Analysis of the Technological Innovation System for BIPV in the Netherlands

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EXECUTIVE SUMMARY

This report uses a technology innovation system (TIS) guide, provided by the IEA PVPS task 15, to describe the dynamics of the national innovation system for BIPV in the Netherlands. This technology is (of course) part of the wider technological innovation system for solar energy but as such it has enough different characteristics and specialised players to set it apart. It also takes into account the innovation dynamics of the construction sector where the BIPV technology is applied. The construction sector is generally more regionally oriented while the solar sector is part of an international value chain. The latest geopolitical developments and upheaval in Europe fall outside the scope and period of the report.

The specific geographical circumstances in the densely populated Netherlands are a main national driver for BIPV and explains partially why multifunctionality of solar applications in general is becoming increasingly important in the Netherlands. Hence the integration of solar PV not only in the built environment but also in the infrastructure, landscape and on water surfaces is set high on the innovation agenda. This potential of BIPV has come to the attention of policymakers from both an innovation point of view and in order to reach the climate goals. The large scale market uptake however remains dependent on the next phase of investment, standardization, education and market demand. If these aspects are addressed, BIPV could become a viable option for the building sector to achieving zero-energy buildings and decarbonized cities in the Netherlands. Therefore several national ministries have become involved over time and with different perspectives. However, the current BIPV technologies have been predominantly implemented in the higher end, B2B market segment and encountered barriers outside that specific market segment which are inherent to innovations in general in the construction sector. In the building “supply market”, innovations are mainly driven by cutting overhead costs and failure costs. The early pioneers, before 2000, acknowledged these particular innovation dynamics and tried to overcome these constraints by collaborating directly with local and national governments, while aiming at the renewable energy benefits of local production. The expectation at the time was that solar thin film technologies would deliver on lower costs and more flexibility in form, shape and colour. Although the later has been achieved, the reduction of costs and market uptake of BIPV did not follow the general trend of solar PV. Only lately and thanks to the introduction of thinner crystalline solar panels, did BIPV cost started to decline. While the deployment of regular solar panels took off after 2014, caused by the serendipity of favourable market conditions in Europe and costs reduction by scaling up production in Asia, the BIPV technology and innovation ecosystem remained restricted to a high-end niche market and an innovation ecosystem consisting predominantly of academic circles

joined by start-ups and innovative product developers. Although the BIPV innovation system has expanded in absolute size, the dynamics of the innovation system seem remarkable constant over the last decade.

In other words, this TIS analysis shows that BIPV technology is not a niche market waiting to be scaled up but that systemic problems still exit which inhibit its growth. The so called “science & technology” and “ entrepreneurial” push motors work well enough in the Netherlands but the “system building” and “ market” motors are stalling. There exist several negative feedback loops that have to be addressed before a take-off can take place. The BIPV innovation system is basically a balancing act between two innovation systems with actors trying to bridge the gap between the solar and construction sector. It needs to expand beyond the science and technology driven parties and address broad societal issues with innovative business cases that include “energy ownership”. A far reaching integration between the two sectors is necessary that would entail the entire building process and adhering to standards in both sectors, product compatibility and finally training. Bridging this gap is a precondition for escaping the niche market and for BIPV to take off. A number of recommendations are made that follow from this TIS analysis and in a specific order. The main recommendations are; first to identify new markets that address societal needs and address energy ownership, second to undertake large demonstration projects in these markets segments with stakeholders along the value chain to further integrate the solar and building sector, validate the proposed solutions and finally to include them in the building codes, preferably on an European scale, regulation and inform all stakeholders.