



Passivhaus Design with prefabricated straw bale panels

Bjørn Kierulf - EcoCocon - Createrra



WINNER

*Hampshire
Passivhaus*

*Hope View
Passivhaus*

Old Holloway

Passivhaus Mews II



HAMPSHIRE PASSIVHAUS

HOPE VIEW HOUSE

OLD HOLLOWAY

PASSIVHAUS MEWS II

A contemporary L-shaped detached self-build, creating private courtyard spaces, on a tight brownfield site with multiple neighbours, opted for a speedy structural CLT construction.

This elegant home nestled into a steep hillside minimises energy use while maximising panoramic countryside views in an Area of Natural Outstanding Beauty.

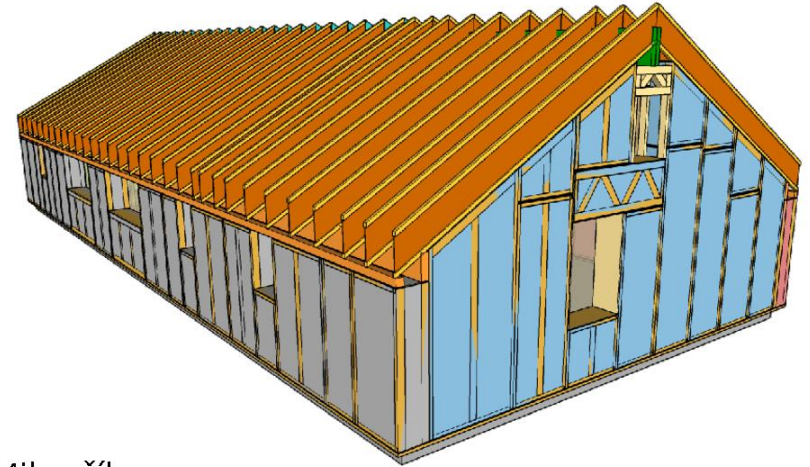
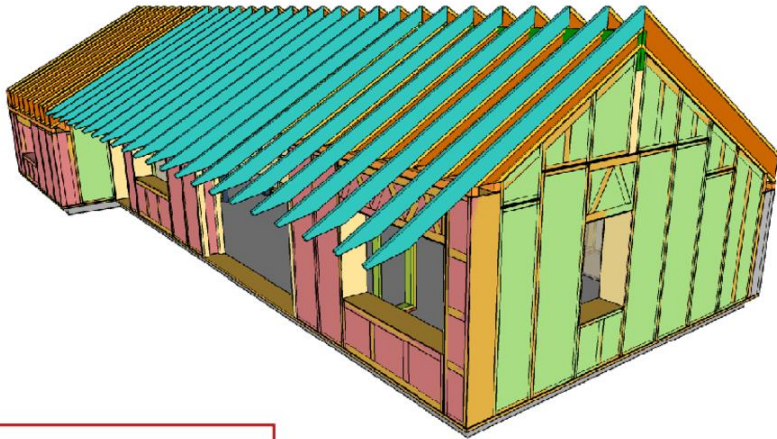
A seductively simple rural self-build utilising an innovative pre-fabricated straw-bale/ timber construction. Persevering through a 4 year planning process.

What's at the bottom of your garden? Overcoming a tight budget, constricted access issues, & sudden changes to the team, this triumphant urban infill delivers a compact light-filled comfortable home.

Juraj Mikurčík



A modular building becomes a certified Passivhaus



Architekt: Juraj Mikurčík



Certified Passivhaus in England



Author: Juraj Mikurčik



Energy efficiency

Christof Drexel

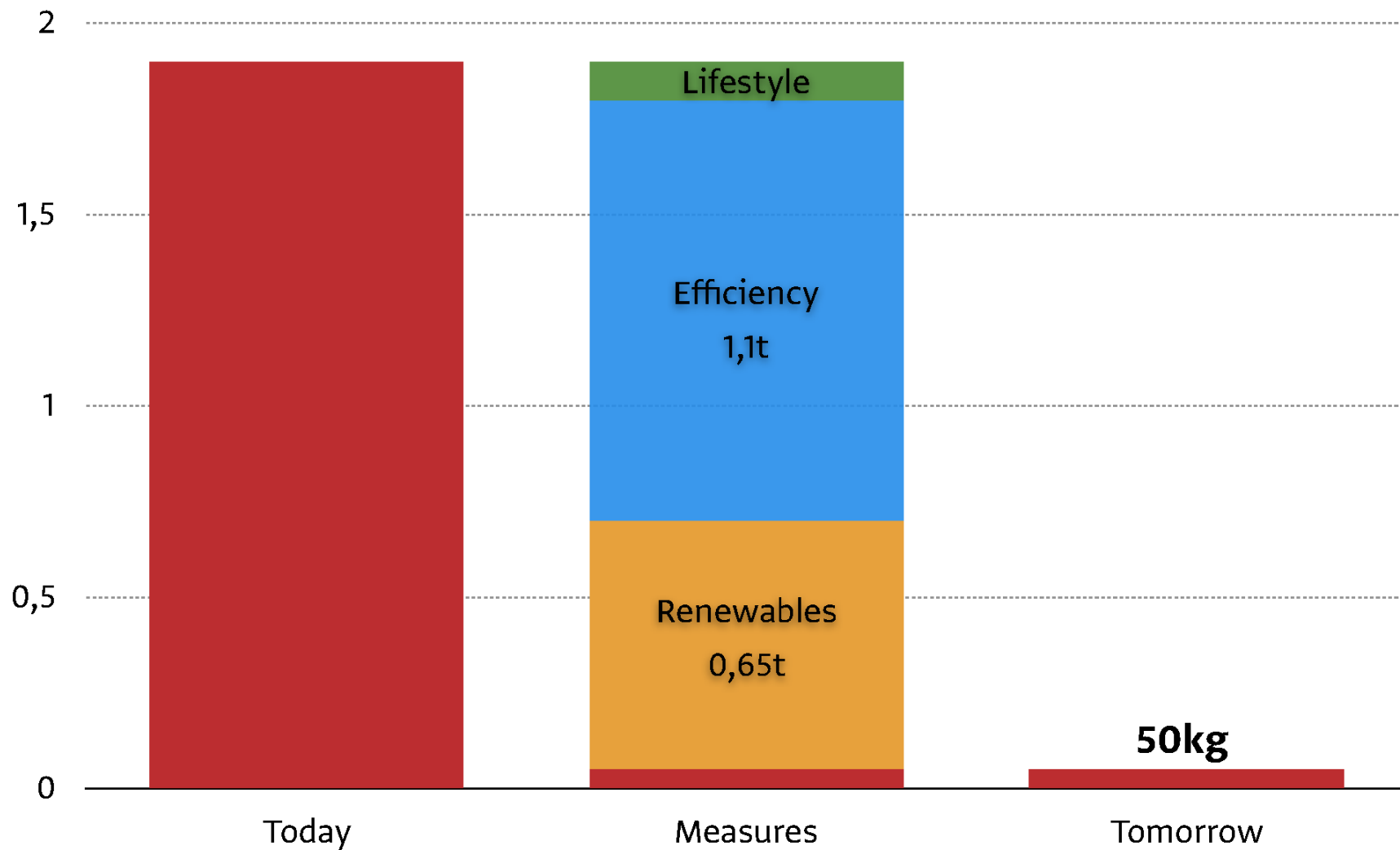
Zwei Grad.

Eine Tonne!

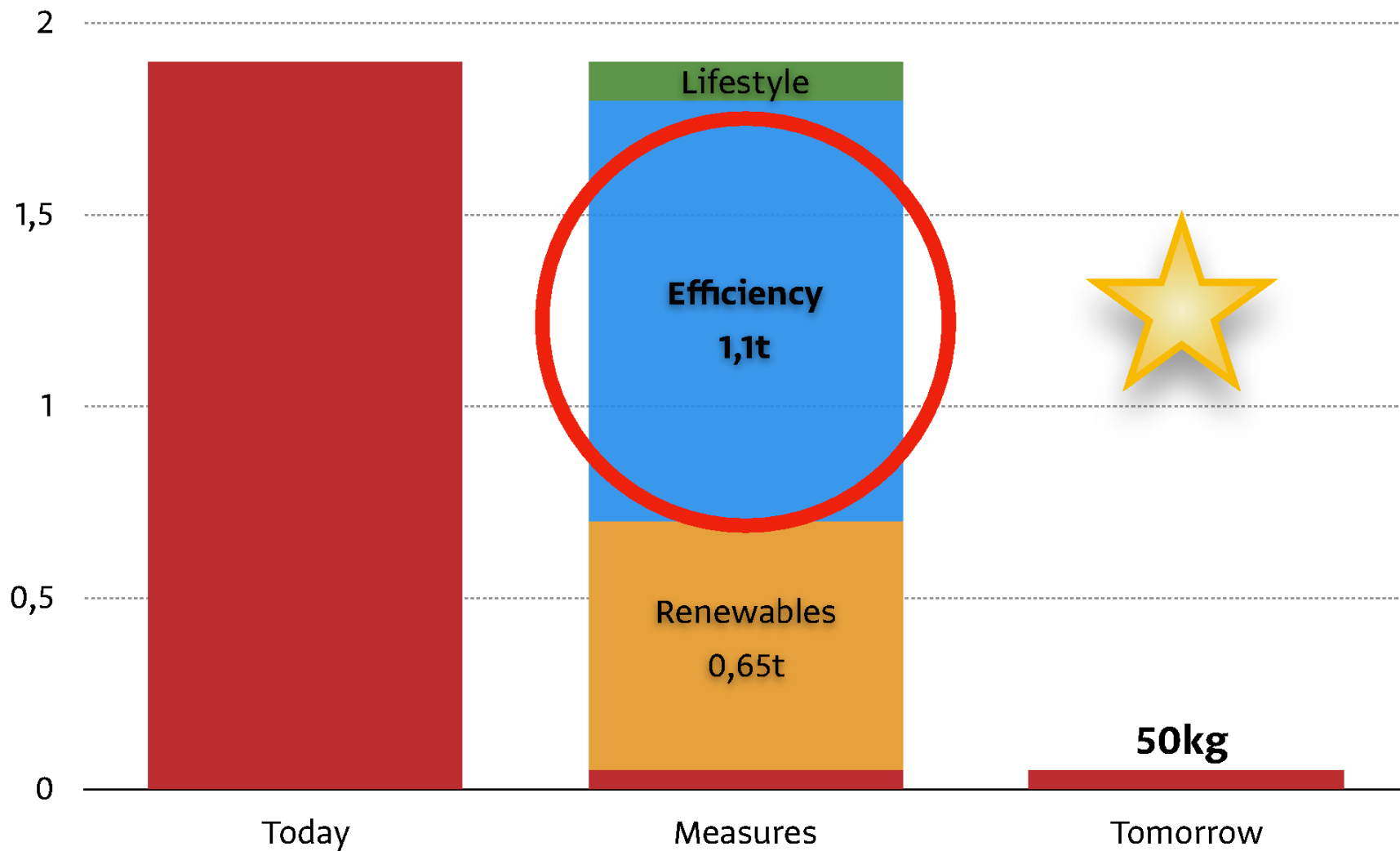
Wie wir das Klimaziel erreichen
und damit die Welt verändern.



