Keeping Warm in the Snow: Creating a comfortable bus stop in the Slovenian Alps

The biggest challenge that the world is currently facing today is climate change. The transportation sector is the second biggest contributor to climate change after the building sector. To combat climate change and reduce the emission of green-house gases, it is essential to encourage the use of public transport over private cars. One of the reasons for people to choose private cars over public transport is uncomfortable conditions experienced at bus stops while waiting for buses. The main objective of the thesis is to develop an energy-efficient bus stop design which is self-sufficient on renewable sources of energy, while keeping the comfort of the users in mind. Moreover, the thesis also aims to study the impact of climate on architectural design in order to provide comfort to the users.

The project began with a literature review to investigate the use of building integrated solar panels. A study was also carried out to investigate different models for thermal comfort. Based on the study, The Universal Thermal Climate Index (UTCI) was chosen to assess thermal comfort inside the bus stop. The UTCI is the 'real feel' that we hear about in weather reports.

Two different types of designs were investigated. A standard conventional bus stop design and a climate-based bus stop design were developed. The temperature inside the bus stop was compared to the 'real feel temperature' outside and the number of comfortable hours in the whole year was calculated.

Passive design measures were also applied to the architectural design of the bus stop. Different types of glazing, wall insulation thicknesses and green roofs were applied, and the results were compared. An active electrical floor heating powered by solar energy was applied in the end. From the results it was found that the climate-based bus stop design performed better than the conventional bus stop design. Finally, it was found that although the use of heating could result in greater comfort inside the bus stop for users, it was important to incorporate passive design measures in order to achieve a sustainable bus stop design.