

SYMETRI

PART OF ADDNODE GROUP

ARTELIAS ARBEJDE MED LCA OG BÆREDYGTIGHED

EVA NEEL BACHER

AGENDA

01

HVEM ER VI?

02

CASESTUDIE

Beskrivelse af case og
valg af One Click LCA

03

EVALUERING

Foreløbig evaluering og
erfaringer



04

VIDERE PROCES

Byggeri

Energi & Industri

Infrastruktur

HVEM ER VI?

RÅDGIVER | BÆREDYGTIGHED OG LCA

EVA NEEL BACHER



ARTELIA DANMARK

SYMETRI
PART OF ADDNODE GROUP

Over **1.300**
medarbejdere

3
forretningsområder
Byggeri
Energi & Industri
Infrastruktur

90+ års
erfaring

8 kontorer

11 divisioner



A satellite view of Earth from space, showing a large solar panel array in the upper right corner. The panel is a grid of dark rectangular cells. Below it, the Earth's surface is visible, showing a mix of blue oceans, white clouds, and brownish-green landmasses. A dark teal banner is at the bottom of the image.

CASESTUDIE



DTU SPACE

- Laboratorie og kontor
- Undervisning
- Udstilling
- Total areal på ca. 7000 m²
- Pilotprojekt DGNB 2025



ET AMBITIØST PROJEKT



CO₂

Optimere konstruktioner
Design for adskillelse



SAMARBEJDE

Stærkt samarbejde i
projektteam



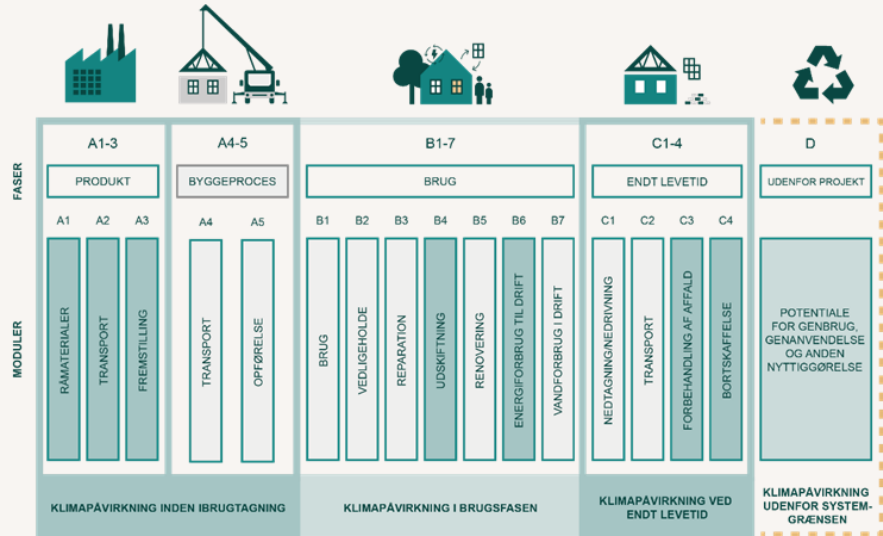
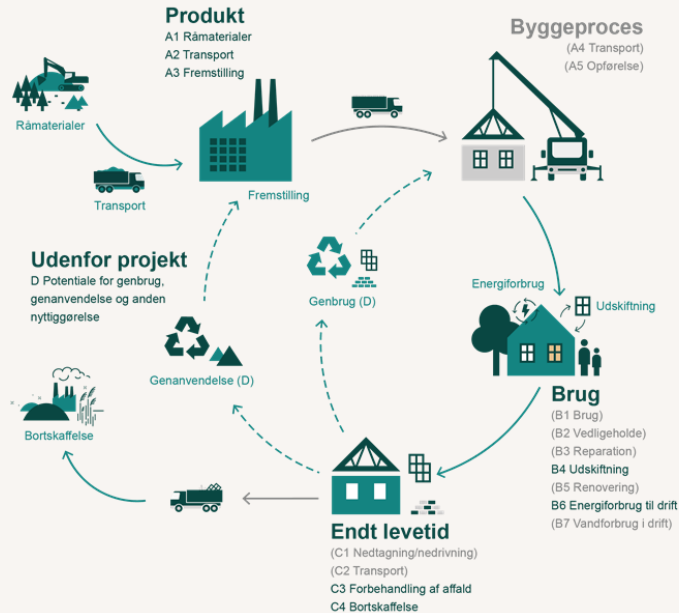
PROCES

Fokus på proces og
varianter



Behov for optimering af
beregningsproces og
tidlige beregninger

LIVSCYKLUSVURDERING (LCA)

