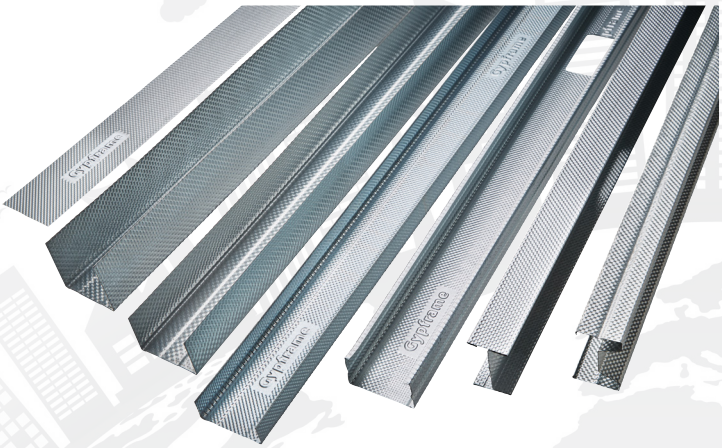
British Gypsum
SAINT-GOBAIN

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

In accordance with ISO 14025:2006, ISO 21930:2017 and EN 15804:2012+A2:2019/AC:2021



Gypframe® metal profiles

Version: 1
Publication Date: 2024/01/28
Validity: 5 years
Valid Until: 2029/01/27

EPD Type: Multiple Products (average results)
Scope of the EPD®: Cradle-to-gate with options, Module C and Module D

Manufacturer Address: Smethwick, West Midlands, B66 2PA

Programme: The International EPD® System
Programme Operator: EPD International AB
System Registration Number: S-P-12275

EPD VERIFIED

ECO PLATFORM EPD VERIFIED

General information

Company information

Manufacturer: Saint-Gobain Construction Products UK Limited t/a British Gypsum
Site of manufacture: Smethwick, West Midlands, B66 2PA
Management system-related certification: ISO 14001 [1], ISO 50001 [2], ISO 9001 [3]

Product name: Gypframe® Metal Profiles
EPD for multiple products: ☐ No ☒ Yes, the EPD represents the following products:
Studs: *Gypframe 'C' Studs, Gypframe AcouStuds, Gypframe 'I' Studs;* ***Channels****: Gypframe Folded Edge Standard Floor and Ceiling Channels, Gypframe Deep Flange Floor and Ceiling Channels, Gypframe Extra Deep Flange Floor and Ceiling Channels, Gypframe CurveLyner Channel, CasoLine MF Ceiling Channels, GypLyner Channels, Shaft Wall Starter and Retaining Channels, Gypframe Fixing Channels;* ***Other:*** *Gypframe Steel Angles, Gypframe Board Jointing Components, Gypframe Sound Insulating Bars and Gypframe Specialist Profiles. (See our catalogue for product information* [4], [5])
UN CPC code: 421 – Structural metal products and parts thereof

Owner of the declaration: Saint-Gobain Construction Products UK Limited t/a British Gypsum
EPD® prepared by: Charnett Chau (charnett.chau@saint-gobain.com) and Sila Danik Dirihan (sila.danik@saint-gobain.com)

Geographical scope of the EPD®: United Kingdom (Production), Global (Use and End-of-life)
EPD® registration number: S-P-12275
Declaration issued: 2024/01/28 valid until 2029/01/27
Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010 [6]. This verification was external and conducted by the following third party based on the PCR mentioned above.

Programme information

Programme:	The International EPD® System [7]
Address:	EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804:2012 + A2:2019 [8] serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction Products, version 1.3.2 [9]

PCR review was conducted by: The Technical Committee of the International EPD® System
See www.environdec.com for a list of members.
Chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact - Contact via info@environdec.com

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ EPD process certification ☒ EPD verification

Third-party verifier: Matthew Fishwick, Fishwick Environmental Ltd.
Email: matt@fishwickenvironmental.com
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third-party verifier: ☐ Yes ☒ No

The EPD owner has sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Product description

Product description and description of use

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 kg of Gypframe® Metal Profile, as installed.

