



Embodied Carbon Assessment
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Approved By: CB

Internal Airtightness Sheathing Board Egger OSB Top

Purpose

This assessment quantifies the embodied carbon of a representative 1m² section of the Hyem Frames 280mm external wall system using manufacturer Environmental Product Declarations (EPDs) and published product information. The assessment has been undertaken to understand the cradle-to-gate embodied carbon associated with the principal construction materials and to provide a transparent basis for comparison with alternative timber frame systems.

Scope

The assessment considers the principal components forming the wall build-up, including:

- EGGER OSB internal sheathing
- EGGER DHF breathable sheathing board
- STEICO Zell blown wood fibre insulation
- EGGER EcoBox structural studs
- SOLITEX FRONTA QUATTRO breather membrane

The assessment reports A1—A3 Global Warming Potential (GWP-total) in accordance with EN 15804+A2.

Assumptions

- Functional unit = 1m² of completed wall panel
- Assessment boundary = A1—A3 (Product Stage)
- Membrane overlaps include a 10% installation allowance.
- EcoBox stud quantities are based on 2.0 linear metres per m² of wall.
- EcoBox adhesive content has been assumed to represent 1% of total stud mass using

Methodology

Each material has been assessed individually using the following process:

1. Obtain the declared embodied carbon from the manufacturer's third-party verified EPD.
2. Convert the declared value to kgCO₂e/kg where necessary.
3. Calculate the mass of each material contained within 1m² of wall construction.
4. Multiply material mass by the embodied carbon factor.
5. Sum all material contributions to obtain the embodied carbon of the complete wall system.

Where a product-specific EPD is unavailable, a transparent engineering estimate has been adopted using published product dimensions, material densities and constituent material EPDs.

Limitations

This assessment is intended for comparative design purposes and should not be interpreted as a whole-building life cycle assessment.

Results are dependent upon:

- currently available manufacturer data;
- declared EPD boundaries;
- representative material quantities;
- engineering assumptions where manufacturer data are unavailable.

The assessment should be updated if revised EPDs or product-specific environmental information become available. a conservative generic carbon factor pending manufacturer verification.

Executive Summary

Hyem Frames 280mm Wall Panel

Functional Unit

1m² of completed Hyem Frames 280mm external wall panel

Assessment Boundary

A1—A3 (Cradle to Gate)

Key Findings

- The Hyem Frames wall system stores more biogenic carbon than is emitted during manufacture, resulting in a negative cradle-to-gate embodied carbon value.
- Timber-based materials account for the majority of stored carbon within the wall construction.
- The EGGER EcoBox structural frame represents the largest individual carbon store within the wall system.
- A conservative allowance has been included for structural adhesive and membrane installation waste.
- The assessment is based on manufacturer EPDs where available and documented engineering assumptions where product-specific environmental data are unavailable.

This assessment has been prepared using third-party verified Environmental Product Declarations (EPDs), manufacturer technical literature and documented engineering assumptions. It is intended for comparative design assessment only and should not be interpreted as an independently verified whole-life carbon assessment. Product data, EPDs and assumptions should be reviewed periodically and updated where revised manufacturer information becomes available.

Number	Layer	Carbon Contribution
1	SOLITEX FRONTA QUATTRO membrane	+0.61 kgCO ₂ e/m ²
2	EGGER DHF breathable sheathing	-8.76 kgCO ₂ e/m ²
3	EGGER EcoBox 280mm structural frame	-19.37 kgCO ₂ e/m ²
4	STEICO Zell insulation	-13.13 kgCO ₂ e/m ²
5	EGGER OSB Top internal sheathing	-12.08 kgCO ₂ e/m ²