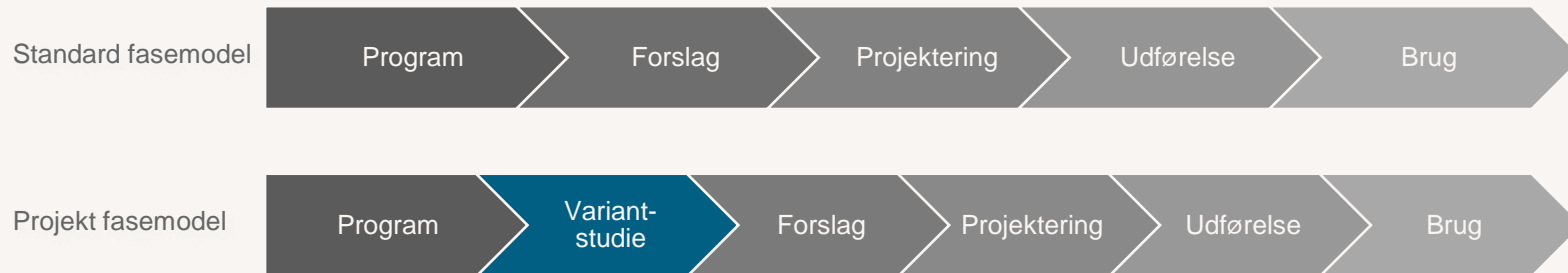


TEST AF ONE CLICK LCA

Hvorfor valget faldt på at teste One Click LCA

- Mulighed for tidligt variantstudie
 - Bygningsdele
 - Konstruktionsprincipper
 - Volumen
- Integration med model
- Løbende nem opdatering af LCA-beregning
- Dynamisk værktøj

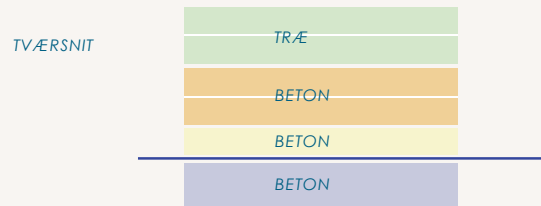
PROCES



- Variantstudie er tværfagligt og inden dispositionsforslag
- Der analyseres ligeligt på tre forskellige volumener
- Der analyseres på forskellige konstruktive principper
- LCA regnes live på arbejds møder

VOLUMENSTUDIE

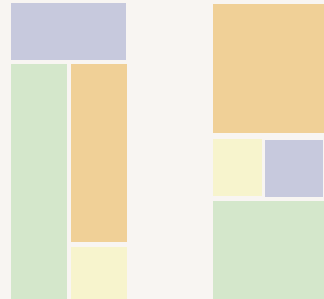
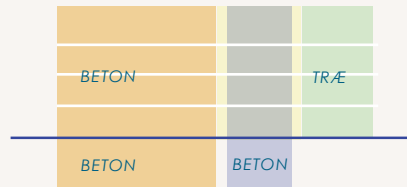
VARIANT 1



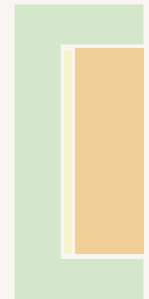
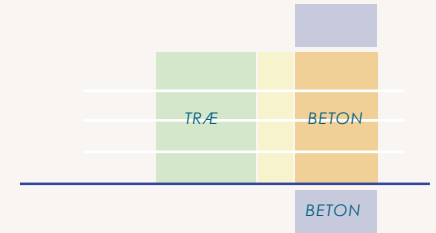
PLAN



VARIANT 2



VARIANT 3



SIMPLE INPUT | CARBON DESIGNER

Input:

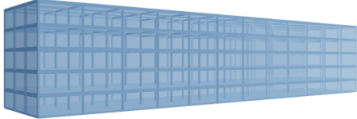
Building dimensions Verify and edit the building dimensions	
Height (above ground) ▾	<input type="text" value="18"/> m
Width ▾	<input type="text" value="85.6"/> m
Depth ▾	<input type="text" value="18"/> m
Internal floor height ▾	<input type="text" value="3.3"/> m
Maximum column spacing distance ▾	<input type="text" value="7.5"/> m
Number of staircases ▾	<input type="text" value="2"/>
Total number of floors ▾	<input type="text" value="5"/>
Gross internal floor area (GIFA) ▾	<input type="text" value="6637.6"/> m ²
Additional building dimensions Verify and edit additional building dimensions	
Load bearing internal walls ▾	<input type="text" value="0"/> %
Shape Efficiency Factor ▾	<input type="text" value="1.1"/>
Floor thickness ▾	<input type="text" value="0.3"/> m
Envelope thickness ▾	<input type="text" value="0.3"/> m
Roof shape efficiency factor ▾	<input type="text" value="1"/>
Length to depth ratio ▾	<input type="text" value="2"/>
Maximum building depth ▾	<input type="text" value="18"/> m
Maximum staircase distance ▾	<input type="text" value="50"/> m
External door ratio ▾	<input type="text" value="0.02"/>
External window ratio ▾	<input type="text" value="0.2"/>
Maximum window ratio ▾	<input type="text" value="0.9"/>
Balcony ratio ▾	<input type="text" value="0.01"/>
Internal wall ratio ▾	<input type="text" value="1.7"/>
External paved area ratio to GFA ▾	<input type="text" value="0"/>

Beregnet af OCL:

Building structures Define and edit the building structures	
Ground slab	
Ground slabs ▾	<input type="text" value="1400"/> m ²
Structure	
Floor slabs ▾	<input type="text" value="5600"/> m ²
Columns ▾	<input type="text" value="936"/> m
Shear walls ▾	<input type="text" value="186"/> m ²
Diagonal wind bracings ▾	<input type="text" value="0"/> m ²
Connecting parts ▾	<input type="text" value="0"/> m ²
Beams ▾	<input type="text" value="2882"/> m
Secondary beams ▾	<input type="text" value="0"/> m
Load bearing internal walls ▾	<input type="text" value="0"/> m ²
Balconies ▾	<input type="text" value="70"/> m ²
Staircases ▾	<input type="text" value="36"/> m
Enclosure	
Underground walls ▾	<input type="text" value="0"/> m ²
External walls ▾	<input type="text" value="2302"/> m ²
Cladding ▾	<input type="text" value="2302"/> m ²
Windows ▾	<input type="text" value="1400"/> m ²
External doors ▾	<input type="text" value="28"/> m ²
Roof slab ▾	<input type="text" value="1400"/> m ²
Roofs ▾	<input type="text" value="1400"/> m ²
Finishes	
Internal walls ▾	<input type="text" value="6340"/> m ²
Floor finishes ▾	<input type="text" value="6689"/> m ²
Ceiling finishes ▾	<input type="text" value="6689"/> m ²

Visualisering:

Variant 1



Transparency 40%

0 100

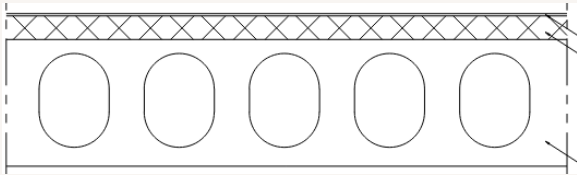
3D Model
The 3D model is based on the final values in the Building Dimensions column and aims to provide a better understanding of the proportions.

Any edits in the areas from the Building Structure column are not taken into account. The demonstrated model excludes

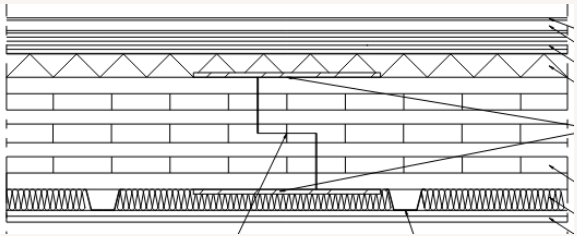
- Cleanliness layer and foundations, except piling
- Internal walls
- Windows and doors
- Stairs and balconies
- Few other building elements which are not relevant for all regions or building frames, such as frost insulation and shear walls.