1,9 ton CO2 eqv.



1,9 ton CO2 eqv.





35%



© LEIGH SIMPSON





Passivhaus Standard

Why building physics matter: Passivhaus Standard

How a house works is applied physics. Understanding it makes it more comfortable and durable.

Characteristics

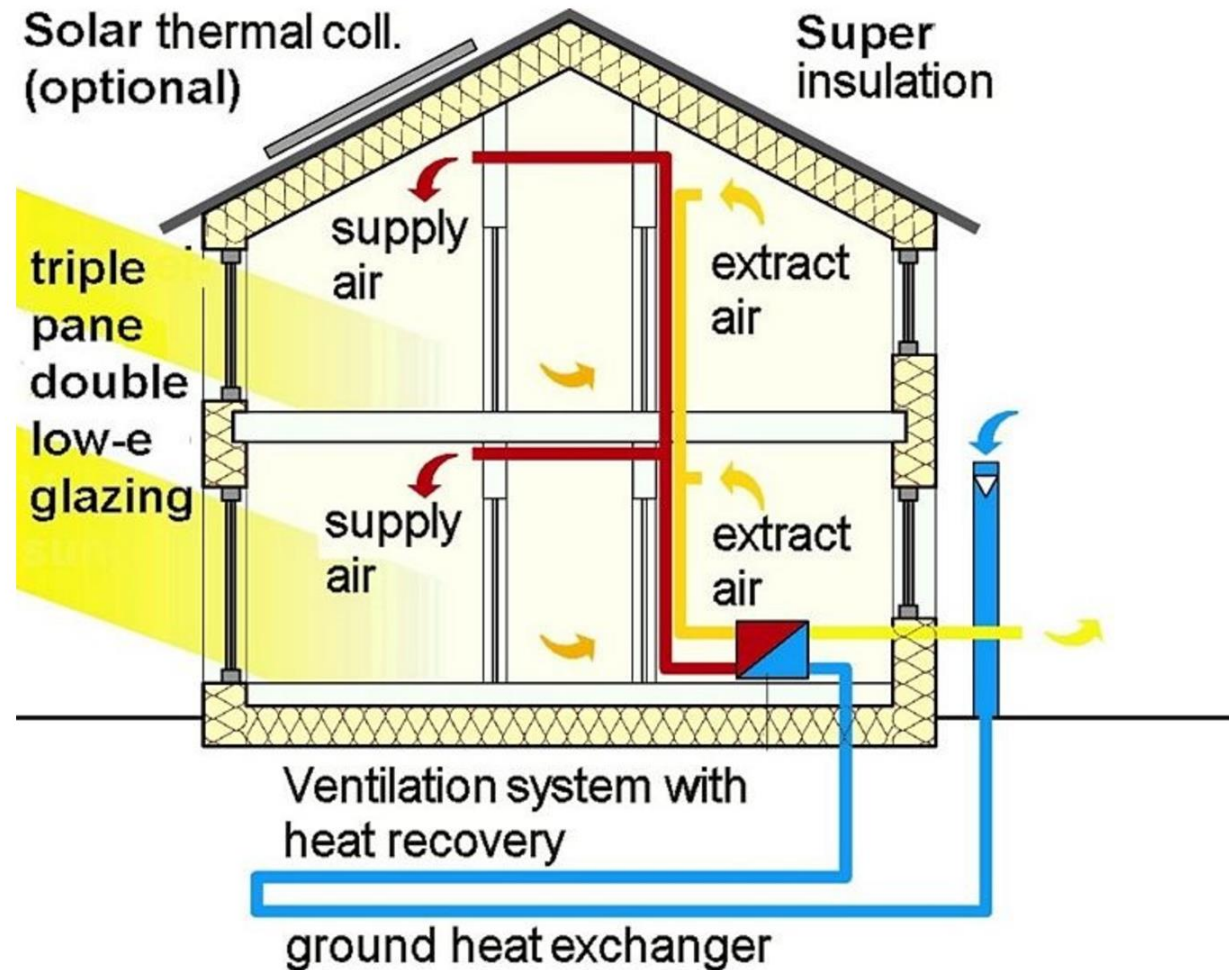
- Thermal Super-Insulation
- Passive House Windows
- Ventilation with heat recovery
- Airtightness
- Thermal bridge free design

