



Photo by : Dennis Schroeder, NREL 23250

Building Energy Modeling (BEM) Library

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Building Energy Modeling (BEM) Library

- Define and develop a best-practices BEM knowledge repository to improve modeling consistency and address training gaps
- Raise energy modeling industry “techniques” to the same high level of confidence and rigor associated with the tools used to perform the analysis (EnergyPlus, etc.)

Project Focus:

- Create a core library (structure) and develop seed materials
 - Support Federal Buildings Personnel Training Act
 - Design the repository to allow crowd-sourced content
 - Support the objectives outlined in DOE’s Commercial Building Energy Modeler job/task analysis (JTA)

Problem Statement: Inflated rates-of-return and de-rated energy savings values are currently applied to potential energy efficiency measures by building owners when evaluating project feasibility, hindering deployment.

Impact of Project: Define and develop formal, vetted best-practice modeling method resources to allow energy modelers to more confidently leverage the powerful software existing in the market.

Project Focus: Lower fiscal barriers and improve investor/building owner confidence in energy modeling results by developing the resources necessary to reduce human-introduced uncertainty in energy models.

Approach

- Address key issues hindering the credibility of BEM, as identified by industry stakeholders

Key Issues

- Owners asking for and getting the BEM services they need
- Modelers applying industry-accepted methods
- BEM workflows addressing performance risk

Distinctive Characteristics

- Documentation of best practices for core BEM topics
- Effectively-structured, electronic format, freely shared
- Owner's resources for finding and securing BEM services

Accomplishments:

- Finalized Project Plan
- Completed all 3 BEM Library outline specifications
 - Benchmarking/Quality Control (QC)
 - Calibration
 - Documentation

Progress on Goals:

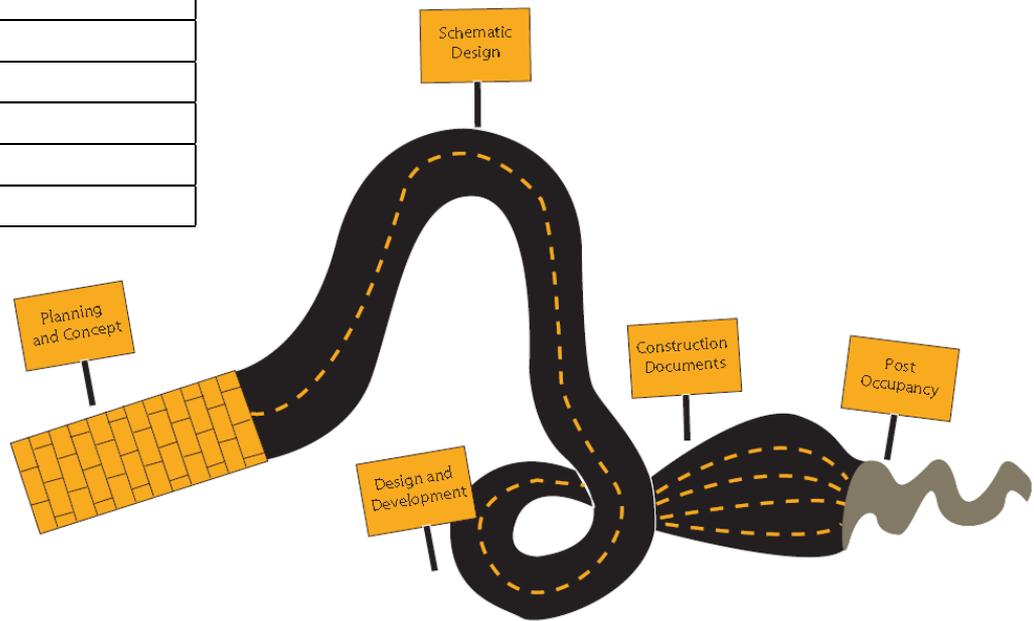
- Drafted 2 of 3 BEM Library components
 - Benchmarking/QC
 - Calibration
- Drafted 7 EEM Characterization Sheets, one more than targeted
- Completed 30% draft of Building Owner's Guide to BEM