Hjælp

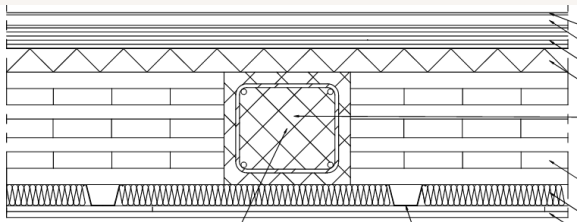
DÆK



Hollow-core slab

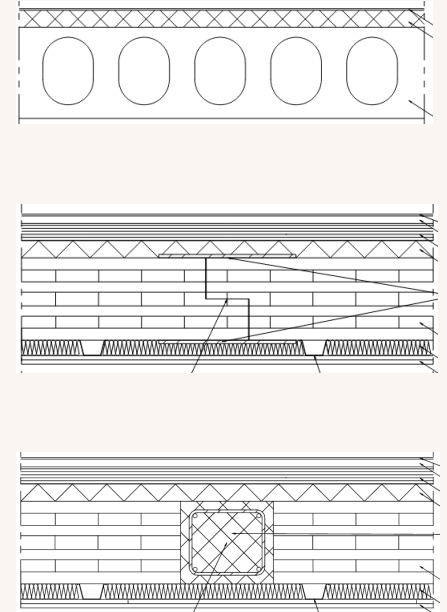
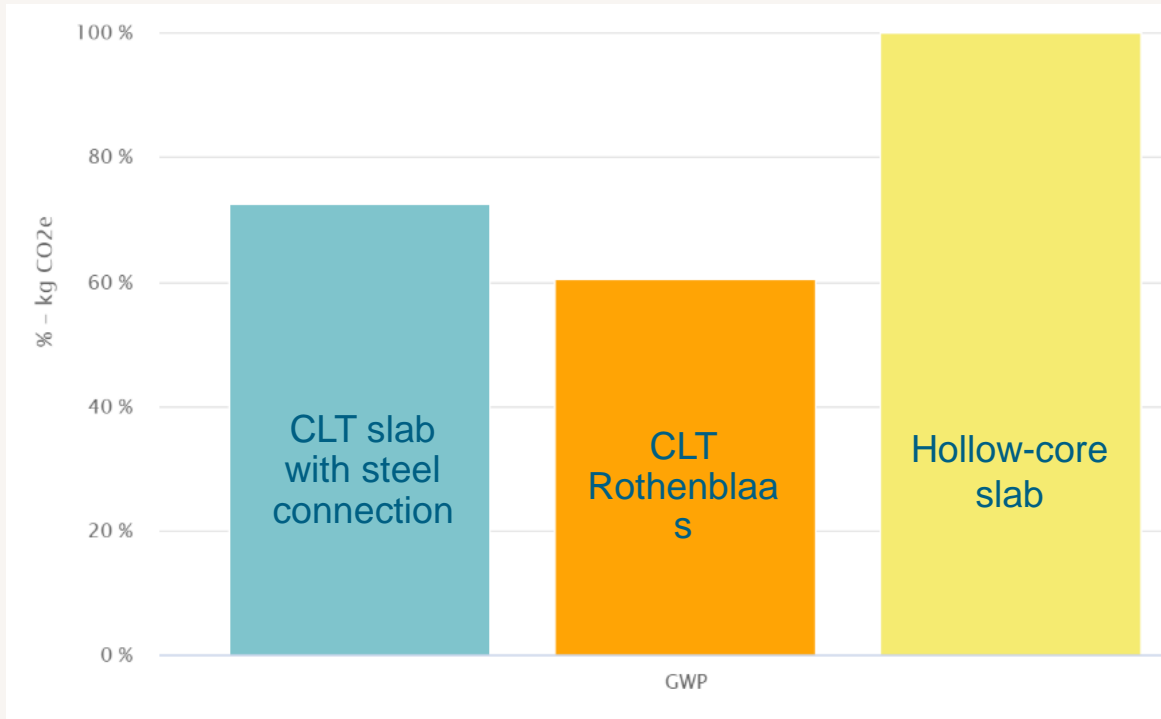


