Greenlife Energy Solutions LLP
making renewable energy work for you

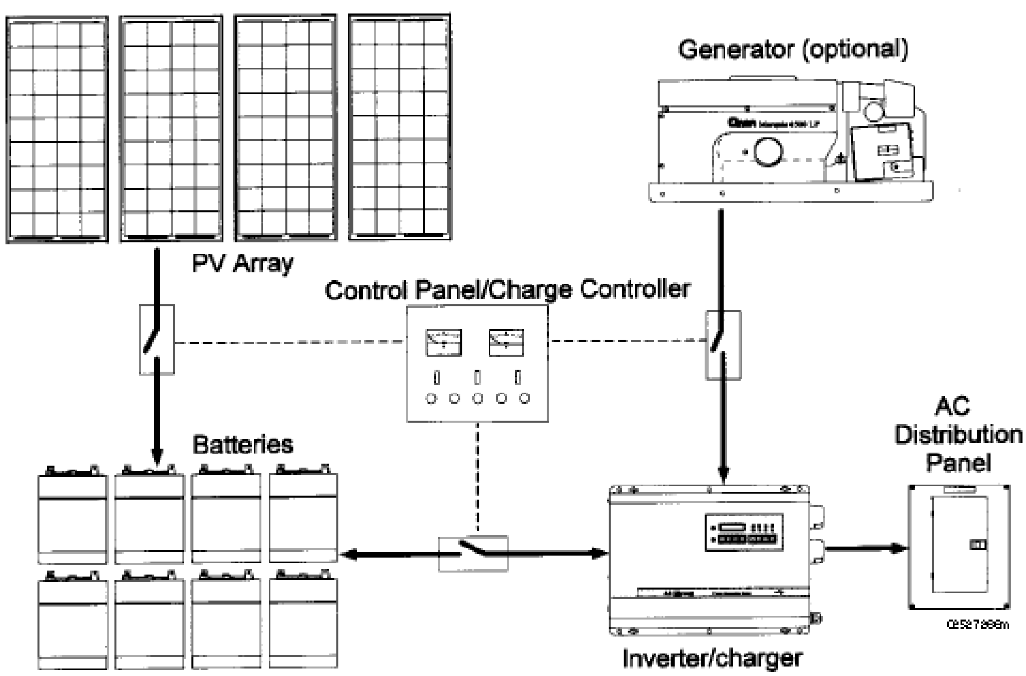
BUILDING INTEGRATED PHOTOVOLTAICS

BIPV Systems

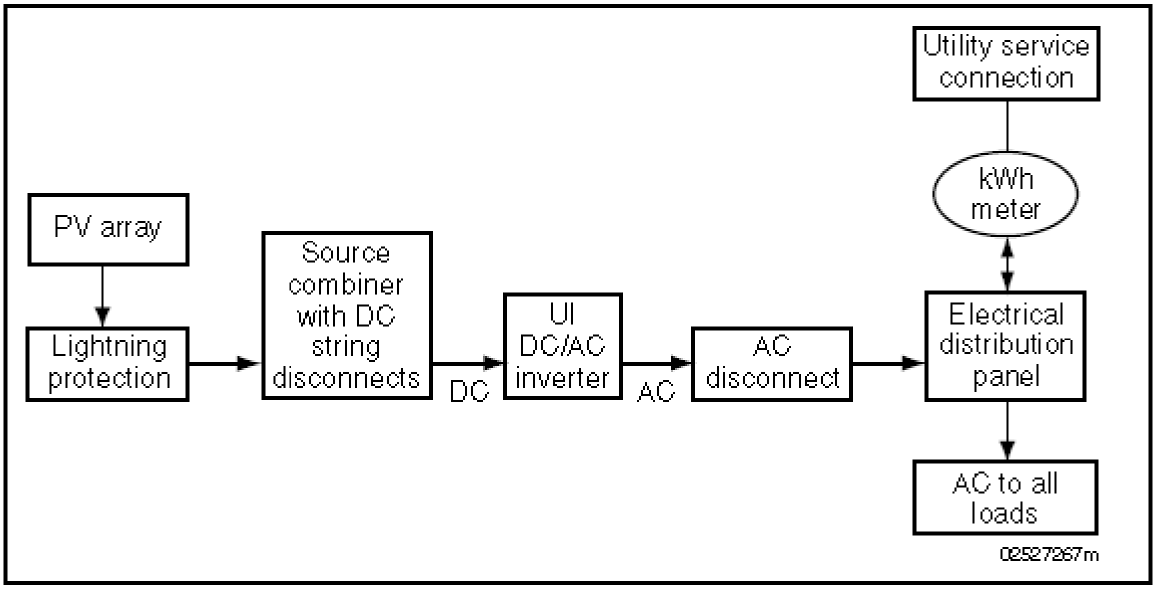
PV applications for buildings began appearing in the United States and elsewhere in the 1970s. Aluminum-framed PV modules were connected to, or mounted on, buildings that were usually in remote areas without access to an electric power grid. In the 1980s, PV module add-ons to roofs began being demonstrated. These PV systems were usually installed on utility-gridconnected buildings in areas with centralized power stations. In the 1990s, BIPV construction products specially designed to be integrated into a building envelope became commercially available.

Building-integrated photo-voltaic (BIPV) are photovoltaic materials that are used to replace conventional building materials in parts of the building envelope such as the roof, skylights, or facades. They are increasingly being incorporated into the construction of new buildings as a principal or ancillary source of electrical power, although existing buildings may be retrofitted with similar technology. The advantage of integrated Photovoltaics over more common non-integrated systems is that the initial cost can be offset by reducing the amount spent on building materials and labor that would normally be used to construct the part of the building that the BIPV modules replace. These advantages make BIPV one of the fastest growing segments of the photovoltaic industry.

BIPV systems are considered to be multifunctional building materials, and they are therefore usually designed to serve more than one function. For example, a BIPV skylight is an integral component of the building envelope, a solar energy system that generates electricity for the building, and daylighting element.



Schematic of a typical stand-alone PV system



Block diagram of a utility-interactive PV system

Design Considerations:

Beyond comfort and aesthetics, BIPV design considerations encompass both environmental and structural factors. Environmental factors include a structure's solar access as well as average seasonal outdoor temperatures at the site, local weather conditions, shading and shadowing from nearby structures and trees, and the site's latitude, which influences the optimum BIPV system orientation and tilt. Structural factors include a building's energy requirements, which influences the size of the system, and the BIPV system's operation and maintenance requirements. These factors must all be taken into account during the design stages, when the goal is to achieve the highest possible value for the BIPV system. Some of the major design considerations unique to solar energy systems are solar access, system orientation and tilt, electrical characteristics, and system sizing.

Application types:

SKYLIGHTS – CANOPIES

CURTAINWALLS – VERTICAL GLASS

ROOFING


Frameless Thin Film Modules applied to roof top


PV Installation with Al structure


Internal Lighting made easy

Source: NREL Published material on BIPV.