Gypframe® Metal Profiles is a product group that includes a large range of light-gauge steel framing products made of hot-dip galvanized steel. The product group includes studs, channels, sheet angles and other specialistic profiles that are designed as framing components for gypsum plasterboard systems as well as for the construction of ceilings, adjustment brackets, couplings, etc.

These products are all made using the same main raw material, galvanized steel coil graded DX51D/S220GD +Z140 MAC, and via the steel profiling technology used at the manufacturing site in Smethwick. While the ranges of product cover thicknesses 0.4 to 1.0 mm and lengths 2395 to 6000 mm, the energy required to manipulate/profile steel coils into the different Gypframe® products is very similar per mass (kg). Hence, it has been deemed suitable to produce an EPD for an average framing product to represent all metal profiles under the umbrella of Gypframe® Metal Profiles.

Technical data/physical characteristics:

Reaction to fire*	A1	As EN 13501 [10] and EN 14915 [11]
Density	7750 kg/m^3	-
Steel grade	DX51D/S220GD + Z140 MA-C (as delivered)	As EN 10345 [12]
Yield strength*	> 210 N/mm^2	As EN 14915
Tensile strength	270 – 500 N/mm^2	-
Profile thickness	0.4 – 1 mm	-

*As stated in the Declaration of Performance (DoP) for Gypframe® Metal Profiles [13].

Declaration of the main product components and/or materials

All raw materials contributing more than 5% to any environmental impact are listed in the following table.

Product components	Mass (%)	Post-consumer material weight (%)
Galvanised steel	> 99	0*
Other components	< 1	0
Sum	**100%**	**0**
Packaging materials	**Weight (kg)**	**Weight (%)**
Polypropylene	0.00068	28
Wooden pallet	0.0017	72

*The worst-case of 0% post-consumer material is declared due to the amount of post-consumer scraps used by our suppliers is unknown. However, the generic data used assumes 19% of scraps are used in blast furnace steel production.

During the life cycle of the product any hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” [14] has not been used in a percentage higher than 0.1% of the weight of the product. The verifier and the program operator do not make any claim nor have any responsibility for the legality of the product.

Raw material category	Product (mass %)	Packaging (mass %)
Metals	> 99	0
Minerals	0	0
Fossil materials	< 1	28
Bio-based materials	0.0017	72

LCA calculation information

TYPE OF EPD	Cradle-to-gate with options, Module C and Module D
DECLARED UNIT	1 kg of Gypframe® Metal Profile, as installed
SYSTEM BOUNDARIES	A1-A5, B1-B7, C1-C4 and D
REFERENCE SERVICE LIFE (RSL)	60 years. By default, it corresponds to standard building design life (in the UK), and it is noted that internal metal profiles are in place for this duration.
CUT-OFF RULES	In the case that there is not enough information, the process energy and materials representing less than 1% of the whole energy and mass used can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded cannot be bigger than 5% of the mass and energy used, as well as emissions to the environment, per module. The construction of plants, production of machines and transportation systems, (i.e. any infrastructure) are excluded since the related flows are supposed to be negligible compared to the production of the product when compared to the system's lifetime level. However, we note that some generic datasets used in the LCA model may include capital goods and infrastructure within their system boundaries. Flows related to human activities such as employee transport are also excluded.
ALLOCATIONS	The allocation criteria are based on the mass flow of products and co-products – i.e. mass allocation between the different product ranges produced in Smethwick, United Kingdom. Where raw materials and energy usage cannot be directly attributed to individual products the total quantity used in the factory was divided by the total mass of products produced to achieve materials and energy per kilogram of product. The polluter pays and modularity principles have been followed. The impact arising from the treatment of waste generated within the system boundaries is allocated to the product until waste reaches the end-of-waste state.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Scope: UK (production), Global (use and disposal) Data is collected from one production site located in Smethwick, UK by Saint-Gobain British Gypsum and Saint-Gobain Gyproc Ireland. Data collected for the year: 2022
BACKGROUND DATA SOURCE	Sphera Managed LCA Content v2023.1 [15] and ecoinvent v.3.8 [16]
SOFTWARE	Sphera LCA for Experts v10 [17]
LCA METHODOLOGY	In addition to EN 15804:2019+A2 and PCR 2019:14, the study was carried out in accordance with ISO 14040:2006 [18], ISO 14044:2006 [19], and GPI for the International EPD® system [20]

According to EN 15804:2012+A2:2019, EPDs of construction products may not be comparable if they do not comply with this standard. According to ISO 21930: 2017 EPDs might not be comparable if they are from different programmes.