Total Embodied Carbon

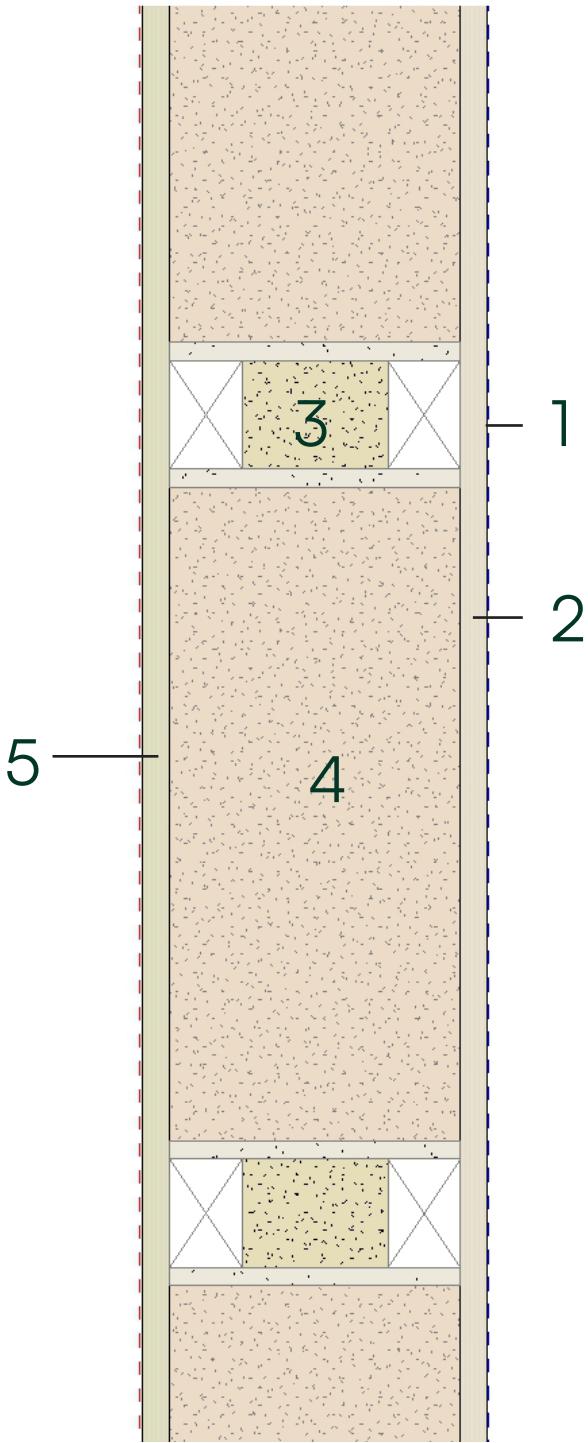
Using the values currently shown in your draft:

$$-8.76+0.61-19.37-13.13-12.08=-52.73$$

Total A1—A3 = -52.73 kgCO₂e/m²

(assuming one layer of each product and the EcoBox assumptions documented in this report)

Total A1-A3 Carbon for 1m² of 280mm wall panel = -52.73 kgCO₂e/m²





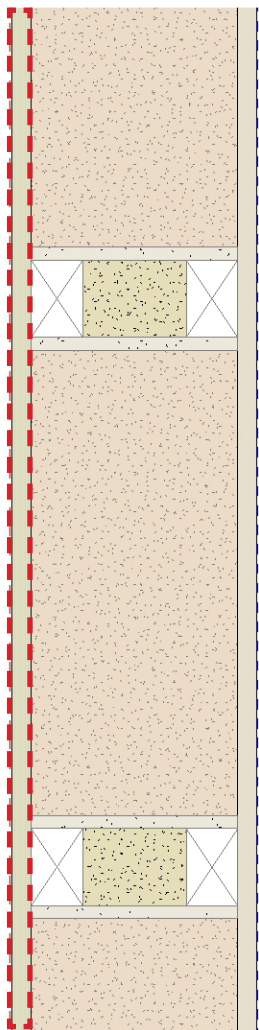
Internal Airtightness Sheathing Board Egger OSB Top

Embodied Carbon Value (A1 - A3) 'Cradle to Gate'	-805 kg CO ₂ e
Thickness	15mm
Unit of Measure	m ²

To calculate the carbon value per m² for a specified product we must first calculate the mass per unit area of product per m². To do so, we must specify the material thickness and density. Mass per unit area is then calculated as follows:

Parameter	Value/Unit
Thickness	15mm
Density	kg/m ³
Mass per unit area	Thickness x Density (kg/m ³)

$\text{kgCO}_2\text{e/kg} = \text{kgCO}_2\text{e/m}^3 \text{ divided by } \text{kg/m}^3$
 $-805 \div 611 = -1.318$



Mass per unit area = Thickness x Density

Parameter	Value	Unit
Thickness	0.015	m
Density	611	kg/m ³
Mass per unit area	9.165	kg/m ²

With the mass of insulation per unit area now established, the embodied carbon per square metre of OSB Top can be estimated.