Structure and approach for electronic publication of best practices

BEM Library Best Practices			
Terms	List of terms		
Methods	List of methods supporting tasks		
Project Phase	Key Tasks	Additional Considerations	
Schematic Design		Compliance	
		Prediction	
Design Development		Compliance	
		Prediction	
Construction Documents		Compliance	
		Prediction	
Construction		Compliance	
		Prediction	
Operation		Compliance	
		Prediction	

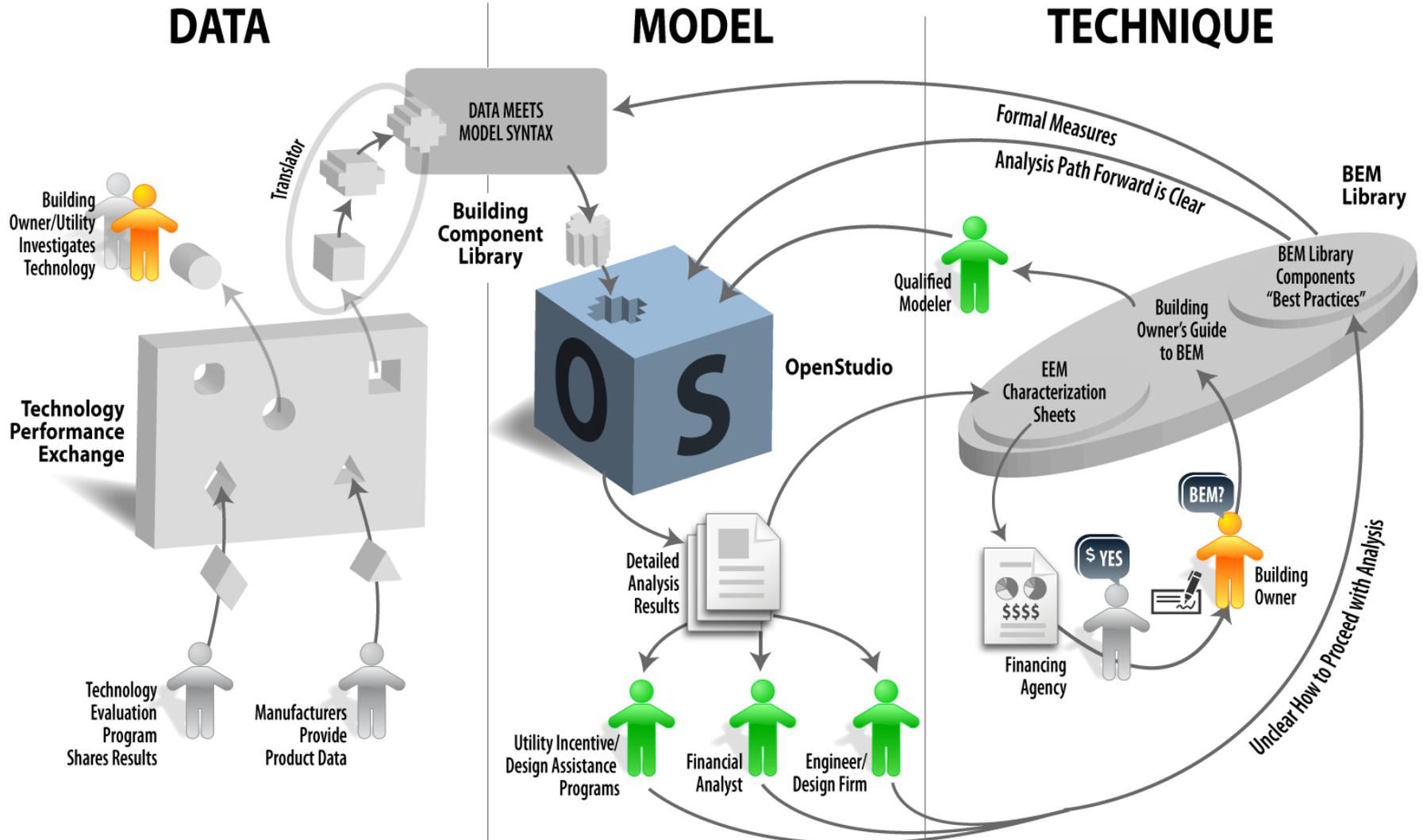
Links within framework to support mix and match approach

