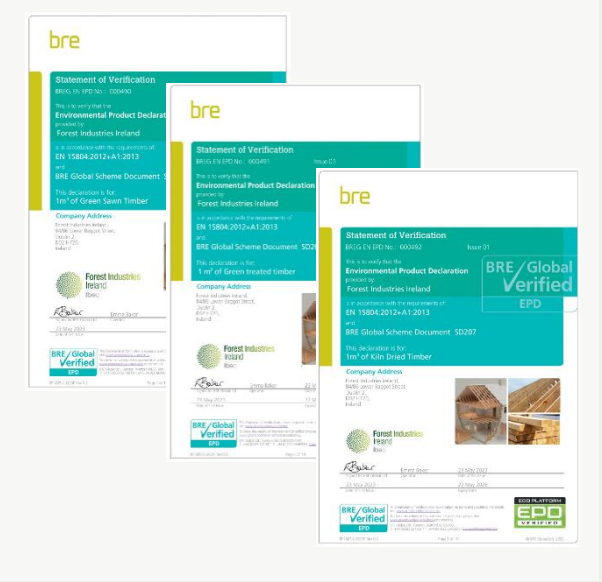


# Guide to the Application of Environmental Product Declarations for Irish Timber

Ver02 January 2025

## 1. Background



On 23 May 2023, three new Environmental Product Declarations (EPDs) for Irish-produced sawn timber were published by Forest Industries Ireland (FII). They were subsequrntly updated in late 2024 and in 2026 to comply with the revisions to EN 15804 +A2, and to include necessary declarations for C1-C4 and D modules, as mandated. Download from IBEC's website.

This guidance document is intended to assist you to interpret the data and understand each element covered in the EPD, and how these new EPDs can be applied in your timber construction projects.

## 2. What is an EPD?

An EPD is an independently verified document for a product that outlines its environmental performance under a number of different parameters and stages in its life cycle, while it also includes necessary technical information for the product. EPDs typically form the primary data sources for the life cycle assessment (LCA) of construction projects. LCA is an important method for quantifying the environmental performance of such projects, including the calculation of embodied carbon emissions, which supports whole life carbon reporting for buildings. The general LCA procedure is defined by the international standard ISO 14040; an EPD can be considered as a product-level LCA.

## 3. Why are EPDs important?

The need to quantify the embodied carbon emissions associated with construction materials is being driven by the national Climate Action and Low Carbon Development (Amendment) Act 2021, the associated Climate Action Plan, and EU legislation. It is expected that embodied carbon emissions of buildings will be regulated in the next five years, as Ireland aims to achieve net zero carbon emissions by 2050. As construction products are a significant contributor to the environmental impact of the built environment, EPDs play an essential role in quantifying and reducing this impact.

## 4. What EPDs have Forest Industries Ireland (FII) produced?

EPDs have been published for three types of sawn timber produced in Ireland, green sawn timber (EPD 000625), green treated timber (EPD 000626) and kiln dried timber (EPD 000627); the latter two products are the result of additional processing of the former. These EPDs are based on the sector averages across the island of Ireland, rather than a specific manufacturer. The manufacturers involved are Balcas Timber Ltd, Coolrain Sawmills, ECC Timber Products, Glennon Brothers Cork Ltd., GP Wood Ltd, Laois Sawmills, Murray Timber Group, and Woodfab Timber Ltd.

Link to EPDs: Forest Industries Ireland - IBEC

## 5. General Summary of Main EPD Contents

EN 15804 defines the content that an EPD must declare, which is divided into general information, technical information and LCA information. General information usually refers to the introduction of manufacturers, product identification, aligned EPD programmes etc. In terms of technical information, the manufacturing process, physical properties, details of the supply chain etc. should be included. The required LCA information is briefly summarised in the following sections. In addition, corresponding contents in the new EPDs for Irish timber are explained.

### 5.1 Functional unit

The functional unit is the unit in which the product's functions and environmental performances are quantified. In the FII timber EPDs, all the information is standardised for 1 cublic metre ($m^3$) of timber, which helps comparison between different products. The declared functional unit is located under general information in the published EPD.

