

# Stephen Bourne, Ph.D. Student

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Advised by Dr. Atila Novoselac



**IGERT Affiliate**

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**Web:** <https://webpace.utexas.edu/sb35762/www>

## Education

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- Ph.D. University of Texas at Austin, CAEE, 2013
- M.S. University of California at Berkeley, CE, 2009
- B.S. University of California at Berkeley, CE, 2007

## Awards

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- William Robert Welty Scholarship
- ASHRAE Graduate Student Grant-In-Aid
- UT Graduate School Recruitment Fellowship
- THRUST 2000 Graduate Fellowship in Engineering
- HILP Fellowship, U.C. Berkeley

## Publications

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- UT Energy Forum 2011 - Radiant Barriers

## Experience

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- Graduate Research Assistant, Pecan Street Project Inc.
  - Assist with modeling for the Home Research Lab
  - Model potential HVAC, DHW, energy-related systems
- Research Associate, Center for Sustainable Design, University of Texas at Austin School of Architecture
  - Engineering support for Thermal Façade Lab

## Studies

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### Masters

- Civil Engineering, Engineering and Project Management
- Engineering for Business and Sustainability  
<http://sustainable-engineering.berkeley.edu>

### Doctoral

- **Civil, Architectural, and Environmental Engineering**
  - Design of Energy Efficient/Healthy Buildings
  - Indoor Air Quality/Transportation and Control
  - Modeling Air/Pollution Flow in Buildings
  - Airflow Modeling/Incompressible Flow
  - Energy Simulation in Building Design

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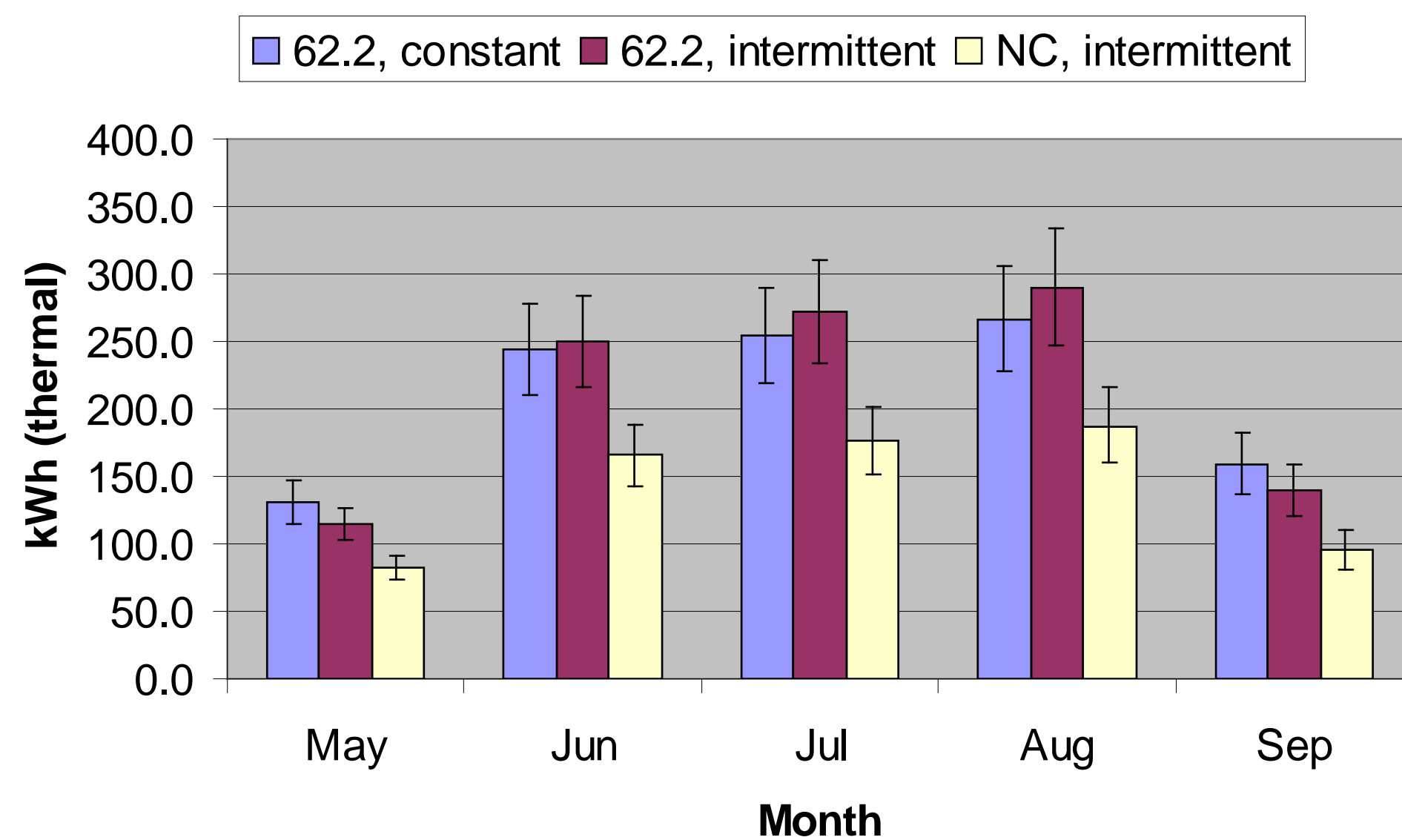
Web: <https://webpace.utexas.edu/sb35762/www>