Embodied Carbon per Unit Area =
Mass per Unit Area x Embodied Carbon Factor

Parameter	Value	Unit
Mass per unit area	9.17	kg/m ²
Embodied Carbon Factor	-1.32	kgCO ₂ e/kg
Embodied Carbon per Unit Area	-12.08	kgCO ₂ e/m ²

Total A1-A3 Carbon = -12.08 kgCO₂e/m²



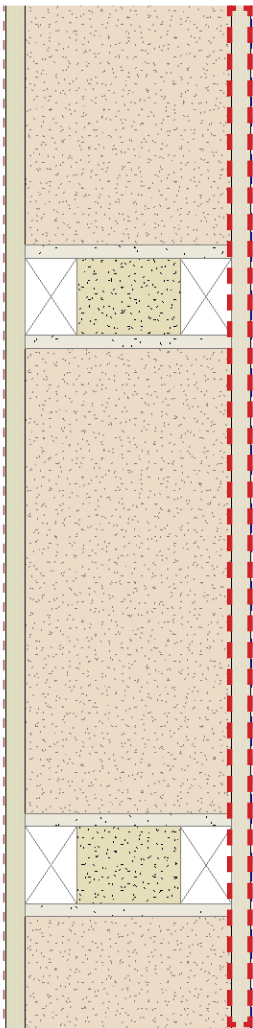
Breathable Sheathing Board Egger DHF

Embodied Carbon Value (A1 - A3) 'Cradle to Gate'	-584 kgCO ₂ e/m ³
Thickness	15mm
Unit of Measure	m ²

To calculate the carbon value per m² for a specified product we must first calculate the mass per unit area of product per m². To do so, we must specify the material thickness and density. Mass per unit area is then calculated as follows:

Parameter	Value/Unit
Thickness	15mm
Density	kg/m ³
Mass per unit area	Thickness x Density (kg/m ³)

kgCO₂e/kg = kgCO₂e/m³ divided by kg/m³
-805 ÷ 611 = -1.318



Mass per unit area = Thickness x Density

Parameter	Value	Unit
Thickness	0.015	m
Density	615	kg/m ³
Mass per unit area	9.225	kg/m ²

With the mass of insulation per unit area now established, the embodied carbon per square metre of OSB Top can be estimated.

Embodied Carbon per Unit Area =
Mass per Unit Area × Embodied Carbon Factor

Parameter	Value	Unit
Mass per unit area	9.23	kg/m ²
Embodied Carbon Factor	-0.95	kgCO ₂ e/kg
Embodied Carbon per Unit Area	-8.76	kgCO ₂ e/m ²

Total A1-A3 Carbon = -8.76 kgCO₂e/m²

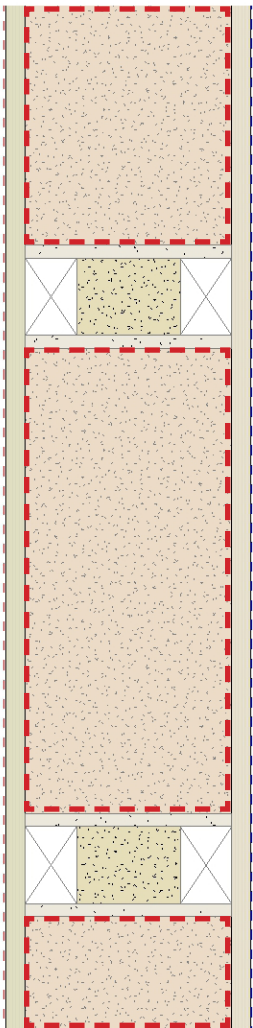
Steico Zell Wood Fibre Insulation

Embodied Carbon Value (A1 - A3) 'Cradle to Gate'	-805 kg CO ₂ e
Thickness	15mm
Unit of Measure	m ²

To calculate the carbon value per m² for a specified product we must first calculate the mass per unit area of product per m². To do so, we must specify the material thickness and density. Mass per unit area is then calculated as follows:

Parameter	Value/Unit
Thickness	15mm
Density	kg/m ³
Mass per unit area	Thickness x Density (kg/m ³)

$\text{kgCO}_2\text{e/kg} = \text{kgCO}_2\text{e/m}^3 \text{ divided by } \text{kg/m}^3$
 $-805 \div 611 = -1.318$



Mass per unit area = Thickness x Density

Parameter	Value	Unit
Thickness	0.28	m
Density	35	kg/m ³
Mass per unit area	9.8	kg/m ²

With the mass of insulation per unit area now established, the embodied carbon per square metre of OSB Top can be estimated.