### 5.2 System boundary

The system boundary indicates the LCA scope of EPDs. As defined in EN 15978, a whole lifecycle assessment for building projects contains a series of stages from product manufacturing to the end of a building's service life (*Figure 1*).

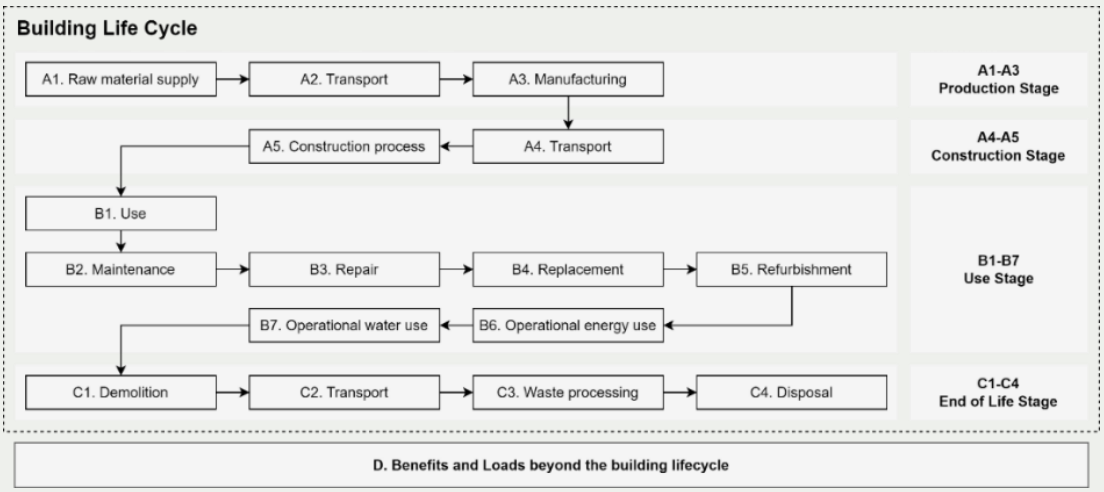



Figure 1. LCA modules defined in EN 15978

The Environmental Product Declarations (EPDs) for sawn wood timber products typically cover system boundaries that include Modules A1-A3, C1-C4, and D. Modules A1-A3, often referred to as "cradle-to-gate," encompass the entire process from wood harvesting in the forest to the finished timber product ready for dispatch from the sawmill. This includes the transportation of logs from the forest to the factory, the manufacturing of sawnwood, and any applicable treatments. Modules C1-C4 and D, on the other hand, focus on the end-of-life aspects of the product, addressing disposal options as well as potential recycling and reuse.

When comparing products using Life Cycle Assessment (LCA), it is crucial for specifiers to ensure that the system boundaries are consistent across all assessments. Discrepancies in boundaries can lead to misleading conclusions, as varying parameters may obscure true environmental impacts and hinder informed decision-making.

### 5.3 Lifecycle Inventory Data

Life Cycle Inventory (LCI) data in product EPDs includes two categories: processing data and environmental data; the former relates to inputs and outputs of energy and materials during manufacturing and the latter is environmental information for these inputs and outputs. The processing data used for the development of these EPD's was collected for the 2021 level with further data supplied for the revision in 2022. Environmental data is derived from the EcoInvent database.

In addition, the LCI data has been allocated to the main product (i.e., sawn timber) and by-products (e.g., chips) through physical allocation. Therefore, the LCA results for sawn timber have excluded impacts from by-products. Moreover, since the data is collected from multiple sawmills, there is a 5-10% variance from the average for different manufacturers.

### 5.4 LCA indicators

For a product EPD, four categories of LCA indicators are required, including environmental impacts, resource use, waste generated, and output flows; the first category is typically of most interest and is introduced here. Seven environmental impact indicators are included in new EPDs for Irish sawn timber, which are core indicators defined in EN 15804. The Global Warming Potential (GWP) indicator is typically reported in $kgCO_2$ equivalent as a measure of embodied carbon emissions. If the user wishes to exclude the impact of biogenic carbon from GWP, EN 16449 should be used for the calculation of biogenic carbon.

