

WOODLIFE SWEDEN

06/03/2023 CURITIBAS

THE SWEDISH EXPERIENCE  
IN SUSTAINABLE WOODEN CONSTRUCTION

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white



The background of the slide is a photograph of industrial smokestacks. Two tall, dark smokestacks are visible, with thick, dark smoke billowing from them and spreading across the sky. The sky is a mix of blue and orange, suggesting a sunset or sunrise. The smoke is dense and has a reddish-orange tint, possibly due to the lighting or the nature of the emissions. The overall mood is one of environmental impact and industrial activity.

## OUR CHALLENGE

**40 % of CO2 emissions in the World origins from the building and real estate sector. And almost twice as much if you account for emmisions from material produced abroad.**

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A yellow Volvo excavator is shown in the foreground, working on a demolition site. The excavator's arm is extended, and it is surrounded by a large pile of rubble and debris. In the background, a multi-story building is being demolished, with its concrete and steel structure exposed. The sky is clear and blue. The overall scene depicts a large-scale construction or demolition project.

## OUR CHALLENGE

**30 % of all waste in Sweden comes from the building sector, almost 9 billions tons/ year.**

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## MULTI DISCIPLINE PRACTICE

- Architecture
- Landscape
- Urban Design
- Interior Design
- Project Management
- Sustainability
- Lighting Design
- Transformation
- Digitalisation
- 14 STUDIOS
- 4 COUNTRIES, Including Stuttgart.

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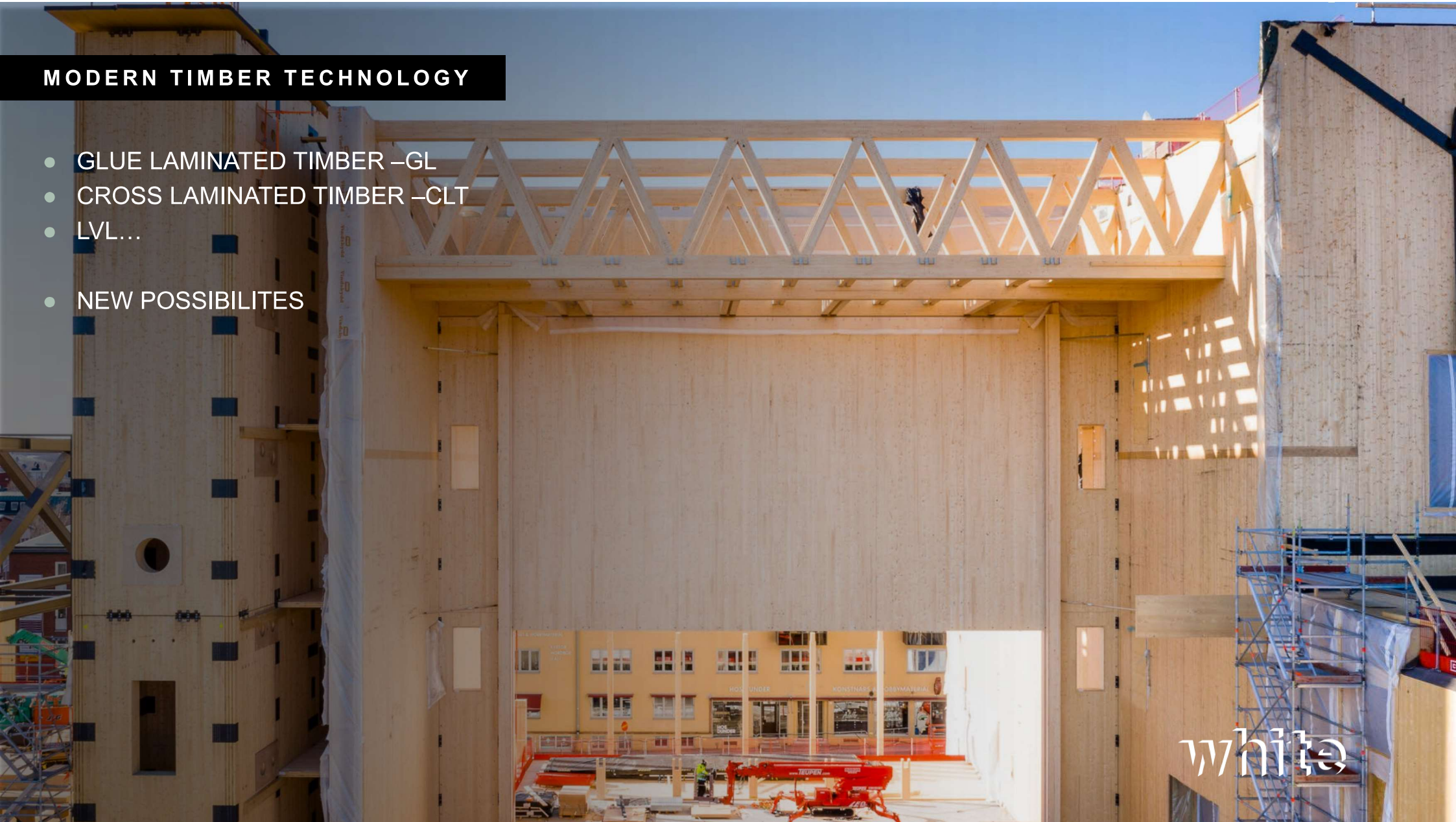
## WHITE RESEARCH LAB

White has an explorative culture, and we have a long and solid background in practice-based research and development. Our White Research Lab is an important part of our operation, with low thresholds for all employees who wish to delve deeper into research and innovation. Over the past 10 years, more than 300 employees have been involved across the whole spectrum, from curious beginners to fully fledged researchers.



## MODERN TIMBER TECHNOLOGY

- GLUE LAMINATED TIMBER –GL
- CROSS LAMINATED TIMBER –CLT
- LVL...
- NEW POSSIBILITIES

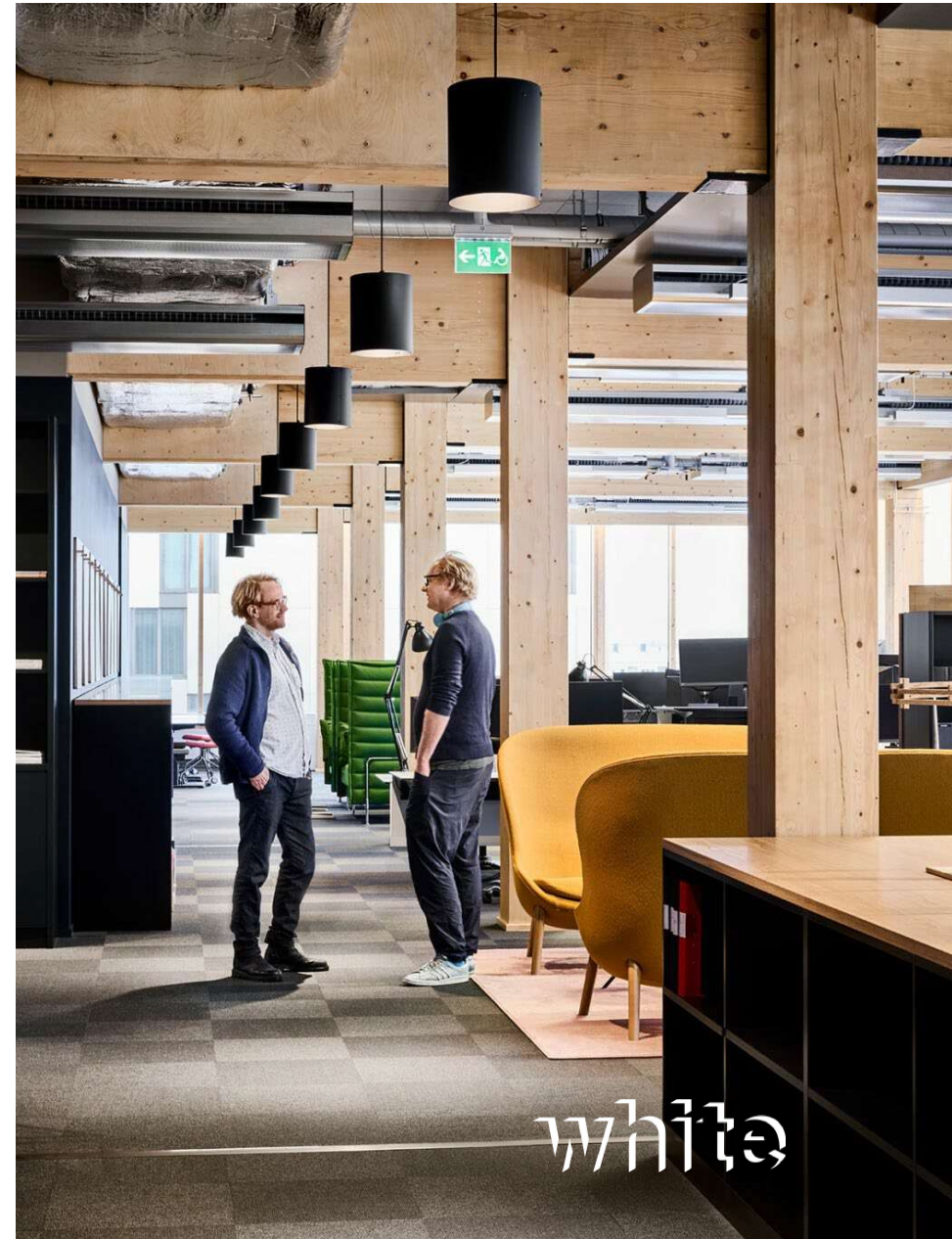


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## MAGASIN X, UPPSALA

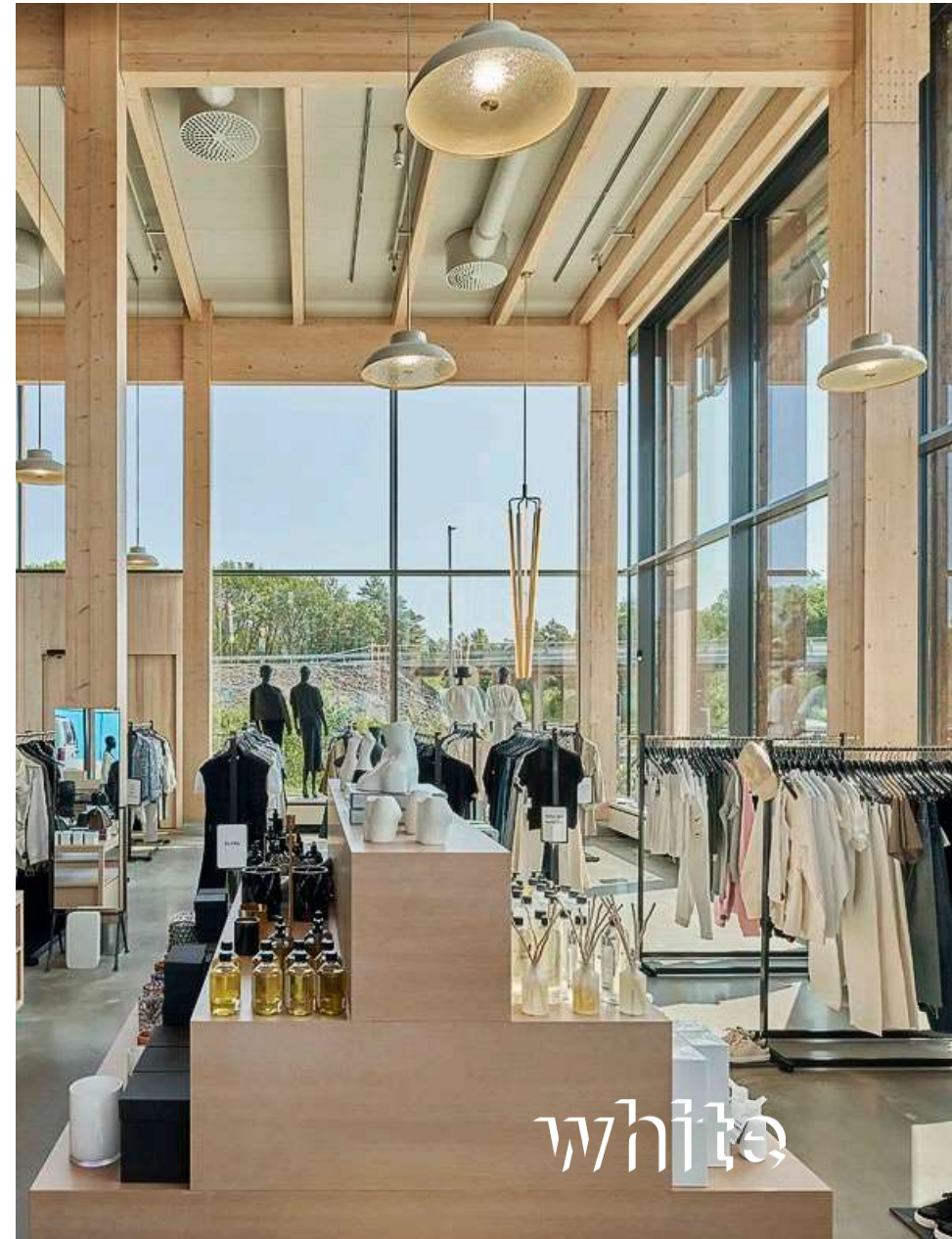
Uppsala kommuns arkitekturpris  
3<sup>rd</sup> prize Rethinking the future awards





