

Bachelor's Thesis in Energy Systems Engineering

Embodied and Operational Environmental Impact of a Building

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Environmental impact assessment of a multi-family house in Uster, Zurich

Within the framework of a case study, the thesis work evaluated the sustainability of a multi-family house (MFH). The building mass and the use phase were assessed according to the environmental impact categories greenhouse gas emissions and environmental impact points.

The aim of the study was to find the total environmental impact of the MFH Lisa and to investigate the contribution percentage of the embodied and the operational part. For this reason, the four-stage framework of a Life Cycle Assessment (LCA) (ISO 14040:14044) was applied. From the insight of the assessment, strategies for the building sector were researched.

Calculations and interpretations

For the calculations, the standards of the Swiss Society of Engineers and Architects (SIA) were mainly used. Further, the SIA 380/1:2016 tool was applied to calculate the heat demand. The results show that the building mass with the included materials and appliances has a share of around 73 percent of the total environmental impact.

The material with the highest environmental impact was found to be reinforced concrete. Further, the work showed that most efforts were previously made to arrive at a more efficient operation. Nevertheless, promising concepts and further research is underway so that soon the building mass can also be constructed more sustainably.

Wood was found to be a promising material to replace massive concrete construction in certain areas of a building. As of today, even wooden high-rise buildings with much less concrete are possible.

Leo Richard Ohnsorg

Supervisor:
Prof. Dr. Heinrich Manz

Expert:
Dr. Karim Ghazi Wakili