Helpful

- Solar orientation
- Compact design
- **Integrated Design**

Ecococon

- Certified component
- Pre-calculated thermal bridges
- Airtight concept



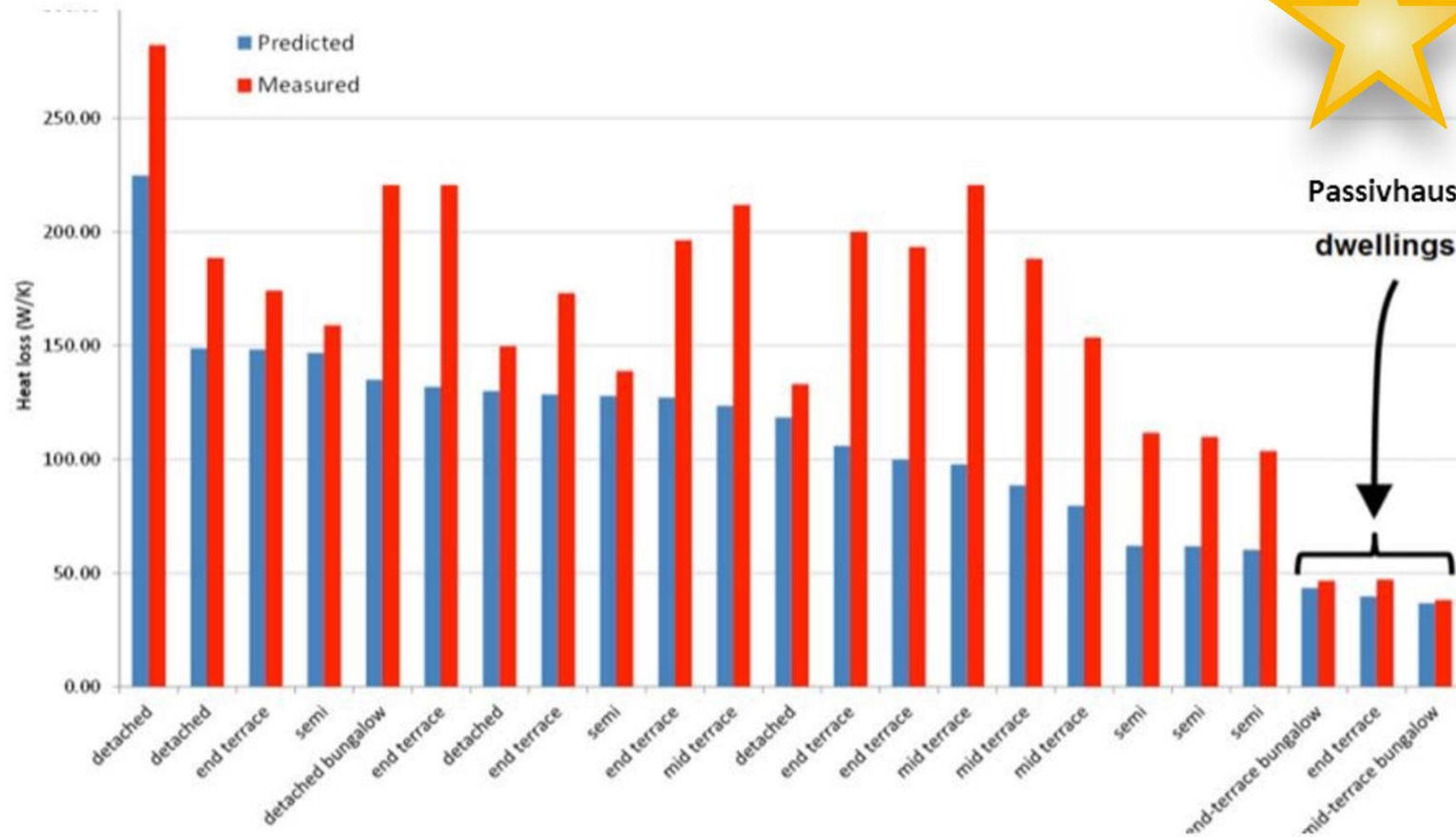
Source: Passivhaus Institut

ONLY CRADLE 2 CRADLE CERTIFIED PASSIVHAUS SYSTEM

CREATERRA



Performance Gap

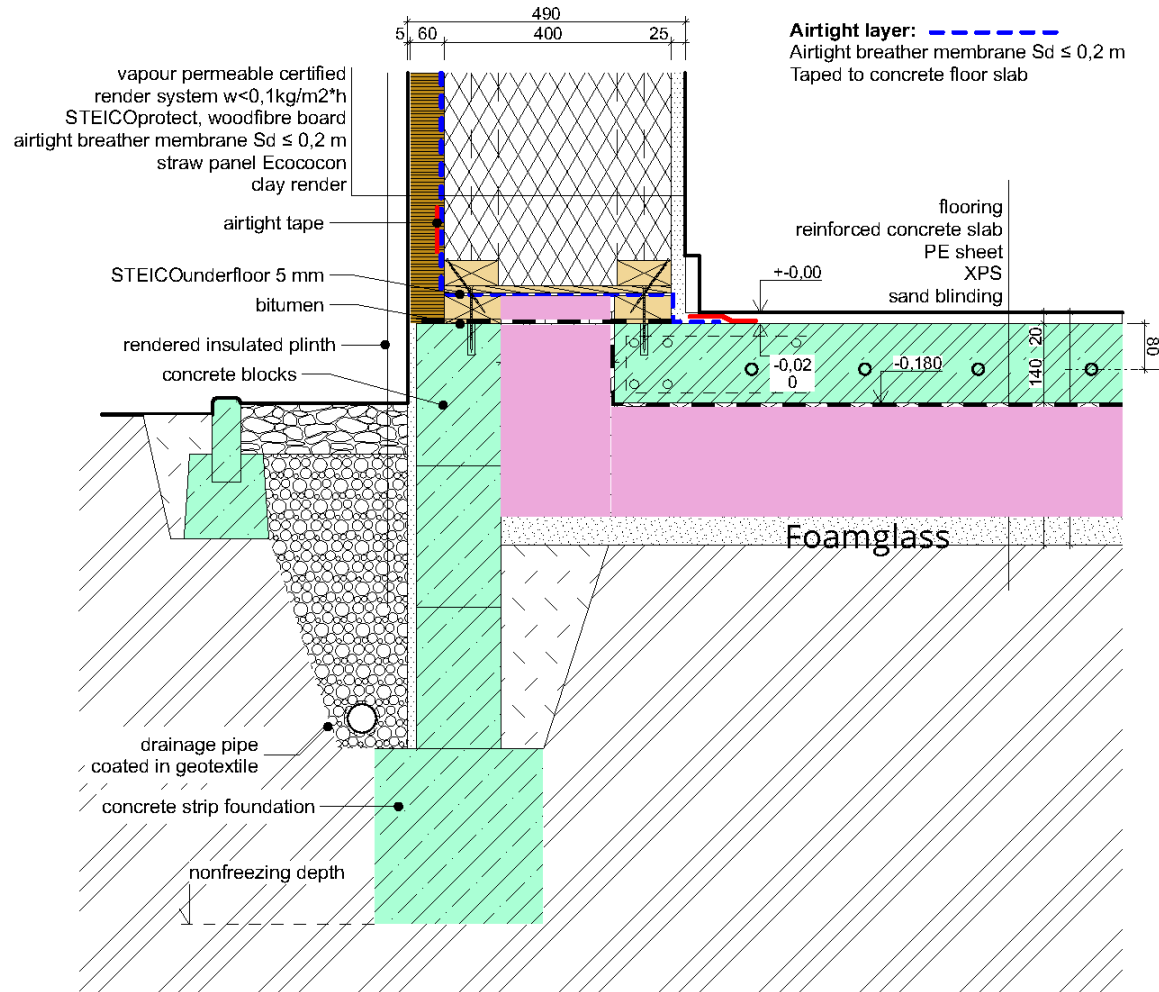


Passivhaus dwellings

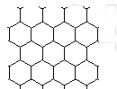


Example

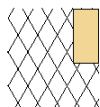
Detail FSEW 01 - 0,059W/mK



0,050 W/(mK) - Steico Protect Typ H 60mm

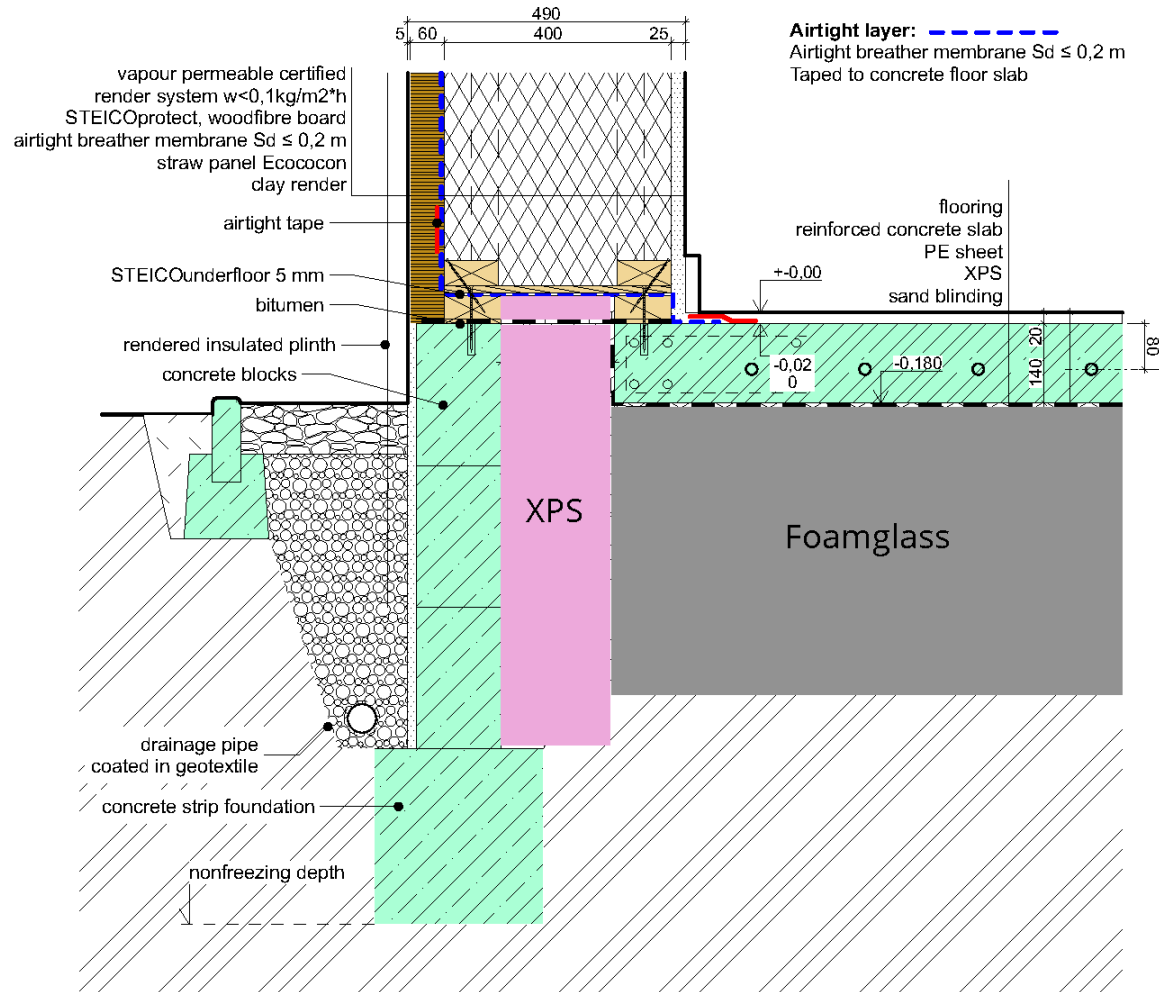


0,037 W/(mK) - XPS (Extruded Polystyrene)