NODI

Dezeen Awards 2021  
Nominated World Architecture Festival





KIMMEL QUARTER, RIGA







SARA KULTURHUS

OPENED 2021  
20 STOREY 75m tall  
LOCALLY SOURCED  
FSC CERTIFIED MASS TIMBER

CULTURE CENTRE – 17.000 m<sup>2</sup>  
HOTEL – 11.000 m<sup>2</sup>

white





A satellite map of the North Atlantic Ocean and surrounding landmasses. The map shows the Gulf Stream as a warm water current flowing from the southwest towards the northeast. Three locations are marked with orange dots: London in the UK, Stockholm in Sweden, and Skellefteå in northern Sweden. Text labels provide additional context about the climate and vegetation at these locations.

**SWEDEN**

65 degrees north  
Dawson City, Yukon  
70% forest  
SPRUCE, PINE

Gulf Stream

SKELLEFTEÅ

STOCKHOLM

LONDON



TIMBER TRADITION



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## TIMBER STRATEGY



WOOD FOR A **SUSTAINABLE SOCIETY**

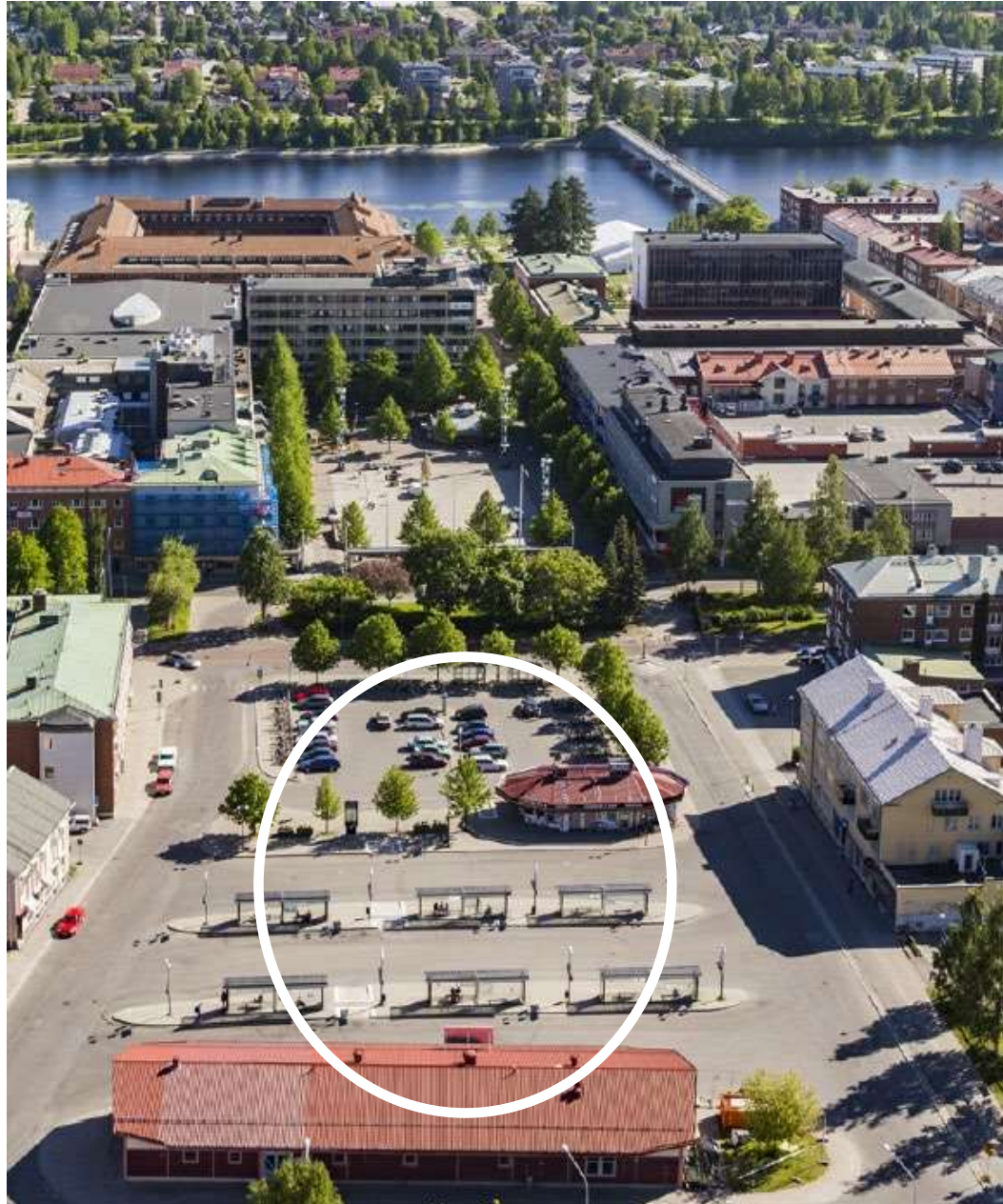


## INTERNATIONAL COMPETITION



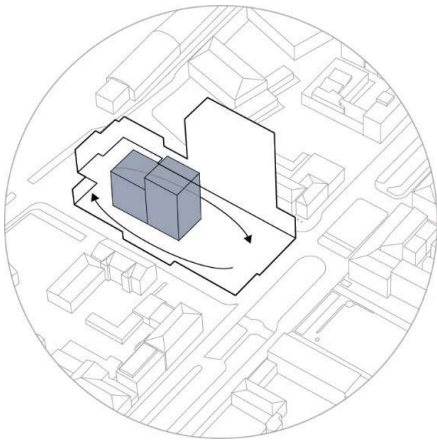


COMPETITION SITE

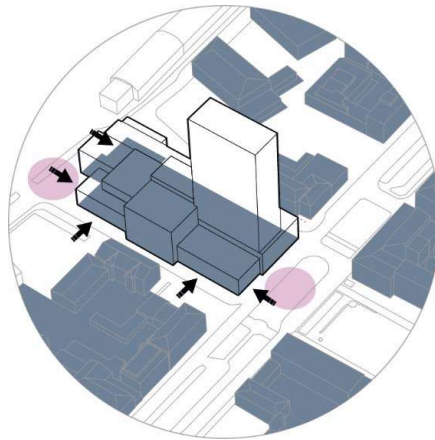




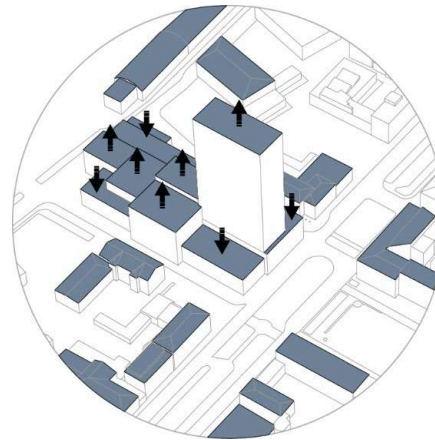
## CONCEPT



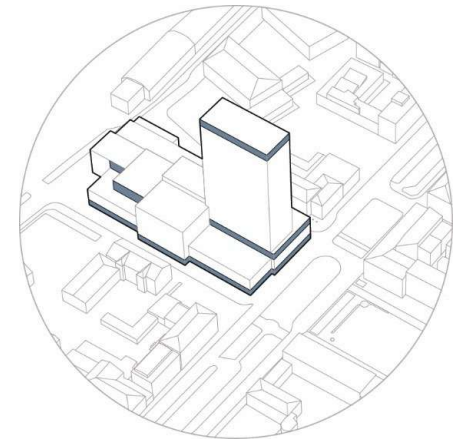
Split level site  
Scenes placed side-by-side in  
the centre of the block.



Entrances in all directions  
facing the street, enlivening  
the streetscape – there is no  
“back” of the building.



Adjusting the scale and height  
to its content, connecting to the  
surrounding city scale.



Shaping new public spaces.



