

## CASE STUDY:

*Science Museum Renewable Energy Project*

Science House, a four-season, 1,200-square-foot building located in the Science Museum of

Minnesota's 1.2-acre outdoor science park, **The Big Backyard**, will operate as a public laboratory, classroom, exhibit area, or a special events space for the park depending on the need at any given time. Science House is both a versatile program space and an environmental experiment. It is designed to operate as a zero-emissions building (ZEB). ZEBs produce all of their energy needs on an annual basis.

Its structure includes a 30-foot tower and galvanized aluminum siding. Other design features include window placement that provides for maximum natural lighting, cream-colored walls, and sensors that automatically increase or decrease the lights as needed. Window placement to maximize natural lighting also helps to increase natural heat and decrease the need for heat to be generated artificially.

All of the technologies used in the construction of this building are easily replicated. The designers intended for visitors to the structure to be able to walk away with ideas that they could implement, they weren't exorbitantly expensive or difficult to implement. It will expose professionals as well as the general public to concepts of energy conservation and renewable energy at the household or business level.

While there are other structures, such as model homes, that incorporate renewable energy technologies, they are only open for a period of time. The center on the other hand will be open to the public at all times.

The Museum intends that Science House contribute to the civic conversation about how buildings can advance both in the benefits provided to their inhabitants and to the Earth's environment. By bringing together energy efficiency and renewable energy technologies, Science House tests the idea that even in Minnesota's climate, houses can be constructed to supply much of their annual energy needs.



To accomplish the goal of being a zero emissions building, Science House has a solar photovoltaic standing-seam metal roof that generates electricity from sunlight. A solar photovoltaic laminate is adhered to the metal trays of the building's roof. Electricity generated by the solar roof is used by a ground-source heat pump that, through four, 250-foot-deep wells,

uses the thermal energy present in the Earth to heat and cool the building. When solar power is not being generated, for example at night, energy will be drawn from the museum. When solar power is being produced, excess solar power will flow from the center to the museum. The goal is for the building to produce as much energy as it consumes each year.

A key tactic for achieving Science House's zero-emissions goal is maximum energy efficiency. Energy-efficient windows and doors, wall insulation, and appliances are combined with passive solar heating and careful lighting design. The strategies for making Science House a zero-emissions building were developed and modeled by the Weidt Group in Minnetonka.

Recommendations regarding the building's orientation, size and volume, fenestration, roof area, and mechanical and electrical systems then were provided to Barbour & LaDouceur Architects in Minneapolis for development into a master architectural design.

Although much attention is focused on Science House's energy features, the building includes other environmental attributes, such as Forest Stewardship

Council-certified lumber, low-VOC paint, and water-conserving fixtures. Science House's furnishings and furniture are still to be decided and the Museum is seeking ideas for how the interior design of the building can also tell environmental stories.

The Science House and The Big Backyard are being supported by a broad range of federal, state, private, and corporate sources. Both open to the public on Saturday, June 26, 2004.

Besides being an exhibit about energy efficiency and renewable energy, Science House will contain demonstrations and activities about soil science and soil health. The Big Backyard will contain nine holes of miniature golf unlike any other course ever created, along with exhibits about landscape processes, river dynamics, urban and rural nonpoint source pollution, biodiversity, ecosystem productivity, biomass energy, and permaculture.

*For more information contact  
Patrick Hamilton at 651-221-4761 or  
hamilton@smm.org.*