

# Environmental Product Declaration

In accordance with  
ISO 14025 and  
EN 15804:2012+A2:2019 for:

## **Adaptable Wall (AW)**



THE INTERNATIONAL EPD® SYSTEM  
EPD INTERNATIONAL AB  
EPD REGISTRATION NUMBER S-P-04634  
ISSUED ON 2021-10-29  
VALID TO 2026-10-29

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)

The environmental impacts of this product have been assessed from cradle to gate with modules A1-A5, C1-C4 & D

This Environmental Product Declaration has been verified by an independent third party.



# Introduction

Optima Products Limited is a UK-based manufacturer of aluminium framed, glazed partition systems and doors. Based in Radstock, Bath, Optima Products Limited has been designing and producing innovative and performance-driven aluminium and glass-based partition and door systems since the 1980s.

This EPD provides environmental performance indicators for Optima Adaptable Walls, in two configurations. Optima Adaptable Walls are freestanding elements for the interiors of buildings, designed to be erected, taken down and moved readily.

This is a cradle-to-gate with options EPD in accordance with the requirements of EN 15804, covering modules A1-A5, C1-C4 and D defined in that standard.

The EPD is based on a life cycle assessment (LCA) study which used production data for the 12-month period 1 January to 31 December 2019 from Optima Products Limited's manufacturing facility in Radstock, UK. Background data was taken from the ecoinvent database (v3.6).

The EPD presents details of the LCA, a description of the product life cycle it covers, values for the environmental indicators specified by EN 15804:2012 + A2:2019 with a brief explanation of those results; indicators required by EN 15804:2012 + A1:2013 are also included to ensure acceptance by the widest possible base of users.

The declared unit is one square metre of Adaptable Wall.

## Adaptable Wall

|   |  |
|---|--|
| Products:   | 5m x 2.9m Adaptable Wall using fabric-coated panels<br>5m x 2.9m Adaptable Wall using laminate panels  |
| EPD programme:                                    | The International EPD® System  |
| EPD programme operator:                           | EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden<br>www.environdec.com - info@environdec.com                                       |
| EPD owner:  | Optima Products Limited, Mill Road, Radstock, Bath BA3 5TX, UK<br>www.optimasystems.com  |
| EPD registration No:                              | S-P-04634  |
| Date of publication:                              | 2021-10-29   |
| EPD valid until:                                  | 2026-10-29   |
| Procedure for data follow-up during EPD validity: | Involves third party Verifier: No  |
| EPD geographical scope:                           | UK   |
| EPD based on Product Category Rules:              | The CEN standard EN 15804 serves as the core PCR<br>The International EPD® System's PCR 2019:14<br>Construction products, Version 1.11, 2021-02-05 |
| PCR review conducted by:                          | The Technical Committee of the International EPD® System<br>Chair: Claudia Peña; contact via: info@environdec.com                                  |
| EPD verification:                                 | Independent verification of this EPD and data, according to ISO 14025/2006: externally verified  |
| Third party verifier:                             | Ugo Pretato - Studio Fieschi & Soci S.r.l. , Italy   |
| Accredited or approved by:                        | The International EPD® System  |
| LCA conducted by:                                 | EuGeos Limited - UK +44 (0)1625 434423 - www.eugeos.co.uk  |
| LCA software:                                     | openLCA  |
| Background database:                              | ecoinvent v3.6   |

The EPD owner has the sole ownership, liability, and responsibility for the EPD.  
EPDs within the same product category but from different programmes may not be comparable.  
EPDs of construction products may not be comparable if they do not comply with EN 15804.  
For further information about comparability, see EN 15804 and ISO 14025

# Company Profile

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Optima Products Limited designs and produces aluminium-framed glass and solid partition systems and doors from its manufacturing base in Radstock. The factory uses the latest design techniques to ensure high quality products which are rigorously tested both in-house and externally before going to market.

The Optima product range is sold and installed through the Optima Contracting divisions in the UK, Dubai and Kuala Lumpur and through a worldwide network of selected contracting partners.

Optima Products Limited puts quality at the heart of the design and production management and operates an accredited quality management system to ISO 9001: 2015 (bmtrada certificate 2367).

In keeping with Optima's determination to drive good environmental practice in the entire product cycle, Optima Products Limited operates an accredited environmental management system to ISO 14001: 2015 (bmtrada certificate 1827). In addition, it is a requirement of all our principal supply chain partners that they also operate similar systems.

Optima Products Limited believes in openness and transparency in the supply chain and manufacturing process and has published Health Product Declarations in accordance with HPD Standard version 1.0.

## Contact

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# Product Information

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## Adaptable Wall

Optima Products offers customers a range of Adaptable Walls (AW) to create effective and innovative workspaces in office and commercial buildings.

Adaptable Walls are freestanding room elements (framework with glass, fabric-coated or laminated panels) that can be put up, taken down or moved quickly and efficiently. AW are assembled at the project site; the modules which form them are standardised and can therefore be reconfigured and re-used.

This EPD is based on two example AW configurations, each designed to close a 5m long x 2.9m high space:

1. Adaptable Wall with fabric-coated panels,
2. Adaptable Wall with laminate panels (18mm melamine-faced chipboard)

UN CPC classification 4219 (CPC V2.1)

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## Manufacturing

Optima Products' Radstock factory carries out the following manufacturing activities:

- Storage of raw materials, components and packaging
- Aluminium profile finishing and coating
- Preparation of AW framework
- Packing of finished goods for delivery to site

## Packaging

Adaptable Walls components are packed for delivery to site using reusable crates, wheeled cradles or pallets, with some items packed in cardboard. Glass and glazing units for the walls are normally delivered directly to the construction site from the glass supplier, using reusable cradles to protect them in transit.

Optima Products Limited uses only FSC certified wood products for pallets, where deliveries require these. All pallets are set aside at their destination with the option of being returned for re-use.

## Installation

AW are assembled on site using hand power tools from a set of components and panels delivered to site. The only wastes arising from installation are packaging materials. Pallets, cradles and trolleys used to bring components to site are removed by Optima for re-use.



