Solar PV and Architectural Integration
Ways to integrate solar PV into buildings:

– Rooftop solar
– Carports and shade structures
– Traditional panels creatively incorporated
– BIPV roofs, shingles, and panels

There are many ways you can incorporate solar PV into buildings. There are conventional applications like rooftop and carports, but also many ways the solar can be integrated into the building structure with awnings, shade structures, roofs, window glazing and other architectural features.

We will now go through examples of each of these applications.
Here is an example of rooftop solar on a small business. The system is tilted rack mounted.
Here are two examples of flush mounted rooftop solar installations.
Example of a peel-and-stick roof panel system
Solar panels can also be mounted as shade structures where the solar panels can provide shade instead of standard carports or patio covers.
The support structure for the shading systems can be normal systems as the weight of a standard PV array is between 3 and 5 pounds/ft².
Snow falling into lanes of travel should also be considered where snow loads are expected.
Many Carport PV structures utilize the PV power to facilitate electric vehicle charging stations located beneath the carport array.
In addition to carports, PV can be installed on other shade structures. Here the PV provides shade for outdoor picnic areas.
Creative use of standard panels

Just like any other PV system, it is best to orient the panels south and avoid shading when possible, but because windows are typically vertical they will likely not have the optimal tilt. This will affect the generation output.
Creative use of standard panels

Photo credit: Eileen Blass, USA TODAY
Creative use of standard panels
Because they face south it is nice when they provide architectural shade features as well as PV power.
Standard modules can also be used to create sunshades to improve the comfort of the building occupants.
BIPV opportunities

BIPV prices are variable by market and by application, but are typically a higher cost than the traditional PV system. There are additional labor costs for specialized architectural design, engineering design, and installation and maintenance.

They may require additional materials like adhesives and flashing materials, but they will not require the racking and mounting systems.

Like all PV systems, it’s important to clean and maintain BIPV installations.

Today, BIPV only accounts for 1 percent of the total solar installations world wide.
BIPV shingles are typically used in residential applications. PV shingles can be aesthetically pleasing for homeowners than rack mounted systems, and do not require holes to be drilled into the roof. PV shingles have a higher cost than crystalline panels and a lower efficiency.
BIPV roofs, shingles and panels

Photo credit: solarcentury

BIPV
Examples of semi-transparent and translucent panels. It’s a BIPV panel (Georgia Tech natatorium). These bi-facial panels are beautiful but the panels cost much more. Performance is similar or better than traditional panels. If you want covered walkways, or parking areas, etc to look pretty.

Semi-transparent and translucent PV modules present the design with a wide range of possibilities to combine the production of the electricity with natural light and interesting light effects.
For more information on the BIPV market, refer to the Inside the BIPV Market white paper.

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