Towards a Computational Approach for Integrating Photovoltaics and Street Art

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Abstract:

Building facades play an essential social role in cities by serving as media for communication and providing a canvas for cultural expression and debate. This is particularly evident in street art which uses architectural surfaces to display large images in urban open spaces, improving a sense of place. At the same time, photovoltaic (PV) technology deployed in urban environments can supply buildings with electricity generated from sunlight and reduce reliance on energy from fossil fuels. Progress in building-integrated photovoltaic (BIPV) technology enables facades to generate electricity while displaying images, combining energy performance and communication. However, this involves addressing conflicting requirements from the earliest stage of a façade design process, which may be facilitated by computational methods tackling the complexity of considering contrasting factors simultaneously. This study aims to identify a computational approach for the early design of solar facades capable of integrating photovoltaics and street art, towards fulfilling energy generation and communicative functions. It examines computational strategies and tools emerging from the literature on solar building envelopes, that address the challenges involved in photovoltaic energy generation and the display of images through architectural skins. The study contributes to growing knowledge in the areas of BIPV design and placemaking through street art by highlighting computational methods for conceiving solar facades that perform environmental and social roles as multifunctional urban interfaces.

Keywords:

street art, solar facades, building-integrated photovoltaics, early façade design, computational design.