Links within modeling process for informing design



Accomplishments and Progress

BEM Library Project		FY 2013	
BEM Best Practice Methods and Resources	JTA Categories	Topics	Resources
	Define project objectives		
	Gather project data		
	Specify baseline building		
	Develop project alternatives with design team		
	Construct models		
	Evaluate model results	Benchmarking	Rules of Thumb
		Calibration	Case Studies
	Communicate analysis results	Documentation	
	Implementing Project		
Owner's Guide to BEM		Applications	Example OPR
		Scope Options	
		Performance Risk	Example SOW
		Contracting	



Credit: Marjorie Schott, NREL

Project Start Date:

- October 11, 2012

Project Planned Completion Date:

- September 13, 2013

Schedule and Milestones:

- All deliverables/milestones on-time and on-budget

Summary												
WBS Number or Agreement Number	19987				Work completed							
Project Number	CBI_NREL-FY13-19				Active Task							
Agreement Number	19987				Milestones & Deliverables (Original Plan)				Milestones & Deliverables (Actual)			
	FY2012				FY2013				FY2014			
	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)
Task / Event												
Project Name: Building Energy Modeling (BEM) Library												
Q1 Deliverable: Project Plan					◆							
Q1 Deliverable: BEM Library Outline Specifications					◆							
Q4 Deliverable: BEM Library Components												
Q4 Deliverable: EEM Characterization Sheets												
Q4 Deliverable: Building Owner's Guide to BEM												

Project Budget: BTO Total: \$260,000

- FY 2012: \$80,000 (carryover applied to FY 2013)
- FY 2013: \$180,000

Variances: None

Cost to Date: On schedule; 30% spent in FY 2013

Additional Funding:

- FY 2013: \$150,000 cost-share
 - Rocky Mountain Institute
 - Environmental Defense Fund

Budget History					
FY 2010		FY 2011		FY 2012	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
N/A	N/A	N/A	N/A	N/A	N/A

Partners, Subcontractors, and Collaborators:

- Subcontractors: Rocky Mountain Institute
- Collaborators: ASHRAE Standard 209P committee, EDF ICP, Deutsche Bank efficiency funds

Technology Transfer, Deployment, Market Impact:

- Creation of IBPSA-USA BOD subcommittee pending
- Clarifies methods to support EDF ICP/Deutsche Bank service requirements

Communications:

ACEEE 2012 Summer Study paper, Building Simulation 2013 paper, 2013 World Summit on Building Performance Modeling presentation, 2012 AEE Colorado Forum presentation, materials available for IBPSA-USA/ASHRAE/RMI BEM Workshops; future communications with AEE

Next Steps and Future Plans

BEM Library Project		Proposed FY 2014+	
BEM Best Practice Methods and Resources	JTA Categories	Topics	Resources
	Define project objectives		
	Gather project data	Input Data Req'ts	Model Input Scoring Matrix
	Specify baseline building		
	Develop project alternatives with design team		
	Construct models	Uncertainty Analysis	Examples with Open Studio
	Evaluate model results		
		LCCA	Examples with RMI LCCA Tool
	Communicate analysis results	Documentation	TBD
	Implementing Project	M&V	TBD
Electronic Publishing		By topic, links within Framework, links within BEM process, links with IBPSA BEMBook Wiki	
Partnerships		IBPSA-USA, IBPSA-World	
		Env. Defense Fund, Deutsche Bank	
		ASHRAE, AEE, BRE-Scotland	
		IPMVP	