## MENDING THE CITY FABRIC

P  
TRAIN  
STATION

CULTURE CENTER

MAIN SQUARE

RETAIL BLOCK

CIVIC CENTER

SKELLEFTE RIVER



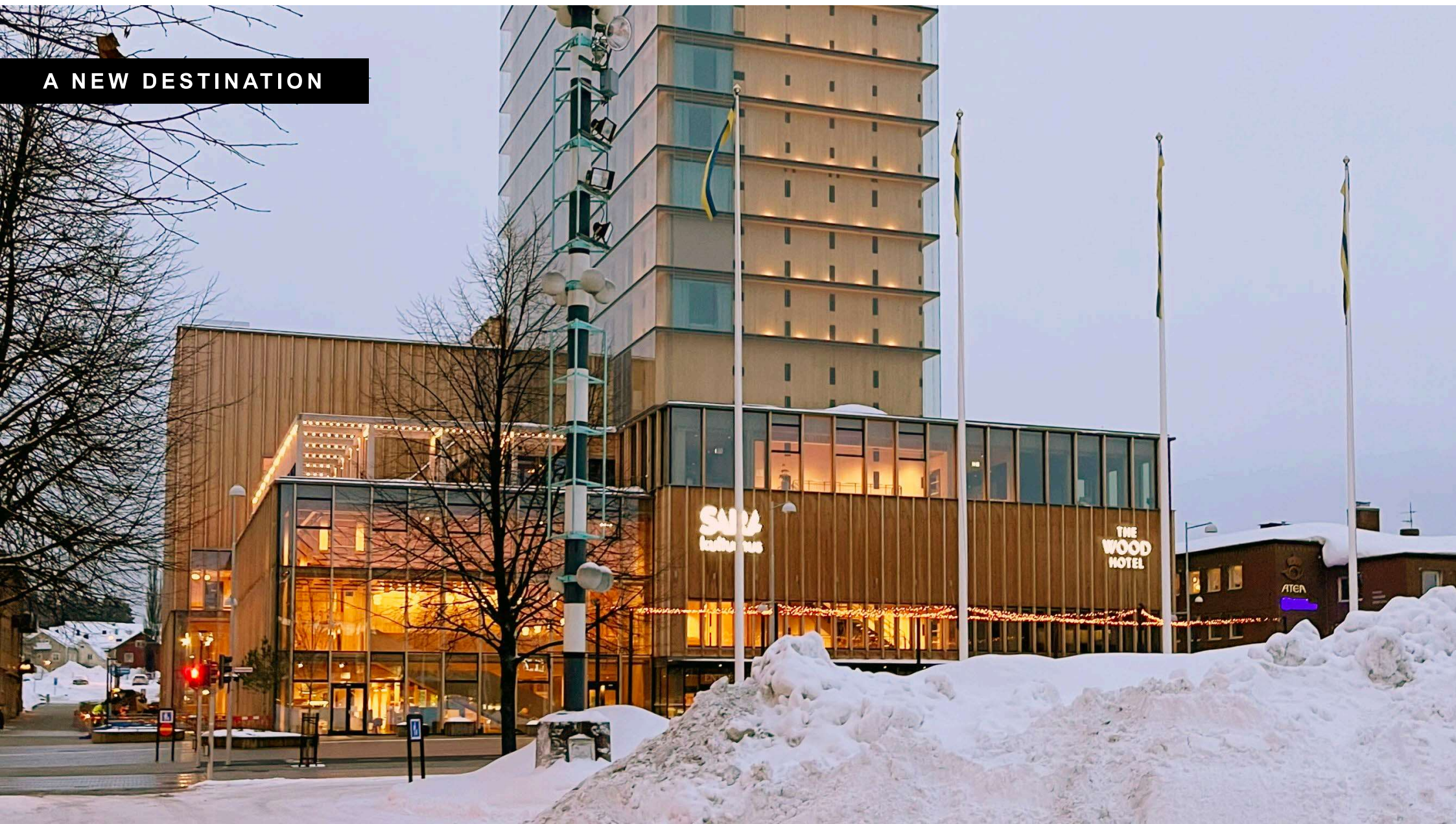


WINNING PROPOSAL





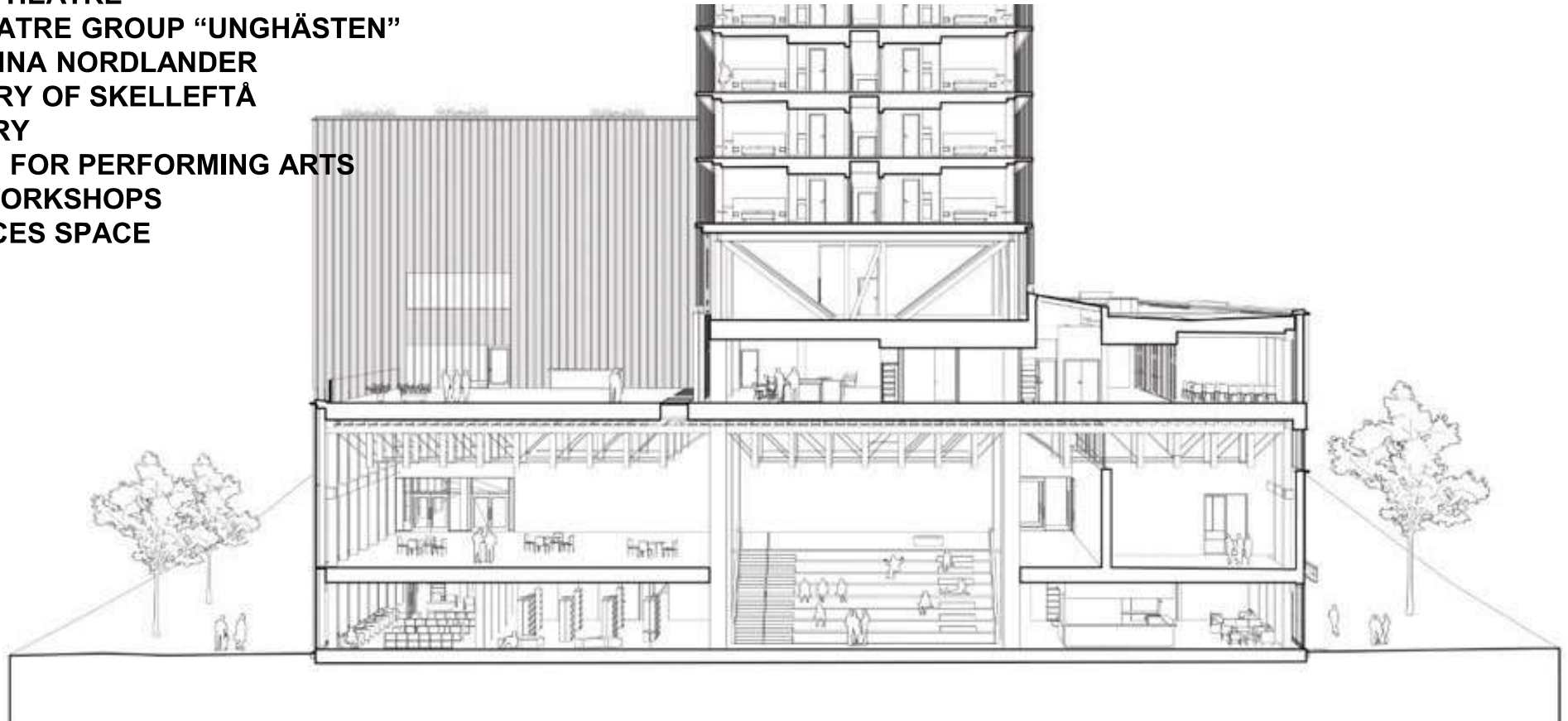
A NEW DESTINATION





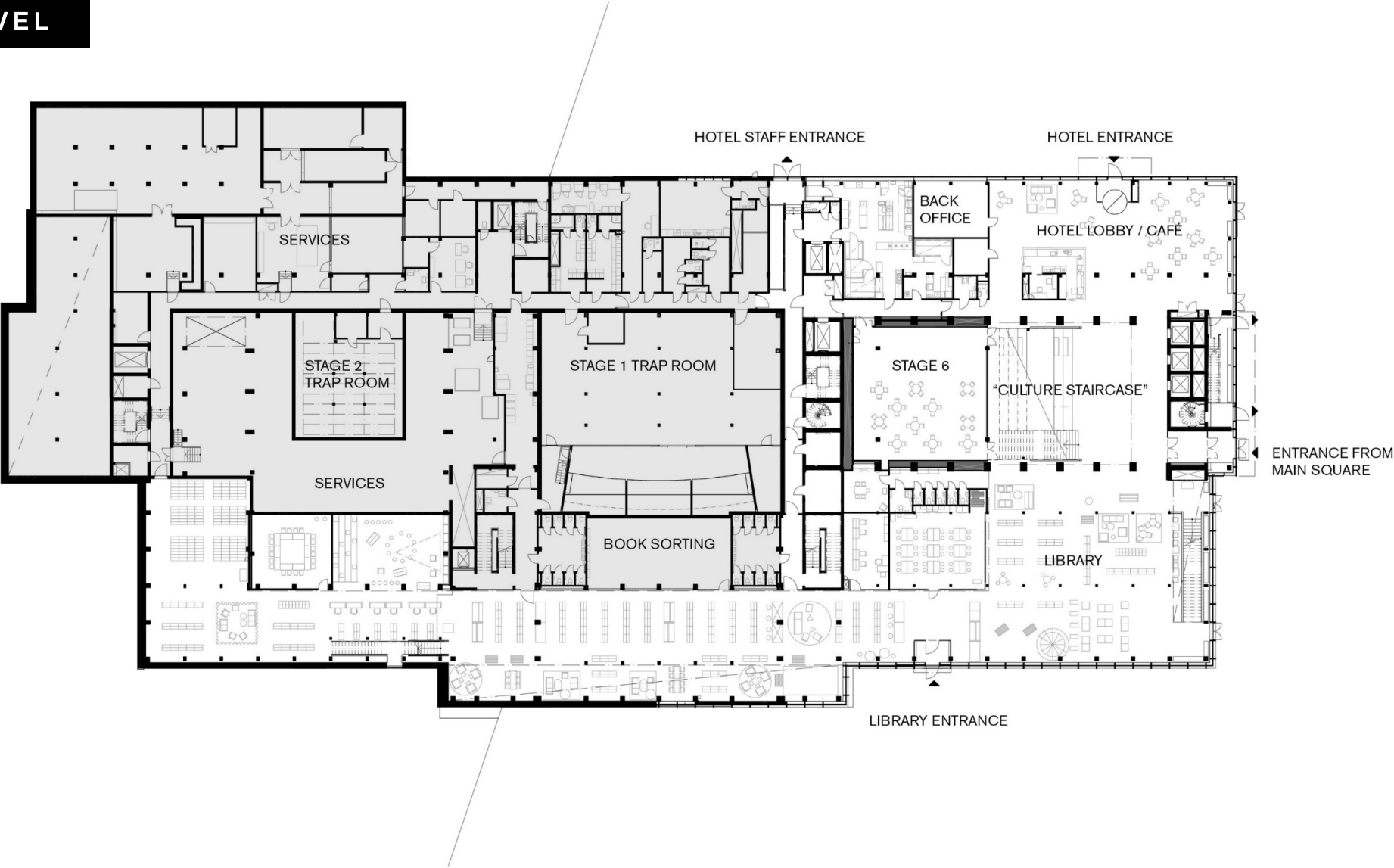
## CULTURAL CENTER

- REGIONAL THEATRE
- YOUTH THEATRE GROUP “UNGHÄSTEN”
- MUSEUM ANNA NORDLANDER
- ART GALLERY OF SKELLEFTÅ
- CITY LIBRARY
- SIX STAGES FOR PERFORMING ARTS
- THEATRE WORKSHOPS
- JOINT OFFICES SPACE



