

Evaluating the thermal performance of residential green roof systems.

D. Murphy, B. Ferando, V. Jost, K. Luckett, S. Morgan, S. Celik, and W. Retzlaff

In order to determine the thermal performance of residential green roofs, eighteen shingled roof models were constructed at three different slope angles, 1°, 20° (5/12), and 40° (10/12). A modular green roof system designed for residential roofs was installed on nine of the roofs. The roof models were divided into three replications in a completely randomized design. Each replication includes two roofs at each slope angle, one of which is fitted with a green roof and the other a conventional shingled roof model. The green roofs were planted with mixed plantings of seven *Sedum* species: *S. kamtschaticum*, *S. reflexum*, *S. sexangulare*, *S. album*, *S. spurium*, *S. floriferum* 'Weihenstaphaner Gold', and *S. immergrunchen*. Temperatures of the undersides of each of the eighteen roof decks were monitored at midday once a week for five months. We have determined that the green roofs were significantly cooler than the conventional roofs during this study period. We also found that the 1° slope was cooler than the other two slope angles on three measurement dates for the conventional shingled roof models and on one measurement date for the green roofs.