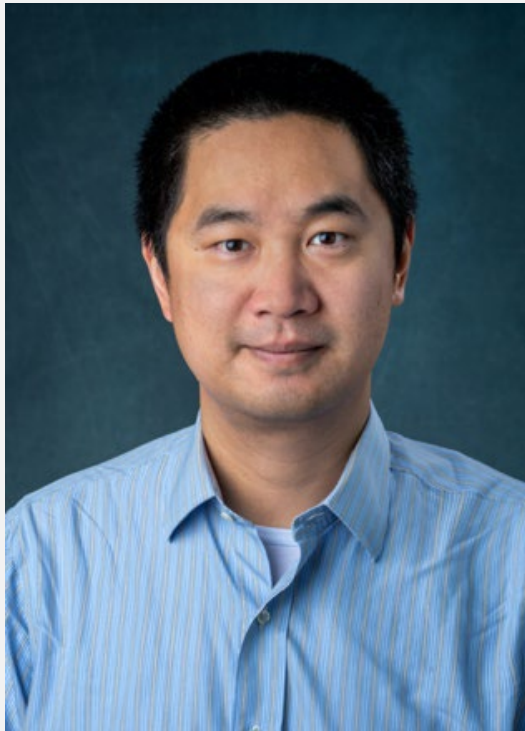




# Multi-Scale Modeling for Smart, Sustainable and Resilient Cities



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**Seminar: Thursday, Feb 23, 10:00 AM, 125 Reber**

## ABSTRACT

This presentation introduces our recent research in developing and applying the Modelica-based multi-scale modeling technology for the optimal design and operation of smart, sustainable, and resilient cities. Then we will demonstrate our research for various applications. For sustainability, we will introduce four DOE projects in developing Modelica models for energy efficient data centers and grid-interactive efficient district energy systems and an NSF project in performing multi-scale building energy modeling to reduce operational carbon emission considering the dynamic composition of carbon in electricity generation. For smartness, we will show an NSF project on developing open-source smart, sustainable, and connected community virtual testbed by integrating energy, transportation, and communication networks; as well as an NSF project in developing biomimicry inspired smart garden alleys using sensor network and machine learning for Makassar City, Indonesia. For resilience, we will discuss an NSF project in developing modeling and control methods to turn a net zero energy community into a resilient community; as well as a project in investigating ventilation strategies to provide protections against COVID while balancing the energy, cost, and CO<sub>2</sub> emission. At last, we will introduce some new initiatives for collaboration, including the new Baltimore Social-Environmental Collaborative (BSEC), one of four DOE Urban Integrated Field Laboratories.

## BIOGRAPHY

Dr. Zuo is a Professor in Architectural Engineering and Mechanical Engineering, as well as the Associate Director for Research of Global Building Network, which is an initiative of Penn State and United Nation on high performance buildings. Dr. Zuo also holds a joint appointment at the Community and Urban Science Group at the National Renewable Energy Laboratory (NREL) and was a former Scientist at Lawrence Berkeley National Laboratory (LBNL).