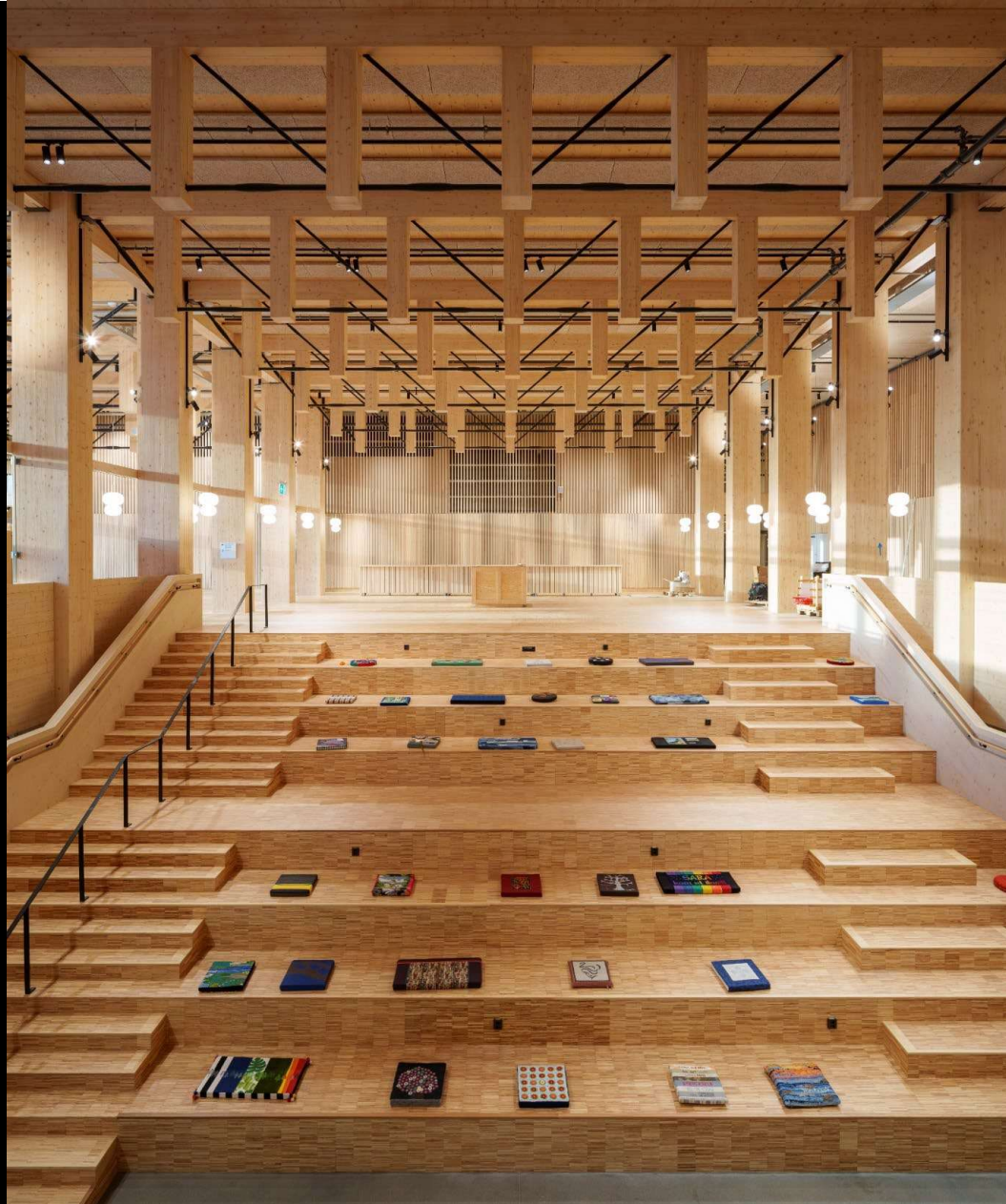


GROUND LEVEL





MAIN ENTRANCE



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PUBLIC SPACE



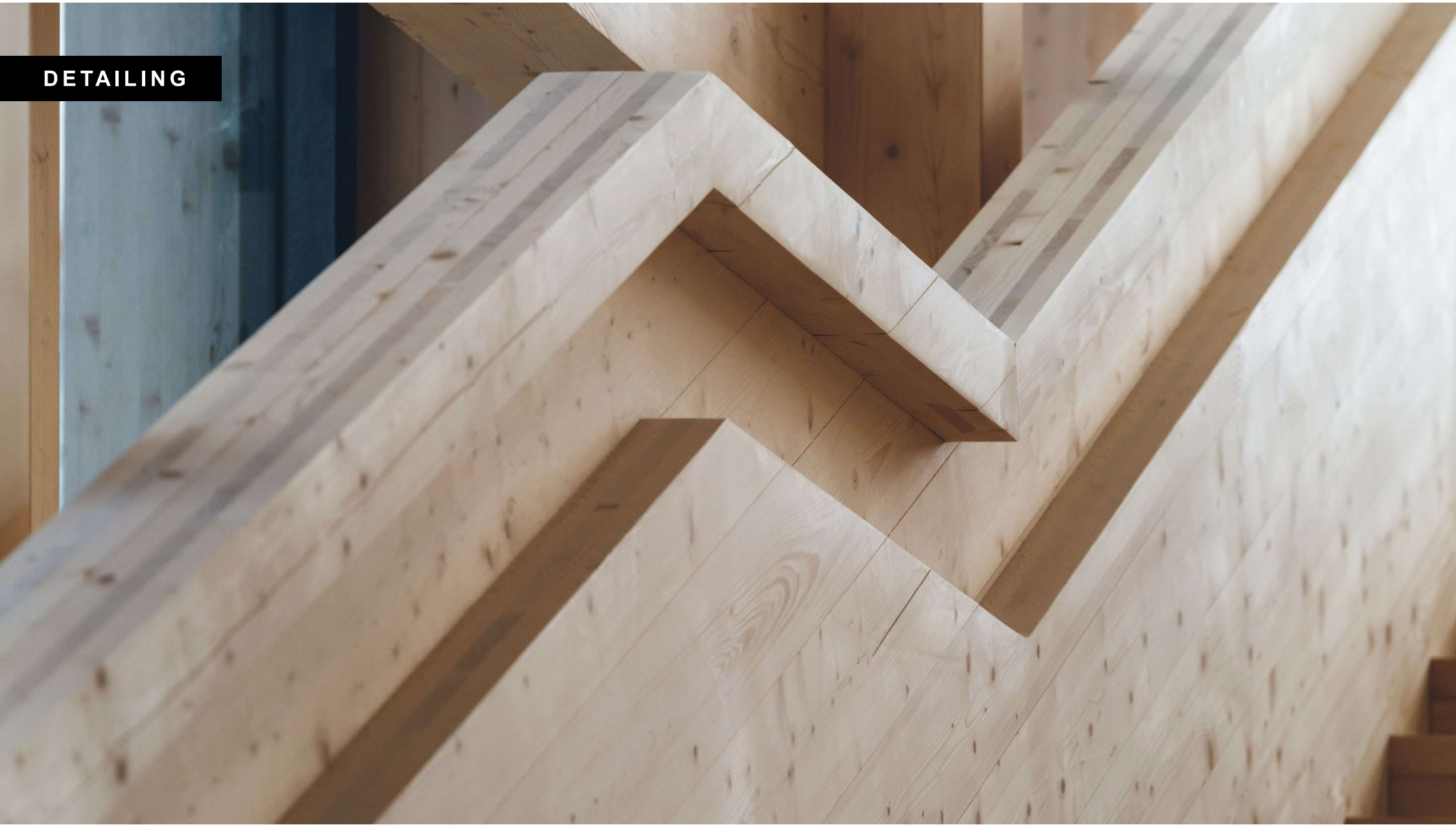


TACTILITY

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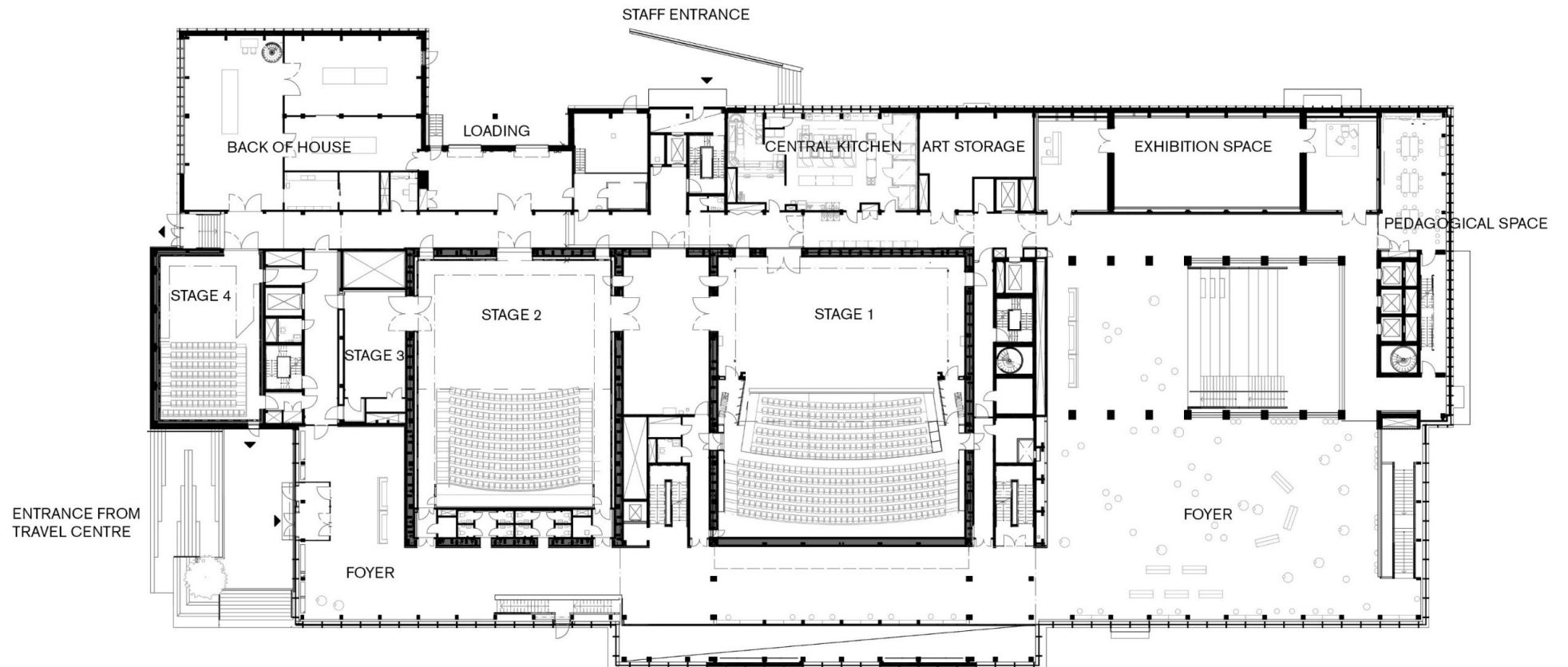


DETAILING





## THEATRE LEVEL





## FLEXIBLE FOYERS



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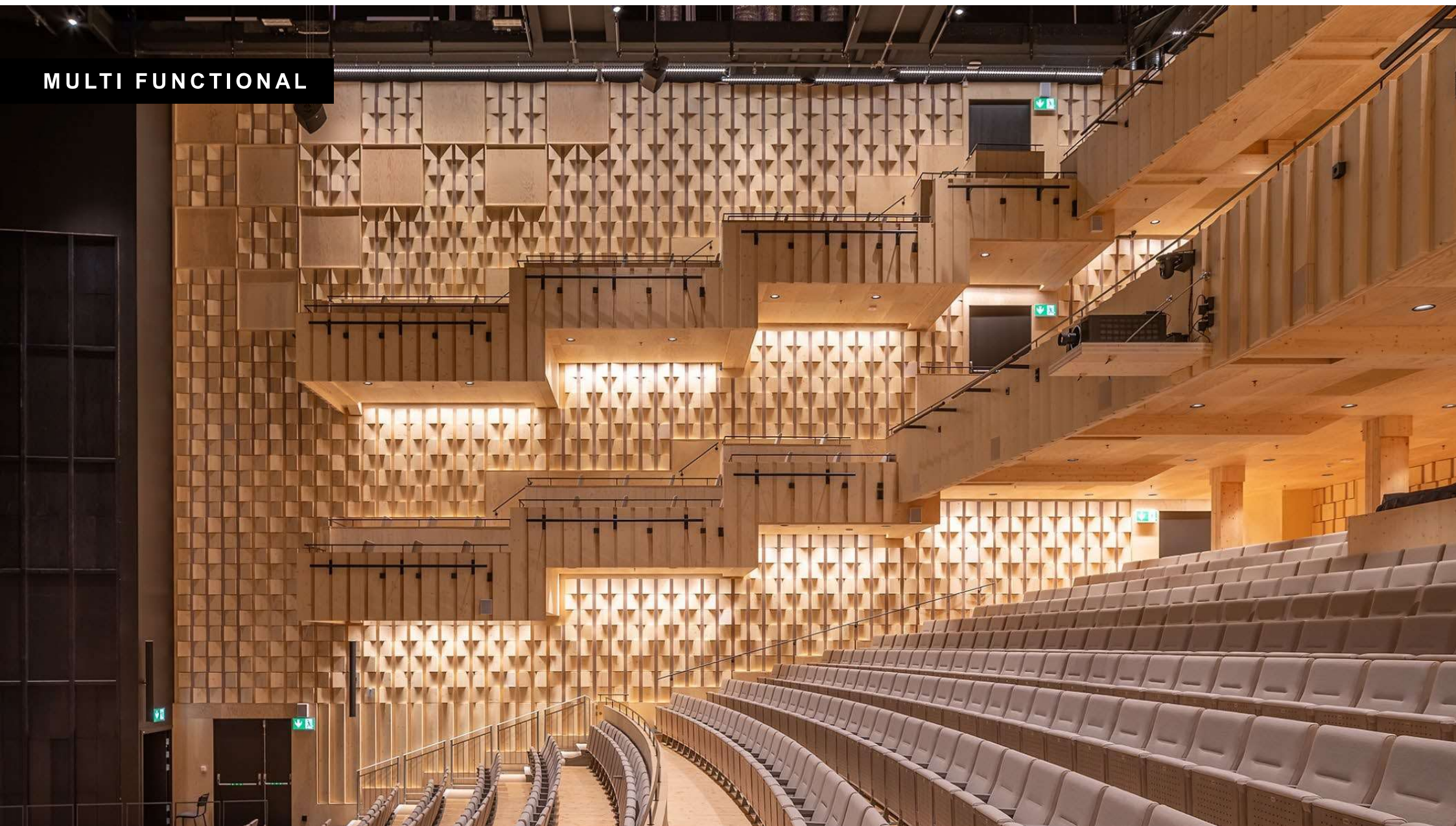


