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BIPV: Turning buildings into power stations

BIPV is used in various parts of buildings such as roofs, facades, glazing and skylights for converting solar radiation into electricity.

EU Smartflex solar façade
Image: Glassbel

Building-integrated photovoltaic (BIPV) is used as a substitute for conventional building materials to integrate solar energy with building designs. Of late installation of BIPV is gaining momentum as it enables cost-effective generation of electricity among utilities, which boosts the overall revenue of the end-user.

"Buildings today are the leading consumer of energy, mainly due to the lighting followed by heating or cooling. BIPV brings a unique opportunity to generate clean energy at the point of consumption along with other green benefits. It has provided new horizon of innovation for the diverse landscapes of energy material science and architectural design," said Karan Shah, Founder & Director, Cosmic Grey LLP.

As per an analysis by research firm Technavio, the global BIPV skylights market is expected to grow at a CAGR of 10.16 per cent during the period 2017-2021 whereas a report by Research and Markets states that global market for BIPV technologies will grow from $2.4 billion in 2016 to $4.3 billion by 2021. "With the Indian government pushing solar awareness to heights, domestic BIPV market is likely to grow at a faster pace than our Western counterparts," Shah adds.

According to Ashish Khanna, Executive Director and CEO, Tata Power Solar, "BIPV segment gives dual benefits to the office buildings by reducing heat and providing solar power. It has great potential to transform urban energy management, utilising a fraction of the real estate which is at a premium in cities. Also, the panels provide shadowing benefits to the building that reduces the energy required for cooling a building."

Explaining the advantages of BIPV, Shah said, "BIPV solar panels may cost 30-40 per cent more than glass panels. But over the years this cost will be recovered, as these panels will also generate power for the structure. Roofing systems are likely to see maximum expansion whereas the facade shall demand maximum innovation."

Pain points

Highlighting the pain points of installing BIPV, Khanna said, "BIPV are very complex project as the solar farms are required to be integrated on the façade of the building without compromising on the aesthetics. Besides constructing complex scaffolding, safety is of utmost importance for workers working on a vertical structure. It requires significant innovation and customisation of the structures, load bearing characteristics and anchorage."

Tata Power offers a gamut of solar solutions ranging from cells and modules, to rooftop and ground mount EPC services for utility, commercial, industrial and residential segments. The company is making significant inroads in the BIPV segment, informs Khanna.

Pushing boundaries on glass size and manufacturing technology are the biggest hurdles for the Indian market, considers Shah. He suggests, "This shall be counter balanced by reducing cost, government support, higher volumes and wider variety in design. New wave of emerging BIPV Technology promises unique opportunity to grow for the industry."

BIPV is used in various parts of buildings such as roofing shingles, standing seam metal roofing, facades, glazing, skylights, and architectural shading. These components capture the Sun, convert to electricity which can be easily consumed by the buildings.

Leading architecture firms have started designing BIPV into the building at the drawing board. Dedication from corporate and developers coupled with promotion from Green Buildings Rating agencies like LEED, IGBC and USGBC is a very positive sign moving into the massive expansion of this segment, observes Shah. Indian corporate sector too has been pushing Green Power to reduce their carbon footprints and improve the energy efficiency of the business.

BIPV experts

Tata Power Solar has recently commissioned India's largest vertical solar structure, 45-metre-long of 120 Kw for Dell India. In the past, the company commissioned unique BIPV system of 19.52 kW for FESTO in Noida of 19.52 Kw.

Tata Power Solar's BIPV installation for Dell International Services India Pvt Ltd at their Bengaluru campus provides the dual benefit of producing sustainable green energy and insulation of the

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