
Thermal Mass and Its Effect on the Whole Building Energy Performance, Parts I and II

Jan Kosny

ABSTRACT

It is widely known that thermal mass effects appear in buildings containing logs or having walls, floors, and ceilings made of heavy masonry and concrete. For many U.S. homeowners, living or working in massive buildings could be a relatively new experience. Some architects may call this technology passive solar architecture, others call it green or environmental architecture, or for some it is their daily bread (especially those of European heritage). In certain climates, massive building envelopes—such as masonry, concrete, earth, and insulating concrete forms (ICFs)—can be one of the most effective ways to reduce building heating and cooling loads. Economical and environmental advantages of the reduction in the whole building energy consumption are obvious. Very often energy savings can be simply achieved in the design stage of the building and for relatively low cost. Reductions in local heat losses through the building envelope combined with optimized material configuration and the proper amount of thermal insulation in the building envelope help to reduce the building cooling and heating energy demands and building-related CO₂ emission to the atmosphere.

This workshop is organized to initiate a professional discussion about eventual benefits of the application of massive technologies in U.S. buildings. It is critical to gather at this workshop both proponents and skeptics of using thermal mass to reduce building energy consumption.

The workshop will focus on the following topics:

- *Builders using massive technologies will have a chance to express their opinions on construction costs, labor intensiveness, and energy performance of their buildings versus conventional ones.*
- *Several available massive building envelope technologies will be presented at this workshop*
- *Passive solar architects will demonstrate how simple it is to use thermal mass in residential buildings.*
- *Insulation material producers will learn that thermal mass and insulation are natural allies. The better a building is insulated, the higher are the chances for energy savings (thermal mass will be much more energy efficient than lightweight building envelope technologies).*
- *Structural engineers will discuss the advantages of massive construction over traditional wood-framed assemblies in regions of frequent hurricanes or seismic zones.*
- *Results of field experiments on energy performance of lightweight and massive wall systems will be presented and discussed.*
- *Prescriptive data on potential energy and CO₂ emission savings in buildings using thermal mass will be presented.*
- *Designers will have a chance to learn which technologies and material configurations are most energy efficient.*

Jan Kosny is with Oak Ridge National Laboratory.