# GRAND AUDITORIUM IN TIMBER





MULTI FUNCTIONAL





# BLACK BOX





DAYLIGHT STAGE





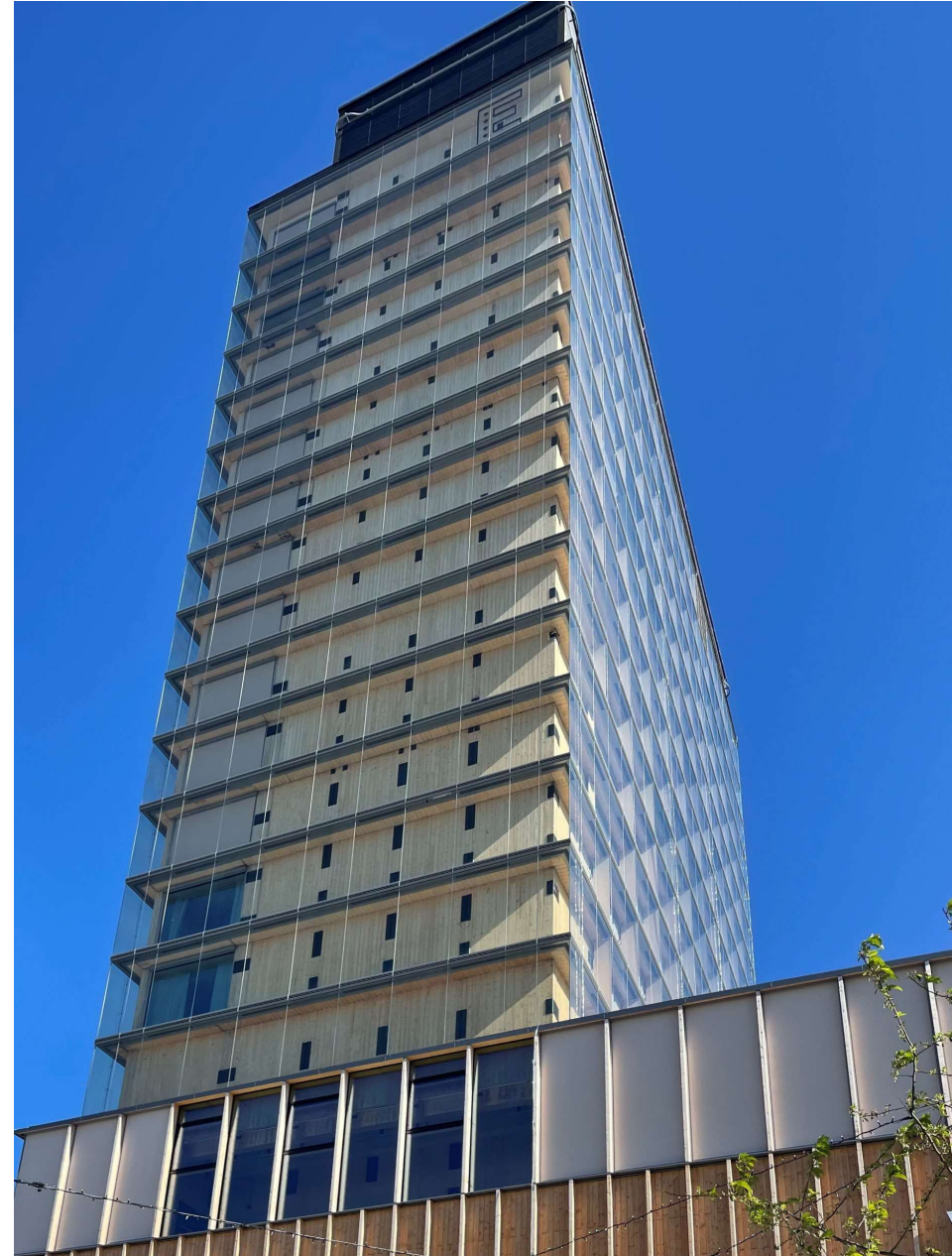
## CREATIVE SPACES





## THE WOOD HOTEL

- 20 storeys
- 75m
- (will shrink about 12cm)
- 205 hotel rooms
- Conference centre
- Gym
- Rooftop spa
- 3 restaurants





## HOTEL PLAN

- 18 prefabricated hotel pods
- 2 elevator cores





## HOTEL ROOMS





A NEW PERSPECTIVE

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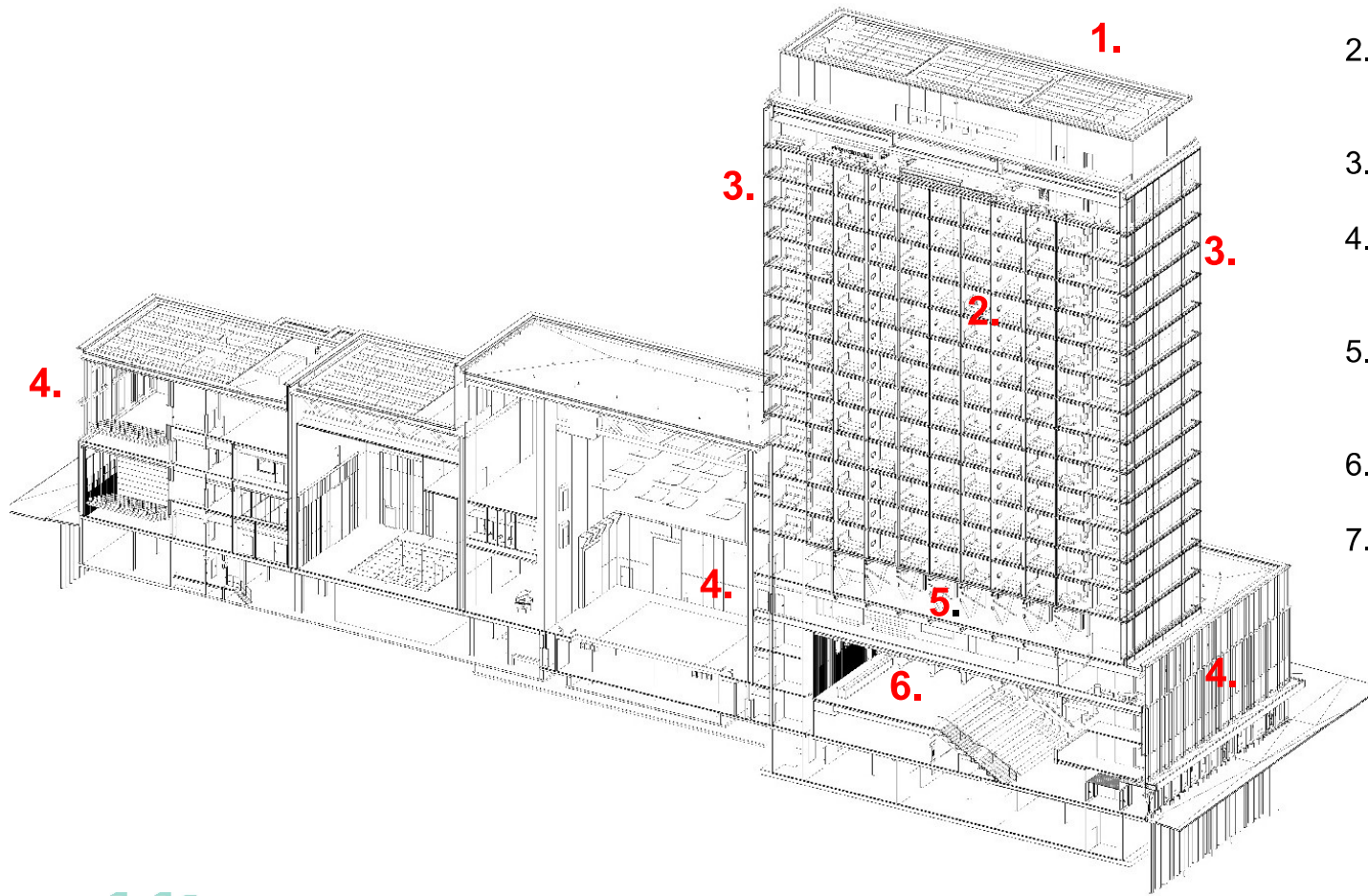


## ROOF TOP SPA





## A LIBRARY OF SOLUTIONS



1. Dead weight concrete slabs
2. Prefabricated CLT hotel modules (13 storeys)
3. CLT cores stability (proposed concrete)
4. Combination of glulam frame with CLT walls and floors
5. Transfer structure, steel trusses, plant floor
6. Hybrid GL and steel trusses
7. Concrete foundations