# Product Information

## Product use and maintenance

All Optima AW units are designed and manufactured to satisfy the strength and robustness criteria of BS 5234, where they can be reasonably applied, for Medium Duty.

AW should be regularly inspected and maintained in accordance with the published Optima operation and maintenance schedule – see [www.optimasystems.com](http://www.optimasystems.com) for further details.

## End-of-life

It is recommended that AW being permanently removed from site, and with no planned re-use, be separated from the general waste disposal regime and any glass, aluminium and wood-based panels stripped out for potential recycling using a regulated recycling scheme. Note that segregated collections of wood wastes may require separation of wood panels (MDF, MFC, etc.) from massive wood items.

The European Waste Catalogue (EWC) codes below apply to the product or parts of it when removed from the building:

EWC 17 02 01 Wood

EWC 17 02 02 Glass

EWC 17 02 03 Plastic

EWC 17 04 02 Aluminium

## Further product information

Detailed product information and datasheets can be found on our website: [www.optimasystems.com](http://www.optimasystems.com)

## Content declaration

The material composition calculated for Adaptable Wall covered by this EPD are shown below:

| Product components | Fabric panel AW            |                                    | Laminate panel AW          |                                    | Renewable material, weight - % |
|--------------------|----------------------------|------------------------------------|----------------------------|------------------------------------|--------------------------------|
|                    | Mass in declared unit - kg | Post-consumer material, weight - % | Mass in declared unit - kg | Post-consumer material, weight - % |                                |
| Aluminium          | 5.8                        | 75                                 | 5.8                        | 75                                 | 0                              |
| Glass fibre        | 1.9                        | 70                                 | 1.9                        | 70                                 | 0                              |
| Steel              | <0.1                       | 25                                 | <0.1                       | 25                                 | 0                              |
| Other polymers     | 2.5                        | 0                                  | 3.9                        | 0                                  | 0                              |
| Wood               | 14                         | n/a                                | 20                         | n/a                                | 100                            |
| Other components   | <1                         | n/a                                | <1                         | n/a                                | n/a                            |

# Product Information

Total mass is not a specified property of the product.

| Packaging materials | Fabric panel AW |                            | Laminate panel AW |                            |
|---------------------|-----------------|----------------------------|-------------------|----------------------------|
|                     | Weight - kg     | Weight - %<br>(vs product) | Weight - kg       | Weight - %<br>(vs product) |
| Cardboard           | 2               | 8                          | 2                 | 7                          |
| Wooden pallet       | <1              | 2.5                        | <1                | 2                          |
| Total               | 3               | 10.5                       | 3                 | 9                          |

No substance on the "Candidate List of Substances of Very High Concern for authorisation" derived under REACH is present either above the limits for registration with the European Chemicals Agency or in excess of 0.1% by weight of the product

## Technical data

The technical characteristics of the Adaptable Wall covered by this EPD are summarised below.

| Name  | Value         | Unit      |
|---|---------------|-----------|
| Sound Insulation to BS EN ISO 10140 - 2 and ISO 717-1   | ≤ 41          | dB (DnTw) |
| Strength:<br>Duty Rating to BS5234-2<br>(not applicable to Frameless Glazed Partitioning:<br>Uncongested office space | 0.36          | kN/m      |
| Congested office space  | 0.74          | kN/m      |
| Maximum allowable deflection under the line load:   | L/120 or 25mm |           |

## Residual risks and emergencies

There are no residual risks associated with use of the product in the context for which it is designed.

# Product Information

## LCA Information

This section of the EPD records key features of the LCA on which it is based.

### Scope

This EPD covers the product stage (modules A1-A3, with these declared in aggregated form, as permitted by EN 15804), the construction stage (modules A4 & A5), end-of-life stages (modules C1-C4 & module D).

| Product stage   |           |               | Construction process stage |          | Use stage |             |        |             |               |                        |                       | End of life stage          |           |                |          | Benefits & loads beyond the system boundaries |
|---|-----------|---------------|----------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|----------------|----------|---|
| Raw material supply   | Transport | Manufacturing | Transport to the site      | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste disposal | Disposal | Reuse- recovery- recycling- potential         |
| A1  | A2        | A3            | A4                         | A5       | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3             | C4       | D   |
| Modules declared<br>X included in LCA - ND: module not declared - NR: module not relevant |           |               |                            |          |           |             |        |             |               |                        |                       |                            |           |                |          |   |
| X   | X         | X             | X                          | X        | ND        | ND          | ND     | ND          | ND            | ND                     | ND                    | X                          | X         | X              | X        | X   |
| Geography   |           |               |                            |          |           |             |        |             |               |                        |                       |                            |           |                |          |   |
| GLO   | GLO       | GB            | GB                         | GB       | -         | -           | -      | -           | -             | -                      | -                     | GB                         | GB        | GB             | GB       | GLO   |
| Specific data used  |           |               |                            |          |           |             |        |             |               |                        |                       |                            |           |                |          |   |
| 85  | >90       | >90           | >90                        | >90      | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -              | -        | -   |
| Variation - products  |           |               |                            |          |           |             |        |             |               |                        |                       |                            |           |                |          |   |
| n/a   | n/a       | n/a           | n/a                        | n/a      | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -              | -        | -   |
| Variation - sites   |           |               |                            |          |           |             |        |             |               |                        |                       |                            |           |                |          |   |
| n/a   | n/a       | n/a           | n/a                        | n/a      | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -              | -        | -   |

# Environmental Performance-Related Information

## Declared unit

The declared unit is one square metre of Adaptable Wall.

The mass of the declared unit is approximately 27kg including packaging for the fabric panel Adaptable Wall and 34kg including packaging for the Adaptable Wall with laminate panels.