## 6. Methodology

EPD's contain data in various environmental impact categories that are critical for calculating resource use and emissions in an Life Cycle Assessment (LCA). Global Warming Potential (GWP) is one of the most a widely used metrics in LCA to quantify the climate change impacts of a product, process, or system.

### 6.1 Understanding Global Warming Potential (GWP)

Various types of GWP are reported *(figure 2)* to provide a comprehensive view of the greenhouse gas emissions associated with a product's life cycle. Each type of GWP focuses on different sources or aspects of emissions.

**Total GWP** represents the overall contribution to global warming from all relevant greenhouse gases (GHG) emitted during the entire life cycle of a product, expressed in carbon dioxide equivalents (CO2-eq). Components include emissions from all phases such as raw material extraction, production, transportation, use, and end-of-life processing.

**Fossil GWP** accounts specifically for the GHG emissions associated with fossil fuel combustion and extraction processes. This includes emissions of CO2, CH4, and N2O that result from using fossil fuels, such as coal, oil, and natural gas. This is important in evaluating the impact of products that rely heavily on fossil fuels for energy or raw materials, and to differentiate between fossil and renewable resources.

**Biogenic GWP** refers to emissions associated with biological processes, primarily originating from the use of biomass and biogenic materials. It can include CO2 emissions resulting from the combustion of biomass, which are generally considered to be part of a closed carbon cycle (assuming sustainable practices), but it may also include methane and nitrous oxide emissions from these processes. This helps assess the climate impact of products that use biogenic materials, distinguishing them from fossil-based products.

**Land Use, Land Use Change, and Forestry (LULUCF) GWP** accounts for the emissions related to land use changes, such as deforestation or afforestation, and the management of land and forests. This may include carbon sequestration or emissions from land degradation, as well as impacts from land-use changes associated with the agricultural production of biomass.

**Ozone Depletion Potential (ODP)** measures the potential of a substance to deplete the ozone layer when released into the atmosphere, compared to a reference substance, typically trichlorofluoromethane (CFC-11), which has an ODP of 1. This metric is relevant for substances such as chlorofluorocarbons (CFCs), halons, and other ozone-depleting chemicals and in assessing products that contain or release chemicals known to harm the ozone layer. The value helps stakeholders understand the relative impact of different materials and processes on ozone depletion.

**Acidification Potential (AP)** quantifies the potential of a substance to contribute to acid rain and soil and water acidification. It is usually expressed in terms of hydrogen ion equivalents (H+) or in terms of $SO_2$ equivalents. Key contributors to acidification include sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$), and ammonia ($NH_3$). These compounds can lead to harmful environmental effects such as the leaching of nutrients from soils and damage to aquatic ecosystems.

**Eutrophication Potential (EP)** assesses the potential for excessive nutrient enrichment in water bodies, leading to algal blooms and oxygen depletion, which can severely affect aquatic life. Eutrophication is often tied to nitrogen and phosphorus inputs.

**Freshwater Eutrophication** specifically looks at the impacts on freshwater ecosystems, emphasizing sources such as agricultural runoff, wastewater discharges, and other nutrient sources that can lead to harmful effects in lakes, rivers, and streams. Eutrophication metrics in EPDs help stakeholders evaluate how various products may contribute to nutrient pollution and the degradation of aquatic ecosystems.

The Global Warming Potential (GWP) for each part life-cycle stage A1-A3, C1-C4 and D is shown in the columns for both domestic (Irish) and UK end use scenarios *(figure 2).*