CLT slab with steel connection assembly

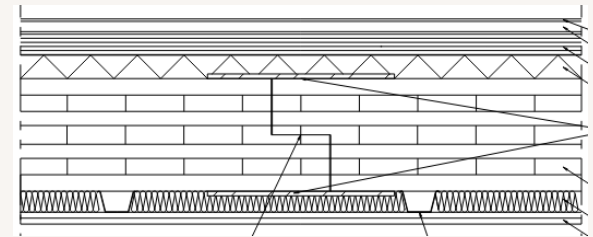


CLT slab with concrete assembly

DÆK: ITERATION 1

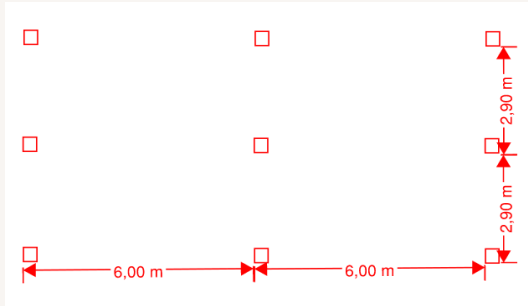


DÆK: ITERATION 2

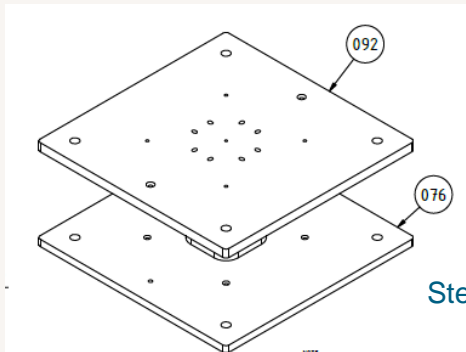


CLT slab with steel connection assembly in 2 variants

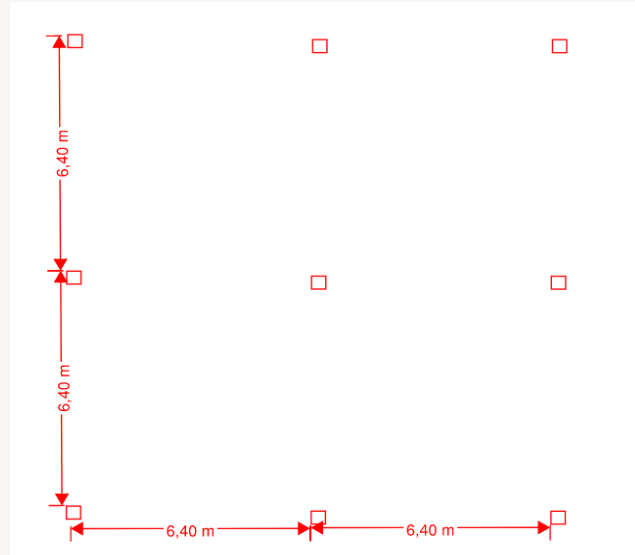
SØJLER



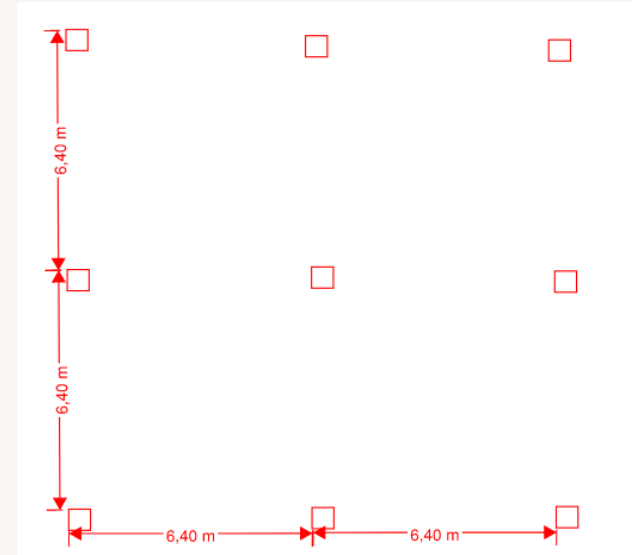
Columns per 2,9 x 6 m (400x400 mm)



