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# Building integrated photovoltaics (BIPV): costs, benefits, risks, barriers and improvement strategy

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## Abstract

Building integrated photovoltaics (BIPV) refers to photovoltaic or solar cells that are integrated into the building envelope (such as facade or roof) to generate 'free' energy from sunshine, and it is one of the fastest growing industries worldwide. However, up until now, there have been limited studies that analysed cost–benefit and risk factors/barriers of BIPV from a supply chain perspective; and there have also been limited studies that provide strategies to industry and academics in order to encourage BIPV diffusion and application. The aim of this research is to identify the costs, benefits and risks of BIPV and propose suggestions for greater BIPV application, from a stakeholder perspective, through a comprehensive review of current literature. The results of this research show that whilst BIPV have high initial investment capital costs, there are significant long-term benefits to be achieved for clients, end users and the

entire society. Further, the results also show that BIPV costs decrease and government policy support and incentives are required in order to promote wider BIPV application. In addition, this research has identified the fact that there was a lack of detailed BIPV cost data (including individual component costs) and lack of methods for BIPV cost–benefit analysis, and there are risks and barriers in BIPV applications. Following this, this research provides a strategic framework and a number of suggestions to industry stakeholders for integration and collaboration within the BIPV supply chain in order to facilitate the cost reduction of BIPV. Finally, this study proposes several topics for future research. It is anticipated that the results presented in this paper have implications not only for government policy and product development and application, but also for academic research.

Keywords:

- building integrated photovoltaic (BIPV)
- construction
- cost–benefit
- stakeholder
- risk
- barrier
- supply chain strategy

## Disclosure statement

No potential conflict of interest was reported by the authors.

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