**LCA Results – Average result**

**Parameters describing environmental impacts**

| | | | GWP-total | GWP-fossil | GWP-biogenic | GWP-luluc | ODP | AP | EP-freshwat |
|---|---|---|---|---|---|---|---|---|---|
| | | | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg CFC11 eq | mol $H^+$ eq | kg $(PO_4)^{3-}$ eq |
| Product stage | Raw material supply | A1 | -7.21E+02 | 1.15E+01 | -7.33E+02 | 1.02E+00 | 2.42E-06 | 5.12E-02 | 8.15E-03 |
| | Transport | A2 | 2.90E+01 | 2.90E+01 | 2.36E-02 | 1.18E-02 | 6.68E-06 | 1.53E-01 | 1.82E-03 |
| | Manufacturing | A3 | 2.16E+01 | 2.01E+01 | 8.65E-01 | 2.29E-02 | 2.92E-06 | 1.53E-01 | 2.71E-03 |
| | Total | A1-3 | -6.71E+02 | 6.07E+01 | -7.32E+02 | 1.06E+00 | 1.20E-05 | 3.58E-01 | 1.27E-02 |
| **Ireland Scenario - 54% to Incineration, 38% to Recycling and 8% to Reuse** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 8.30E-03 | 8.30E-03 | 7.10E-06 | 3.27E-06 | 1.93E-09 | 3.38E-05 | 5.35E-07 |
| | Waste processing | C3 | 7.36E+02 | 2.98E+00 | 7.33E+02 | 2.49E-03 | 2.97E-07 | 7.90E-02 | 2.18E-03 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.81E+02 | -2.12E+02 | 3.13E+01 | -2.39E-01 | -1.16E-05 | -6.60E-01 | -2.76E-02 |
| **The UK scenario - 68% to Incineration for energy recovery, 32% to Recycling** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 8.30E-03 | 8.30E-03 | 7.10E-06 | 3.27E-06 | 1.93E-09 | 3.38E-05 | 5.35E-07 |
| | Waste processing | C3 | 7.36E+02 | 3.06E+00 | 7.33E+02 | 2.29E-03 | 3.13E-07 | 8.50E-02 | 2.19E-03 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.98E+02 | -1.98E+02 | -3.01E-01 | -2.83E-01 | -1.37E-05 | -6.25E-01 | -3.18E-02 |

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

Figure 2. Extract from *BREG EN EPD No.* 000627 (issue 2)

## 7. Steps to Calculate GWP Using EPD Data

This refined process ensures that you accurately assess the GWP associated with your specific use of sawnwood.

**Select the Appropriate Product EPD**: Choose the EPD that corresponds to the specific type of sawnwood you are evaluating, ensuring that it includes relevant data for your intended end-use requirements (e.g., green sawn, green treated or strength graded kiln dried).

**Select the Environmental Indicator**: Identify the GWP value (e.g., Total GWP, Fossil GWP) that aligns with your Life Cycle Assessment (LCA) goals. Make sure the selected indicator is relevant to your sustainability evaluation.

**Select the Relevant Life-Cycle Stages**: Determine which life-cycle stages (e.g., raw material extraction, production, transportation, use phase, end-of-life) are pertinent to your assessment. Ensure that the EPD provides GWP data for the stages you are examining.

**Calculate the Volume of Timber Used in the Given Application**: Measure and calculate the total volume of sawnwood you plan to use in your application, expressed in cubic meters ($m^3$).

**Multiply by the Appropriate GWP Value**: Multiply the calculated volume of timber (in $m^3$) by the selected GWP value (expressed in CO2 equivalents per $m^3$) from the EPD to obtain the total GWP for your application. This will provide a total GWP estimate for the use of sawnwood in your specific scenario.

**Units Consistency**: Ensure that the GWP values you are using are in compatible units with the volume you have (e.g., if GWP is given in kg CO2-eq/$m^3$, ensure you're multiplying the volume in $m^3$ to yield a total in kg CO2-eq).

**Documentation and Reporting**: After completing the calculation, document your methodology and findings clearly for transparency and for future reference.

