AUSTRALIAN PV INSTITUTE

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The Business Case for Building-integrated PV

The APVI reports that the business case for building-integrated photovoltaics (BIPV) is stronger than ever. The major feature of BIPV is multi-functionality as a building material, but other important values include aesthetics, and contribution to environmental sustainability.

BIPV is a product that generates electricity, and replaces traditional building materials by serving as a significant weather barrier on building surfaces. This building-integrated source of solar PV (such as solar tiles and façades) is in contrast to the more widespread building-attached PV – the roof-mounted solar panels that adorn more than 2.56 million homes across Australia.

As the APVI reports, BIPV is seen as one of the five major tracks for large market penetration of PV, alongside price decrease, improvement in efficiency, lifespan and electricity storage.

The business case for BIPV hinges on its multi-functionality – replacing other building elements or materials, producing electricity with improved architectural design (compared to building-attached PV), opportunities for marketing, and an attractive living or office place.

BIPV systems can take over a range of building functionalities which would otherwise need to be provided by conventional building components, providing potential for improved resistance, safety and stability of the building, its water and air tightness, noise protection, shading, privacy, insulation, daylight and comfort. BIPV systems have been showing to lower the need for heating in winter and cooling in summer. [1] [2] [3]

A more obvious advantage of BIPV is the aesthetic value, in combination with marketing value. BIPV may be utilised to visually integrate into the building, making it more palatable for some developments, or conversely become a feature to highlight its presence and provide reputational impact.

Another value of BIPV will be realised when building-attached PV or energy efficiency alone are no longer enough to cost-efficiently meet energy-related requirements; particularly in locations where energy performance regulations dictate higher levels of sustainability compliance, such as Net Zero Energy buildings. BIPV is better adapted to utilise larger parts of the surfaces of a building than mounted solar panels, and although less efficient per unit area in some cases, a larger area can be covered, resulting in a higher electricity yield in total.

It’s acknowledged that there are also potential challenges, such as safety (e.g. fire risk wiring), that do not apply to the same extent to conventional building materials, so standardisation and certification are crucial elements to facilitate the use of BIPV as a replacement of conventional building components.

The Business Case recommendations are from the latest report on BIPV from the International Energy Agency task force 15. The APVI’s Dr Rebecca Yang is the Australian leader for this task force. Rebecca said, “Our team of international researchers have uncovered a range of potential value in BIPV for building and construction industry stakeholders to consider. As BIPV has become more affordable in recent years, we are committed to supporting the trajectory of growth in BIPV with a clear value proposition for these remarkable multi-purpose energy-producing building materials”

This IEA task contributes to the ambition of realising zero energy buildings and built environments, with the recent report providing guidance for building industry stakeholders to include BIPV with equal weighting as traditional building-attached PV (BAPV) in building development and construction.

[1] J. Peng, D. C. Curcija, L. Lu, S. E. Selkowitz, H. Yang and W. Zhang, "Numerical investigation of the energy saving potential of a semi-transparent photovoltaic double-skin facade in a cool-summer Mediterranean climate," *Applied Energy,* vol. 165, pp. 345-356, 2016.
[2] H. Ishii, "Thermal Performance (G-value and U-value) Evaluation of BIPV Applied to Glass Facade," in *33rd European PV Solar Energy Conference and Exhibition*, Amsterdam, The Netherlands, September 2017.
[3] S. Boddaert, J. Benson, P. Bonomo, V. Delisle, C. Erban, A. Fedorova, F. Frontini, S. Inoue, H. Ishii, K. Kapsis, J.-T. Kim, N. M. Chivelet, E. R. Medina, A. Schneider and H. R. Wilson, "Compilation and Analysis of User Needs for BIPV and its Functions," Report IEA PVPS T15-06, 2019

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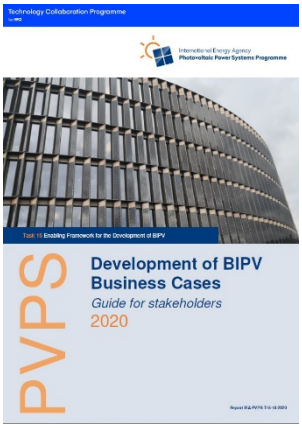
Full Report



Development of BIPV Business Cases 2020

About the IEA PV Power Systems Programme:

The International Energy Agency Photovoltaic Power Systems Programme Task 15 is represented in Australia by the APVI’s Dr Rebecca Yang. The Australian PV Institute, with support from ARENA, leads Australia’s engagement in the IEA PV Power Systems program and works with its members to increase the uptake of PV through quality research, data and analysis.

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About the APVI

The Australian PV Institute is a not-for-profit, member based organisation which focuses on data analysis, independent and balanced information, and collaborative research. Our objective is to *support the increased development and use of PV via research, analysis and information.* The APVI promotes solar through its live solar mapping platform [http://pv-map.apvi.org.au], the national solar research conference and Australia's participation in two International Energy Agency (IEA) programs – PVPS (Photovoltaic Power Systems) for solar photovoltaics and SHC (Solar Heating and Cooling), concerned with new solar thermal products and services.

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