LCA scope

System boundaries (X=included. MND=module not declared)

	PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EU/GLO		GB	GB/GLO													

Specific data used*	< 10%
Variation products	< 1%
Variation sites	N/A

*Share of specific data that is specified according to PCR 2019:14. We gathered site-specific data on the generation of electricity provided by contracted suppliers (using Guarantee of Origin), transportation data on distances, means of transportation, load factor, fuel/other energy consumption at the site. The value in the table is calculated on the share of impact deriving from LCI data from databases on transportation and energy ware that are combined with actual transportation and energy parameters.

Life cycle stages

A1-A3, Product stage

Modules A1-A3 sit within the product stage of a building's life cycle, where raw and secondary materials are extracted and processed (A1) before being transported (A2) to manufacturing facilities for the fabrication of building products (A3). Here we detail A1-A3 for Gypframe® Metal Profiles produced at Smethwick. Information on the supply of materials and manufacturing of the product(s) were primary data from Saint-Gobain British Gypsum and Hadley Group. Secondary data from Sphera (2023.1) and ecoinvent (3.8) databases were used to obtain LCIs for input materials and the processing of waste materials. Electricity used at the Smethwick manufacturing site was modelled based on the power mix purchased with a Guarantee of Origin (GO)/residue electricity mix from the UK market.

The aggregation of the modules A1, A2, and A3 is a possibility considered by the EN 15804 standard. This rule is applied in this EPD.

A1: Raw materials supply
Raw materials that are required to manufacture the Gypframe® Metal Profiles are supplied from various countries around the world. These raw materials can be categorised as “natural” materials and “processed” materials. Materials supplied to the product manufacturing site are all “processes”, steel coils are processed materials manufactured from iron ore, a natural material).

The use of electricity, fuels, and auxiliary materials in production is taken into account too. The environmental profile of these energy carriers is modelled for local conditions.