## 8. EPD Data for Total GWP

Table 1 below summarises the total GWP figures for each life cycle stage for each of the EPDs developed by FII and this data will be used in the worked examples that follow.

| **EPD** | **627** | **626** | **625** |
|---|---|---|---|
| *Units* | *kg CO2eq* | *kg CO2eq* | *kg CO2eq* |
| A1 | -721 | -721 | -720 |
| A2 | 29 | 14.9 | 22.2 |
| A3 | 21.6 | 21.6 | 17.8 |
| **Total (A1-3)** | **-670.4** | **-684.5** | **-680** |
| C1 | 0 | 0 | 0 |
| C2 | 0 | 0 | 0 |
| C3 | 736 | 737 | 739 |
| C4 | 0 | 0 | 0 |
| **Total (C1-4)** | **736** | **737** | **739** |
| D | -181 | -255 | -382 |
| **Total (A1-3, C1-4, D)** | **-115.4** | **-202.5** | **-323** |

Table 1 : GWP Data (issue 2)

## 9. Worked Example #1

Calculate the GWP for 16 floor joists used in a domestic dwelling spanning 4.8m @ 400mm centres.

**Select the Appropriate Product EPD**: BREG EN EPD No. *0000627* kiln dried timber

**Select the Environmental Indicator**: Total GWP value *(Figure 3)*

**Select the Relevant Life-Cycle Stages**: (Ireland) A1-A3, C1-C4 and D *(Figure 3)*

**LCA Results – Average result**

**Parameters describing environmental impacts**

| | | | GWP-total | GWP-fossil | GWP-biogenic | GWP-luluc | ODP | AP | EP-freshwater |
|---|---|---|---|---|---|---|---|---|---|
| | | | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg CFC11 eq | mol $H^+$ eq | kg $(PO_4)^{3-}$ eq |
| Product stage | Raw material supply | A1 | -7.21E+02 | 1.15E+01 | -7.33E+02 | 1.02E+00 | 2.42E-06 | 5.12E-02 | 8.15E-03 |
| | Transport | A2 | 2.90E+01 | 2.90E+01 | 2.36E-02 | 1.18E-02 | 6.68E-06 | 1.53E-01 | 1.82E-03 |
| | Manufacturing | A3 | 2.16E+01 | 2.01E+01 | 8.65E-01 | 2.29E-02 | 2.92E-06 | 1.53E-01 | 2.71E-03 |
| | Total | A1-3 | -6.71E+02 | 6.07E+01 | -7.32E+02 | 1.06E+00 | 1.20E-05 | 3.58E-01 | 1.27E-02 |
| **Ireland Scenario - 54% to Incineration, 38% to Recycling and 8% to Reuse** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 8.30E-03 | 8.30E-03 | 7.10E-06 | 3.27E-06 | 1.93E-09 | 3.38E-05 | 5.35E-07 |
| | Waste processing | C3 | 7.36E+02 | 2.98E+00 | 7.33E+02 | 2.49E-03 | 2.97E-07 | 7.90E-02 | 2.18E-03 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.81E+02 | -2.12E+02 | 3.13E+01 | -2.39E-01 | -1.16E-05 | -6.60E-01 | -2.76E-02 |
| **The UK scenario - 68% to Incineration for energy recovery, 32% to Recycling** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 8.30E-03 | 8.30E-03 | 7.10E-06 | 3.27E-06 | 1.93E-09 | 3.38E-05 | 5.35E-07 |
| | Waste processing | C3 | 7.36E+02 | 3.06E+00 | 7.33E+02 | 2.29E-03 | 3.13E-07 | 8.50E-02 | 2.19E-03 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.98E+02 | -1.98E+02 | -3.01E-01 | -2.83E-01 | -1.37E-05 | -6.25E-01 | -3.18E-02 |

| **EPD** | **627** |
|---|---|
| *Units* | *kg CO2eq* |
| A1 | -721 |
| A2 | 29 |
| A3 | 21.6 |
| **Total (A1-3)** | **-670.4** |
| C1 | 0 |
| C2 | 0 |
| C3 | 736 |
| C4 | 0 |
| **Total (C1-4)** | **736** |
| D | -181 |
| **Total (A1-3, C1-4, D)** | **-115.4** |

Figure 3. Extract from *BREG EN EPD No. 000627 (issue 2)*

**Calculate the Volume of Timber Used in the Given Application**: *(Table 2)*

| Component | Volume (m3) | Total GWP per m3 (kg C02 eq) | Total GWP (kg CO2 eq) |
|---|---|---|---|
| 44 x 225mm Joists | 0.76 | -115.4 | -87.704 |

Table 2 : Total GWP Calculation (Stages *A1-3, C1-4 and D*) *

***Notes**

(i) Total GWP in this example covers life-cycle stages A1-3, C1-4 and D and is - 0.087 Tonnes CO2e

(ii) The negative kg CO2 equiv value indicates the net result is carbon storage rather than emission.

