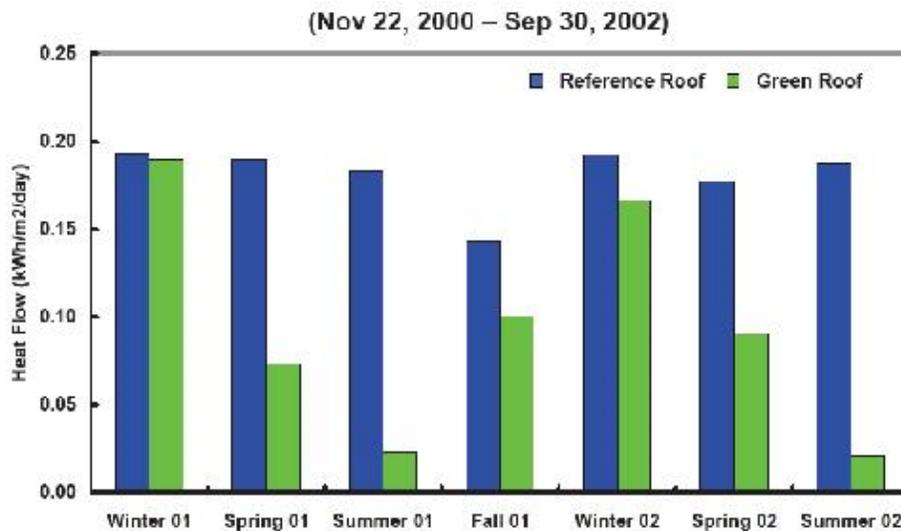


Green Roof Thermal Performance

Green roofs reduce heat transfer between building and outside environment. Reduction in heat transfer leads to energy savings and cost reduction for the building owner.

Green roof energy efficiency is illustrated by a study in Ottawa, ON, which documented building energy use for space conditioning with a green roof and one with a conventional roof. The average daily energy demand for space conditioning due to the heat flow through the conventional roof was 6.0-7.5 kWh/day (20 500 – 25 600 BTU/day) . However, due to the insulating capacities of the vegetated roof, heat flow was moderated and decreased the average daily energy demand to less than 1.5 kWh/day (5 100 BTU/day); a 75 % reduction (Liu & Baskaran, 2003). Over the entire year, total energy demand is estimated to decrease by 1 % with a 0.5 % reduction in fall/winter season and a 6 % reduction in the spring/summer months (Alcazar & Bass, 2005).



Green Roof Thermal Performance

Differences in energy savings between warm and cool months is due to the roofs thermal properties. Green roofs have a greater potential for reducing heat gain rather than preventing heat loss in the fall and winter. A green roof in Ottawa reduced heat gain by 95 % compared to a heat loss reduction of 26 % (Liu & Bass 2003). Similarly, Del Barrio (1997) noted that green roofs have a greater affinity for preventing heat gain rather than heat loss. Differences in seasonal thermal performance could be due to plant death in the fall and winter months, thereby reducing the amount of heat trapped by the green roof.

In addition plant coverage, substrate properties are crucial in green roof thermal performance. Results from a study on a green roof in the Mediterranean region noted that soil thickness, density and moisture content all influence roof thermal conductivity. Thermal conductivity increases with soil density and decreases with increasing soil moisture content. Thus, selecting light soils with lower density but high field capacity will decrease thermal conductivity (Del Barrio, 1997).