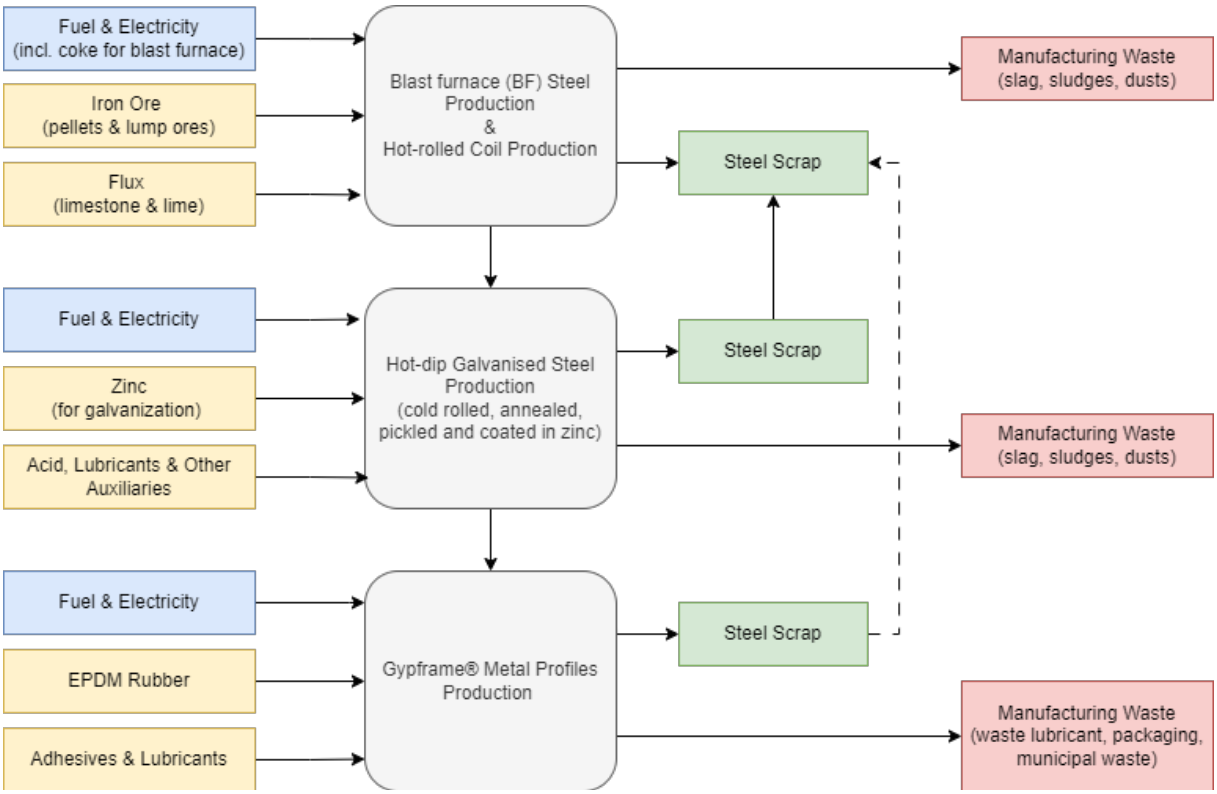
A2: Transport to the manufacturer
The raw materials are transported to the manufacturing site. The modelling includes road, boat and/or train transportation of each raw material.

A3: Manufacturing
See Process Flow Diagram for a complete breakdown of the manufacturing process.

In A3, other processes modelled include:

- The processing of waste arising from the manufacturing process. How manufacturing waste is processed was based on waste reports from waste contractors, however, where processes are unavailable from Sphera and ecoinvent databases, the worst-case process was used (landfill and incineration).
- The combustion of refinery products, such as natural gas, is related to the production process.
- Packaging-related flows in the production process and all upstream packaging are included in the manufacturing module, i.e. wooden pallets and polypropylene packaging.
    - In addition to the production of packaging material, the supply and transport of packaging material are also considered in the LCA model. They are reported and allocated to the module where the packaging is applied. Data on packaging waste created during this step are then generated.

Manufacturing process flow diagram



Manufacturing in detail

The figure above shows the main processes associated with manufacturing Gypframe® Metal Profiles which include steel manufacturing processes that occur at our steel supplier's site (i.e. the blast furnace steel and hot-dip galvanised steel productions).

Gypframe® Metal Profiles are manufactured using hot-dip galvanized steel coil produced and sourced from multiple suppliers around the world (see Table 3 for 2022 material origin split). Our suppliers for steel coils generally manufacture via the blast furnace/basic oxygen furnace (BF/BOF) route. The blast furnace route produces pig iron from various forms of iron ore such as sinter, pellets and lump ore with coke as a reducing agent. The pig iron is transferred to the BF vessel, where it is converted to steel by reducing the carbon content. The BF vessel is also used to regulate other chemical properties of the steel such as the alloy content. Steel scrap is used in the BF vessel, primarily for temperature control.

Liquid steel from the BF vessel is cast into slabs and rolled to produce hot-rolled coils. To produce hot-dip galvanized steel, the hot-rolled coil is cold-rolled, annealed, pickled and coated in zinc. Hot-dip galvanized steel coils are formed and cut into the specific profiles required for the building application, i.e. manufactured into Gypframe® products at our designated site in Smethwick, UK. The products are packaged in plastic straps and loaded onto wooden bearers/pallets prior to distribution.

A4-A5, Construction process stage

The construction process is divided into two modules: A4, transport to the building site and A5, installation in the building.