## System boundaries

This EPD covers the product stage, delivery to site, installation, and 'end-of-life' management. It therefore includes the following information modules:

- A1 - raw material extraction and processing, and the processing of secondary material input
- A2 - transport of raw materials and secondary material inputs to the manufacturer
- A3 - manufacturing of the construction product and packaging
- A4 - delivery of construction products to the building site
- A5 - assembly
- C1 - removal from the building
- C2 - transport to waste treatment facility
- C3 - waste treatment
- C4 - final disposal
- D - benefits associated with recycling in a different product system

Modules A1, A2 and A3 comprise the product stage and are declared as one aggregated module A1 – A3. This stage includes the extraction and manufacture of raw materials, intermediate products and energy, as well as waste processing up to the end-of-waste state (i.e. no longer considered a waste material) or disposal of final residues arising during the product stage.

Modules A4 & A5 are part of the "Construction Process stage".

Module C1 - C4 cover the end-of-life stage.

Module D provides an estimate of the potential benefits that would accrue to a different product system were the AW constituents and recycled wastes identified in data for other life cycle modules actually recycled or recovered at current rates and using current technologies.

All upstream resource extraction and manufacturing processes are included in the system. All energy used in factories and offices at Optima Products' Radstock site is included; energy used in Optima Products' offices at locations other than Radstock is excluded. Maintenance of equipment is also excluded.

## Biogenic carbon

Carbon dioxide (CO<sub>2</sub>) is absorbed from the atmosphere by trees, so any wood-based product contains some carbon from this source. This carbon is considered as a negative emission in some carbon accounting systems. The biogenic carbon in the wood contained in the declared unit in this EPD is shown below for each type of Adaptable Wall.

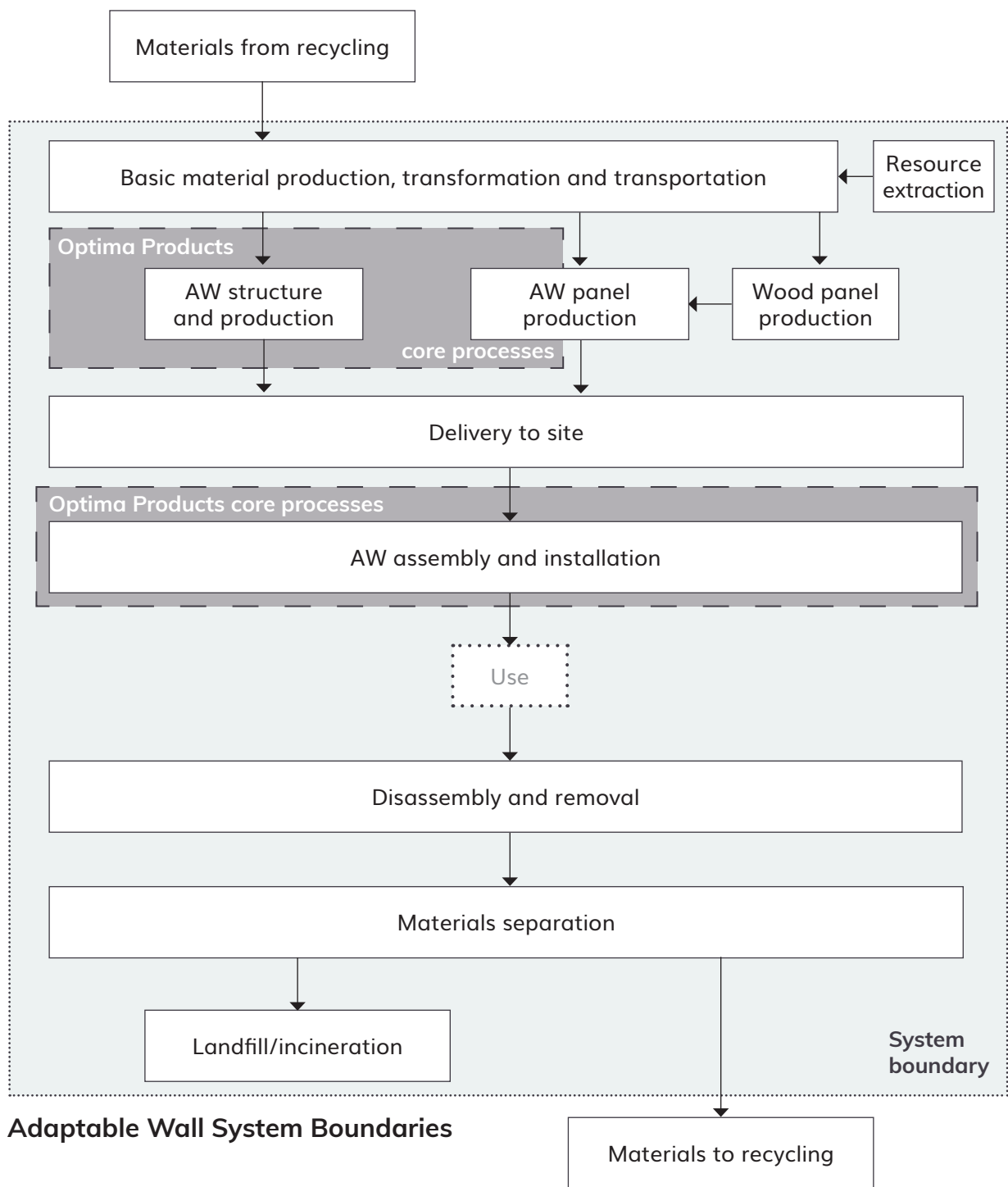
| Biogenic carbon content per declared unit | Unit | Quantity          |                    |
|---|------|-------------------|--------------------|
|   |      | AW fabric -coated | AW laminate panels |
| Biogenic carbon content in product        | kg C | 7                 | 10                 |
| Biogenic carbon content in packaging      | kg C | 1                 | 1                  |

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>



# Environmental Performance-Related Information

The product life cycle covered by this EPD is illustrated below.



# Environmental Performance-Related Information

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## Cut-off criteria

According to EN 15804 and the PCR, flows can be omitted (cut-off) from a core process in the LCA up to a maximum of 1% of the total mass of material inputs. The total of input flows omitted in this way for any single module must not exceed 5% of the total energy usage and mass inputs for that module. The following must be included in all cases, regardless of the proportion of mass or energy they represent:

- Inputs giving rise to significant environmental effects or energy use in their extraction, use or disposal
- Inputs or outputs classified as hazardous waste

The data collected from Optima Products encompassed all raw materials, packaging materials and process aids, as well as associated transport to the manufacturing site. Process energy and water use, and direct production waste are included within the data. There are no emissions to air or water apart from un-monitored combustion gases and trade effluent; these are quantified by virtue of mass balance (trade effluent) or by their inclusion in generic processes characterising inputs (gas combustion).

