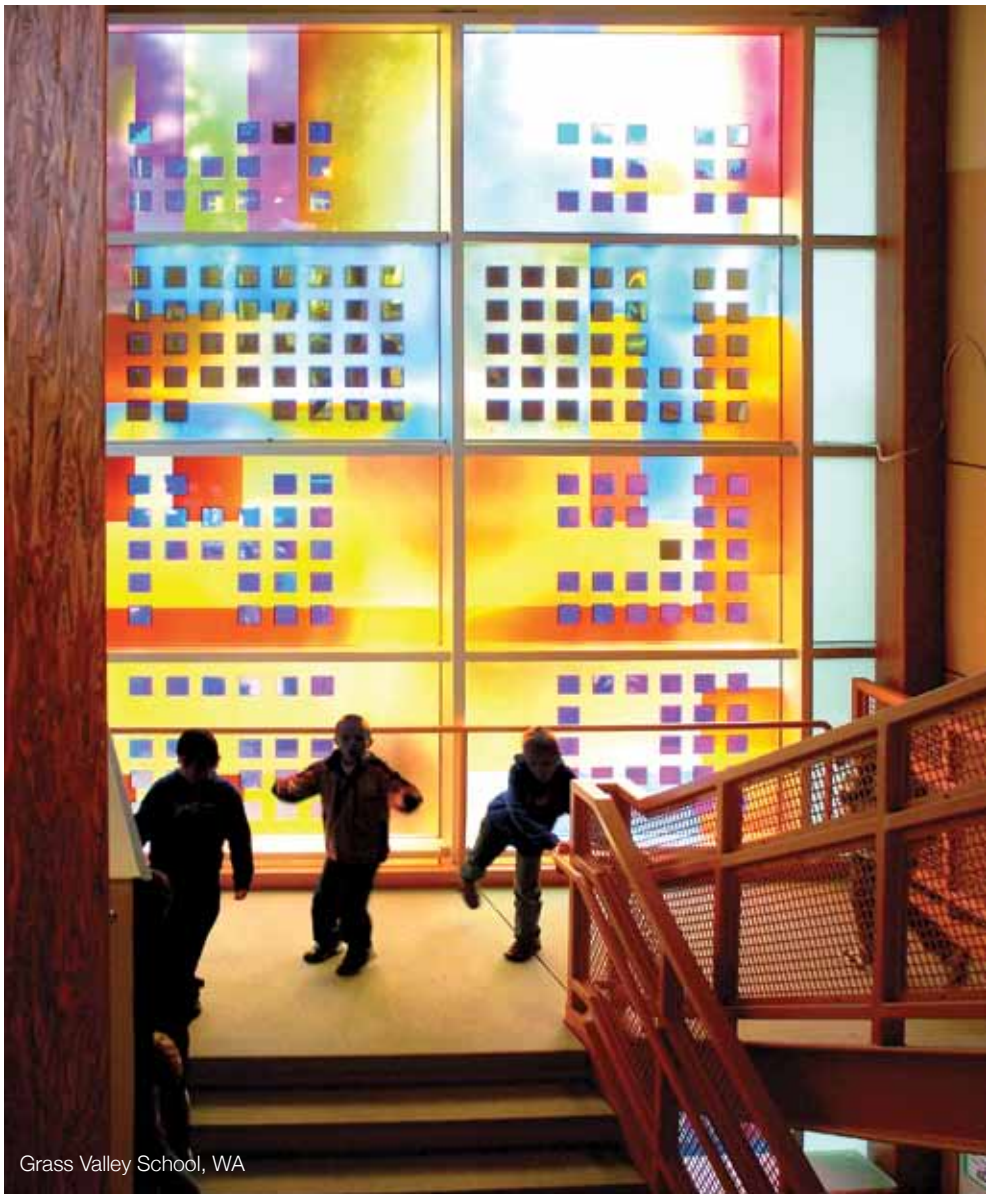
creating a partnership with the sun

BY SARAH HALL



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Building Integrated Photovoltaics (BIPV) is one of the most promising and elegant ways of producing on site electricity directly from the sun — silently, without environmental harm or pollution and without depletion of resources.

Solar energy collection is integrated into the building envelope as part of the design of the building. The PV modules serve a dual purpose — replacing conventional building envelope materials and generating power. While BIPV technology is incorporated into many new buildings in Europe, it is still an emerging practice in Canada.

Once upon a time, the only available option for photovoltaic installations was the familiar rooftop panels mounted on metal frames; and indeed, many people still think of solar panels as rigid modules — added to the building but often at odds with the architecture.

In the 1990s BIPV products become commercially available that were especially designed to be part of the building envelope — and recent technological advances have made it much easier to create architectural designs that thoroughly integrate solar energy collection into the design of the building.

The initial cost of BIPV is offset by reducing the amount spent on conventional building materials and labour that would normally be used to construct that part of the building. Once the building is in operation, there are additional savings as the sunlight generates electrical energy. These advantages make BIPV one of the fastest growing segments of the photovoltaic industry.

There are many parts of the building that can be easily substituted with photovoltaics: spandrel glass, skylights, roofs, windows and facades. In these applications, BIPV is part of the structure and look of a building, not an add-on.

Curved surfaces and windows are possible with varying degrees of transparency. These new developments allow revolutionary changes to the design of a building. BIPV systems can be designed to blend with and complement traditional building materials or they can be used to create an elegant, hi-tech appearance. A beautiful and highly visible "green" building is very appealing to many clients.

Semi-transparent modules are now available that can replace architectural elements commonly made with glass or similar materials, such as windows and skylights. Solar cells can also be incorporated into the facade of a building, as a complement to, or even a replacement for traditional view or spandrel glass.

Although a vertical installation of photovoltaic materials (as opposed to roof mounted systems) means less solar efficiency, this is compensated for by the large surface areas available to collect energy.

Using PV for skylight systems can be both an economical use of PV and an exciting design feature. Photovoltaics can also be incorporated into awnings, or into geometric designs on a building facade. These increase access to direct sunlight while providing additional architectural benefits such as passive shading and can eliminate the need for air conditioning.

With the new technologies available, retrofit facades can be installed on existing buildings, giving them a whole new look. These modules, mounted on the facade of the building over the existing structure, can increase the appeal of the building and its resale value. This type of retrofit is sometimes referred to as building-applied photovoltaics (BAPV).

The photovoltaic system can be used as a stand-alone power unit or used to regulate the intake of daylight to a building by powering an automatic sun-blind, operate an engine driven ventilation system, act as emergency lighting or be grid-tied.

As a designer working in architectural glass with projects that were always integrated into buildings the leap into solar was a learning curve, but it was also a natural extension of custom glasswork. Now with many BIPV projects completed, the possibilities are more exciting than ever to create a partnership with the sun. DQ

Sarah Hall, RCA, is an internationally recognized glass designer based in Toronto. See www.SarahHallStudio.com/media for further BIPV project and information.

Photo Peter Kaufmann