0,0645 W/(mK) - Straw/Wood Ecococon Panel

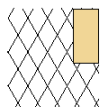
Variation of foundation



0,050 W/(mK) - Steico Protect Typ H 60mm



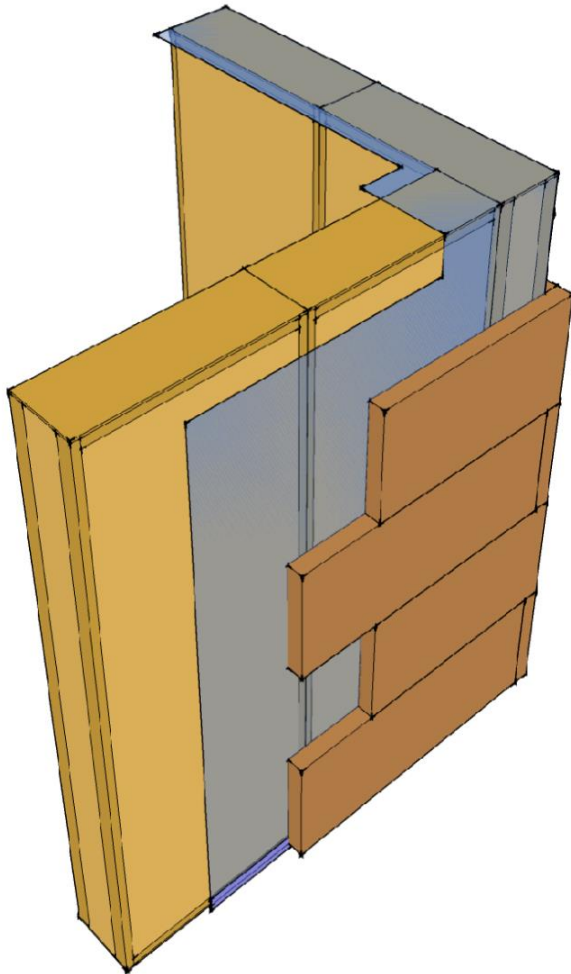
0,037 W/(mK) - XPS (Extruded Polystyrene)



0,0645 W/(mK) - Straw/Wood Ecococon Panel

Airtight - but completely open to vapour

Vapour permeable
Airtight layer
 $S_d < 0,2m$



Detail ROEA 01 - 0,030W/mK




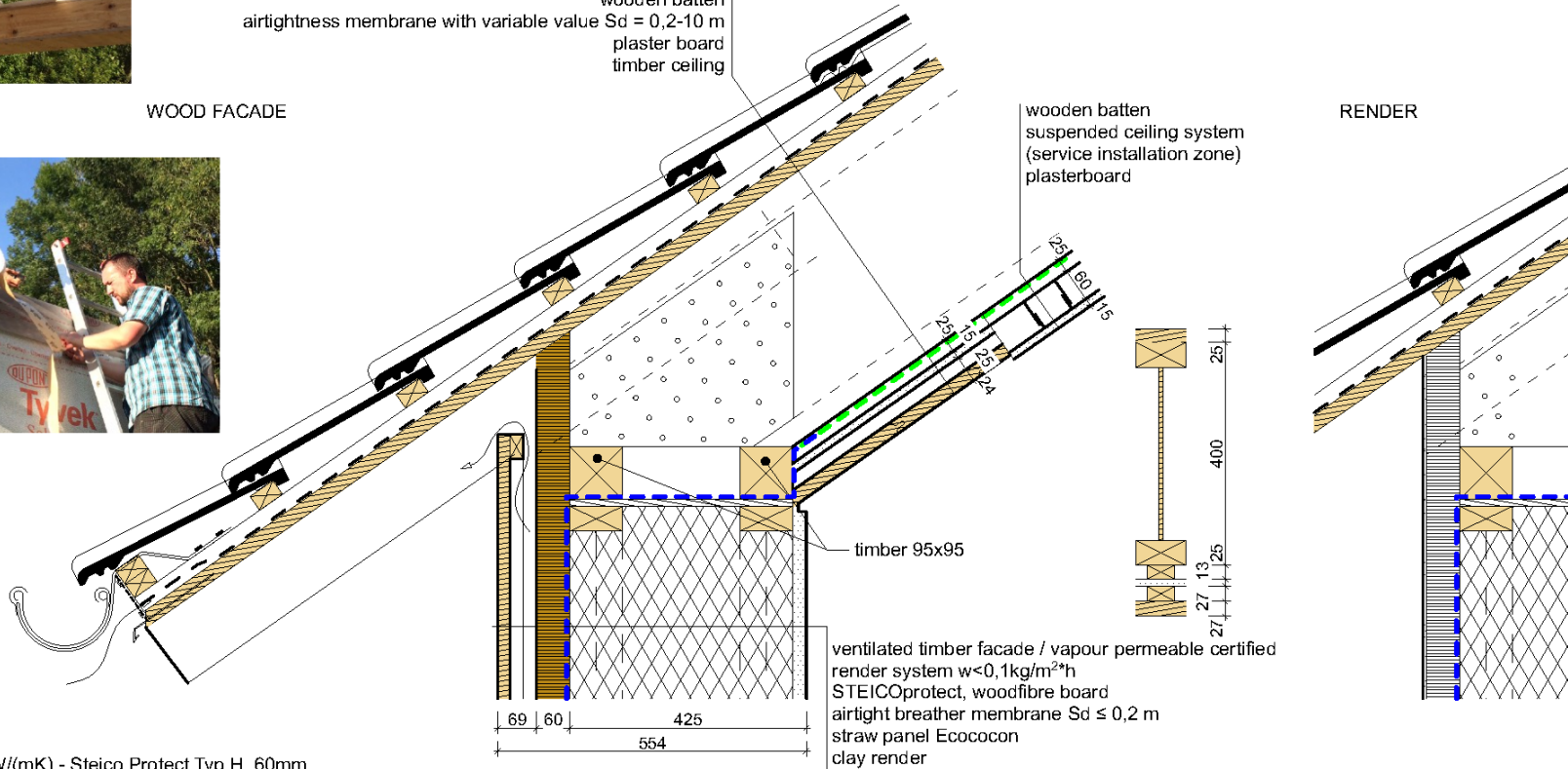
WOOD FACADE



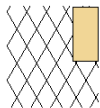
roof tiles
 roofing battens and counter battens
 breather membrane
 STEICOuniversal
 STEICOjoist / STEICO ZELL 0,044 W/(mK)
 wooden batten
 airtightness membrane with variable value $S_d = 0,2-10$ m
 plaster board
 timber ceiling

