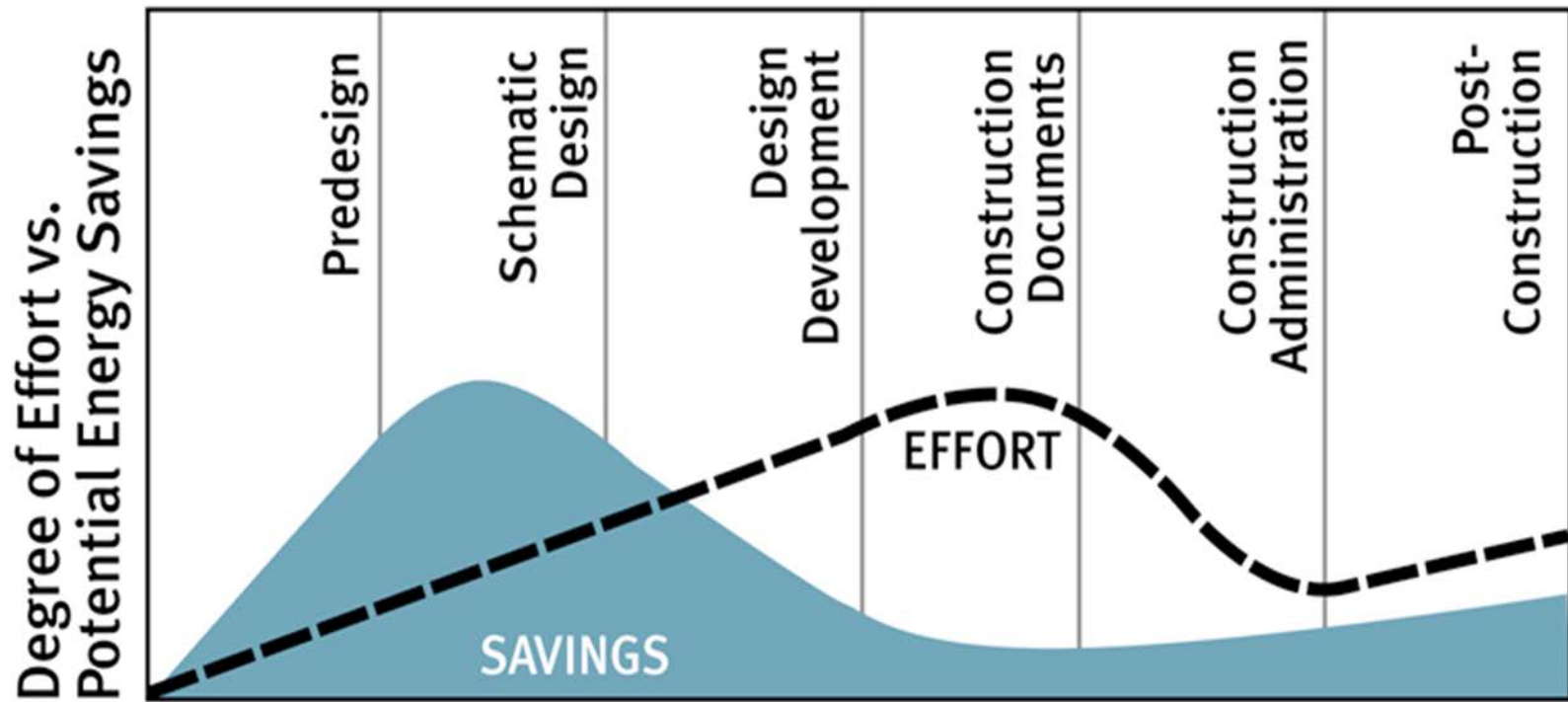
Challenge 2 – Barrier Buster

DOE efforts:

- Better Buildings Energy Data Accelerator
 - Designed to increase whole-building data access for owners/operators, especially in multi-tenant buildings
 - Addresses barrier of unavailable whole-building data
- BEDES Audit Use Case
 - Standard specification for commercial building energy audit data
 - Addresses barrier by standardizing audit data, which provide detailed building information