Non-hazardous material inputs amounting, in combination, to <0.5% of all inputs to Optima's Radstock facility during the data period were omitted from the LCA. Non-hazardous components used in the AW amounting, in combination, to <1% of the AW total mass were also omitted from the LCA.

## Data sources and data quality

Data used for this EPD were collected following guidance in ISO 14044:2006; the most current available data were used in accordance with EN 15804.

The manufacturer-specific data used in LCA calculations cover a period of 1 year from 1 January 2019 to 31 December 2019. They are therefore based on 1 year averaged data and have been updated within the 5 years prior to publication of the EPD. These data were checked to ensure that sufficient materials and water were included within the inputs to account for all outputs, including products and wastes. Their technological coverage reflects physical reality for the declared product.

Other (generic) datasets used for calculations have been updated within the last 10 years.

Inputs to and outputs from the system are accounted for over a 100-year time period; long-term emissions are therefore omitted from the LCIA.

## Background data

Background (generic) data for raw material inputs and fuels were taken from the ecoinvent v3.6 database, augmented where necessary to ensure the data used is as representative as possible of the materials actually used by Optima. This fulfils the EN 15804 requirement that generic data used in the LCA have been updated within the last 10 years. Data quality has been reviewed for all processes that contribute significantly to the overall LCA.

## Allocation

In the background data, the ecoinvent default allocation is applied to all processes except those in which secondary materials are used, where the "cut-off" allocation is applied. This ensures that secondary materials are free of upstream burdens that arise prior to their reaching the "end of waste" state, in accordance with Section 6.3.4.2 of EN 15804.

Factory data for Optima Products' Radstock facility have been sub-divided where possible to avoid allocation. Remaining inputs and outputs are allocated on the basis of physical relationships.

# Environmental Performance-Related Information

## Assumptions and estimates

The "primary energy used as material" indicators (PERM; PENRM) are calculated using - as characterisation factors - published values for constituent materials which can yield energy on combustion, where available, and from published calorific values where PEM values are not available.

In this EPD, the following values are used:

- Renewable primary energy as material: wood, cardboard – 14MJ/kg
- Non-renewable primary energy as material: ABS – 40 MJ/kg; PVC - 27 MJ/kg; other polymers - 30 MJ/kg

"Primary energy as fuel" indicators (PENRE, PERE) are calculated as the total primary energy demand minus primary energy used as material.

Delivery of the product to users' sites, installation and transport to waste processing and final disposal are modelled using scenarios. The relevant parameters for the transport scenarios are shown in the tables below.

| Scenario parameters - A4 transport to site     |                               | Scenario parameters - C2 transport to waste treatment |                       |
|--|-------------------------------|---|-----------------------|
| Parameters                                     | Quantity and unit             | Parameters  | Quantity and unit     |
| Vehicle type                                   | lorry                         | Vehicle type  | lorry                 |
| Vehicle load capacity                          | 10t; n/a                      | Vehicle load capacity                                 | 10t; n/a              |
| Fuel type and consumption                      | diesel, 0.1 l/km              | Fuel type and consumption                             | diesel, 0.1 l/km      |
| Volume capacity utilisation factor             | 1                             | Volume capacity utilisation factor                    | 1                     |
| Capacity utilisation (including empty returns) | 38%                           | Capacity utilisation (including empty returns)        | 33%                   |
| Distance to site                               | 200 km                        | Distance to site                                      | 50 km                 |
| Bulk density of transported products           | n/a (mixed materials, packed) | Bulk density of transported products                  | n/a (mixed materials) |

Installation (Module A5) is modelled on the basis of information from Optima. Consumption of 0.08kWh electricity per declared unit is assumed, to account for the use of hand-held power tools. Cardboard packaging is assumed to be recycled; the same assumptions are applied for transport as in Module C2. Other items used to transport Adaptable Wall elements to site are returned for re-use. Removal from the building (Module C1) is assumed to use the same energy as installation.

In the end-of-life modules, aluminium is assumed recycled, therefore separated in Module C3. The remaining fraction represents approximately 95% of the total declared unit mass. Of this, 59.3% is assumed incinerated and 40.7% landfilled in Module C4, reflecting UK practice. Approximately 2/3 of waste incineration in the UK includes energy recovery; the efficiency of this is assumed to be 60%, and the resulting energy output reported as "Exported Energy" (EE) in module C4.

# Environmental Performance-Related Information

Module D quantifies the benefits and loads associated with recycling materials and the exported energy from waste management activities, were those recycled materials and recovered energy to be used in another product system. Net output quantities of materials used in the Module D calculation are shown in the table below, with the associated "quality factors" and the virgin materials assumed to be displaced. The overall efficiency of energy recovery is assumed to be 72%, with 20% energy recovered as electricity, 52% as heat.

| Scenario parameters - Module D |              |                               |                |                             |             |
|--------------------------------|--------------|-------------------------------|----------------|-----------------------------|-------------|
| Output to recycling / recovery | Assumed fate | Displaced input flow          | Quality factor | Net output quantity & units |             |
|                                |              |                               |                | AW fabric                   | AW laminate |
| Aluminium                      | 90% recycled | primary aluminium ingot       | 1              | 1.3kg                       | 1.3kg       |
| Cardboard (A1-A5)              | recycled     | core board                    | 0.85           | 0.1kg                       | 0.1kg       |
| Heat energy                    | recovery     | heat from natural gas         | -              | 58MJ                        | 71MJ        |
| Electrical energy              | recovery     | electricity, residual mix, UK | -              | 22MJ                        | 27MJ        |