Steel connection, 140kg steel

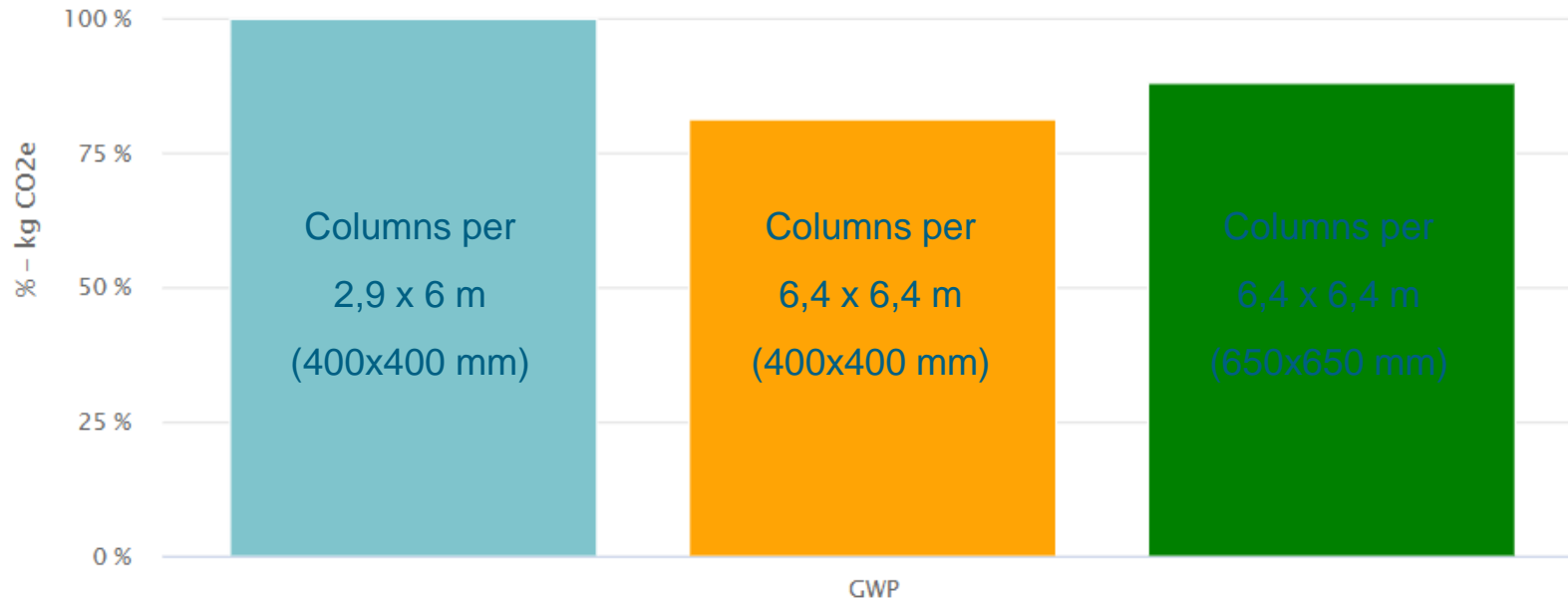


Columns per 6,4 x 6,4 m (400x400 mm)

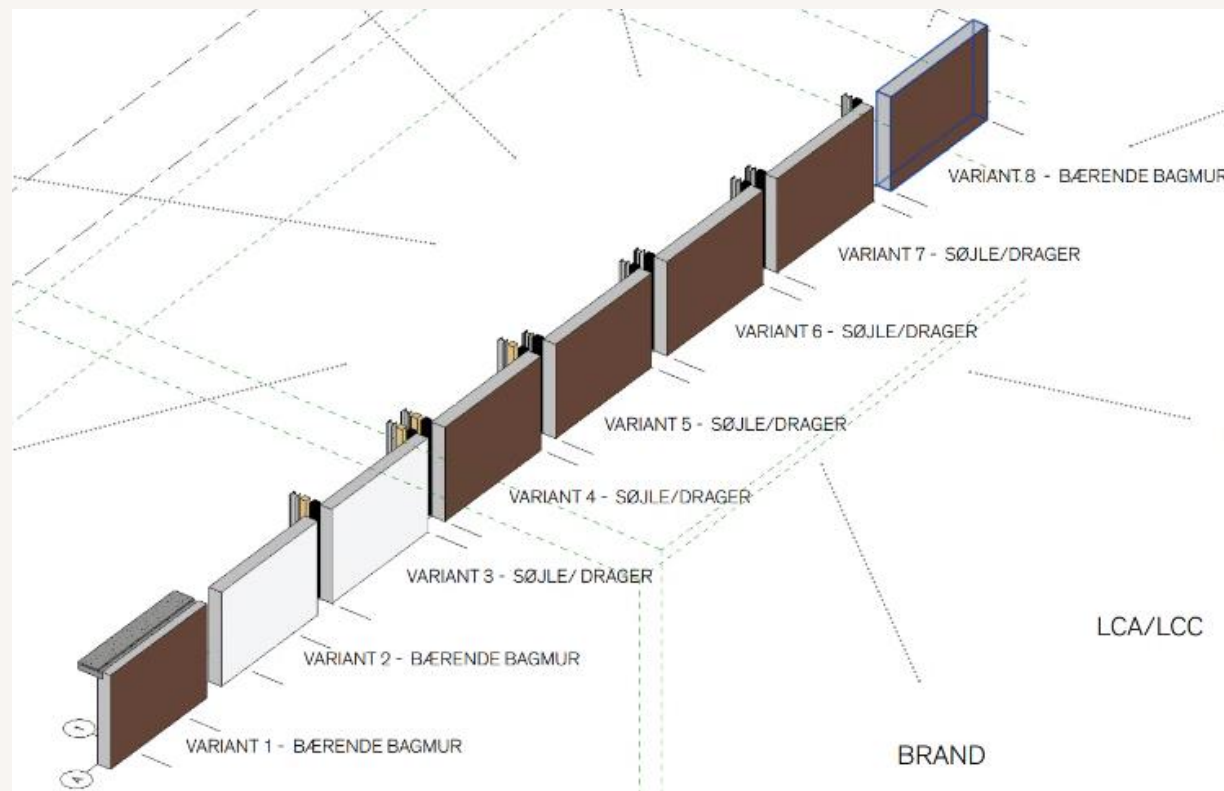


Columns per 6,4 x 6,4 m (650x650 mm)