Challenge 3

Inconsistency in practitioner services



Challenge 3 – Barrier Buster

Clearly specifying service requirements



Standard 209
Proposed



BUILDING ENERGY
MODELING
FOR OWNERS AND
MANAGERS



Requirements

Standard 140
Modeler
Certification
Input/output
disclosure
Calibration
criteria
Process
description
Industry -
accepted
format



Procedures

Inform model
input values
Calibration
criteria and
metric check
Analysis of
EEMS
Pricing/Cost
Estimation
Quality
assurance

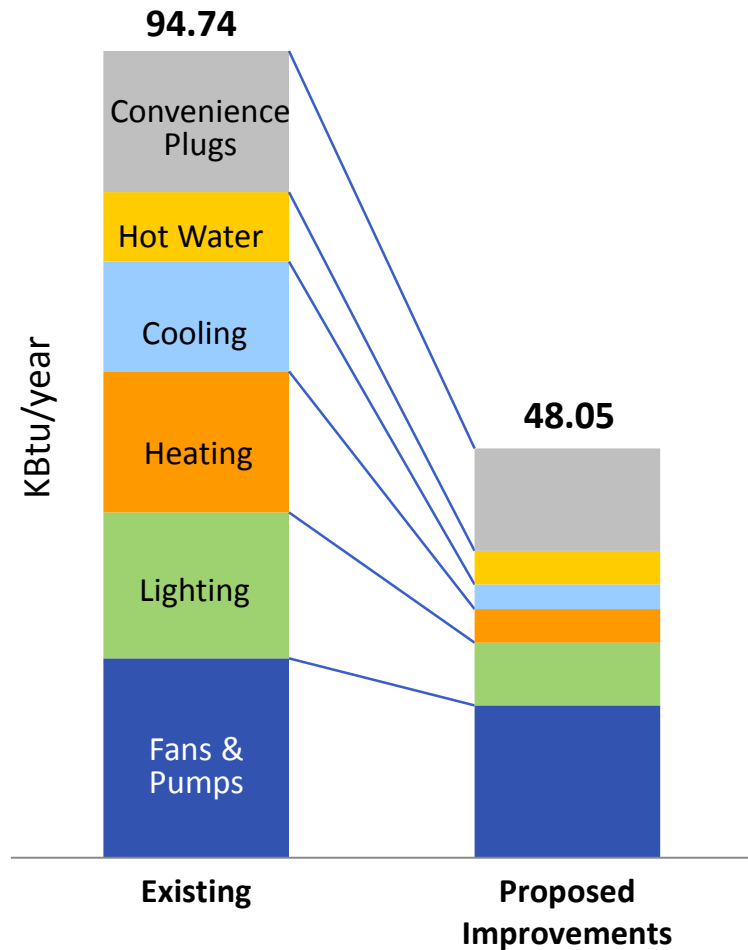
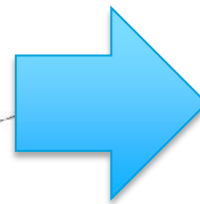
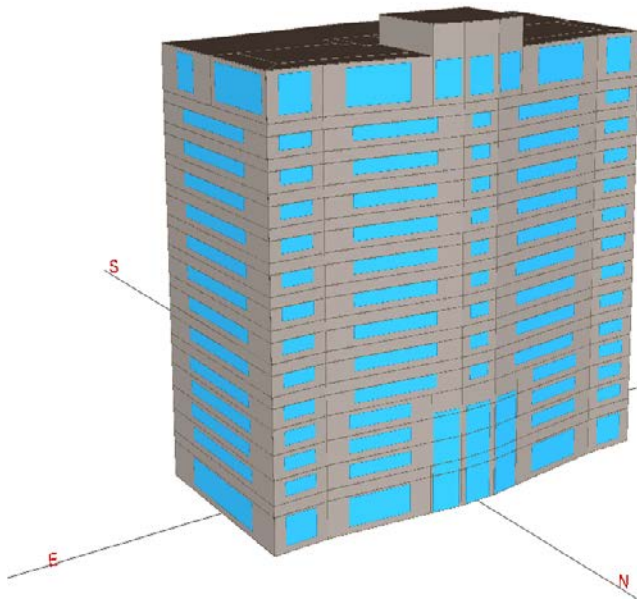