## TIMBER CONSTRUCTION

### ON SITE

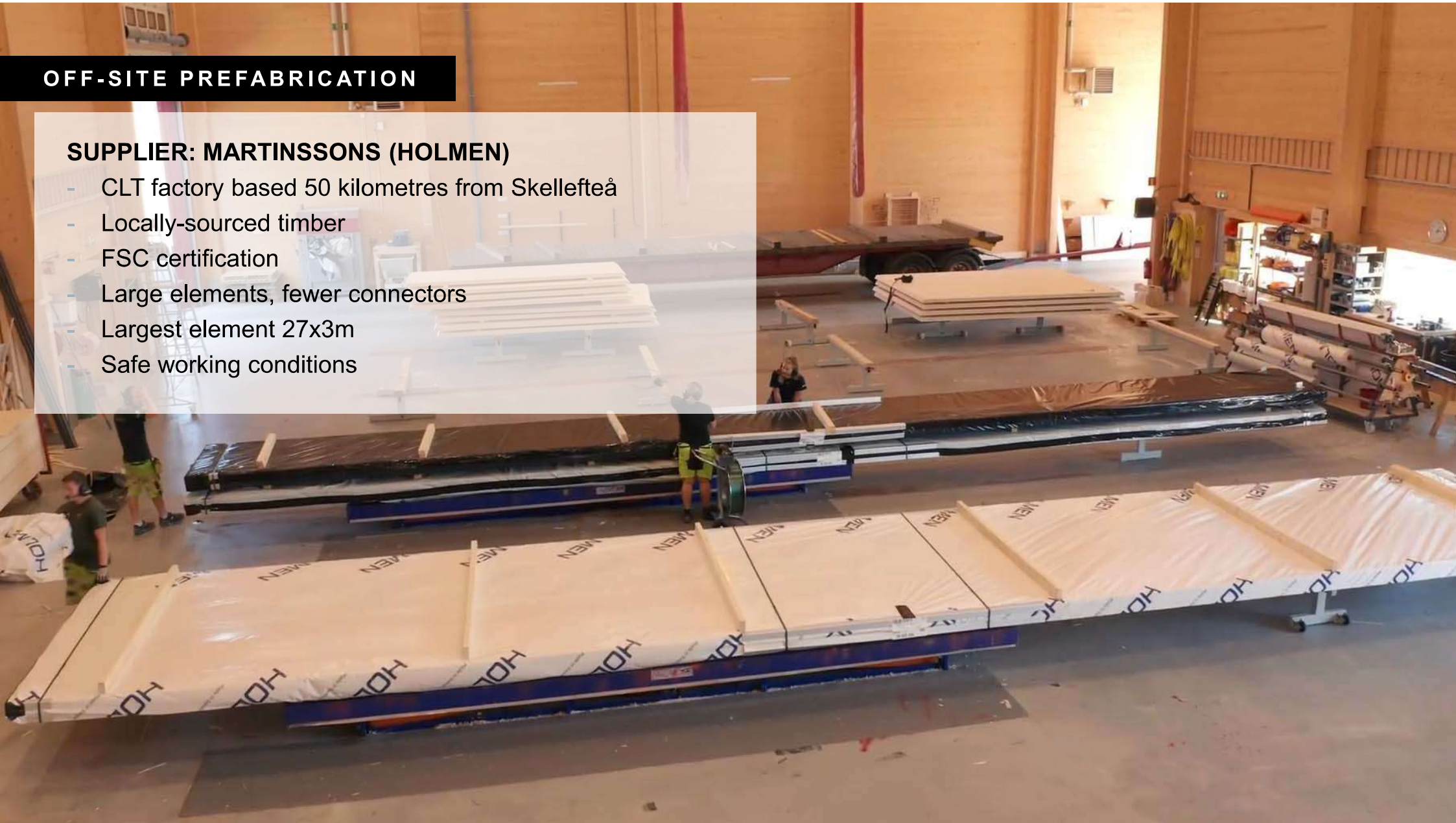
- 73-week montage
- One year saved in construction time
- Clean working site
- Silent construction site (no complaints)
- Fewer lifts with crane
- 80% reduced transportation



## OFF-SITE PREFABRICATION

### SUPPLIER: MARTINSSONS (HOLMEN)

- CLT factory based 50 kilometres from Skellefteå
- Locally-sourced timber
- FSC certification
- Large elements, fewer connectors
- Largest element 27x3m
- Safe working conditions

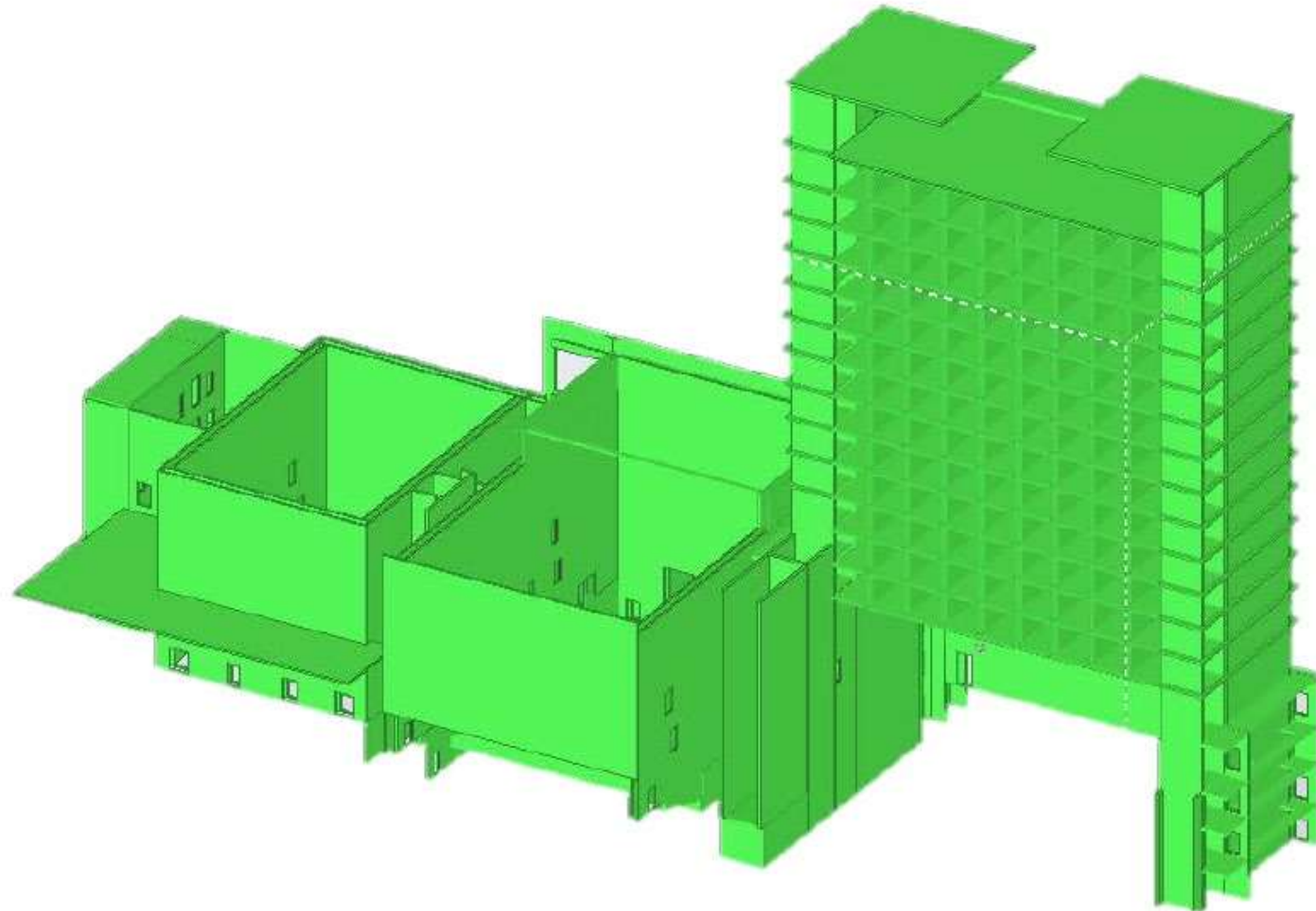




## CLT

**9500m<sup>3</sup>**

- Elevator cores
- 3D volumetrics
- Shear walls
- Floor slabs



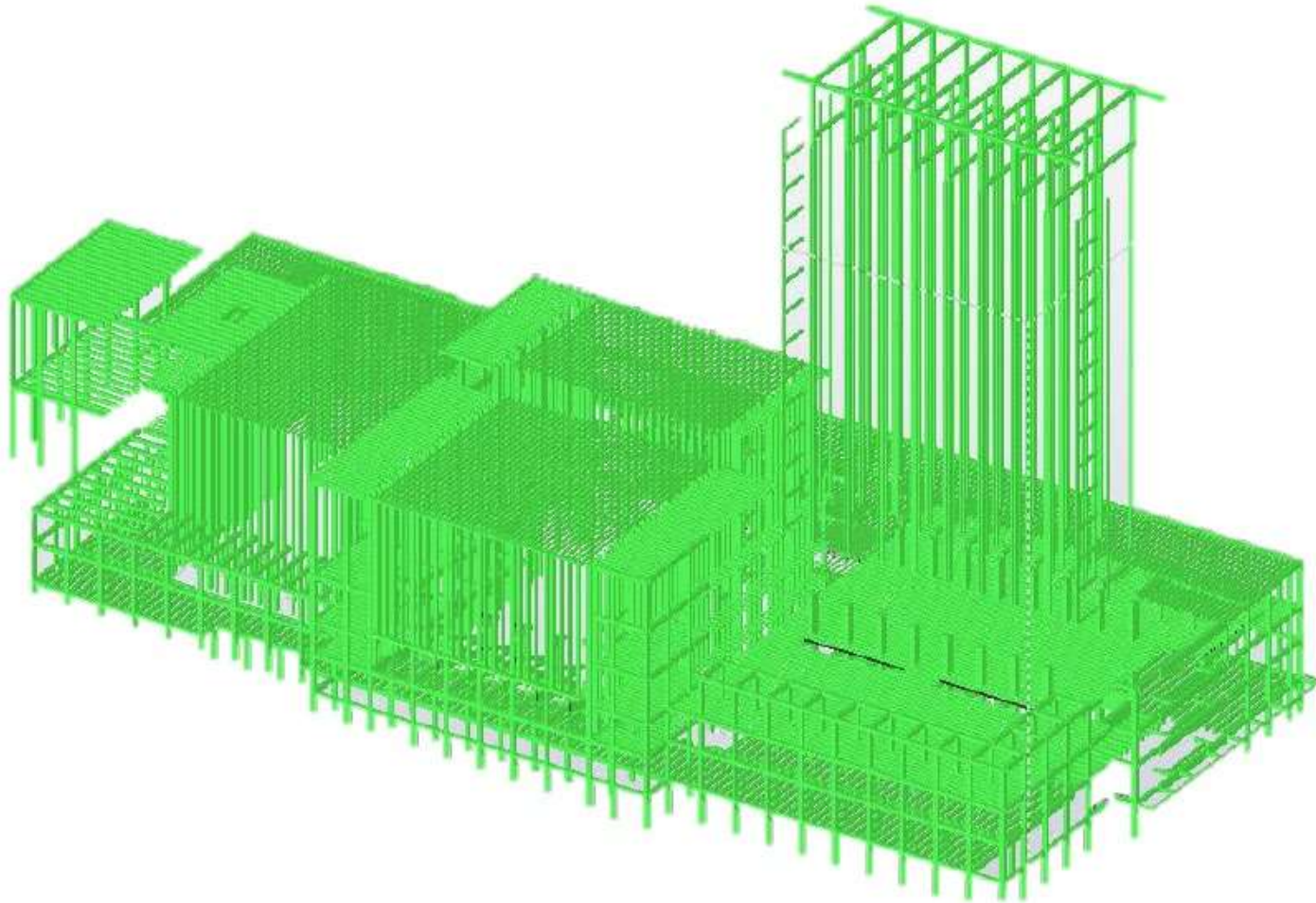
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## GLUE LAM