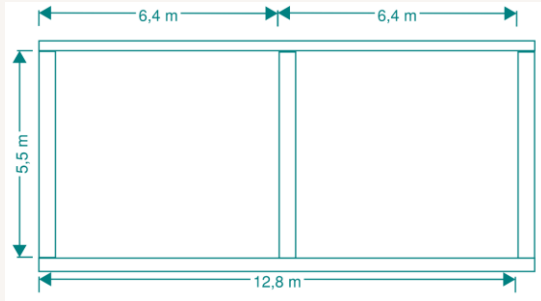
SØJLER



FACADE



FACADE DESIGN



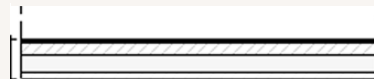
Bærende bagmur



VARIANT 1
240 mm concrete element
300 mm mineral wool, kl37
110 mm bricks



VARIANT 2
240 mm concrete element
300 mm wood struct/mineral wool, kl37
110 mm cement-based wind panel
25 mm ventilation/distance profiles
50 mm alu façade

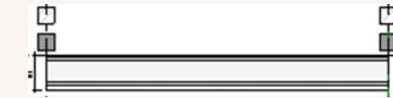


VARIANT 8
25 mm plasterboard (2 layers 13mm)
25 mm ventilation/distance profiles
240 CLT element
300 mm mineral wool
110 mm bricks

Søjle bjælke system



VARIANT 3
2 layers 13 mm plasterboard
470 mm wood struct/mineral wool
10 mm cement-based wind panel
25 mm ventilation/distance profiles
50 mm alu façade



VARIANT 4
2 layers 13 mm plasterboard
470 mm wood struct/mineral wool
10 mm cement-based wind panel
25 mm ventilation/distance profiles
110 mm bricks



VARIANT 5
10 mm plaster
110 mm reused bricks
400 mm mineral wool
110 mm bricks

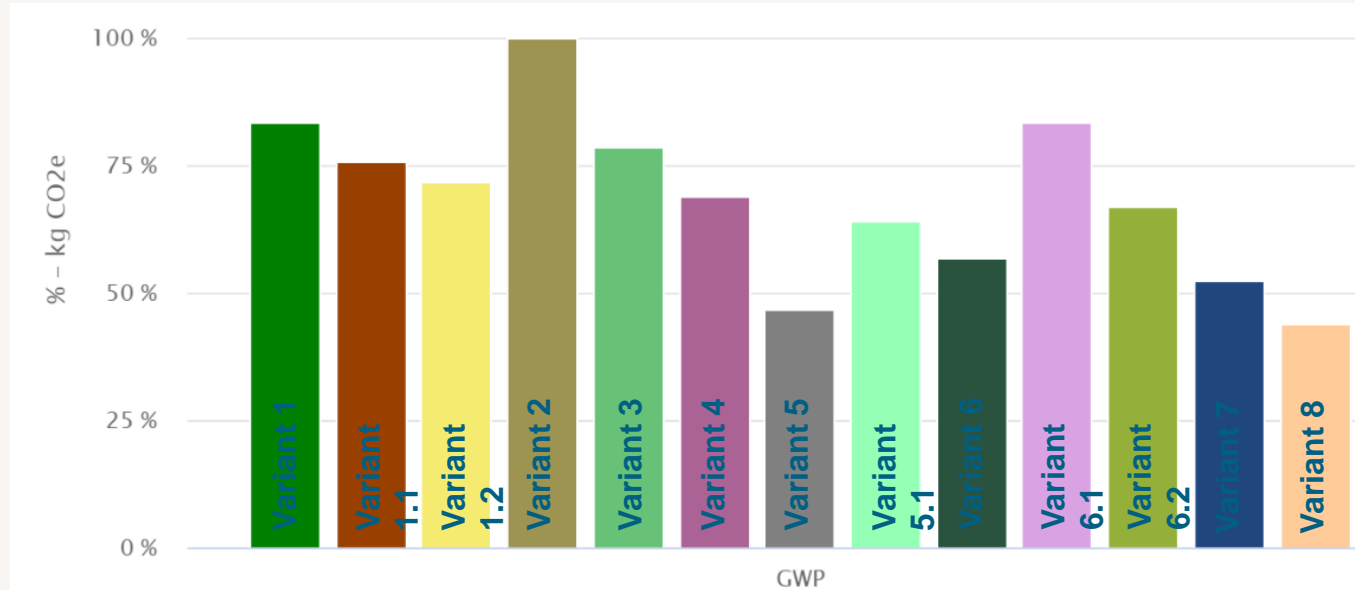


VARIANT 6
10 mm plaster
490 mm brick blocks (insulating)
25 mm ventilation/distance profiles
110 mm bricks



