Benedictine Women of Madison
Uniting Through Christ

Solar Heat Gain

It wasn't until early in the 17th century, when Galileo stated that the earth revolves around the sun, that humans began to understand the power of the sun. Now, centuries later, not only do we realize we have the ability to harness the sun's energy, we also know we must harness it in such a way that does not further damage the universe. As the design of the new monastery building evolved, a great deal of attention was paid to the sun and its effect on heating, cooling, lighting and shading the building.

Solar heat gain *refers to the increase in temperature in a space, object or structure that results from solar radiation. The amount of solar heat that a building gains increases with the strength of the sun and the ability of any intervening material to transmit or resist the radiation.*

When sunlight strikes an object like a roof, for example, the roof absorbs the short-wave radiation from the sunlight and re-radiates the heat at longer infrared wavelengths. This effect is often referred to as the *greenhouse effect* because it is like the heat gain that is experienced within a glass greenhouse. The *greenhouse effect* is a well-known contributor to global warming.

Here are some of the ways that solar heat gain was addressed in the monastery building:

- Most flat-roofed buildings today have dark tar and asphalt or membrane roofs. The flat roof portion of the new monastery building is a ***white*** membrane designed to minimize the building's solar heat gain. Although the extra heat of a dark roof is desirable in winter, what is gained in heat in the winter does not offset the energy needed to cool the building the other three seasons of the year. The white roof relieves the greenhouse effect.
- Each window of the new monastery building was custom tinted based upon its orientation to the sun. This reduces glare and minimizes solar heat gain inside the building. Neither draperies nor blinds should be needed in the building.
- The monastery's green roofs are another part of reducing the building's solar heat gain. The planted roofs were designed to insulate against absorbing heat, and the pavers used on the roofs were specifically chosen for their ability to reflect heat.
- The parking lot was another area of concern. To meet LEED standards, either the parking lot had to be smaller or a reflective surface needed to be used. Otherwise, the parking lot could contribute to global warming. A compromise was reached that balanced the higher cost of concrete (a white reflective surface) with the solar heat gain of asphalt. Therefore almost half of the parking area is concrete and the other half asphalt containing recycled tire rubber.

In addition to reducing heat gain throughout the monastery building, photovoltaic cells were installed to capture the power of the sun and generate energy for the building.

– Neal Smith, executive director, administration
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