

Sustainability optimization of supporting structures in buildings

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INTRODUCTION

One of the biggest sinners in terms of CO₂ emissions is the building industry. The way we construct buildings today, is due to the environmental issues being challenged in this project. The building industry accounts for about 40% (Authority, n.d.) of the total energy consumptions in Denmark, and therefore it could be interesting and valuable to investigate how these emissions can be brought down.

Construction materials applied for supporting structures in buildings are numerous, but in Denmark the most widely used material is concrete (Cain & Evang, 2014). The reasons for applying concrete are numerous, amongst other; great compressive strength, local resources and great self-weight, which helps increasing stability. In this study it is investigated what happens if the arguments for using concrete are challenged and some other criteria are included in the prioritization of materials for supporting structures

THEORY

Initially sustainability relevant for supporting structures will be defined based on different views on sustainability and not at least my own interpretation and view. LCA will be applied for the assessment and quantification of the environmental performance of the supporting structures. The LCA will rely on the ReCiPe method, which is a life cycle impact assessment method where different category indicators at midpoint can be aggregated into a simplified set of indicators. The structural ability will be evaluated by comparing the amount of materials used when applying the same load to each element of the different materials.

METHOD

Separate structural elements made from different materials, including steel, wood, glass fiber composites and concrete, will be analyzed and compared considering both environmental performance and structural ability. A simplified price comparison will also be taken into account, since price has a considerable influence on the choice of construction materials.

RESULTS

Based on the environmental, structural and price assessments multi-criteria recommendations will be formulated. The purpose of the criteria are to facilitate selection of supporting structures based on a more diverse set of criteria than structural performance and price.

REFERENCES

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