Documentation

Input file
Weather file
Scope of work
Calibration
considerations
Calibration
criteria
Signed QA
statement

Challenge 4

Inconsistency in practitioner methods



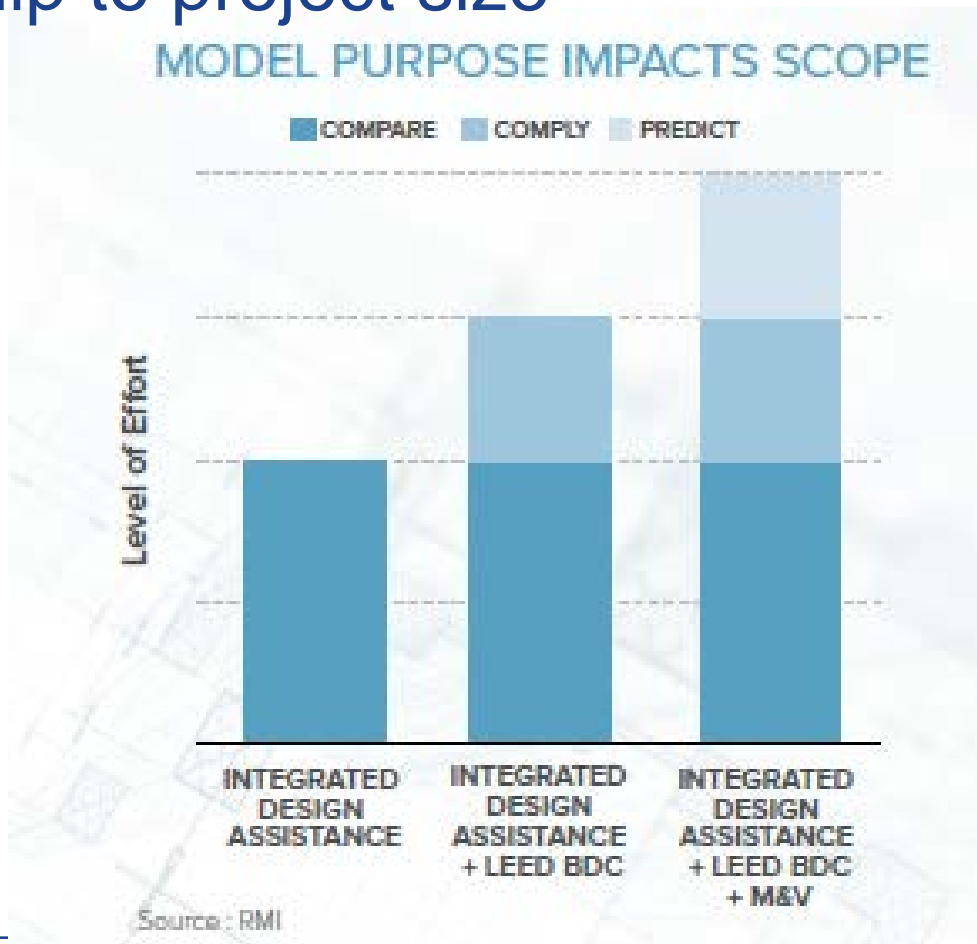
Challenge 4 – Barrier Buster

Develop knowledge waterfall and single industry repository of best practice methods



