Greenhouse emissions in 2 Passive Plus houses with 2 energy systems.

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To reduce greenhouse gas by 70% in 2030 a new max. emission for buildings will be implemented in Denmark. In 2023 a limitation for buildings is proposed to be 8 kg CO2e/m2 per year and in 2029 a limit of 5 kg CO2e/m2 per year. A lifecycle analyse (LCA) according to EN 15978 has to be made with the lifecycle fases A1-A3, A4-A5, B4, B6, C3, C4, covering all emissions from "Cradle to grave".

In Denmark the LCA tool that has to be used to document the total emissions is "LCAbyg". The data for materials mostly are generic data from a Danish database https://www.epddanmark.dk/. Materials data are mostly generic data form the German database from the German database https://www.oekobaudat.de/.

Calculating emissions materials can be product based and based on a product specific Environmental Product Declaration EPD.

In this Paper LCA calculations are done by using LCAbyg based on 2 different material data to analyse how this can influence total emission results. The data used are:

1. the generic material data
2. and secondly by using EPD material product data.

2 passive house Projects will be analysed:

Foto:

A. A 4 apartment house with 2 levels, heated with Compact ventilation heat pumps.
B. A rowhouse with 2 levels, heated with district heating.

Table 1: Case A results

Case A	Generic Data	EPD data
	Total Emissions GWP Kg CO_2-eq./m2per year	**Total Emissions GWP Kg CO_2-eq./m2per year**
B6 Energy for heating and ventilation and hot water	1,49	1,49
Building elements	4,59	2,49
Sum	**6,08**	**3,99**

First results show a potential of 24-50% reduction of greenhouse gas compared to the new limit of 8 Kg CO_2-eq./m2per year. A calculation of emissions grouped by materials show a difference in mineralbased materials such as stone cladding, wood and insulation values.

The paper will further analyze difference grouped by materials and heating systems in the 2 Cases. Also, the paper will show emission results for the district heating system consisting of Biomass boilers, Heat pump, solar panels and net, as well as building facilities.