## Environmental indicators

This EPD contains environmental information about Optima's Adaptable Wall in the form of quantitative indicator values for a number of parameters, which encompass calculated environmental impact potentials, resource and energy use, waste generation and material and energy outputs from the product system that may be reused, recycled or recovered into other, unspecified product life cycles. These parameters are listed below along with the abbreviations used for them in the tables of indicator values that follow.

| Parameter   | Abbreviation   | Units   |
|---|----------------|---|
| <b>Potential environmental impacts</b>                          |                |   |
| Climate change – GWP fossil                                     | GWP-fossil     | kg CO <sub>2</sub> eq                         |
| Climate change – GWP biogenic                                   | GWP-biogenic   | kg CO <sub>2</sub> eq                         |
| Climate change – GWP land transformation                        | GWP-luluc      | kg CO <sub>2</sub> eq                         |
| Climate change – GWP total                                      | GWP-total      | kg CO <sub>2</sub> eq                         |
| Climate change - GWP fossil & land transformation <sup>1</sup>  | GWP-GHG        | kg CO <sub>2</sub> eq                         |
| Acidification potential   | AP             | mol H <sup>+</sup> eq                         |
| Eutrophication – freshwater                                     | EP-freshwater  | kg P eq & kg PO <sub>4</sub> <sup>3-</sup> eq |
| Eutrophication – marine   | EP-marine      | kg N eq                                       |
| Eutrophication – terrestrial                                    | EP-terrestrial | mol N eq                                      |
| Photochemical ozone formation                                   | POFP           | kg NMVOC eq                                   |
| Ozone depletion   | ODP            | kg CFC-11 eq                                  |
| Depletion of abiotic resources – minerals & metals <sup>2</sup> | ADPMM          | kg Sb eq                                      |
| Depletion of abiotic resources – fossil fuels <sup>2</sup>      | ADPFF          | MJ, ncv                                       |
| Water (user) deprivation potential <sup>2</sup>                 | WDP            | m <sup>3</sup> world-eq deprived              |

# Environmental Performance-Related Information

| Parameter   | Abbreviation | Units          |
|---|--------------|----------------|
| <b>Resource use</b>   |              |                |
| Renewable primary energy as energy carrier                                  | PERE         | MJ             |
| Renewable primary energy resources as material utilisation                  | PERM         | MJ             |
| Total renewable primary energy use<br>(sum of the two parameters above)     | PERT         | MJ             |
| Non-renewable primary energy as energy carrier                              | PENRE        | MJ             |
| Non-renewable primary energy resources<br>as material utilisation           | PENRM        | MJ             |
| Total non-renewable primary energy use<br>(sum of the two parameters above) | PENRT        | MJ             |
| Use of secondary material   | SM           | kg             |
| Use of renewable secondary fuels  | RSF          | MJ             |
| Use of non-renewable secondary fuels  | NRSF         | MJ             |
| Net use of fresh water  | FW           | m <sup>3</sup> |
| <b>Wastes</b>   |              |                |
| Hazardous waste disposed  | HWD          | kg             |
| Non-hazardous waste disposed  | NHWD         | kg             |
| Radioactive waste disposed  | TRWD         | kg             |
| <b>Output flows</b>   |              |                |
| Components for re-use   | CRU          | kg             |
| Materials for recycling   | MFR          | kg             |
| Materials for energy recovery   | MER          | kg             |
| Exported energy - electrical  | EEE          | MJ             |
| Exported energy - thermal   | EET          | MJ             |

1 - GWP-GHG includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013

2 - The results of this environmental impact indicator shall be used with care because either the uncertainties associated with the results are high or there is limited experience with the indicator



# LCA Results - AW with fabric-coated panels

Environmental indicator results for Optima's fabric-coated Adaptable Wall are shown in the 4 following tables for the declared unit of one square metre of Adaptable Wall; modules A1 - A3 are shown on an aggregated basis. The mass of the declared unit is approximately 27kg.