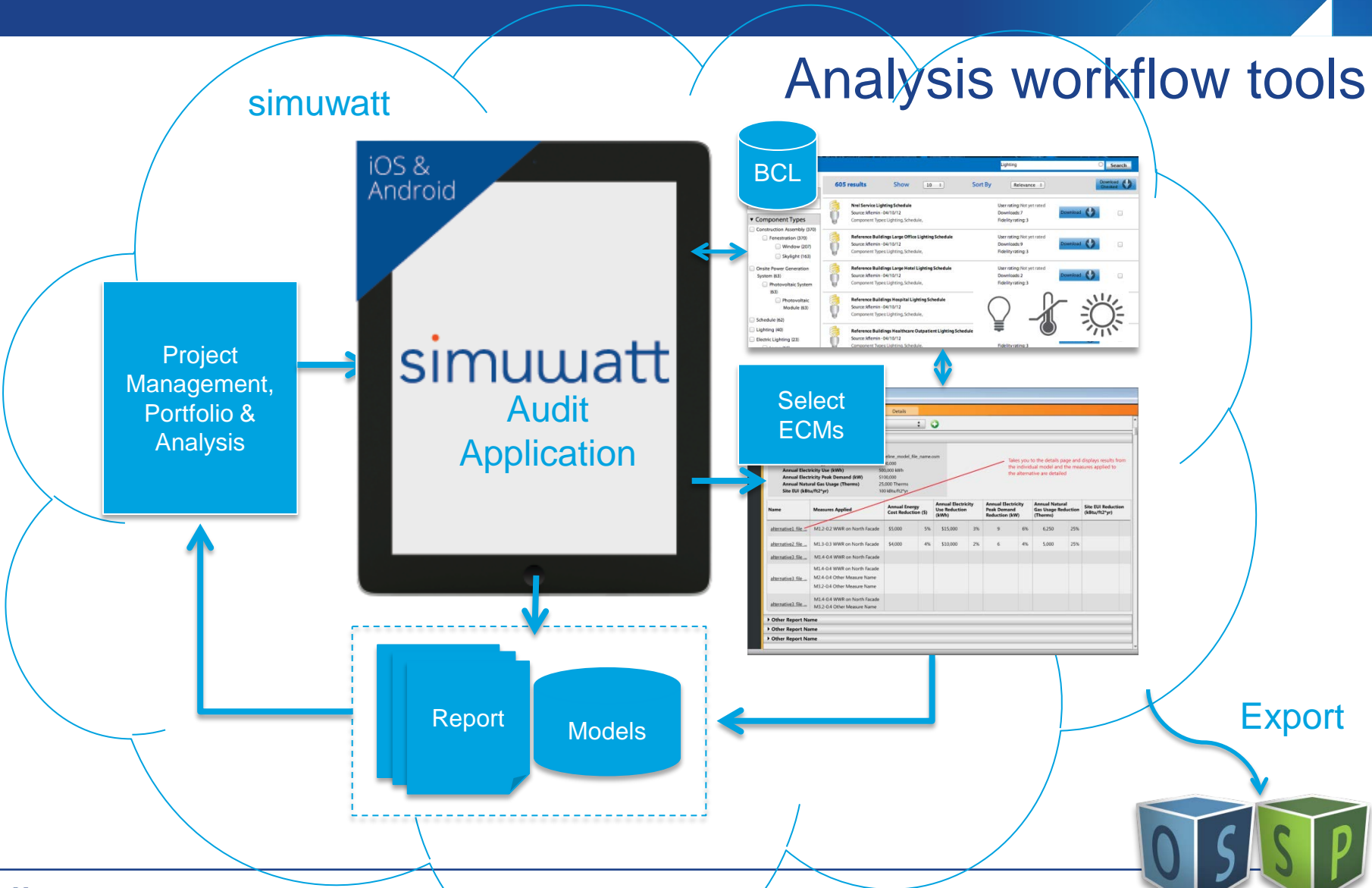
Challenge 5

Time and expense of analysis and their relationship to project size



Challenge 5 – Barrier Buster

Analysis workflow tools



Challenge 6

Transparency and clarity in a complex process – maintaining client engagement.



REDUCED FIRST COSTS	REDUCED OPERATING COSTS	IMPROVED OCCUPANT SATISFACTION
Develop synergistic combinations of measures		Decreased vacancy rate
Simplifying systems and reducing infrastructure		Decreased absenteeism
Optimally sizing building systems	Integrated building systems	Increased occupant productivity
Optimizing renewable energy systems	Energy efficient building design	Improved occupant health
Reduced change orders and call backs	Energy efficient building systems	Improved occupant thermal and visual comfort
Secure financial incentives	Lower maintenance costs	Elevated employee recruitment and retention

