The Building Energy Modeling (BEM) Sub-Program develops energy modeling tools and resources to support building design, code development and building operations to save energy.

Dec. 2015

External Influences: DOE budget, Spin-off modeling tools & applications , Energy prices, Legislation / Regulation, Private sector R&D

Objectives	Activities / Partners	Outputs	Short Term Outcome	Mid-Term Outcome	Long Term Outcome
Enhance, maintain & support open-source BEM tools EnergyPlus (E+), OpenStudio. (OS) & Radiance (RD)	Direct & shared funding to enhance, support & maintain E+, OS & RD	E+ supports latest technologies, system configurations & control strategies.	Building designers, operators, 3rd party software developers & vendors equipped with comprehensive modeling tools	Increased number of E+ & OS-based third-party apps for different use-cases.	Building industry & the larger buildings market are confident in the results produced via energy modeling & regularly use it to design & operate more energy efficient buildings.
	Competitive funding for BEM R&D.	Spawn-of-E+ uses Modelica & FMI to support third-party models & control ecosystem.		Increased use of BEM (esp. E+ & OS based tools) by government, standards & professional organizations to develop codes, industry standards & guidelines.	
	Direct & shared development & codification of test methods	OS SDK supports E+ & RD. OS BCL has many measures. OS app supports model creation. OS server supports large scale analysis.			
Test, validate, characterize & improve BEM engine accuracy.	Direct & shared empirical testing in test facilities with national labs.	E+ accuracy characterized & improved where necessary.	Standards orgs. (ASHRAE / IECC) have the data & techniques to validate engine accuracy & codify certification & testing.	Increased use of BEM (esp. E+ & OS-based tools) by utilities develop & administer programs	
	Direct support for BTO apps, e.g., HES, Asset Score & Scout analysis tool.	Updated & expanded analytical & comparative tests in ASHRAE 140			
	Competitive funding for 3rd-party E+,OS, RD-based apps	Empirical test in ASHRAE 140	Developers & vendors are equipped with add-on tools & technical support to innovate applications	Increased # of products & applications built by 3rd party vendors	
Increase use of BEM & DOE tools via market partnerships.	Technical support for 3rd-party E+, OS, RD-based apps	Online resources for BEM community: BEM Library, UnmetHours Q&A site, tools & training directory, & AIA DDx.	Modelers & educational trainers better understand how to use E+ & OSl & the benefits	Increased # of building professionals that productively use BEM (especially E+ & OS-based tools) in building design & operations.	
	Support resources for energy modelers via org. partnerships (IPBSA, ASHRAE, AIA)				

Impact

By 2020, increase use of advanced energy simulations to:
-50% of gross sq. ft. in new bldgs. and deep retrofits achieving 20% EUI reduction
-2% of gross sq. ft. for continuous commissioning and dynamic bldg. control

Enable the development of cost-effective technologies that will be capable of reducing bldg. EUI 30% by 2020

Reduce EUI in all bldgs. 30% by 2030

Building Energy Modeling Research and Development Logic Model

OBJECTIVE	ACTIVITIES	KEY OUTPUT	SHORT-TERM OUTCOME	MID-TERM OUTCOME	LONG-TERM OUTCOME
Improve Open-Source Tools	BEM R&D; EnergyPlus, Modelica, and OpenStudio	Improved EnergyPlus, Modelica, and OpenStudio	Accessible DOE tools	Foundational DOE Tools	Market depends on tool outputs to improve efficiency
Improve BEM Engine Accuracy	Develop test methods National labs test empirical suites	Data, simulation, and empirical suites meet ASHRAE 140	Validated products	Accurate BEM engine	
Increase tool usage	Create add-on tools Support and expand user community	Tools meet market needs Best practices	Tool benefits understood	Tools widely used	

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EXTERNAL INFLUENCES

- DOE Budget
- Spin-off Products
- Market Incentives
- Legislation / Regulation
- Energy Prices
- Private R&D