Commercial Building Energy Saver:
An Energy Retrofit Analysis Toolkit

**Mary Ann Piette, Tianzhen Hong, Yixing Chen, Sang Hoon Lee
Rongpeng Zhang, Kaiyu Sun, Sarah Taylor-Lange, Phillip Price
William Fisk, Rengie Chan, Norman Bourassa, Margarita Kloss**

Small commercial buildings in the United States consume 47% of the total primary energy of the buildings sector. However retrofitting these buildings poses a huge challenge for small and medium-sized enterprises as building owners usually lack the expertise and resources to conduct on-site energy audit to identify and evaluate cost-effective energy retrofit technologies. This seminar presents the Commercial Building Energy Saver (CBES), an energy retrofit analysis toolkit, which calculates the energy use of a building, identifies and evaluates retrofit measures in terms of energy savings, energy cost savings and payback. The toolkit provides a rich set of features as follows: (1) Energy Benchmarking provides an ENERGY STAR score for the building and how it compares with other peer buildings in California; (2) Load Shape Analysis identifies potential building operation improvements using statistical analysis of the building's 15-minute interval electricity use data; (3) Preliminary Retrofit Analysis searches a pre-simulated database for retrofit measures based on investment criteria; and (4) the Detailed Retrofit Analysis performs EnergyPlus simulations to evaluate energy savings of user configurable energy conservation measures considering the actual building characteristics and operation schedules. The CBES Toolkit includes a web app (cbes.lbl.gov) for end users and the CBES Application Programming Interface for integrating CBES with other energy software tools. The object oriented software architecture of CBES enables its expansion to cover more building types, more climates, and more building technologies in future.

Mary Ann Piette is the Director of the BTUS Division. She is a Staff Scientist and the PI of the CEC sponsored CBES project. Tianzhen Hong is a Staff Scientist and Deputy Lead of the Simulation Research Group. He is the lead of the CBES software development. Yixing Chen is a postdoc and the chief software developer of the CBES. Sang Hoon Lee is a Senior Scientific Engineering Associate and the developer of the Database of Energy Efficiency Performance (DEEP) for preliminary retrofit analysis. Rongpeng Zhang is a postdoc and the developer of the web app for the detailed retrofit analysis. Kaiyu Sun is a Scientific Engineering Associate and the developer of the automatic model calibration for CBES. Sarah Taylor-Lange is a postdoc and the coordinator of the CBES development. Phil Price is a Staff Scientist and the developer of the load shape analysis. William Fisk is a Senior Scientist and led the IEQ measurement task of the project. Rengie Chan is a Research Scientist and the developer of qualitative impact of retrofit measures on IEQ. Norman Bourassa is a Project Manager and led the city partner demonstration task. Margarita (Gari) Kloss is a Program Manager and the CBES project manager.

Thursday, July 2nd
At 12:00pm in Bldg. 90, Room 3122
*For further information about this seminar please contact
Tianzhen Hong: thong@lbl.gov*