Challenge 6 – Barrier Buster

Resources for Owners



BUILDING ENERGY MODELING FOR OWNERS AND MANAGERS

A GUIDE TO SPECIFYING AND SECURING SERVICES

ISSUED AUGUST 30, 2013

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Practical how-to-guide
for securing BEM
services

- Value of BEM
- Defining Scope
- Developing RFP Content
- Credentialing Service Providers



Challenge 7

Resourcing commissioning and M&V – tying them back to pre-retrofit analytics



Challenge 7 – Barrier Buster

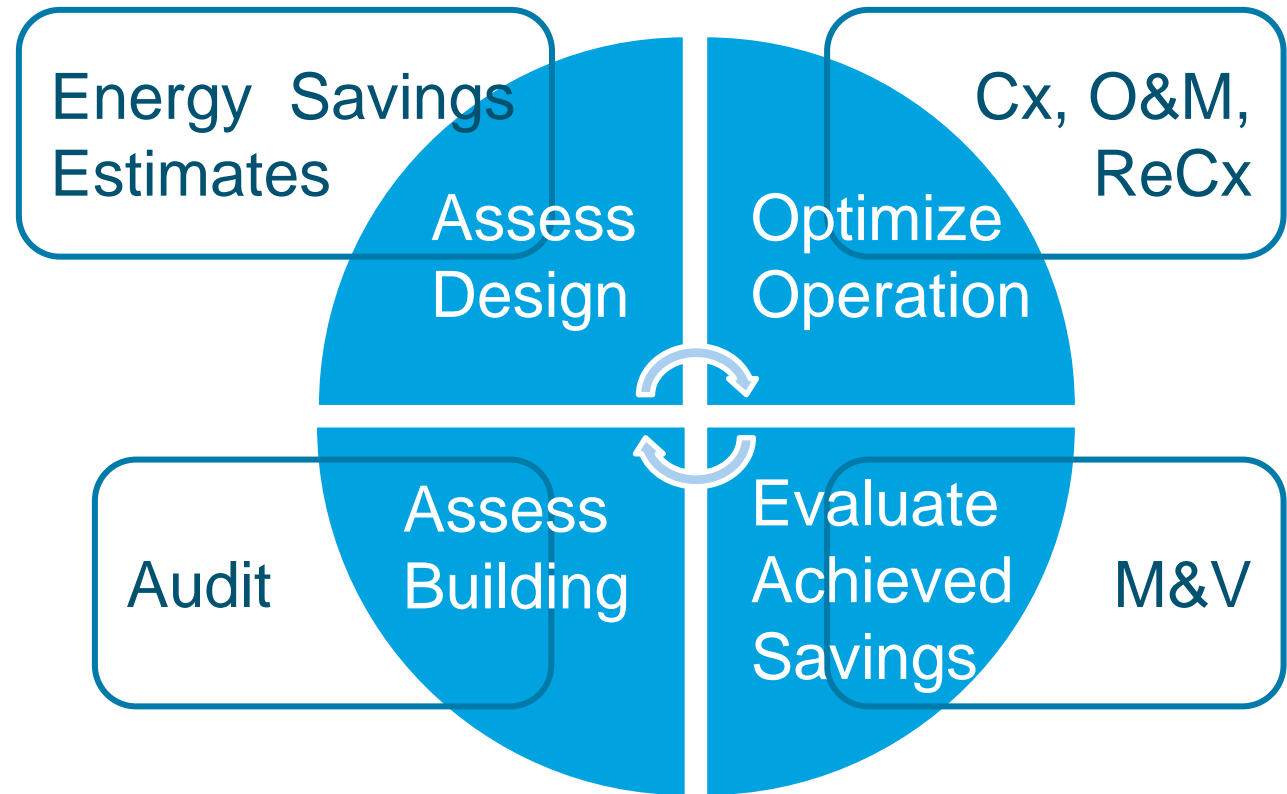
Define service requirements that close-the-loop between design intent and actual performance



Standard 209
Proposed



BUILDING ENERGY
MODELING
FOR OWNERS AND
MANAGERS



Challenges are gaps in modeling software

Automation gap—human doing work of computer

- Simple tasks: entering equipment performance data.
- More complicated: modeling an EEM.
- Additional effort and cost.
- Human errors (additional effort and cost).
- Inconsistency across modelers.

