Intersolar Europe
Intersolar Europe Conference
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TREND PAPER FOR INTERSOLAR EUROPE: BUILDING-INTEGRATED PHOTOVOLTAICS (BIPV)

Munich/Pforzheim, February 2022: The new German government has set out ambitious goals for renewable energies, having announced that they are to account for 80% of the electricity market by 2030 and that more than 15 gigawatts (GW) of photovoltaic capacity is to be installed annually. This means there is more need than ever before for additional surface areas and applications for photovoltaics. Building-integrated photovoltaics (BIPV) presents tremendous opportunities to meet these goals, particularly in urban environments. This is down to the fact that it helps enable large surface areas to be used for energy production and also helps avoid competition for land thanks to its multifunctionality. What's more, BIPV has a synergistic effect, as it supports the building sector to get on track with meeting climate goals as well as to reduce carbon emissions. With BIPV, solar panels become building components that produce energy and open up new design possibilities. What we need now is to move up a gear when it comes to installing BIPV in cities. It is time to accept the challenges and opportunities presented by BIPV head on. BIPV will be a key focus area at the upcoming Intersolar Europe 2022 and accompanying specialist conference.

The enormous technical potential of BIPV in Germany

Cities generate 75% of carbon emissions worldwide. Redesigning cities and the building sector will therefore play an important role in the transformation to a climate-neutral society. The building sector is responsible for as much as 40% of all carbon emissions worldwide and for around 30% in Germany. A range of measures are in place to reduce the carbon footprint of cities and buildings, use surface areas efficiently and strengthen sustainable development in urban areas. The wider use of solar energy and particularly BIPV can also play a key part in achieving this. The technical potential of BIPV is huge, with the Fraunhofer Institute for Solar Energy Systems ISE estimating it to be around 1,000 GW for Germany alone.

BIPV applications offer a wide range of benefits

Integrating photovoltaics into roofs and façades can serve several purposes at once since the available surface areas can be used for multiple purposes. BIPV is incorporated into building envelopes, producing energy while simultaneously taking on other functions. These include heat insulation, weather and sun protection, privacy and noise protection. Furthermore, BIPV serves as a design element. New technologies and designs allow architects to choose BIPV modules that fit in seamlessly with the surrounding cityscape or landscape in terms of their shape and color.

Since BIPV modules are mounted on existing substructures, an added bonus is the reduction in the amount of installation materials required. For example, unlike when solar panels are elevated on a mounting frame in a free-field, hardly any additional material is required to mount BIPV modules. The front panel of the module – often a sheet of glass – has a dual purpose, also often acting as a protective cover for the building. According to Fraunhofer ISE, these synergistic effects reduce the amount of material used, improve the environmental footprint of photovoltaics and even have cost benefits.

A further advantage of BIPV is the proximity of the power supply, which is beneficial for self-consumption and eases the burden on the power grid. Solar modules integrated into non-south-facing façades increase the amount of electricity generated in both the morning and afternoon, which in turn allows for a better balance between electricity generation and consumption over the course

of the day. BIPV also presents great potential for local markets since it often requires customized solutions.

BIPV can be used on a diverse range of buildings
An ever-growing range of products are available that facilitate the aesthetic integration of photovoltaics (PV) into building envelopes. And according to Fraunhofer ISE, this can be done with minimum effort, even on glazed surfaces.BIPV modules can be incorporated into both roofs and façades. They can be built into transparent and non-transparent areas, for example into the rear-ventilated area of the building envelope. BIPV is also suitable for new buildings as well as for the modernization or redevelopment of a broad range of existing buildings and structures, as was also highlighted during the webinar "BIPV – Opportunities for Photovoltaics in an Urban Environment" by Intersolar Europe. By registering for the webinar archive, you can access the recordings and presentations of past webinars.

Specific examples of BIPV
Vienna is at the forefront of integrated urban photovoltaics. The city widely uses BIPV as part of a campaign to make the Austrian capital climate-neutral by 2040. For example, a high-rise building at TU Vienna was converted to an energy-plus building using a large PV façade (231 kilowatts) that in combination with a 98 kilowatt (kW) PV rooftop installation supplies the offices and lecture theaters as well as the heating, cooling and ventilation systems with solar power. To ensure the building's employees can still see outside, the windows were equipped with semitransparent modules. And in the same groundbreaking spirit, there is also an electricity-producing rooftop garden on one of the buildings at the city's University of Natural Resources and Life Sciences. The rooftop garden is a very green space comprising seating plus an urban gardening area shaded by a wooden construction with semitransparent PV modules. This is also combined with rainwater utilization technology. PV modules (20 kW) have also been integrated into the glass roof of the renovated, historic giraffe house at Vienna's Schönbrunn Zoo, another prime example of innovation in the city.

The "Rathaus im Stühlinger" city hall building in Germany's Freiburg im Breisgau also demonstrates the diverse way in which BIPV can be used. Vertical solar panels are integrated into the façade of this energy-plus building as shading components, while hybrid modules on the roof supply electricity and heat. Digitally printed, large solar modules developed by the Centre Suisse d'Electronique et de Microtechnique (Swiss Center for Electronics and Microtechnology – CSEM) in Neuchâtel offer interesting opportunities for façade design. Colored PV modules with an output of 42 kW produced using ceramic digital printing are integrated into the façade of an energy-plus building comprising six apartments in Zurich's Höngg district and are supplemented by a 24 kW PV rooftop installation. A folding, solar roof measuring 4,000 square meters combines power generation and weather protection at the parking lot for the Kronberg cable car.

Redevelopments by Gewoba, the largest rental property provider in Bremen and Bremerhaven, Germany, also highlight the number of potential uses for BIPV. An eight-story residential building was equipped with a large PV façade, integrated PV balcony balustrades as well as a solar rooftop installation.

Challenges for stakeholders
Given that a lot of planning goes into BIPV thanks to the involvement of many different trades and the various regulations in force, planners, architects, builders and investors, installers, industry representatives and policymakers are all needed to help BIPV to make its breakthrough. Architects also need to complete more intensive training on BIPV. Short production runs, a low level of automation during production as well as a lack of standardization frequently make BIPV more expensive. Finally, the PV industry is also required to expand its product range so that it includes more functionally and aesthetically optimized BIPV products and to form more partnerships within the construction industry.

BIPV at Intersolar Europe 2022 and its accompanying conference
This year's Intersolar Europe will be held from May 11–13, as part of The smarter E Europe 2022 at Messe München. The event and the accompanying Intersolar Europe Conference, both of which are major sources of inspiration for the solar industry, will shine a spotlight on the exciting area of BIPV. The Intersolar Europe Conference will take place on May 10 and 11, 2022 at the Internationales Congress Center München.

Intersolar Europe Conference: Next Gen Space-efficient Solar I

May 10, 2022 | 11:30am-1:00pm
Building-integrated photovoltaics (BIPV): Beautiful, Multifunctional, and Compelling - The Long-Awaited Rise of Solar as Building Material is in Sight:

Hailed as the perfect solution for solar in the building environment for many years, only a very limited number of building-integrated systems have been installed for various reasons. With the first cities, states and countries having passed laws for mandatory solar inclusion for new houses and leading global module manufacturers launching first BIPV products, it looks like the time has come for this to change.

This session will discuss:

- New technical BIPV solutions
- Drivers and barriers for integrating solar into building skins
- Perspectives and value propositions for the construction sector
- Examples for attractive BIPV projects

For more information, please visit:
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