## Completed Research Work

### 1) Modeling Effects of Intermittent Ventilation

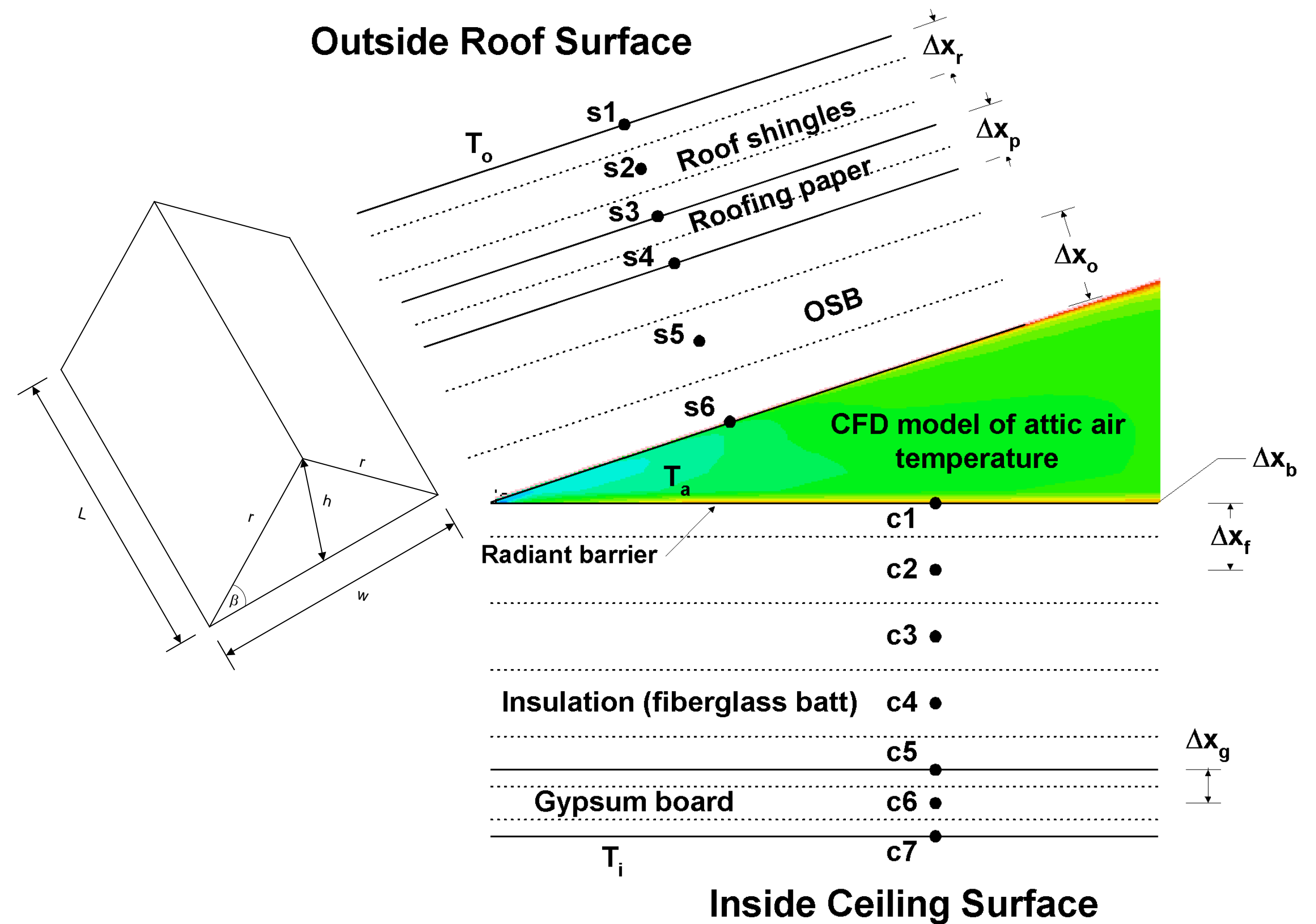
- Compares costs of variable ventilation systems
  - Increase ventilation during times of poor IAQ
  - Decrease ventilation during times of high OAT
- ASHRAE 62.2-compliant/non-compliant schemes
- Results show high dependence on diurnal temperature swings, RH