| Environmental Impacts (EN 15804 + A2) | Unit                                | A1 - A3   | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|---------------------------------------|-------------------------------------|-----------|----------|----------|----------|----------|----------|----------|-----------|
| GWP-fossil                            | kg CO <sub>2</sub> eq               | 5.66E+01  | 1.16E+00 | 1.34E-01 | 3.46E-02 | 2.89E-01 | 1.25E-01 | 3.35E+00 | -1.17E+01 |
| GWP-biogenic                          | kg CO <sub>2</sub> eq               | -1.26E+01 | 0.00E+00 | 6.45E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.37E+01 | 2.32E+00  |
| GWP-luluc                             | kg CO <sub>2</sub> eq               | 2.90E-01  | 5.00E-04 | 6.07E-05 | 2.20E-06 | 1.30E-04 | 1.50E-04 | 4.00E-04 | -6.43E-02 |
| GWP-total                             | kg CO <sub>2</sub> eq               | 4.43E+01  | 1.16E+00 | 7.79E-01 | 3.46E-02 | 2.89E-01 | 1.25E-01 | 1.70E+01 | -9.48E+00 |
| GWP-GHG                               | kg CO <sub>2</sub> eq               | 5.71E+01  | 1.16E+00 | 6.96E-01 | 3.46E-02 | 2.89E-01 | 1.25E-01 | 1.32E+01 | -1.19E+01 |
| AP                                    | mol H <sup>+</sup> eq               | 3.11E-01  | 2.74E-03 | 6.70E-04 | 8.40E-05 | 6.90E-04 | 1.08E-03 | 3.91E-03 | -5.04E-02 |
| EP-freshwater                         | kg P eq                             | 2.47E-03  | 1.12E-05 | 2.43E-06 | 1.11E-06 | 2.80E-06 | 9.62E-06 | 1.63E-05 | -6.80E-04 |
|                                       | kg PO <sub>4</sub> <sup>3-</sup> eq | 7.57E-03  | 3.44E-05 | 7.46E-06 | 3.41E-06 | 8.59E-06 | 2.95E-05 | 5.01E-05 | -2.08E-03 |
| EP-marine                             | kg N eq                             | 4.57E-02  | 3.60E-04 | 3.00E-04 | 1.76E-05 | 8.98E-05 | 8.52E-05 | 1.41E-03 | -1.08E-02 |
| EP-terrestrial                        | mol N eq                            | 5.88E-01  | 3.98E-03 | 2.05E-03 | 1.90E-04 | 1.00E-03 | 1.10E-03 | 1.31E-02 | -1.07E-01 |
| POFP                                  | kg NMVOC eq                         | 1.69E-01  | 1.91E-03 | 7.80E-04 | 5.14E-05 | 4.80E-04 | 4.00E-04 | 6.16E-03 | -2.44E-02 |
| ODP                                   | kg CFC-11 eq                        | 6.70E-06  | 2.56E-07 | 2.35E-08 | 3.50E-09 | 6.40E-08 | 1.68E-08 | 1.39E-07 | -1.12E-06 |
| ADPMM                                 | kg Sb eq                            | 7.80E-04  | 4.17E-05 | 2.33E-06 | 2.69E-08 | 1.04E-05 | 7.52E-06 | 2.01E-05 | -1.87E-03 |
| ADPFF                                 | MJ, ncv                             | 8.99E+02  | 1.71E+01 | 2.04E+00 | 6.07E-01 | 4.27E+00 | 1.67E+00 | 8.49E+00 | -1.80E+02 |
| WDP                                   | m <sup>3</sup> world-eq dprv        | 9.23E+03  | 2.06E+01 | 1.74E+00 | 4.87E-01 | 5.16E+00 | 1.02E+01 | 1.22E+01 | -7.53E+02 |
| Resource use                          |                                     |           |          |          |          |          |          |          |           |
| PERE                                  | MJ                                  | 1.08E+02  | 2.94E-01 | 3.49E-02 | 3.78E-03 | 7.35E-02 | 3.06E-01 | 4.95E-01 | -4.67E+01 |
| PERM                                  | MJ                                  | 2.30E+02  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| PERT                                  | MJ                                  | 3.38E+02  | 2.94E-01 | 3.49E-02 | 3.78E-03 | 7.35E-02 | 3.06E-01 | 4.95E-01 | -4.67E+01 |
| PENRE                                 | MJ                                  | 9.51E+02  | 1.75E+01 | 2.43E+00 | 9.59E-01 | 4.37E+00 | 1.93E+00 | 8.91E+00 | -2.12E+02 |
| PENRM                                 | MJ                                  | 8.07E+01  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| PENRT                                 | MJ                                  | 1.03E+03  | 1.75E+01 | 2.43E+00 | 9.59E-01 | 4.37E+00 | 1.93E+00 | 8.91E+00 | -2.12E+02 |
| SM                                    | kg                                  | 1.03E+01  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -2.46E+00 |
| RSF                                   | MJ                                  | 1.58E+00  | 1.06E-02 | 8.30E-04 | 4.49E-05 | 2.65E-03 | 7.86E-03 | 7.99E-03 | 0.00E+00  |
| NRSF                                  | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| FW                                    | m <sup>3</sup>                      | 1.07E+00  | 1.47E-03 | 2.70E-04 | 1.30E-04 | 3.70E-04 | 8.10E-04 | 1.33E-01 | -1.63E-01 |
| Waste                                 |                                     |           |          |          |          |          |          |          |           |
| HWD                                   | kg                                  | 5.90E+00  | 2.04E-02 | 4.73E-03 | 1.68E-03 | 5.09E-03 | 9.88E-03 | 8.52E-01 | -1.02E+00 |
| NHWD                                  | kg                                  | 1.03E+02  | 1.13E+00 | 3.82E-01 | 4.78E-02 | 2.82E-01 | 5.94E-01 | 1.98E+01 | -1.35E+01 |
| TRWD                                  | kg                                  | 3.60E-03  | 1.20E-04 | 1.65E-05 | 7.33E-06 | 2.94E-05 | 1.01E-05 | 3.83E-05 | -7.20E-04 |
| Output flows                          |                                     |           |          |          |          |          |          |          |           |
| CRU                                   | kg                                  | 0.00E+00  | 0.00E+00 | 1.00E+01 | 1.00E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| MFR                                   | kg                                  | 5.63E+00  | 6.92E-03 | 1.39E+00 | 2.79E-05 | 1.73E-03 | 5.40E+00 | 5.84E-02 | -1.87E-01 |
| MER                                   | kg                                  | 1.92E-02  | 1.20E-04 | 9.33E-06 | 6.41E-07 | 2.95E-05 | 8.57E-05 | 8.73E-05 | -1.51E-02 |
| EEE                                   | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.02E+01 | 0.00E+00  |
| EET                                   | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.02E+01 | 0.00E+00  |

# LCA Results - AW with fabric-coated panels

## Additional Environmental Information

### ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the table below for the declared unit of one square metre of fabric-coated Adaptable Wall; modules A1 - A3 are shown on an aggregated basis

| Environmental Impacts<br>(EN 15804 + A1)                         |      | Unit                                | A1 - A3  | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|--|------|-------------------------------------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Global warming potential   | GWP  | kg CO <sub>2</sub> eq               | 5.55E+01 | 1.15E+00 | 5.15E-01 | 3.41E-02 | 2.87E-01 | 1.23E-01 | 1.00E+01 | -1.15E+01 |
| Depletion potential of the stratospheric ozone layer             | ODP  | kg CFC-11 eq                        | 6.01E-06 | 2.04E-07 | 1.99E-08 | 3.97E-09 | 5.10E-08 | 1.44E-08 | 1.60E-07 | -9.99E-07 |
| Acidification potential of land and water                        | AP   | kg SO <sub>2</sub> eq               | 2.62E-01 | 2.37E-03 | 6.30E-04 | 7.11E-05 | 5.90E-04 | 9.70E-04 | 3.58E-03 | -4.27E-02 |
| Eutrophication potential   | EP   | kg PO <sub>4</sub> <sup>3-</sup> eq | 2.90E-02 | 2.30E-04 | 1.50E-04 | 9.58E-06 | 5.83E-05 | 6.71E-05 | 7.00E-04 | -6.99E-03 |
| Formation potential of tropospheric ozone photochemical oxidants | POCP | kg ethene eq                        | 2.59E-02 | 1.40E-04 | 1.30E-04 | 3.24E-06 | 3.56E-05 | 4.77E-05 | 1.78E-03 | -2.21E-03 |
| Abiotic depletion potential for non-fossil resources             | ADPE | kg Sb eq                            | 7.80E-04 | 4.17E-05 | 2.33E-06 | 2.69E-08 | 1.04E-05 | 7.52E-06 | 2.01E-05 | -1.87E-03 |
| Abiotic depletion potential for fossil resources                 | ADPF | MJ                                  | 8.99E+02 | 1.71E+01 | 2.04E+00 | 6.07E-01 | 4.27E+00 | 1.67E+00 | 8.49E+00 | -1.80E+02 |

