

Public summary

Vertical green systems, such as green façades, are becoming increasingly popular due to their numerous benefits, including improved thermal regulation, energy efficiency, air purification, and to biodiversity. This thesis focuses on the design process of a green façade system for the company Unitura. The aim is to create an aesthetically pleasing façade finish that supports the growth of climbing plants, particularly English Ivy, to enhance biodiversity in urban landscapes. Aside from that, it should be sustainable, durable and ecological to contribute to the greening of urban environments. At present, there are few or no products for façade cladding with the specific aim of supporting climbing plants. Various options for creating such a product were explored, resulting in a final concept proposal.

Initial research has been carried out on the topics of façades, vertical greening systems - including living wall systems and green facades, the value and benefits of a green facade and the guidelines and considerations that need to be taken into account when designing one. More detailed research is carried out on the different types of climbing plants, with a focus on English Ivy (*Hedera Helix*).

The main findings are that aspects such as damage to the building caused by the plants, frequent maintenance and failure of the product due to the inability to support the weight of the plant should be avoided by designing a suitable system. The selected focus plant, English Ivy, has a high biodiversity value but requires a suitable support system to prevent damage to the building and ensure stability.

The design process was guided by a list of requirements which is extracted from the research findings and the outlines specified by Unitura. Several concepts were generated using a morphological chart and with input from experts in construction and climbing plants. The chosen concept is a system from three tiles which are made from sustainable arbolite (wood-concrete composite), designed to prevent plant intrusion and accommodate different climbing plant species. The system contains several aspects such as a trellis network for plant support, edgings to close gaps, and integrated animal shelters for birds and bats. The combination of the three tile variations with each four configurations provides a natural and dynamic aesthetic when installed on a building's facade.

The final product is an ecological, sustainable, and durable green façade system that aims to increase biodiversity in urban landscapes. By using native climbing plant species, the need for irrigation is reduced, and more biodiversity is attracted to the system compared to when using foreign plant species, and modular animal shelters provide immediate shelters for birds and bats. Once the plants are sufficiently grown they will provide additional shelter. Although the product meets most requirements, further research and developments are needed to ensure detachability and a lifetime of 50 years.

The value of the final product to Unitura, the client, and biodiversity is given. Unitura gains a unique market position with a specialized façade cladding for climbing plants and gains valuable insights into this field through the project. Clients gain a cost-effective solution for greening their buildings, improving energy efficiency, heat regulation, and sound insulation. Biodiversity benefits from shelters and food sources for birds, bats, and insects throughout the lifecycle of the green façade.

Several recommendations are presented for future developments of the product. These include more material research and testing, optimization of attachment methods, and improvements in trellis, animal housing, and design of the edgings. The concept currently offers inspiration and demonstrates possibilities for integrating plants into façade finishing, but further adjustments are necessary before it can be implemented in practice.