Embodied Carbon per Unit Area =
Mass per Unit Area x Embodied Carbon Factor

Parameter	Value	Unit
Mass per unit area	9.8	kg/m ²
Embodied Carbon Factor	-1.34	kgCO ₂ e/kg
Embodied Carbon per Unit Area	-13.13	kgCO ₂ e/m ²

Total A1-A3 Carbon = -13.13 kgCO₂e/m²

Egger Ecobox Stud - 280mm

For the purposes of this calculation. We have assumed a 1m2 section of Wall Panel contains 2.0 linear metres of Ecobox Stud

280mm Ecobox weighs 6.2kg/lm.
1m2 of Wall panel includes 12.4kg of Ecobox 280mm Studs.

Webs of OSB

280mm x 10mm x 2m = 0.0056m3 x 2 for two webs 0.0112m3
Volume x Density = Mass 0.0112 x 611 = 6.8432kg
Embodied Carbon = Mass x Carbon Factor = 6.8432kg x 1.318 =

-9.019kg per kgCO₂e/m2

Solid Timber 2no 60x60mm Studs

Assumed values from C16 kiln dried & planed structural timber
60mm x 60mm x 2m = 0.06 x 0.06 x 2= 0.0072m3 x 2 = 0.0144m3
Volume x Density = Mass 0.0144 x 460 kg/m3 = 6.624kg
Embodied carbon of Egger structural stud = -696 kgCO₂e/m3
Density = 460 kg/m3. -696÷460=-1.513 kgCO₂e/kg
Embodied Carbon = Mass x Carbon Factor = 6.624kg x -1.513 =

-10.02kgCO₂e/m2

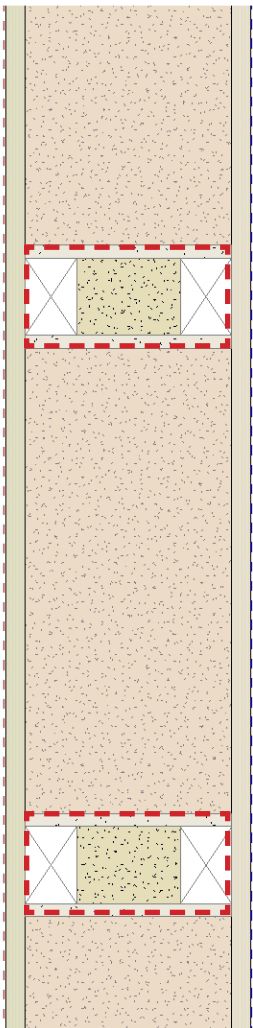
Woodfibre Batt

160mm x 60mm x 2m = 0.160 x 0.06 x 2 = 0.0192m3
Assumed values from steico zell data.
Volume x Density = Mass 0.0192 x 35 kg/m3 = 0.672kg
Embodied carbon of Steico insulation -1.34 kgCO₂e/kg
0.672 x -1.34 kgCO₂e/kg = -0.90048kgCO₂e/m2

-0.90kgCO₂e/m2

In Lieu of adhesive data. The following assumptions have been made;
Adhesive content = 1% of the completed EcoBox stud mass
a conservative generic carbon factor of:
4.0 kgCO₂e/kg of adhesive, A1—A3
Total weight of 2l/m of Ecobox 280mm = 14.136kg
1% = 0.141 x 4.0 =

0.565kgCO₂e/m2



The embodied carbon of the EGGER EcoBox stud has been estimated using a composite material approach, combining the impacts of the constituent OSB, structural timber and an allowance for adhesive. In the absence of a product-specific EPD, this provides a reasonable estimate but should be regarded as indicative pending manufacturer verification.

Element	Embodied Carbon Value	Unit
OSB Webs x2	-9.019	kg/m2
Solid Structural Timber x2	-10.02	kg/m2
Wood Fibre Insulation within web	-0.90	kg/m2
Adhesive	0.565	kg/m2
TOTAL	-19.37	kg/m2

Solitex Fronta Quattro Breather Membrane

The embodied carbon of the breather membrane has been taken directly from the manufacturer's third-party verified Environmental Product Declaration (EPD), which is declared per 1 m² of installed membrane. A 10% allowance has been applied to account for membrane overlaps, trimming and normal installation waste.