# LCA Results - AW with laminate panels

Environmental indicator results for Optima's Adaptable Wall with laminate panels are shown in the 4 following tables for the declared unit of one square metre of Adaptable Wall. The mass of the declared unit is approximately 34kg.

| Environmental Impacts (EN 15804 + A2) | Unit                                | A1 - A3   | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|---------------------------------------|-------------------------------------|-----------|----------|----------|----------|----------|----------|----------|-----------|
| GWP-fossil                            | kg CO <sub>2</sub> eq               | 5.34E+01  | 1.39E+00 | 1.34E-01 | 3.46E-02 | 3.48E-01 | 1.25E-01 | 2.86E+00 | -1.31E+01 |
| GWP-biogenic                          | kg CO <sub>2</sub> eq               | -2.13E+01 | 0.00E+00 | 6.45E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.37E+01 | 2.32E+00  |
| GWP-luluc                             | kg CO <sub>2</sub> eq               | 2.88E-01  | 6.03E-04 | 6.07E-05 | 2.20E-06 | 1.57E-04 | 1.50E-04 | 3.60E-04 | -6.50E-02 |
| GWP-total                             | kg CO <sub>2</sub> eq               | 3.25E+01  | 1.39E+00 | 7.79E-01 | 3.46E-02 | 3.49E-01 | 1.25E-01 | 2.66E+01 | -1.08E+01 |
| GWP-GHG                               | kg CO <sub>2</sub> eq               | 5.39E+01  | 1.39E+00 | 6.96E-01 | 3.46E-02 | 3.48E-01 | 1.25E-01 | 1.64E+01 | -1.32E+01 |
| AP                                    | mol H <sup>+</sup> eq               | 3.00E-01  | 3.30E-03 | 6.70E-04 | 8.40E-05 | 8.32E-04 | 1.08E-03 | 4.14E-03 | -5.28E-02 |
| EP-freshwater                         | kg P eq                             | 2.32E-03  | 1.35E-05 | 2.43E-06 | 1.11E-06 | 3.38E-06 | 9.62E-06 | 1.52E-05 | -7.00E-04 |
|                                       | kg PO <sub>4</sub> <sup>3-</sup> eq | 7.11E-03  | 4.14E-05 | 7.46E-06 | 3.41E-06 | 1.04E-05 | 2.95E-05 | 4.64E-05 | -2.15E-03 |
| EP-marine                             | kg N eq                             | 4.40E-02  | 4.34E-04 | 3.00E-04 | 1.76E-05 | 1.08E-04 | 8.52E-05 | 1.65E-03 | -1.13E-02 |
| EP-terrestrial                        | mol N eq                            | 5.65E-01  | 4.80E-03 | 2.05E-03 | 1.90E-04 | 1.21E-03 | 1.10E-03 | 1.50E-02 | -1.13E-01 |
| POFP                                  | kg NMVOC eq                         | 1.68E-01  | 2.30E-03 | 7.80E-04 | 5.14E-05 | 5.78E-04 | 4.00E-04 | 7.63E-03 | -2.60E-02 |
| ODP                                   | kg CFC-11 eq                        | 6.43E-06  | 3.08E-07 | 2.35E-08 | 3.50E-09 | 7.71E-08 | 1.68E-08 | 1.31E-07 | -1.28E-06 |
| ADPMM                                 | kg Sb eq                            | 7.50E-04  | 5.02E-05 | 2.33E-06 | 2.69E-08 | 1.26E-05 | 7.52E-06 | 1.78E-05 | -1.88E-03 |
| ADPFF                                 | MJ, ncv                             | 8.67E+02  | 2.06E+01 | 2.04E+00 | 6.07E-01 | 5.14E+00 | 1.67E+00 | 8.55E+00 | -2.04E+02 |
| WDP                                   | m <sup>3</sup> world-eq dprv        | 9.09E+03  | 2.49E+01 | 1.74E+00 | 4.87E-01 | 6.22E+00 | 1.02E+01 | 1.07E+01 | -8.10E+02 |
| Resource use                          |                                     |           |          |          |          |          |          |          |           |
| PERE                                  | MJ                                  | 1.45E+01  | 3.54E-01 | 7.15E-01 | 3.78E-03 | 8.86E-02 | 3.06E-01 | 4.36E-01 | -4.88E+01 |
| PERM                                  | MJ                                  | 3.06E+02  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| PERT                                  | MJ                                  | 3.20E+02  | 3.54E-01 | 3.49E-02 | 3.78E-03 | 8.86E-02 | 3.06E-01 | 4.36E-01 | -4.88E+01 |
| PENRE                                 | MJ                                  | 9.31E+02  | 2.11E+01 | 3.47E+01 | 9.59E-01 | 5.27E+00 | 1.93E+00 | 8.93E+00 | -2.41E+02 |
| PENRM                                 | MJ                                  | 6.64E+01  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| PENRT                                 | MJ                                  | 9.98E+02  | 2.11E+01 | 2.43E+00 | 9.59E-01 | 5.27E+00 | 1.93E+00 | 8.93E+00 | -2.41E+02 |
| SM                                    | kg                                  | 1.31E+01  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -2.47E+00 |
| RSF                                   | MJ                                  | 1.48E+00  | 1.28E-02 | 8.30E-04 | 4.49E-05 | 3.19E-03 | 7.86E-03 | 7.15E-03 | 0.00E+00  |
| NRSF                                  | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| FW                                    | m <sup>3</sup>                      | 9.93E-01  | 1.77E-03 | 2.70E-04 | 1.30E-04 | 4.46E-04 | 8.10E-04 | 1.10E-01 | -1.66E-01 |
| Waste                                 |                                     |           |          |          |          |          |          |          |           |
| HWD                                   | kg                                  | 5.77E+00  | 2.45E-02 | 4.73E-03 | 1.68E-03 | 6.13E-03 | 9.88E-03 | 7.29E-01 | -1.06E+00 |
| NHWD                                  | kg                                  | 9.70E+01  | 1.36E+00 | 3.82E-01 | 4.78E-02 | 3.40E-01 | 5.94E-01 | 2.48E+01 | -1.40E+01 |
| TRWD                                  | kg                                  | 3.44E-03  | 1.45E-04 | 1.65E-05 | 7.33E-06 | 3.54E-05 | 1.01E-05 | 3.81E-05 | -8.30E-04 |
| Output flows                          |                                     |           |          |          |          |          |          |          |           |
| CRU                                   | kg                                  | 0.00E+00  | 0.00E+00 | 1.00E+01 | 1.00E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| MFR                                   | kg                                  | 9.37E+00  | 8.34E-03 | 1.39E+00 | 2.79E-05 | 2.08E-03 | 5.40E+00 | 5.94E-02 | -1.89E-01 |
| MER                                   | kg                                  | 1.83E-02  | 1.45E-04 | 9.33E-06 | 6.41E-07 | 3.55E-05 | 8.57E-05 | 7.83E-05 | -1.51E-02 |
| EEE                                   | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.77E+01 | 0.00E+00  |
| EET                                   | MJ                                  | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.77E+01 | 0.00E+00  |