Airtight layer: 
 Airtight breather membrane $S_d \leq 0,2$ m

Airtight layer: 
 Airtight membrane with variable value $S_d = 0,2-10$ m



0,050 W/(mK) - Steico Protect Typ H 60mm



0,0645 W/(mK) - Straw/Wood Ecocon Panel

Airtight & rain protection during construction





Low-rise buildings

Developed by **CREATERRA**

Pre-assemble in a protected environment

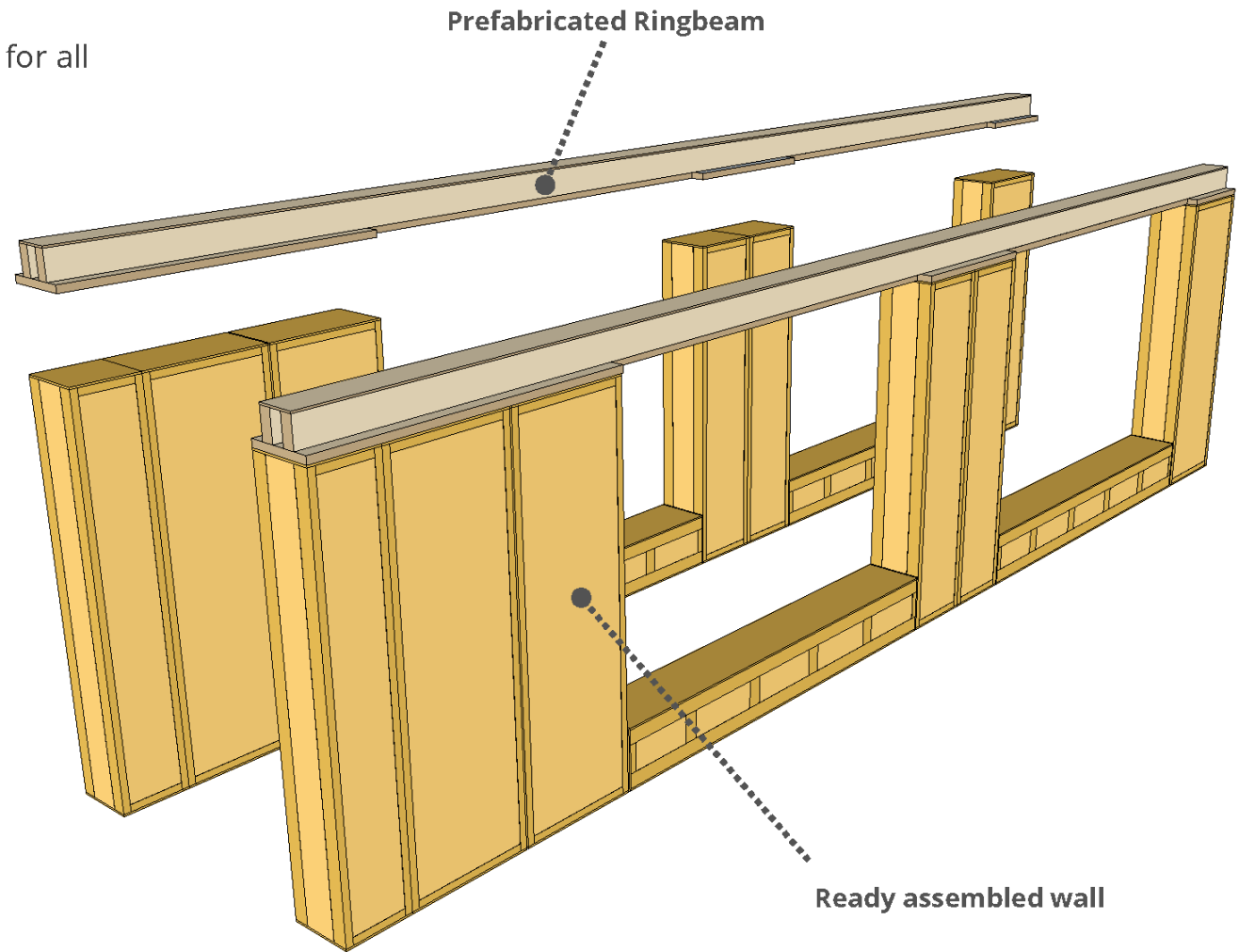


Build quickly on site



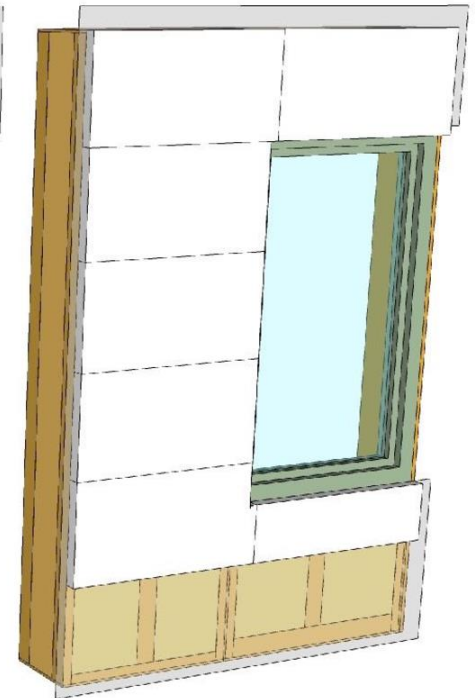
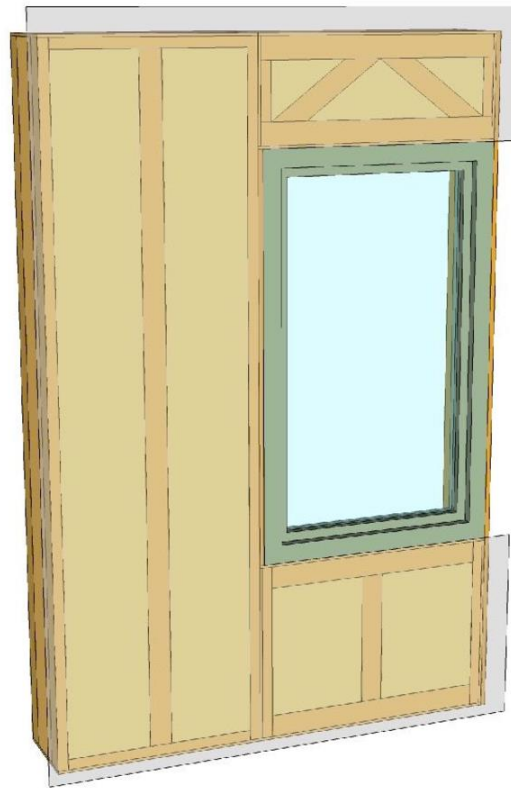
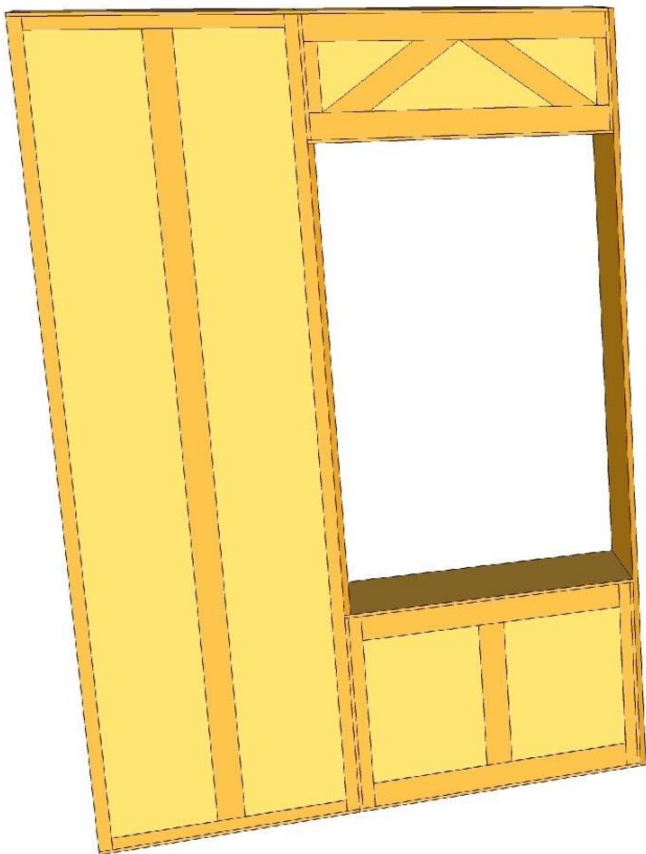
Prefabricated Walls

- Walls transported to building site pre-assembled.
- Ringbeam is strong enough for all lifting and handling



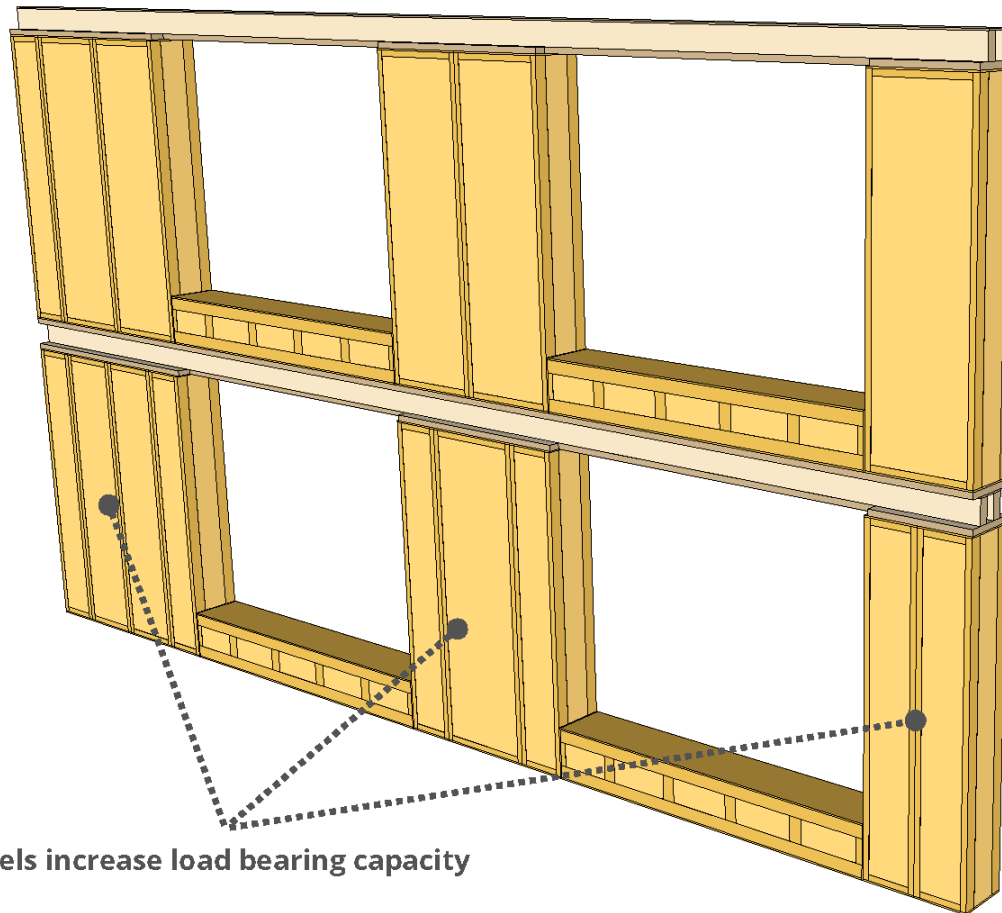
Wall elements with different levels of finishing

- Only elements preassembled
- Openings can be fitted with windows in advance
- The airtight membrane and weatherproofing can be included in the pre-assembly
- The facade surface can also be finished partially to speed up work on site