Embodied Carbon (A1—A3): 0.61 kgCO₂e/m² (including 10% installation allowance).

Total A1-A3 Carbon = 0.61 kgCO₂e/m²



Summary of Assumptions & Data Sources

This assessment quantifies the embodied carbon of 1m² of the Hyem Frames 280mm external wall system. Results are expressed as Global Warming Potential (GWP-total) in kgCO₂e/m² and are based on the A1—A3 Product Stage (Cradle to Gate) defined within EN 15804+A2.

Manufacturer-specific Environmental Product Declarations (EPDs) have been used wherever available. Where product-specific EPDs are unavailable, documented engineering assumptions have been adopted using published product information, constituent material EPDs and recognised industry data. All assumptions are intended to be conservative and should be updated as manufacturer-specific information becomes available.

Data Sources

Component	Data Source	Assessment Basis
EGGER OSB Top	EGGER Environmental Product Declaration (EN 15804+A2)	Manufacturer-specific EPD
EGGER DHF Breathable Sheathing Board	EGGER Environmental Product Declaration (EN 15804+A2)	Manufacturer-specific EPD
STEICO Zell Wood Fibre Insulation	STEICO Environmental Product Declaration (EN 15804+A2)	Manufacturer-specific EPD
SOLITEX FRONTA QUATTRO Breather Membrane	pro clima Environmental Product Declaration (EN 15804+A2)	Manufacturer-specific EPD
EGGER EcoBox Structural Stud	Composite assessment using EGGER technical data, EGGER OSB EPD and structural timber EPD	Engineering estimate
Structural Timber	BRE Environmental Product Declaration — C16 Kiln Dried & Planed Structural Timber	Industry-average EPD
Structural Adhesive	Generic embodied carbon factor	Engineering assumption

Principal Assumptions

Functional Unit

The assessment is based on 1m² of completed Hyem Frames 280mm external wall construction.

Assessment Boundary

The assessment considers Modules A1—A3 (Product Stage / Cradle to Gate) only. Construction, transport, operational use, maintenance and end-of-life impacts are excluded unless otherwise stated.

EcoBox Structural Frame

No product-specific EPD is currently available for the EGGER EcoBox structural stud. The embodied carbon has therefore been estimated using a composite material approach based upon:

EGGER OSB environmental data;
structural softwood environmental data;
published EcoBox dimensions and weight;
calculated constituent material quantities.

A representative wall panel has been assumed to contain 2.0 linear metres of EcoBox stud per square metre of wall.

Structural Adhesive

Manufacturer data relating to adhesive type and quantity were unavailable at the time of assessment. A conservative allowance has therefore been adopted using:

adhesive content = 1% of total EcoBox stud mass
embodied carbon factor = 4.0 kgCO₂e/kg

This assumption has a relatively small influence on the overall wall embodied carbon.



Breather Membrane

A 10% allowance has been included to account for membrane laps, trimming and normal installation waste.

Material Quantities

Material quantities have been calculated using published product dimensions and declared densities. Where EPDs are declared in $\text{kgCO}_2\text{e}/\text{m}^3$, values have been normalised to $\text{kgCO}_2\text{e}/\text{kg}$ before calculating the embodied carbon contribution of each material.

Limitations

This assessment has been prepared as a comparative product-level study and does not constitute a whole-building Life Cycle Assessment (LCA).

The calculated values are dependent upon:

- current manufacturer Environmental Product Declarations;
- published technical information;
- representative construction details;
- engineering assumptions where manufacturer-specific data are unavailable.

The assessment should be reviewed and updated as revised EPDs or verified manufacturer information become available.

Revision Control

- This document should be reviewed when any of the following occur:
- Updated manufacturer EPDs are published.
- The wall build-up or material specification changes.
- Product dimensions or densities are revised.
- A product-specific EGGER EcoBox EPD becomes available.
- A whole-life carbon assessment (A1—A5, B, C or D modules) is undertaken.

Declaration

This assessment has been prepared in accordance with the principles of EN 15804+A2 using publicly available Environmental Product Declarations (EPDs) and manufacturer technical data. It is intended to provide a transparent and repeatable methodology for comparing the embodied carbon of the Hyem Frames wall system and should not be interpreted as an independently verified Environmental Product Declaration or whole-building Life Cycle Assessment.