# LCA Results - AW with laminate panels

## Additional Environmental Information

### ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the table below for the declared unit of one square metre of Adaptable Wall with laminate panels; modules A1 - A3 are shown on an aggregated basis.

| Environmental Impacts<br>(EN 15804 + A1)                         |      | Unit                                | A1 - A3  | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|--|------|-------------------------------------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Global warming potential   | GWP  | kg CO <sub>2</sub> eq               | 5.24E+01 | 1.38E+00 | 5.15E-01 | 3.41E-02 | 3.45E-01 | 1.23E-01 | 1.20E+01 | -1.28E+01 |
| Depletion potential of the stratospheric ozone layer             | ODP  | kg CFC-11 eq                        | 5.88E-06 | 2.46E-07 | 1.99E-08 | 3.97E-09 | 6.15E-08 | 1.44E-08 | 1.46E-07 | -1.14E-06 |
| Acidification potential of land and water                        | AP   | kg SO <sub>2</sub> eq               | 2.53E-01 | 2.86E-03 | 6.30E-04 | 7.11E-05 | 7.11E-04 | 9.70E-04 | 3.62E-03 | -4.47E-02 |
| Eutrophication potential   | EP   | kg PO <sub>4</sub> <sup>3-</sup> eq | 2.69E-02 | 2.77E-04 | 1.50E-04 | 9.58E-06 | 7.02E-05 | 6.71E-05 | 8.20E-04 | -7.22E-03 |
| Formation potential of tropospheric ozone photochemical oxidants | POCP | kg ethene eq                        | 2.63E-02 | 1.69E-04 | 1.30E-04 | 3.24E-06 | 4.29E-05 | 4.77E-05 | 2.37E-03 | -2.32E-03 |
| Abiotic depletion potential for non-fossil resources             | ADPE | kg Sb eq                            | 7.50E-04 | 5.02E-05 | 2.33E-06 | 2.69E-08 | 1.26E-05 | 7.52E-06 | 1.78E-05 | -1.88E-03 |
| Abiotic depletion potential for fossil resources                 | ADPF | MJ                                  | 8.67E+02 | 2.06E+01 | 2.04E+00 | 6.07E-01 | 5.14E+00 | 1.67E+00 | 8.55E+00 | -2.04E+02 |

# Interpretation

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Aluminium framework accounts for some 80% of the cradle-to-gate GWP total indicator value for the whole unit. This indicator counts CO<sub>2</sub> absorbed from the atmosphere into growing trees as a "negative emission". This absorbed biogenic carbon is released at the end of the product's life, mostly as CO<sub>2</sub> but also some methane due to assumed wood decomposition in landfill, so that GWPbiogenic is positive across the full life cycle, representing a net impact. For other environmental categories, for example POFP and eutrophication which relate to air and water quality, the wood panels make a much stronger contribution –around 40% - to the indicator totals.

The recycled polyester textile makes a small contribution to the environmental burdens for the fabric panel AW covered by this EPD. Non-recycled fabrics, if used, would make larger contributions to indicator totals, and some textiles containing natural fibres would significantly increase the indicators obtained for several environmental categories, including GWP, eutrophication and water use.

For ODP, releases of Halon 1301, Halon 1211 and CFC-114 in generic inventory data for upstream processes - particularly hydrocarbon production and transport - account for almost 95% of the indicator values obtained. Some information sources underlying this generic data predate Montreal Protocol deadlines for replacement of these substances in all but essential uses. ODP indicator values should therefore be treated with caution.

PENRE and ADPF, although reported in the same units, are calculated by different methods. PENRE includes nuclear energy and energy in wood extracted from primary forests, whereas ADPF does not. The fossil fuel-derived component of PENRE is identical to the ADPF indicator value.

The reporting of Module D shows benefits as negative indicator values.



# References

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## **Glossary**

The International EPD® System: a programme for Type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. ([www.environdec.com](http://www.environdec.com))

Life cycle assessment (LCA): LCA studies the environmental aspects and quantifies the potential impacts (positive or negative) of a product (or service) throughout its entire life. ISO standards ISO 14040 and ISO 14044 set out conventions for conducting LCA.

MDF: medium-density fibreboard

REACH Regulation: REACH is the European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals. It entered into force in 2007, replacing the former legislative framework for chemicals in the EU.

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