VARIANT 7
10 mm plaster
490 mm brick blocks (insulating)
25 mm ventilation/distance profiles
110 mm bricks

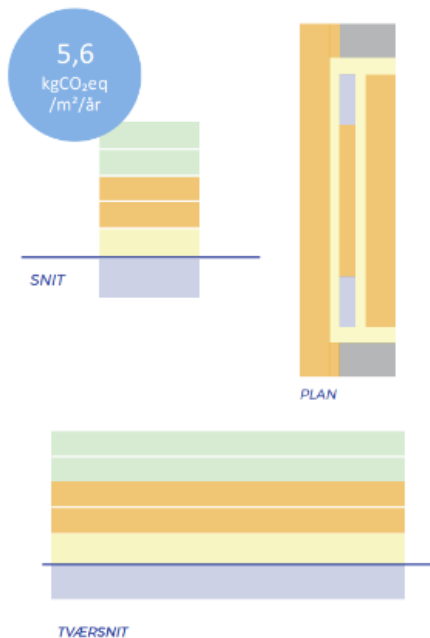
FACADE DESIGN



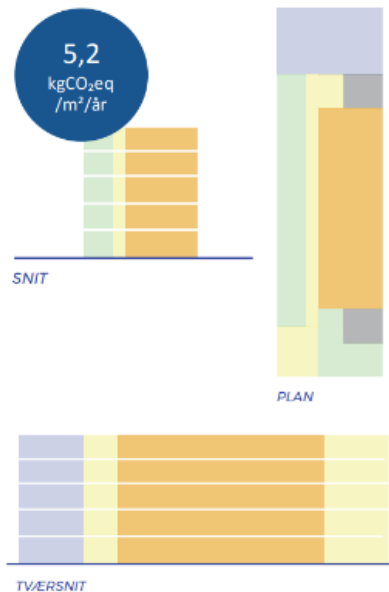
- Variant 1 - Bearing rear wall
- Variant 1.2 - Bearing rear wall 5-15 reinforcement
- Variant 3 - Column beam system
- Variant 5 - Column beam system
- Variant 6 - Column beam (uninsulated, reused bricks)
- Variant 6.2 - Column beam (uninsulated brick blocks)
- Variant 8 - Bearing rear wall with CLT
- Variant 1.1 - Bearing rear wall (16-25 reinforcement)
- Variant 2 - Bearing rear wall
- Variant 4 - Column beam system
- Variant 5.1 - Column beam system
- Variant 6.1 - Column beam (uninsulated)
- Variant 7 - Column beam

VOLUMENSTUDIE

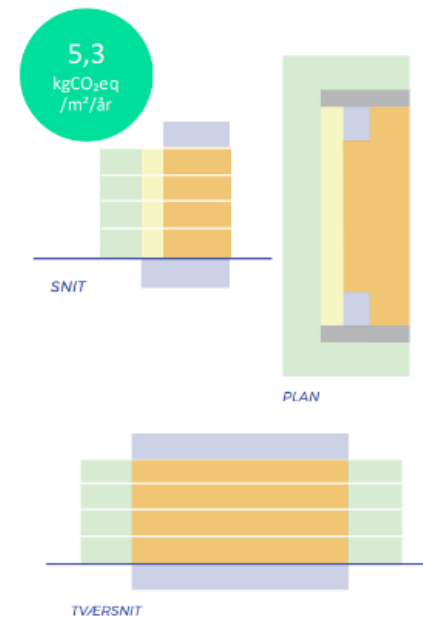
VARIANT 1



VARIANT 2



VARIANT 3



OBS: Resultater er ikke endelige og har ikke alle bygningsdele med, men er sammenlignelige

VARIANT VX



FORELØBIG EVALUERING



HVAD HAR VI ERFARET?

Fordele

- Nemt volumenstudie
- Fungerer godt live på arbejds møder
- Nemt at integrerer variantstudie af bygningsdele i volumenstudie

Ulemper

- Nye arbejdsgange kræver tilvænning

VIDERE PROCES



HVAD SER VI FREM I?

- Integration med model
- Udveksling af data gennem Excel
- Løbende opdatering af beregning

TAK FOR NU