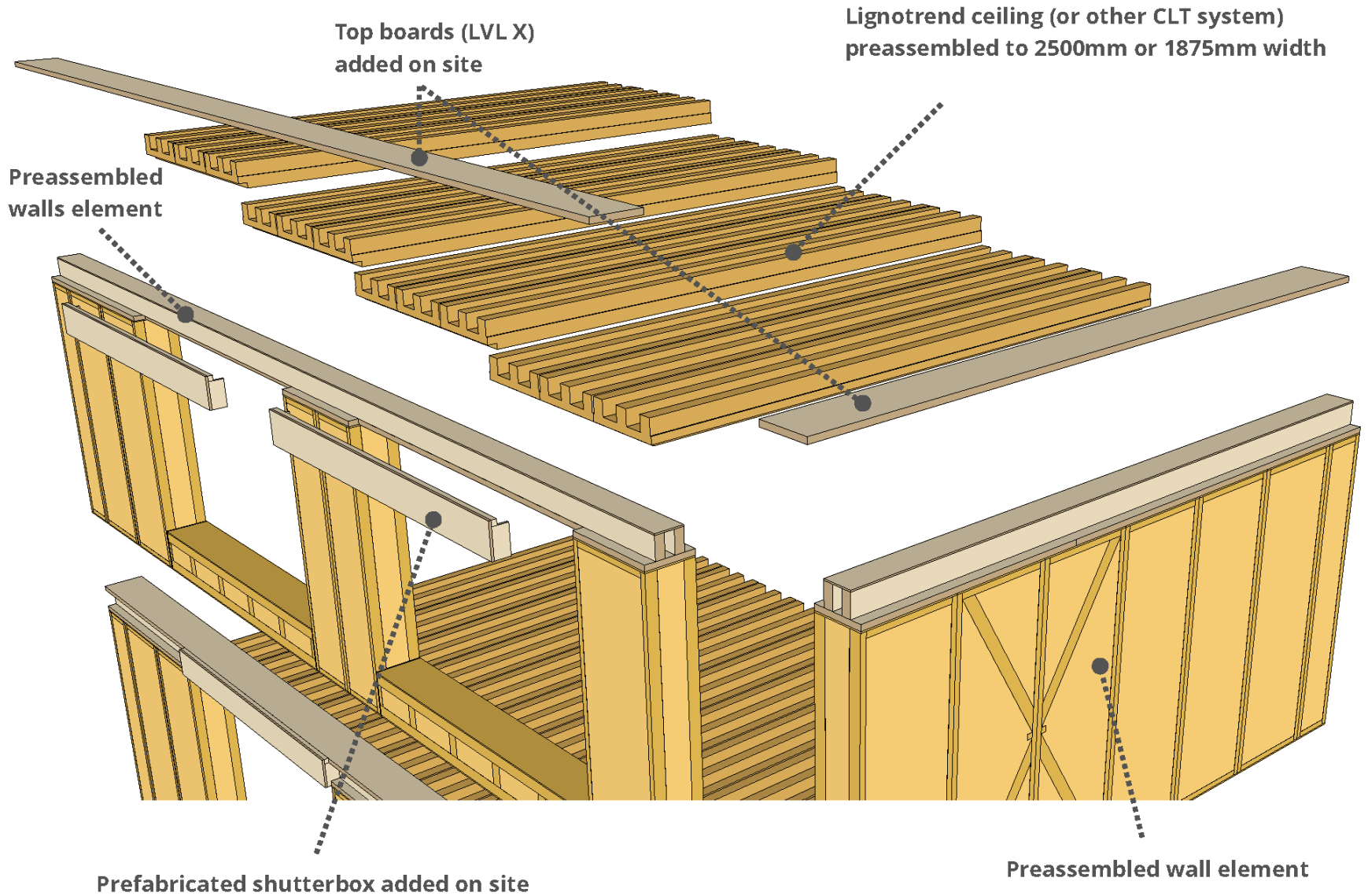
Enhancing loadbearing capacity

- Using narrower panels increases the number of posts per m
- Very flexible system as ringbeam distributes weight from columns