(iii) To complete the assessment, the specifier will need to assign GWP values for stages A4-5 and B1-7 to account for transport to site, installation and use including any maintence and repair.

(iv) Calculations are for illustrative purposes only. Actual Volumes will vary depending on the building type and design.

## 10. Worked Example #2

Calculate the GWP for all timber components in a typical 125 $m^2$ timber frame home to include structural and non-structural but excluding timber based sheathing material *(table 3).*

| Structural Timber Components | Typical Dimensions mm | Typical Volume $m^3$ | EPD Reference No. | GWP per $m^3$ kg C02eq | Total GWP kg CO2 eq |
|---|---|---|---|---|---|
| Joists | 44 x 225 | 5.47 | 627 | -115.4 | -631.2 |
| Trusses | Varies | 2.53 | 627 | -115.4 | -292.0 |
| Wall Stud | 38 x 89 | 5.11 | 627 | -115.4 | -589.7 |
| Wall Stud | 38 x 140 | 4.78 | 627 | -115.4 | -551.6 |
| Battens SR82 | 22 x 47 | 0.71 | 627 | -115.4 | -81.9 |
| Service Batten | 47 x 35 | 1.9 | 627 | -115.4 | -219.3 |
| Backing Board | Varies | 0.25 | 627 | -115.4 | -28.9 |
| Bracing | 22 x 100 | 0.36 | 627 | -115.4 | -41.5 |
| Bracing | 35 x 75 | 0.24 | 627 | -115.4 | -27.7 |
| Fire Stop | 44 x 47 | 0.39 | 627 | -115.4 | -45.0 |
| Valley Board | 35 x 125 | 0.07 | 627 | -115.4 | -8.1 |
| **Total** | | **21.81** | | | **-2516.9** |
| **Non Structural Components** | **Typical Dimensions mm** | **Typical Volume $m^3$** | **EPD Reference No.** | **GWP per m3 kg C02eq** | **Total GWP kg CO2 eq** |
| Decking(25 $m^2$) | 22 x 150 | 0.55 | 626 | -202.5 | -111.4 |
| Deck Supports | 38 x 140 | 0.33 | 626 | -202.5 | -66.8 |
| Fencing | Varies | 1 | 626 | -202.5 | -202.5 |
| Skirtings | 12 x 125 | 0.2 | 627 | -115.4 | -23.1 |
| **Total** | | **2.08** | | | **-403.8** |

Table 3 : Example calculation of the Total GWP (A1-3, C1-4, D) in a typical 125 $m^2$ timber frame home*

***Notes**

(i) Total GWP in this example covers life-cycle stages A1-3, C1-4 and D and is -2.92 Tonnes CO2e

(ii) The negative kg CO2 equiv value indicates the net result is carbon storage rather than emission.

(iii) To complete the assessment, the specifier will need to assign GWP values for stages A4-5 and B1-7 to account for transport to site, installation and use including any maintence and repair and include any panel products or ther timber uses.

(iv) Calculations are for illustrative purposes only. Actual Volumes will vary depending on the building type and design.

## 11. Worked Example #3

An independent study published in the Engineers Journal in April 2021 compared two typical Irish house types for a development project in Tralee, Co. Kerry. The assessment compared a cradle to grave life-cycle (A1-A4, B4-B5, C1-C4 without materials associated with finishes and services). It showed that the Global Warming Potential per $m^2$ of both types of constructions have similar carbon for all life-cycle stages apart from stages A1-A3 Materials. The building materials used in the timber frame construction produce 41% less carbon per $m^2$ than the masonry construction materials, a saving of 124.1 kg CO2e per $m^2$.

