

Preliminary Study of the Cost-Effectiveness of Green Walls: Analyzing Cases from the Perspective of Life Cycle

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Abstract : Urban heat island effect is derived from the reduction of vegetative cover by urban development. Because plants can improve air quality and microclimate, green walls have been applied as a sustainable design approach to cool building temperature. By using plants to green vertical surfaces, they decrease room temperature and, as a result, decrease the energy use for air conditioning. Based on their structures, green walls can be divided into two categories, green façades and living walls. A green façade uses the climbing ability of a plant itself, while a living wall assembles planter modules. The latter one is widely adopted in public space, as it is time-effective and less limited. Although a living wall saves energy spent on cooling, it is not necessarily cost-effective from the perspective of a lifecycle analysis. The Italian study shows that the overall benefit of a living wall is only greater than its costs after 47 years of its establishment. In Taiwan, urban greening policies encourage establishment of green walls by referring to their benefits of energy saving while neglecting their low performance on cost-effectiveness. Thus, this research aims at understanding the perception of appliers and consumers on the cost-effectiveness of their living wall products from the lifecycle viewpoint. It adopts semi-structured interviews and field observations on the maintenance of the products. By comparing the two results, it generates insights for sustainable urban greening policies. The preliminary finding shows that stakeholders do not have a holistic sense of lifecycle or cost-effectiveness. Most importantly, a living wall well maintained is often with high input due to the availability of its maintenance budget, and thus less sustainable. In conclusion, without a comprehensive sense of cost-effectiveness throughout a product's lifecycle, it is very difficult for suppliers and consumers to maintain a living wall system while achieve sustainability.

Keywords : case study, maintenance, post-occupancy evaluation, vertical greening

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