Analysis of the Technological Innovation System for BIPV in Austria

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EXECUTIVE SUMMARY

This report analyses the Technological Innovation System (TIS) of Building Integrated Photovoltaics (BIPV) in Austria. The study's scope is consistent with the IEA PVPS Task 15 report (Report T15-16:2023).

The analysis aims to facilitate and support the innovation, development, and implementation of industrial solutions of BIPV technologies. In Austria, the use of BIPV is still a niche application and covers under 2% of all implemented PV systems [1]. BIPV technology in Austria has historically developed with the support of different public financial incentives, national and European. The history of BIPV is somehow tightened to the history of PV.

The first BIPV prototypes were developed by PV companies in the framework of national or European research activities, with the first development and innovation projects starting around 2003. In general, it should be mentioned that in the last years, PV and BIPV companies have increased specialization in the production of BIPV, especially colored and semitransparent PV modules. In this regard, a wide range of variants are offered (printing, coating, films). The colored components are mainly purchased from glass companies or polymer film producers. Another trend in Austria is the production of transparent glass/glass modules for integration in facades, skylights, winter gardens, or courtyard roofing.

TIS assessed the BIPV market through eight functional areas and provided the following results:

- The analysis of knowledge development showed that it can be classified as moderate. On the one hand, there are not enough training and further education opportunities in the field of BIPV available, but on the other hand, the PV manufacturers and research institutions are driving forward the development of knowledge in the field of BIPV.
- Knowledge dissemination is well advanced internationally within the research community but insufficient at the practical, national level, particularly between the PV industry and the construction sector. Architects are demanding more information from PV manufacturers and suppliers, who share their information only irregularly with the architectural community. Usually, architects obtain this information from PV technology platforms through workshops, brochures, and projects. However, architects have to engage with it more extensively. The goal is to make BIPV more appealing to architects. Thus, we have to summarize that knowledge dissemination is inadequate/weak.
- Entrepreneurial willingness to experiment can be classified as moderate. Overall, it can be said that there are four players in the Austrian BIPV market and a substantial number of newcomers and small innovative players who could take the role of innovation drivers. However, there are too few opportunities for highly specialized small companies.
- Resource mobilization is well positioned financially and in terms of network services. However, and this is essential if we want to expand the BIPV market strongly, there is a lack of skilled

personnel (human resources) to carry out the expansion, which is why this function is rated to only be moderate.

- The scoring of social capital is weak. The connection where there is a lack of communication is between the (BI)PV planner and the architects. In most projects, the (BI)PV planner is not involved in the early stages of the building design process. In addition, conventional PV planners have no experience or are afraid of planning BIPV systems.
- The legitimacy is moderate, but as the acceptance of PV improves from year to year, the chance of better acceptance of PV integrated into the building, i.e., BIPV, also increases. However, there are still reservations and resistance towards individual, specific BIPV projects. This resistance could be reduced by increasing knowledge about the multifunctional possibilities of BIPV at the decision-maker and customer stage.
- Guidance of the search is moderate, as there are no specific political targets for BIPV, but there are for PV. However, the government and relevant authorities aim to implement clean energy development positively and apply applicable policies and regulations. There is an increased subsidy for innovative PV solutions, which also includes BIPV.
- It can be stated that the market formation of BIPV in Austria still offers room for improvement. When it comes to governmental-driven incentives and support for the BIPV-market development, the missing technical standards (e.g., fire safety regulations) and the absence of regulatory obligations on renewable energies in the local building codes are the biggest weaknesses.

The structural and functional analysis is followed by a coupled structural-functional analysis. This assessment will help identify weaknesses and strengths and recommend strategies that will enable the growth of BIPV from a niche market to a major market segment.

The aim is for photovoltaics (PV) on buildings to be primarily designed as Building Integrated Photovoltaics (BIPV) to reduce additional costs. This, combined with the avoided costs for other components of the building, should result in cost parity with Building-Attached Photovoltaics (BAPV). It is also crucial to encourage all manufacturers of building envelope components to ensure that their products offer the dual benefit of serving as building components while also generating electricity. By doing so, such products can become standard in the industry. The transition from BAPV to BIPV was already analyzed in a 2015 BIPV brochure from the Austrian Photovoltaics Technology Platform (TPPV), which discussed the advantages of an integrated solution versus an attached solution and outlined the necessary steps to make BIPV the standard for building PV.

The recommendations are summarized as follows: i) It is important to involve (BI)PV in the early stages of the building planning process. ii) successful implementation projects must be made public through various channels to increase knowledge about BIPV technology and its possibilities (e.g., lighthouse projects in public buildings). iii) PV standards and construction codes have to be harmonized. iv) The Austrian government should stipulate the use of PV in the obligatory building specifications. v) Another recommendation would be to enact a law requiring every sealed area to be checked for dual use with (BI)PV.

One positive development worth mentioning is the Climate Fund's Lighthouse call, which focuses specifically on integrated PV and offers higher grants for BIPV than the EAG, demonstrating increased interest and commitment to this technology. In addition, the TPPV Innovation Awards, which were awarded for the first time specifically for building-integrated PV and now include other topics outside of buildings, are a sign that the industry is broadening its perspective and recognizing the importance of BIPV beyond traditional applications. These developments could help to further promote the acceptance and deployment of BIPV and drive innovation in this area.