San Antonio, TX - Monthly Ventilation Energy Costs



### 2) Numerical Model of Attic Heat Flux

- Finite-difference model of attic structure
- Predicts heat flux from roof through attic ceiling
- Basis for continued ASHRAE-supported research
- CFD modeling used to predict attic airflow



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## Ongoing Research Work

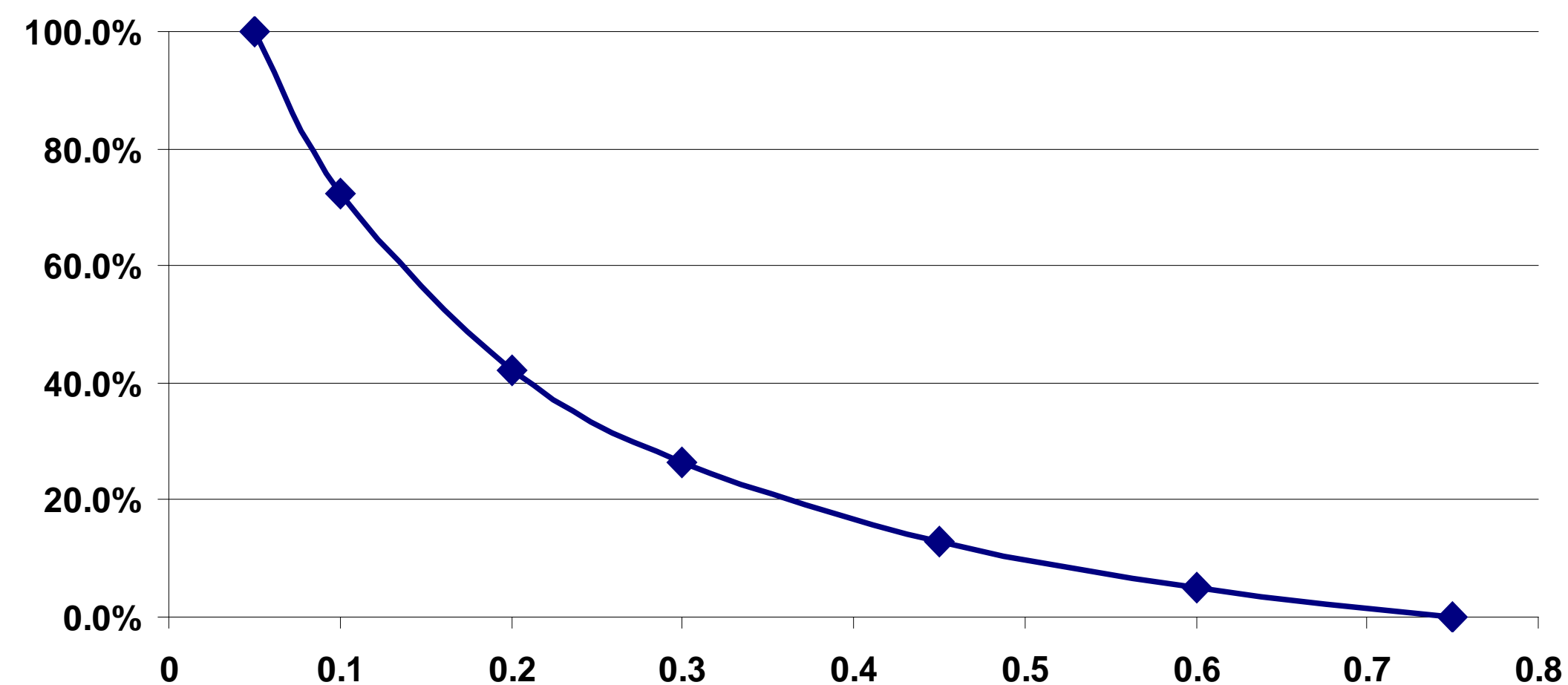
### 1) Impact of Dust on Radiant Barrier Emissivity