Figure 4 highlights the key timber and wood based panel product components of a timber frame home and the many external uses of timber.

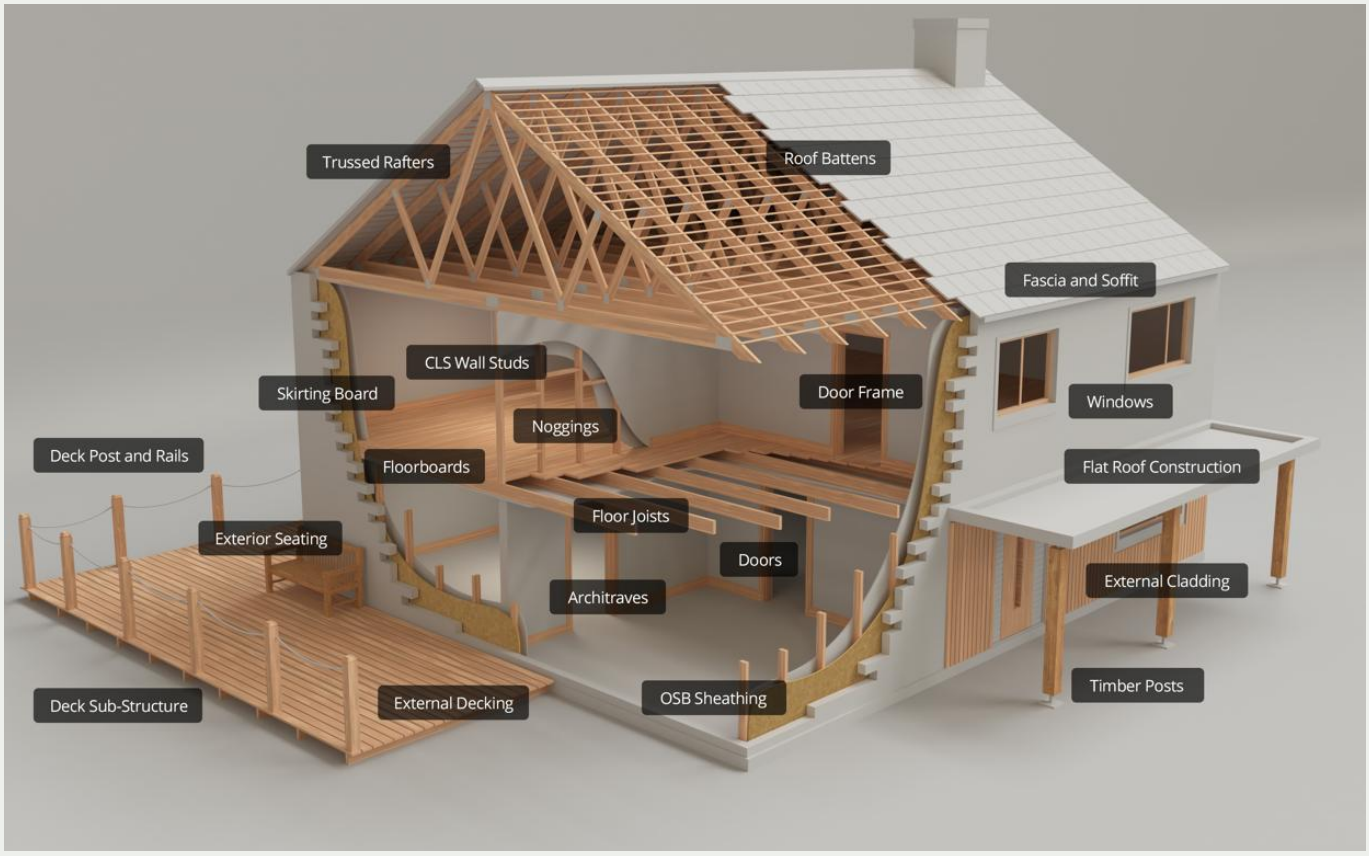



Figure 4. Key timber and wood based panel components in a timber frame home