BIPV: Where Sustainability meets Aesthetics

PV integration offers many opportunities for visual enhancement. By combining aesthetics and additional functions, Building-Integrated PV (BIPV) is unique and differentiates itself from Building-Added PV (BAPV), where the PV module is added after the whole building is finished.

In addition to converting solar energy into electricity, BIPV can perform multiple functions, such as

- weather, heat, sun and noise protection of a building
- guarantee attractive façades and roof designs
- deliver energy efficiency as part of a low-carbon architectural approach.

Building Material + **Power Generation**


BSW-Solar


BSW-Solar - Langrock


BSW-Solar

BIPV systems consist of photovoltaic components that are integrated in the building envelope and constitute a part of the building structure (such as the roof or façade), thus replacing conventional building material. BIPV systems provide structural functionality (e.g., waterproofing, safety, sun protection,…) with the added value of electricity generation. BIPV requires that the integration of PV modules is part of the architectural design process from the beginning. BIPV systems are ideally installed during construction phase but can be part of an existing building retrofit. Building-Added PV (BAPV) systems, by comparison, are applied on the roof of the building on top of the existing roofing elements and they have no additional functionality but electricity production.

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BIPV in the Built Environment

BIPV systems can be neatly implemented in dense urban environments. Although BIPV implementations in façades or with imperfect orientations may lead to sub-optimal yields, they will often still be competitive. Therefore, due to the considerable suitable roof and façade surface available in cities, BIPV systems can have a substantial power contribution, with a high distributed generation of power produced close to the points of consumptions.

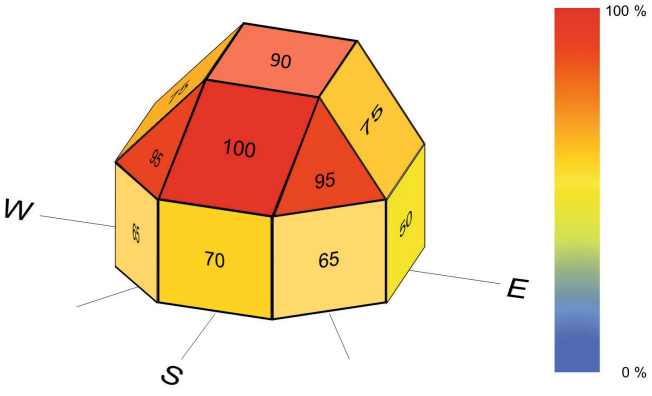

Figure 1. Yearly insolation into surfaces with varying orientation and tilt, relative to an optimally aligned surface -- valid for central Europe

BIPV Economics

Considered individually, a BIPV system tends to be more expensive than standard BAPV, due to the extra elements and additional labor needed to integrate the PV system into the building envelope. However, when BIPV is implemented during the construction phase, these extra costs are offset by the avoided expense of the substituted building material and of its installation. Only the differential cost represents the true cost of PV generation, which can lead to a highly competitive price for the generated electricity.

BIPV in the EU: A Fast Growing PV Market Segment Driven by Energy Efficiency

BIPV is expected to become the fastest growing PV market segment in the EU. The EU Directive 2010/31 imposes all new buildings in the EU to become near-zero energy buildings (NZEB) by 2020. In addition to strong energy efficiency measures, this implies buildings should generate power to compensate power consumption of its appliances, where PV is virtually the only possible option. BIPV is expected to play a crucial role in realizing these objectives, and will thus evolve from a niche into a high-volume market.

Finally, the BIPV value chain, compared to a traditional PV system, integrates a number of additional activities – design, customization, architectural integration, smart network integration, energy storage, etc. – that represent a growing part of the project value. These activities are not exposed to international competition and are therefore firmly anchored in the local economy. For Europe, these represent a renewed opportunity to build industry leadership in BIPV high added-value activities, capitalizing on its existing industry excellence (e.g., network control, building materials, architectural design, ...) while simultaneously boosting its ailing construction sector.