Transparency gap—black-box procedures or data

- Data and process hidden or untraceable
- Inability to diagnose and fix errors.

Degrade confidence in modeling process & results.



OpenStudio: A modeling SDK predicated on ...

Automation—eases the pain of modeling ...

- ... and of developing applications that use modeling!
- A common-core of supporting functionality for modeling
 - Importing CAD data, wiring standard HVAC systems
 - Doing parametric runs, uncertainty & optimization
 - Supports multiple engines & multiple analyses!
- All scriptable and extensible

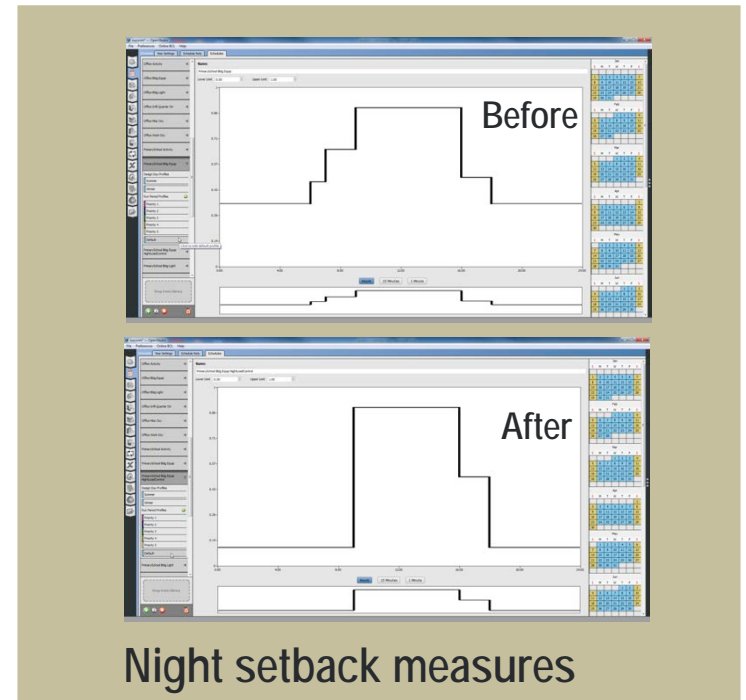
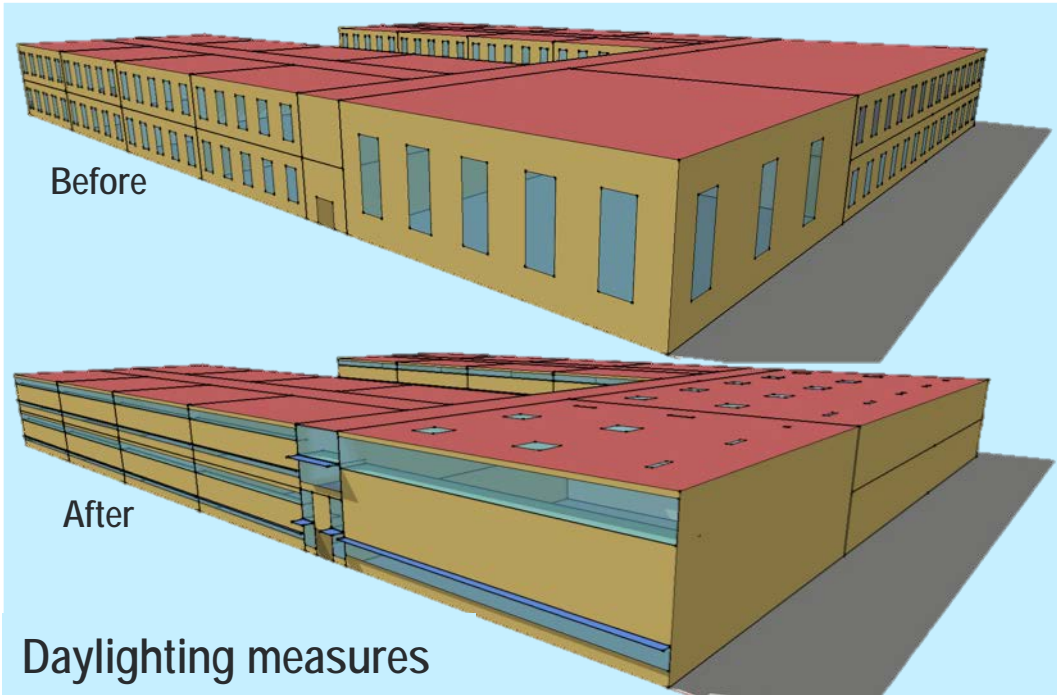
Transparency—open-source & crowd-source