- Spawned by work with attic numerical model
  - Model predicts non-linear sensitivity of radiant barrier performance to emissivity changes
- Equipment co-funding by ASHRAE GIA

#### Goals

- Determine emissivity changes due to dust
- Develop best practices for installation and maintenance

Radiant Barrier Effectiveness v. Emissivity

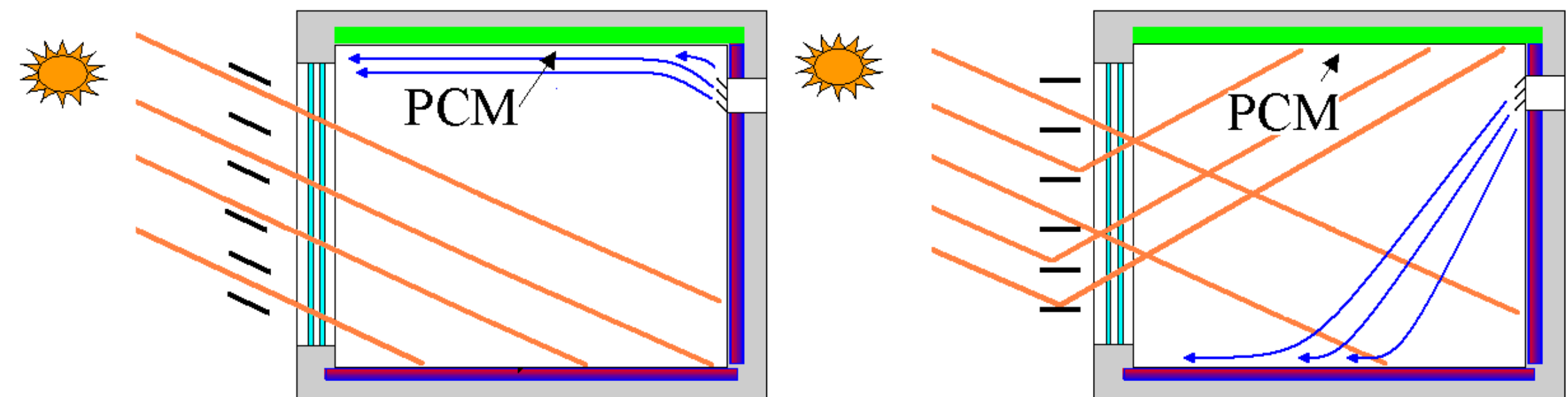


### 2) PCM Integration Into Building Materials

- Allows high-capacity thermal storage
- Model using numerical heat transfer model and CFD
- Validate with Façade Thermal lab

#### Goals

- Model PCM performance in building components
- Develop charge status measurement methods
- Model charge/discharge controls
- Integration of controls into HEM system



Application of active controls for ceiling tile PCM



The Thermal Façade Lab at the SOA