



CEEE/EÇEM SEMINAR SERIES

SUPPORT OF ENERGY RETROFIT DECISIONS AT MULTIPLE SCALES

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Abstract

The talk chronicles two recent projects conducted by the research group of Dr. Augenbroe dealing with retrofit decision-making at different levels of aggregation. Inspection of the projects reveals the contrast in resolution and scope of decision making that is typical of different retrofit contexts. At the aggregate level the benchmarking across a portfolio of buildings is supported including the selection of candidates for improvement. Our approach articulates a scalable methodology as the core of a retrofit decision-making environment to support two distinct levels of analysis:

(1) Aggregated level decision-making by policy makers and planners. This analysis inspects buildings in a large portfolio to inspect the effects of different energy improvement scenarios over time. At this level, one can decide which level of intervention in certain categories of buildings is necessary to reach an overall energy improvement target.

(2) Individual level decisions by the building owner, i.e. the selection of the right mix of energy efficiency measures (EEM) while adequately recognizing financial risks associated with them. At this level explicit information about performance risks related to certain EEMs is made available to enable risk-conscious selection of measures.

In many cases the underlying building energy model may not be accurate enough to correctly analyze an EEM in a specific building, especially when accurate information about energy savings potentials and costs of EEMs is necessary to make the right investment decisions. In those cases the reduced order model parameters need to be identified and calibrated. We will show that using a Bayesian technique offers a unique advantage if expert experience and judgment can be leveraged adequately.

This result is vital to support risk-conscious decision-making for retrofit stakeholders. The talk will summarize the findings of two complementary approaches at aggregate and individual building scales.

Godfried Augenbroe, Professor, School of Architecture, Georgia Institute of Technology: Prof. Augenbroe has a 35 year track record of teaching and research of modeling and simulation of buildings and their performance assessment. He is internationally recognized in promoting professional use of building simulation and has served as board member of the international building performance simulation association (IBPSA). In the nineties he coordinated four major EU funded consortia of academic and industrial partners, in the fields of design tool interoperability (COMBINE, 1990-1995), energy performance simulation, outsourcing and project planning. He has been main advisor of more than 27 PhD graduates in Europe and the USA. He teaches graduate courses and conducts research in the fields of building performance concepts, computational building simulation, indoor air quality, intelligent building systems, uncertainty and risk, system monitoring and diagnostics. He serves on the scientific board of five international journals. He has published over 160 refereed papers and published three books. He has held appointed visiting professorships at five universities in Europe and Asia, was member of the accreditation boards of architecture colleges in the Netherlands. He has served on national research program assessment panels in the UK and Finland, and was recently inducted as IBPSA fellow.

Augenbroe has obtained major research grants in Europe and the US. Most recently he received the prestigious NSF EFRI-SEED award "Risk conscious design and retrofit of buildings for low energy", \$2.0 Million, 2010-2014.

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