A4: Transport to the building site

Distribution distances of products were obtained by mapping the transport distances from the Smethwick manufacturing site to Saint-Gobain British Gypsum and Saint-Gobain Gyproc Ireland distribution locations and then to the client. The average distance was then taken along with the typical mode and load of transport to form the transport scenario. All clients were included in the calculation from the year 2022, no assumptions or cut-offs were made to find the average distribution distance. Additionally, it's assumed that no product is lost, broken or wasted during transportation due to the efficiency of our courier and our packing process.

NATIONAL PARAMETERS (87.5% OF SALES)	VALUE
Fuel type and vehicle type e.g. long-distance truck, boat, etc.	Long-distance truck: 28t payload capacity Euro 0 – 6 mix Fuel type: Diesel
Distance	370 km
Average load weight	26.3 tonnes
Empty return	36%
Average utilisation	92%

EXPORT PARAMETERS (12.5% OF SALES)*	VALUE
Fuel type and vehicle type e.g. long-distance truck, boat, etc.	Long-distance truck: 26t payload capacity Euro 0 – 6 mix Fuel type: Diesel Container ship: 43000 t payload capacity Fuel type: Heavy fuel oil
Road distance	329 km
Truck average load weight	25 tonnes
Empty return	0%
Truck average utilisation	96%
Sea distance	291 km
Shipping average utilisation	0.7

*Export percentage includes transport to and distribution from Saint-Gobain Gyproc Ireland.

A5: Installation in the building

The scenario for the installation of 1kg of Gypframe® Metal Profile was developed in consultation with Saint-Gobain British Gypsum's technical team and product technical data sheets for the average installation requirements for typical Gypframe® products. The installation typically requires screws and a small amount of energy use from tools. 5% product loss was assumed and resupply of the losses was modelled. UK waste stats were applied to modelling the disposal of steel. However, worst-case scenario, landfill, was modelled for packaging waste.

PARAMETER	VALUE/DESCRIPTION
Ancillary materials for installation	Screws: 2 units
Electricity use	0.2 kWh
Wastage output from installation	Product: 0.05 kg (92% recycled, 8% landfilled) Pallet: 0.00181 kg (worst-case: 100% landfilled) Polypropylene: 0.00072 kg (worst-case: 100% landfilled)
Direct emissions	None

B1-B7, Use stage

The use stage, related to the building fabric is separated into seven modules. The following describes the use of Gypframe® Metal Profiles over its RSL, 60 years, which corresponds to a building's standard life span.

B1: Use (or application of the installed product)
This model represents any emissions to the environment of the installed product. Emissions to the environment are not attributable to Gypframe® Metal Profiles.

B2: Maintenance; B3: Repair; B4: Replacement; B5: Refurbishment
No maintenance, repair, replacement or refurbishment is required after the implementation of Gypframe® Metal Profiles. Therefore, no impact has been accounted for in these modules.

B6: Operational energy use; B7: Operational water use
Gypframe® Metal Profiles are not related to any electricity or water use during the operation of the building. Therefore, no impact has been accounted for in these modules.

C1-C4, End of life stage

The end-of-life scenario for Gypframe® Metal Profiles was developed based on Saint-Gobain's own knowledge and confirmation of customers for the deconstruction and demolition of the product from the building (C1). Since most products are distributed in the UK, UK waste statistics [21] for metal were used to determine the EoL of the steel profiles.

C1: Deconstruction, demolition
The deconstruction and/or dismantling process of Gypframe® Metal Profiles is assumed to be deconstructed as part of the entire building. These processes mainly use energy for mechanical operations. In our case, a small amount of energy is considered 0.0437 MJ/kg.

C2: Transport to waste processing
As there is no data for the transport of waste after its use, the default distance of 100 km of an average truck used at 85% capacity was assumed.

C3: Waste processing for reuse, recovery and/or recycling
The percentage of product waste recovered for recycling considered UK waste statistics on non-hazardous construction demolition waste recovered in the UK and "Metallic wastes, ferrous" (from all sectors) recovered for recycling. It was determined that approximately 92% of steel profiles would be recycled.