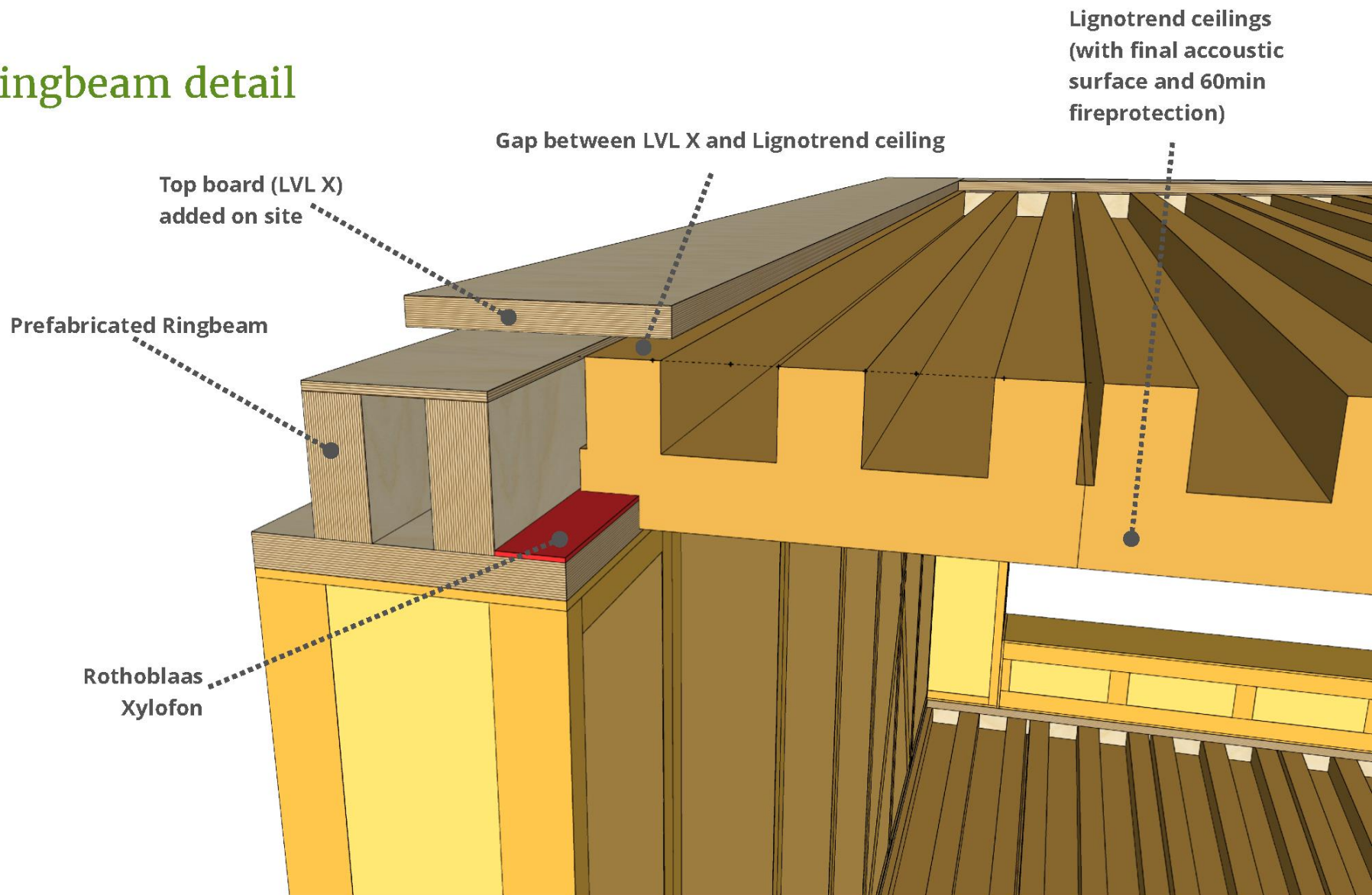


More panels increase load bearing capacity

Assembly on site

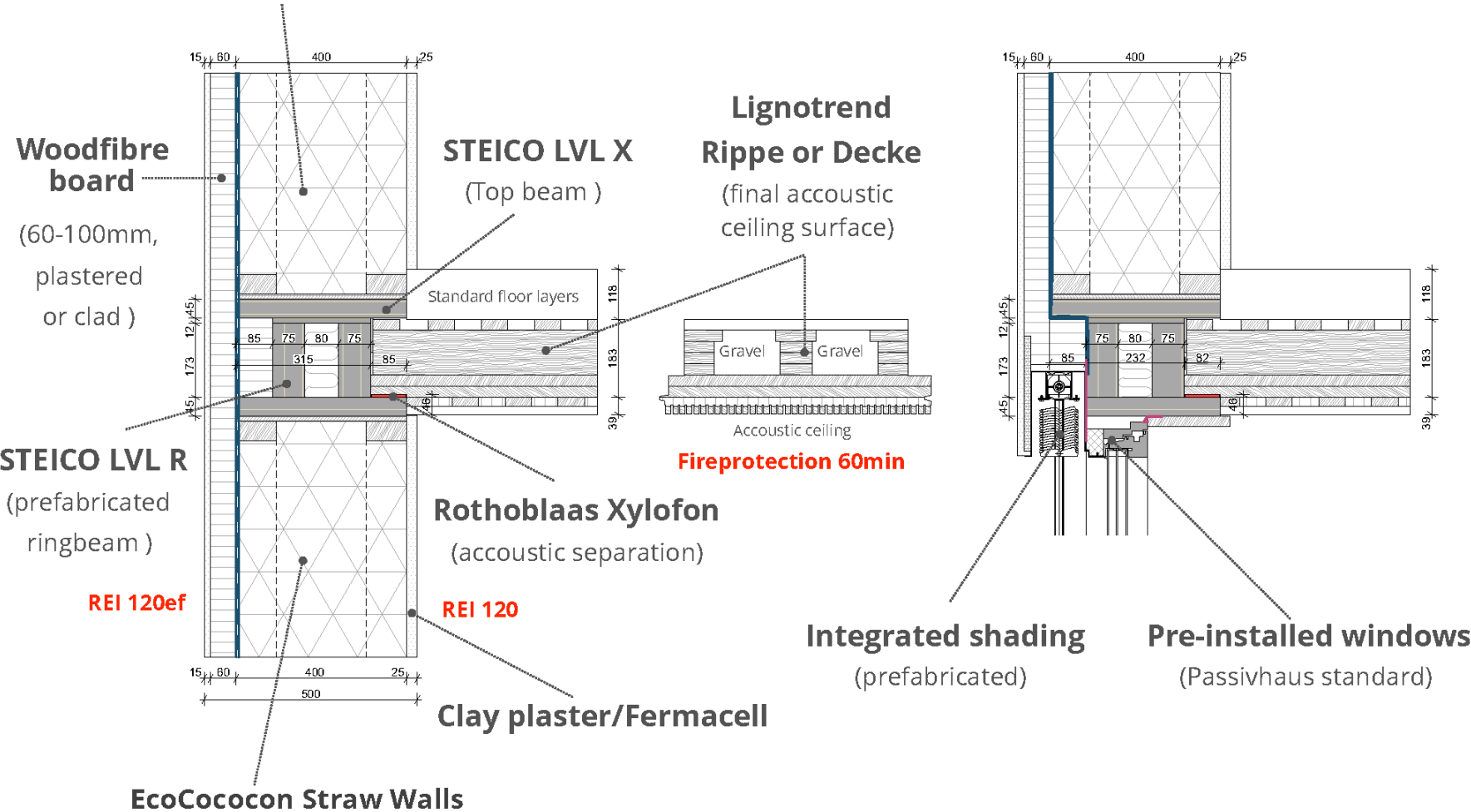


Ringbeam detail

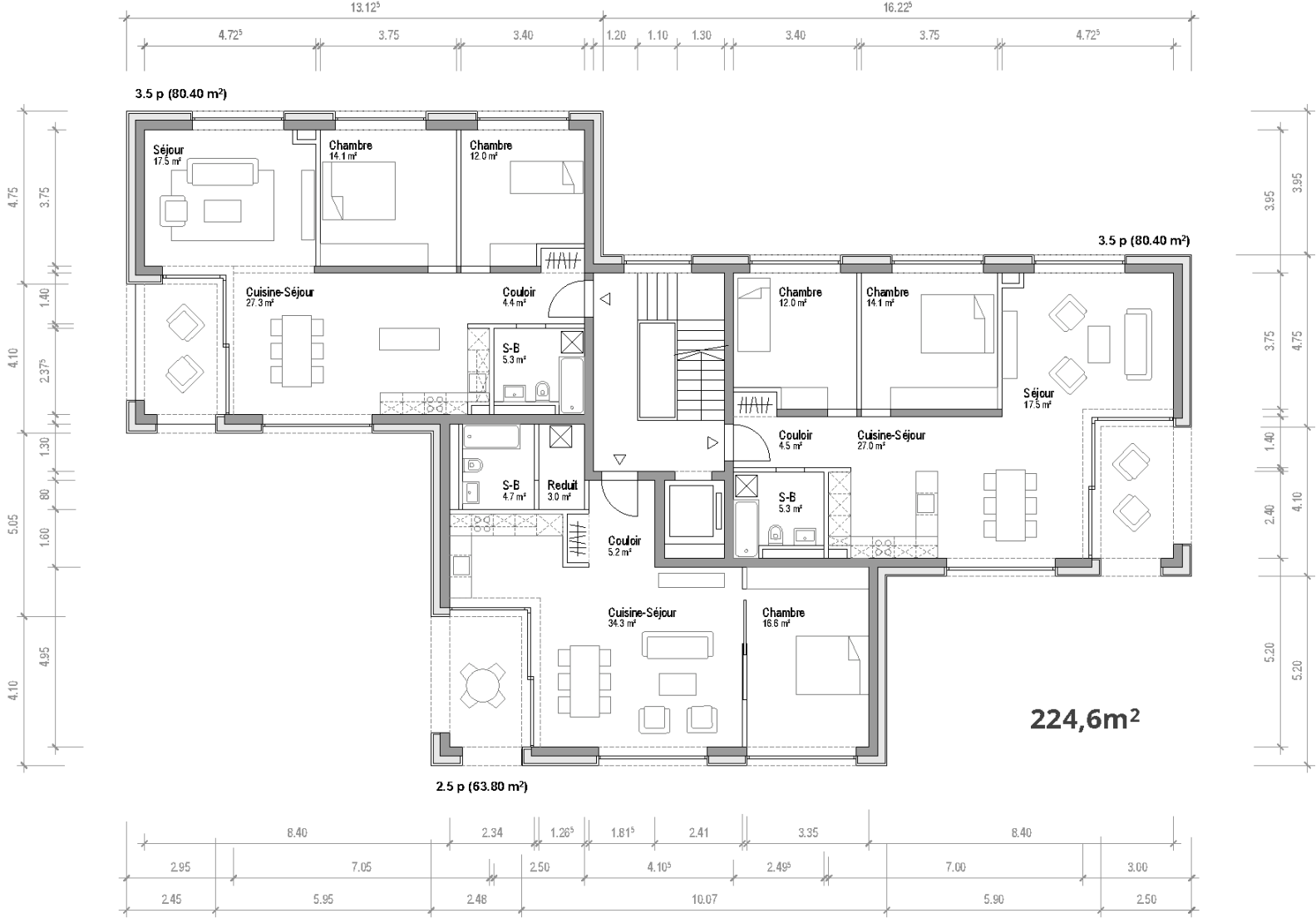


Ringbeam detail

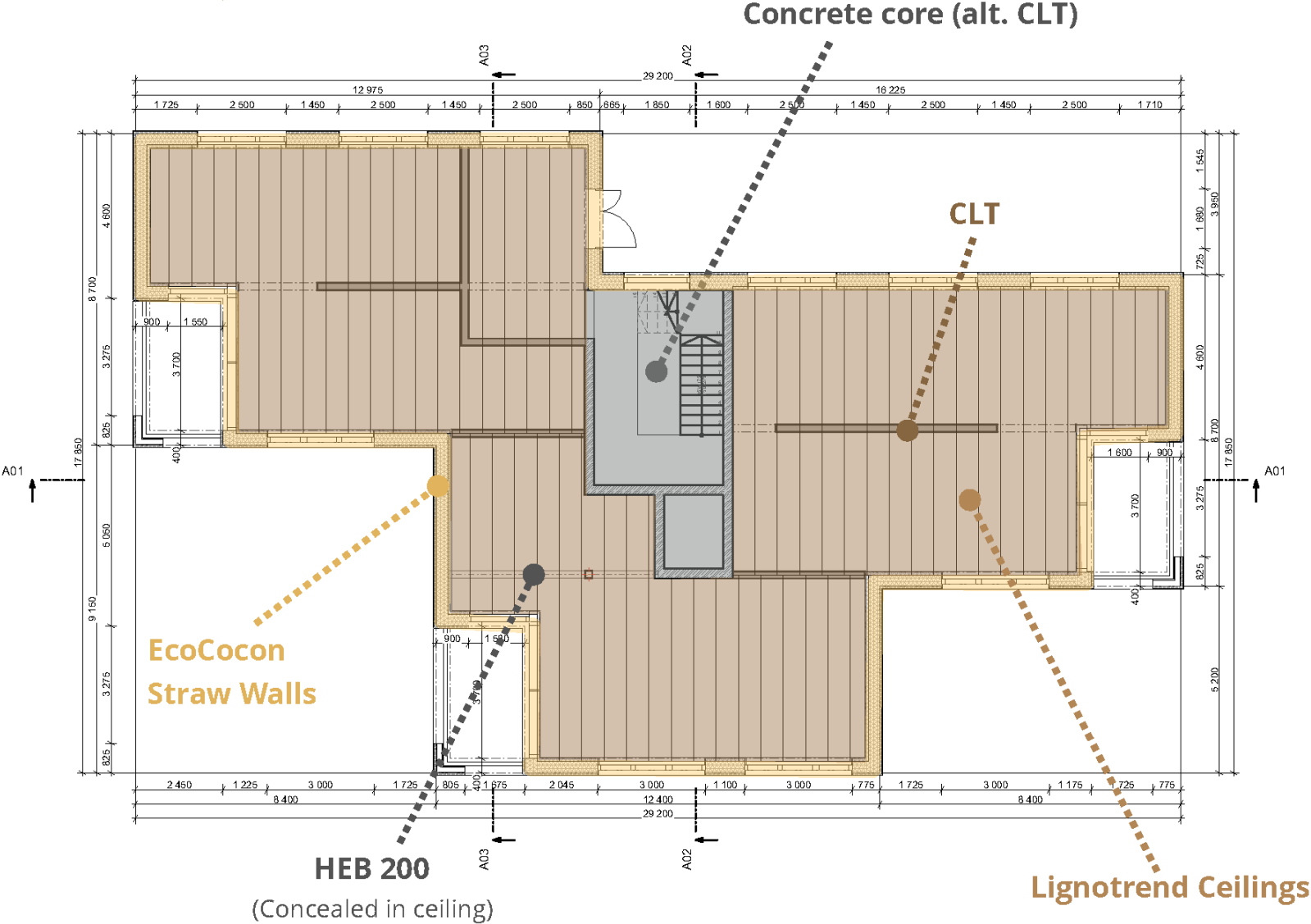
EcoCococon Straw Walls



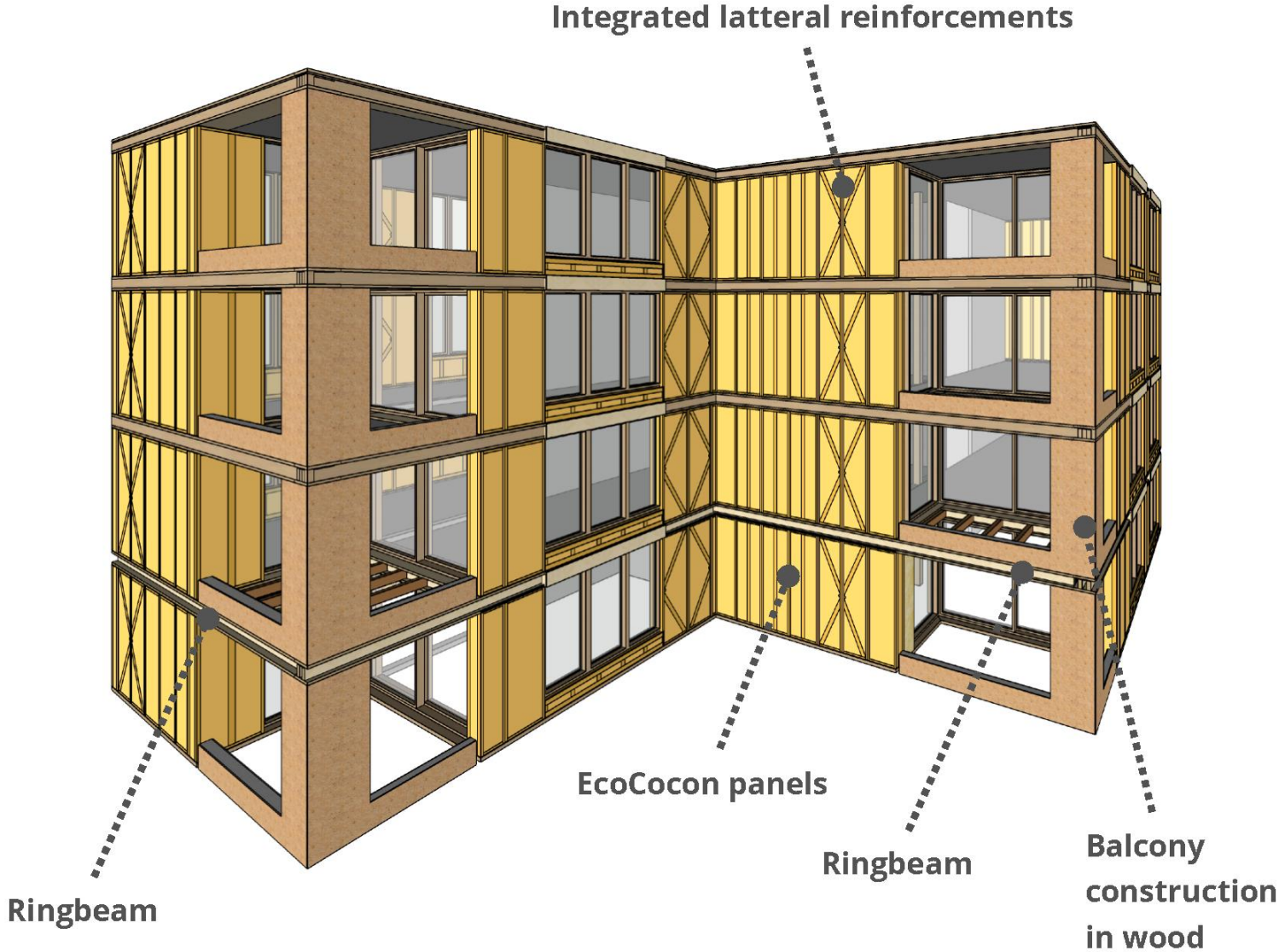
Example floorplan



Loadbearing constructions



EcoCocon exterior walls



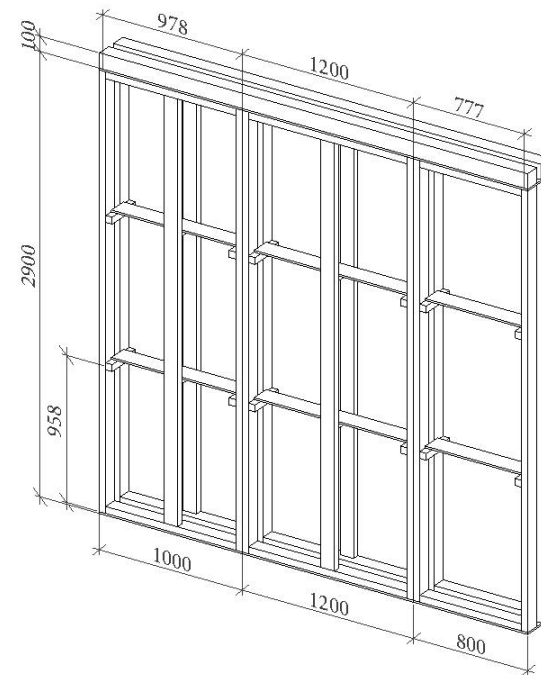


Reaction to Fire & Fire Resistance

Fire resistance test REI with 70kN/m load (approx. 7t/m)



- **R** - The structural element should not collapse or deflect beyond the permitted levels when subjected to the applied load.
- **E** - The integrity of the room must be maintained. No breakthrough of flames is permitted.
- **I** - The temperature on the non-exposed side of the structural element must not rise more than 140° C above ambient as an average measurement and no more than 180° C at any one location.



REI 120 – no destruction after 120 minutes



- Test conducted on 25cm thick EcoCocon wall (valid also for larger thickness)
- Inside 30mm clay plaster