**2200 m<sup>3</sup>**

- Beams
- Columns
- Trusses



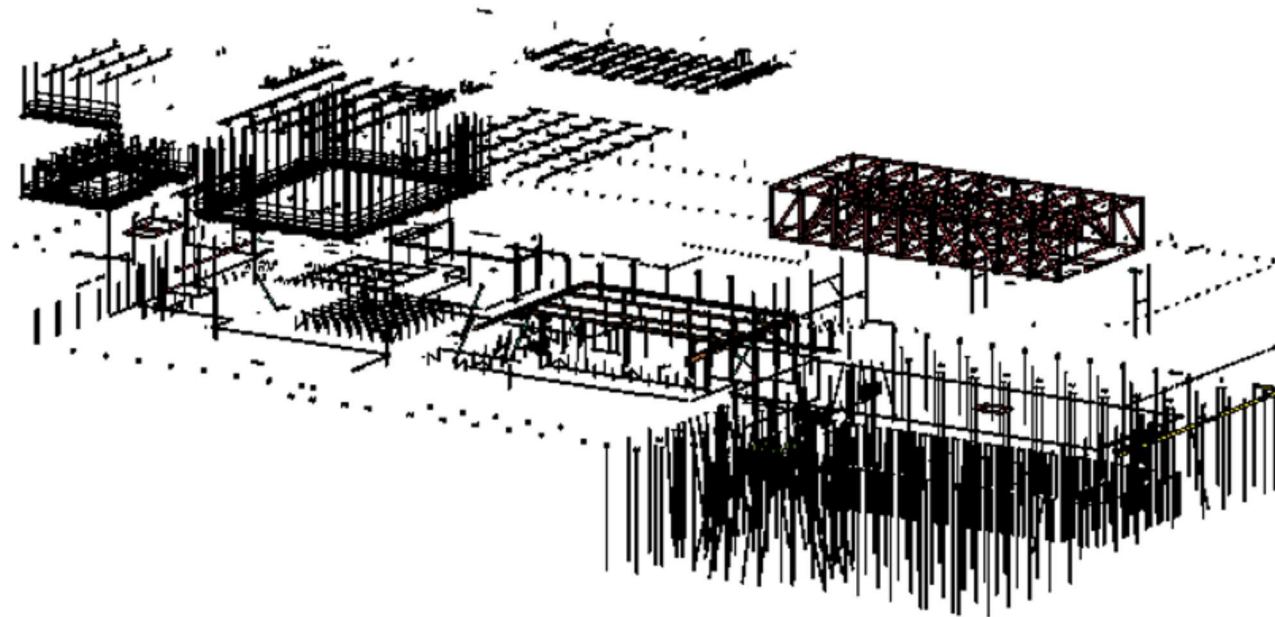
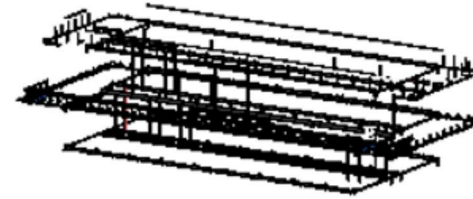
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## STEEL

234 ton (excluding screws)

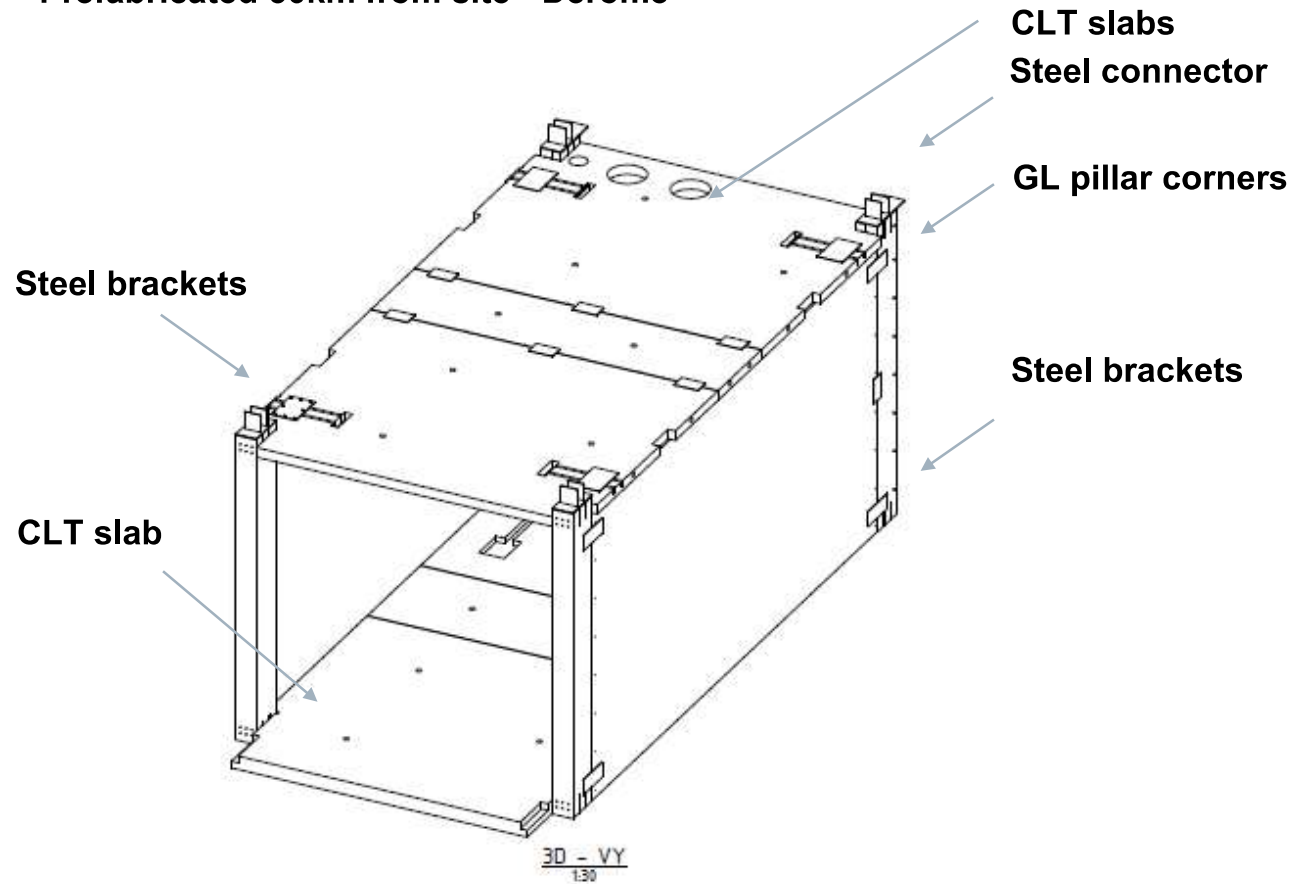
- Steel piles to bedrock
- Hybrid Trusses
- Connectors
- Brackets