- Data components live in online database
- All scripts live there too
- Everything is traceable, citable, auditable



openstudio.nrel.gov

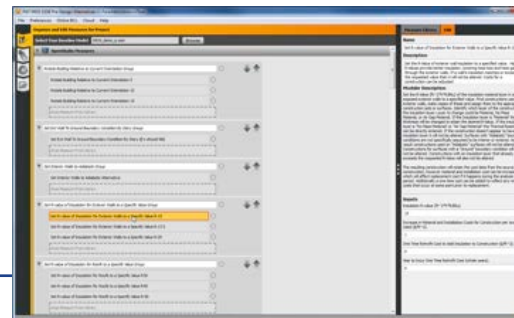
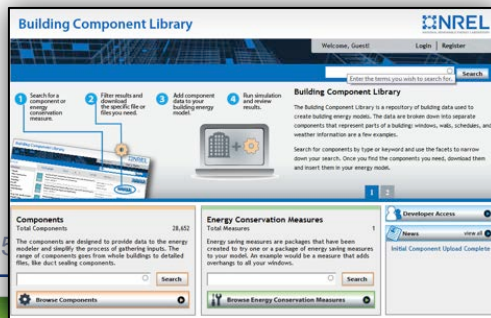
OpenStudio automation



#1. Find measures online

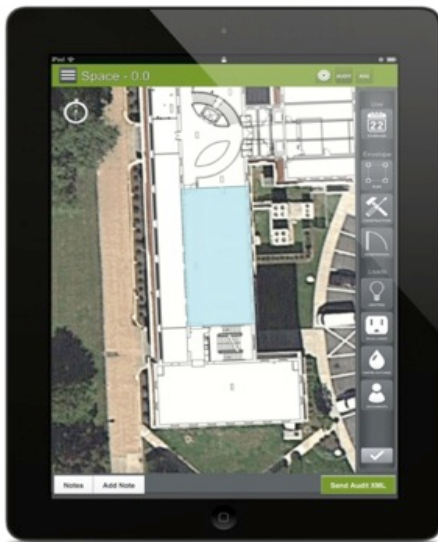
#2. Run parametrics (cloud)

#3. Sort by EUI, ROI or TMI

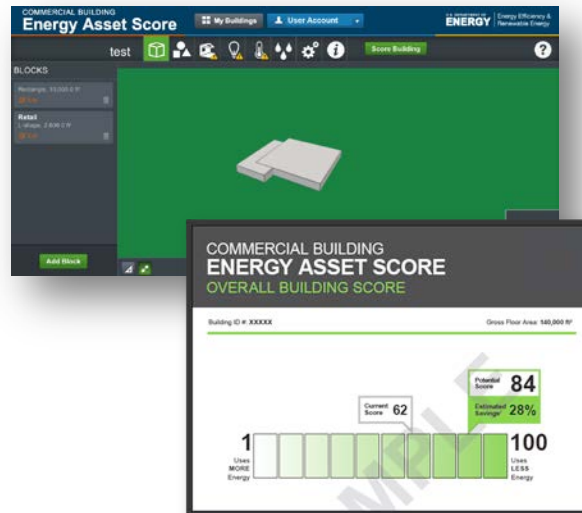


OpenStudio ecosystem

OpenStudio—eases the pain of modeling ...
... and of developing apps that use modeling!



Concept3D Simuwatt
Tablet-based auditing



DOE Asset Score
Ratings & upgrades



Sefaira Concept
Early-stage design

All from this year! Check again next year!