- Outside 60mm woodfibre board (not plastered)
- Test done according to EU test regulations with temperatures up to 1050°C.
- **Test achieved REI 120!** That is the time in minutes the construction fulfilled the demanded criteria.
- Max. measured deformation was 7,2mm

Test REIef on Woodfibre board (from outside)



- **Test achieved REIef 120!** That is the time in minutes the construction fulfilled the demanded criteria.
- Max. measured deformation was 7,7mm
- No visible damage on the outside
- Max. temperature on clay surface less than 40°C

After the test



- 25mm of wooden surface construction is charred
- The fire progressed only approx. 50mm deep into the straw



Network

Summer residence in Finland



Partner: Natural Building Company - Paul Lynch

Sports hall in Holland



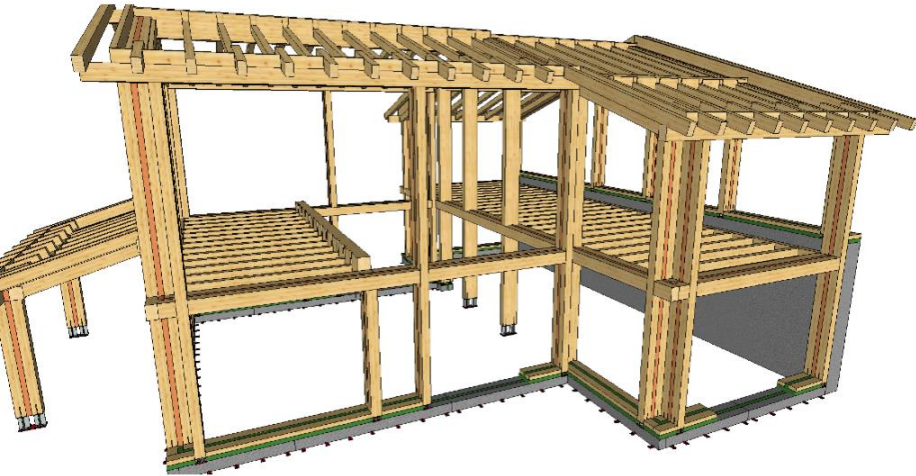
Partner: Strotec - Eric Verheijen

Family home in Switzerland



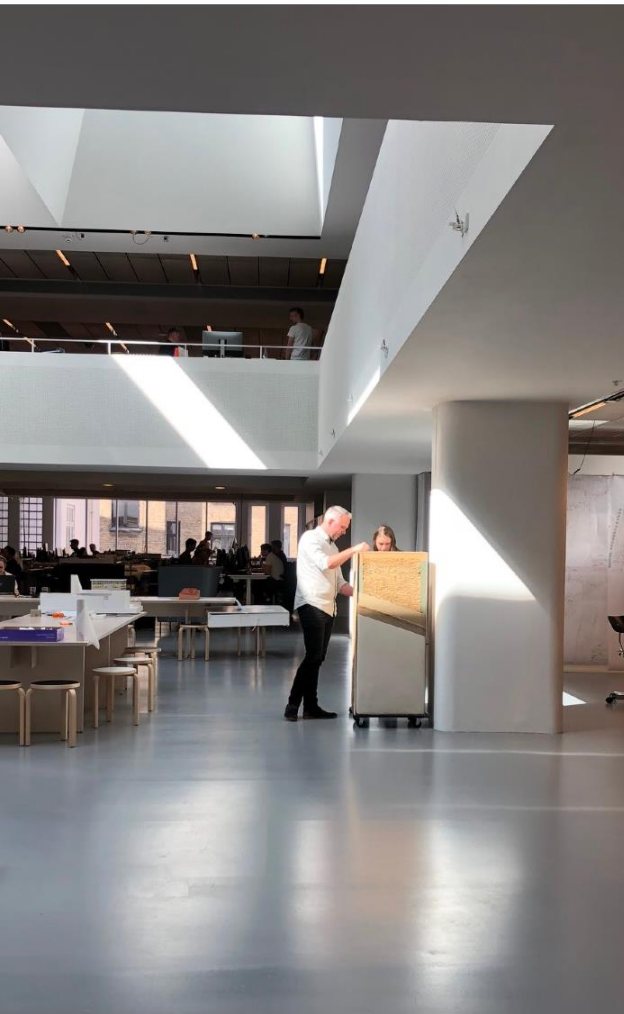
Partner: Prana House - Roberto Camarasa

Earthquake safe house in Italy



Partner: De Pra Adriano

Schoolbuilding in Denmark



Partner: Small Planet - Lars Keller





Thank you!