## 3D HOTEL ROOM MODULES

Prefabricated 50km from site - Derome





## VOLUMETRIC ASSEMBLY





DOUBLE SKIN



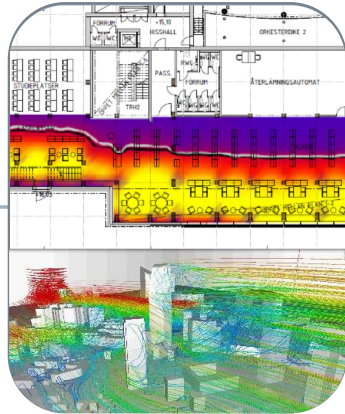


# BIM AS A TOOL FOR COLLABORATION

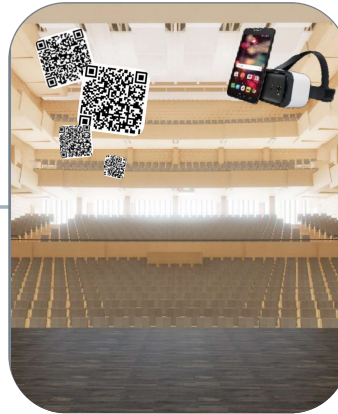
## DESIGN



## SUSTAINABILITY



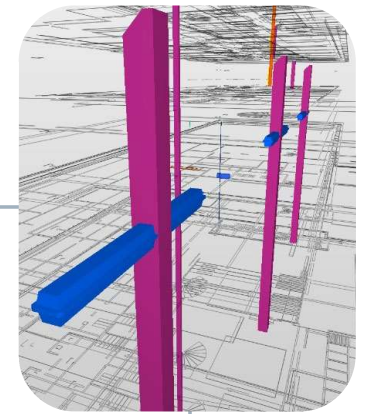
## AR/VR



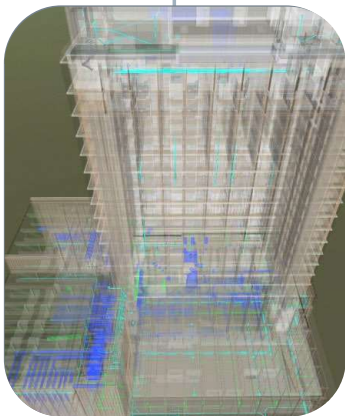
## VISUALISATION



## REVIEW COLLISIONS



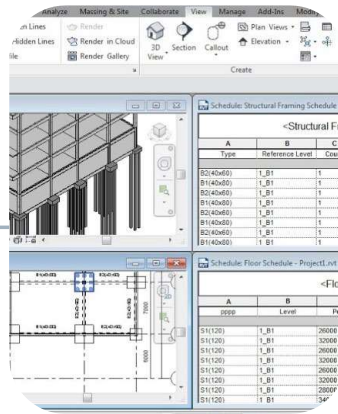
## COORDINATION



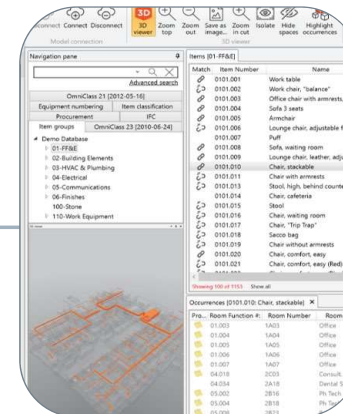
## DIALOGUE



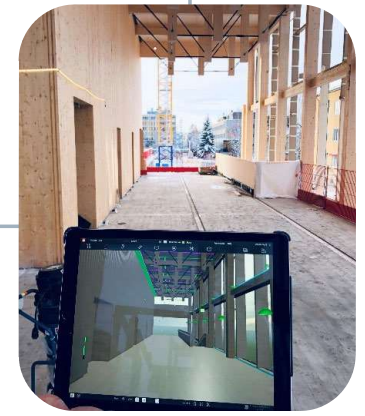
## QUANTITY TAKE-OFF



## DATABASE



## ON-SITE





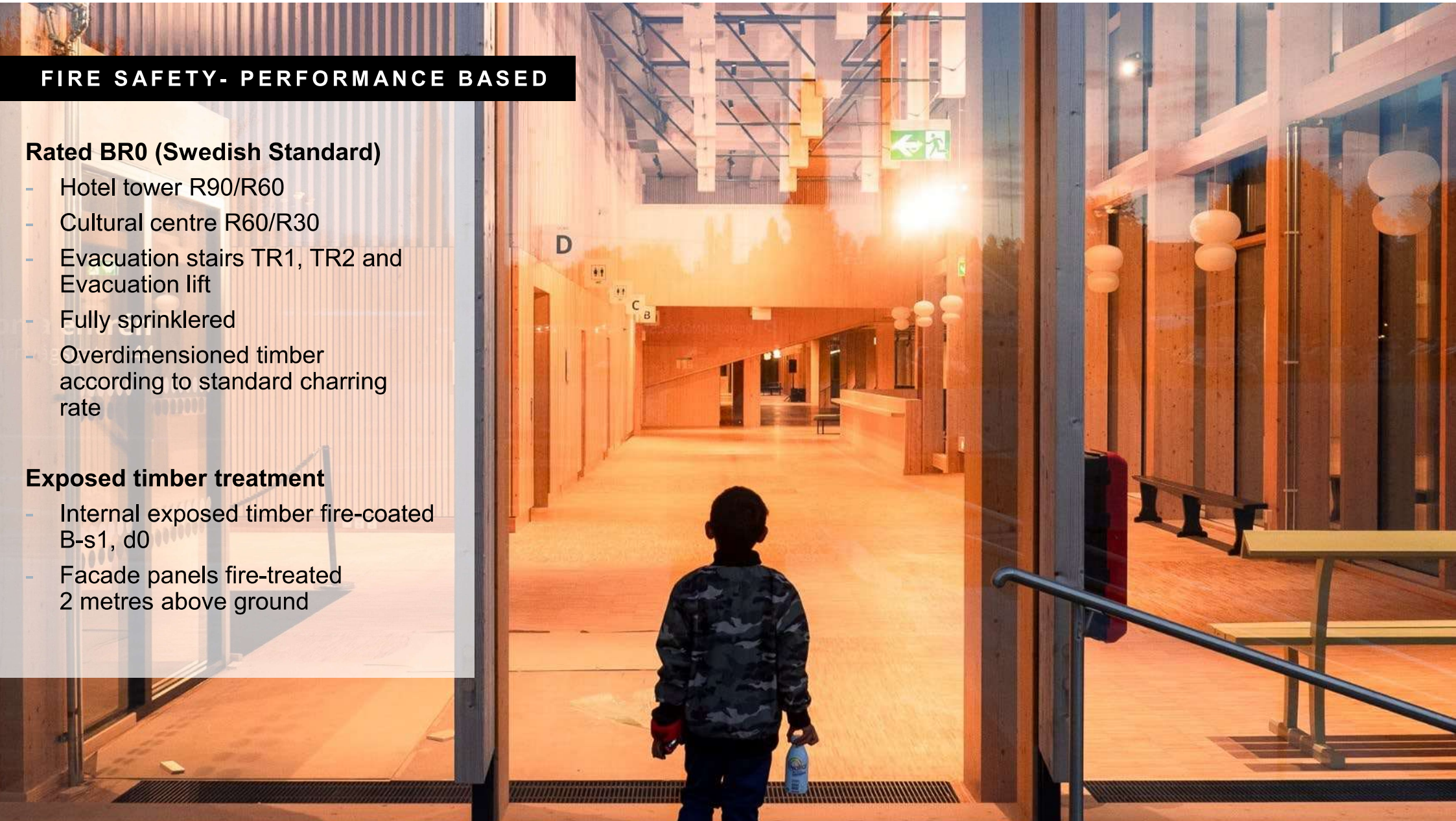
## FIRE SAFETY- PERFORMANCE BASED

### Rated BR0 (Swedish Standard)

- Hotel tower R90/R60
- Cultural centre R60/R30
- Evacuation stairs TR1, TR2 and Evacuation lift
- Fully sprinklered
- Overdimensioned timber according to standard charring rate

### Exposed timber treatment

- Internal exposed timber fire-coated B-s1, d0
- Facade panels fire-treated 2 metres above ground







## ENERGY PERFORMANCE

**REDUCES THE CALCULATED ENERGY  
BY 45% to 50,6 kwh/sqm/year**

**"GOLD" GREEN BUILDING  
COUNCIL.**

### **100% RENEWABLE ENERGY**

- Electricity from hydropower
- Bio-energy district heating
- District cooling from River Skellefteå

### **CONNECTED TO THE CITY GRID – AI**

- Heating / cooling heatpump.
- Learns the building's behaviour and optimizes energy use

### **PHOTOVOLTAICS ON ROOFS AND FACADES**

- 1000m<sup>2</sup> PVs TOTAL 175 KW

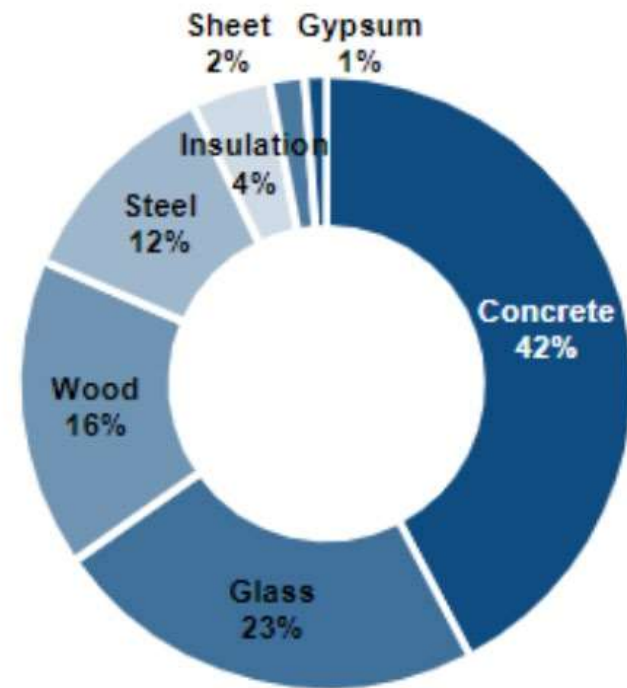
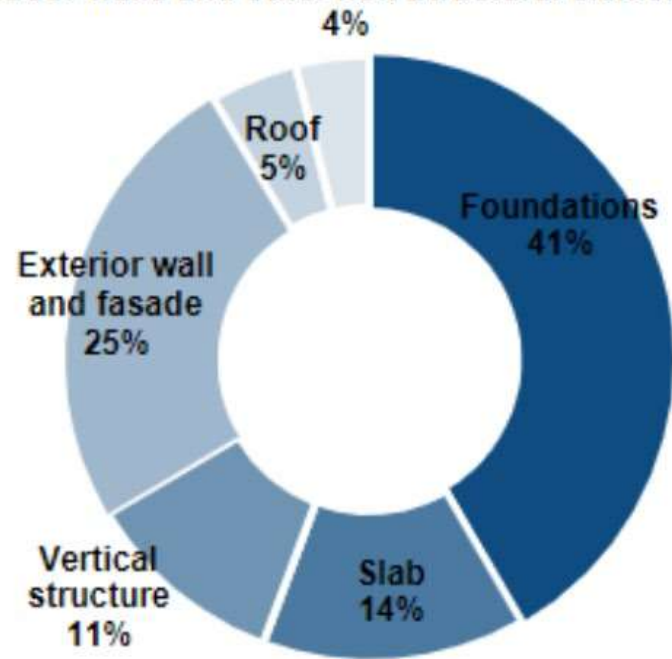
### **BATTER ENERGY STORAGE SYSTEM**

- Back-up sprinkler pump
- Batteries from Northvolt
- Peak shaving, forecasting energy use



## MATERIAL IMPACT (A1-A3)

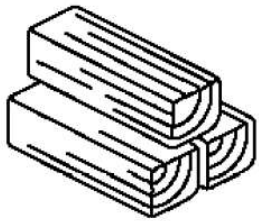
Indoor walls and other non-structural elements





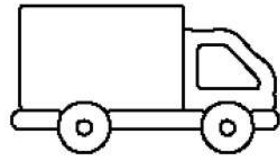
## C02-E LCA

Materials (A1-A3)



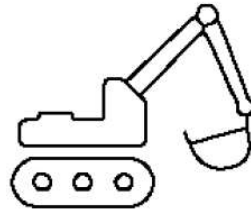
3550 ton CO<sub>2</sub>e

Transportation (A4)



25 ton CO<sub>2</sub>e

Construction process (A5)



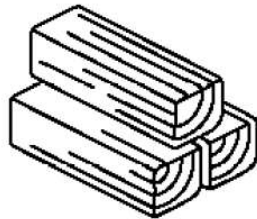
520 ton CO<sub>2</sub>e

Operational energy (B6)



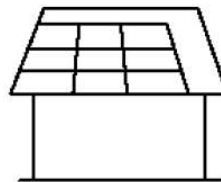
1540 ton CO<sub>2</sub>e

Carbon sequestration



-9095 ton CO<sub>2</sub>e

PV



-1095 ton CO<sub>2</sub>e

## RESULTS

Total emissions, 50 years

5631 ton CO<sub>2</sub>-e

202 kg CO<sub>2</sub>-e/ m<sup>2</sup>

Total balancing, 50 years

10190 ton CO<sub>2</sub>-e

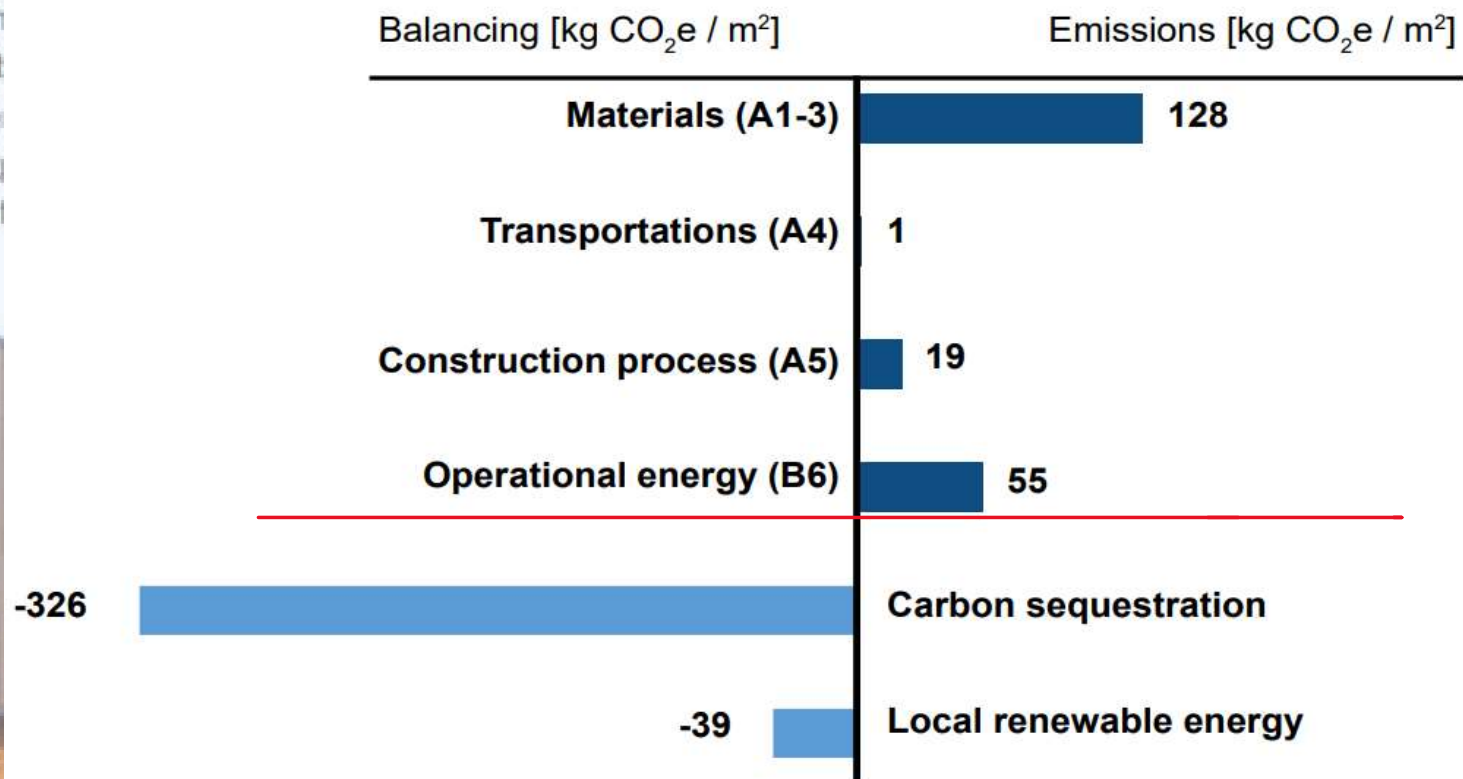
366 kg CO<sub>2</sub>-e/ m<sup>2</sup>

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## LCA - CARBON NEGATIVE BUILDING

LCA/sqm over 50 years



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