

# **Investigation of Thermal Performance of Green Roof Systems and Their Synergistic Benefits with Solar Panels at SIUE Campus**

Serdar Celik<sup>\*1</sup>, Susan Morgan<sup>1</sup>, Bill Retzlaff<sup>1</sup>

<sup>1</sup>Box 1805, Southern Illinois University Edwardsville, Edwardsville, IL 62026

<sup>\*</sup>Corresponding Author, [scelik@siue.edu](mailto:scelik@siue.edu), (P) 618.650.2584

The effect of building insulation on cooling and heating energy consumption has become more significant with increasing energy costs and global warming awareness in the past decade. As a response to that, insulation technologies have been improving, as well. Today, most of the insulation materials available in the market are synthetic. However, there also exists a natural insulation method that is sustainable, eco-friendly, and effective if applied right. This method is called the green roof technology, where the roofs of building envelopes are covered with plant canopies. Green roofs have proven to provide a number of benefits such as reducing heating and cooling energy costs, reducing storm water run-off, filtering pollutants and CO<sub>2</sub> out of the air, decreasing the heat-island effect in large cities, and increasing the lifespan of roofing materials.

One of the main advantages of green roofed buildings is the energy savings due to the reduction in required cooling and heating loads in respective seasons. At Southern Illinois University Edwardsville (SIUE), thermal benefits of green roofs are being studied both experimentally and theoretically. Performances of different green roof systems with varied growth media, plant type, and system depth are investigated. This study portrays thermal resistance values of green roof combinations with varied growth media and plant types.

Recently, a new project on investigating synergistic benefits of green roofs and solar panels has also been launched at SIUE. This study aims to quantify thermal benefits of green roofs on the building and their energy output enhancement benefits on the solar panels.