C4: Disposal
Based on UK waste statistics, it was assumed that 8% of Gypframe® Metal Profiles is landfilled.

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	100% collected with mixed deconstruction and demolition waste
Recovery system specified by type	0.92 kg recycled
Disposal specified by type	0.08 kg to landfill
Assumptions for scenario development (e.g. transportation)	Waste is transported 100 km by truck from deconstruction or demolition sites to either landfill or recycling sites

D, Reuse/Recovery/Recycling potential

As scraps are typically used to produce blast furnace steel (the main raw material for Gypframe® Metal Profiles), and the product is mostly recycled at its end-of-life, loads and benefits for using secondary material and recycling steel scraps were calculated in Module D. It was assumed that recovered steel scraps are used to produce steel billets/slabs produced via electric arc furnaces, which replaces steel billets and slabs produced via blast furnace.

LCA results

As specified in EN 15804:2012+A2:2019 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterisation factors from the EC-JRC. Specific data has been supplied by the plant, and generic data come from Sphera and ecoinvent databases.

All emissions to air, water, and soil, and all materials and energy used have been included.

The estimated impact results are only relative statements which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins or risks.

All figures refer to a declared unit of 1 kg of Gypframe® Metal Profiles, as installed.

The following results correspond to a product range manufactured in a single plant: Smethwick.

Environmental impacts

Environmental indicators		PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				REUSE, RECOVERY RECYCLING
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate change [kg CO_2 eq.]	3.21E+00	2.81E-02	2.79E-01	0	0	0	0	0	0	0	5.15E-03	5.97E-03	2.31E-03	1.04E-03	-1.53E+00
	Climate change (fossil) [kg CO_2 eq.]	3.20E+00	2.79E-02	2.74E-01	0	0	0	0	0	0	0	5.15E-03	6.01E-03	2.31E-03	1.20E-03	-1.53E+00
	Climate change (biogenic) [kg CO_2 eq.]	8.87E-03	-1.55E-05	4.08E-03	0	0	0	0	0	0	0	1.76E-06	-8.93E-05	-2.39E-05	-1.57E-04	2.43E-03
	Climate change (land use change) [kg CO_2 eq.]	2.77E-03	2.57E-04	1.68E-04	0	0	0	0	0	0	0	4.53E-07	5.58E-05	1.77E-05	3.49E-06	-6.45E-04
	Ozone depletion [kg CFC-11 eq.]	1.56E-07	2.46E-15	7.80E-09	0	0	0	0	0	0	0	1.11E-10	5.28E-16	3.94E-15	4.50E-18	4.56E-12
	Acidification terrestrial and freshwater [Mole of H+ eq.]	3.04E-02	4.90E-05	1.78E-03	0	0	0	0	0	0	0	2.91E-05	3.56E-05	1.23E-05	8.71E-06	-3.50E-03
	Eutrophication freshwater [kg P eq.]	1.42E-03	1.01E-07	7.12E-05	0	0	0	0	0	0	0	1.57E-07	2.20E-08	8.01E-09	2.08E-09	-1.15E-07
	Eutrophication marine [kg N eq.]	4.64E-03	1.50E-05	2.96E-04	0	0	0	0	0	0	0	1.36E-05	1.74E-05	5.64E-06	2.24E-06	-8.40E-04
	Eutrophication terrestrial [Mole of N eq.]	9.50E-02	1.74E-04	5.42E-03	0	0	0	0	0	0	0	1.48E-04	1.93E-04	6.23E-05	2.46E-05	-9.10E-03
	Photochemical ozone formation - human health [kg NMVOC eq.]	1.74E-02	3.92E-05	1.06E-03	0	0	0	0	0	0	0	4.65E-05	3.28E-05	1.53E-05	6.79E-06	-2.80E-03
	Resource use, mineral and metals [kg Sb eq.][1]	7.22E-05	1.81E-09	4.59E-06	0	0	0	0	0	0	0	1.84E-09	3.92E-10	2.52E-09	1.09E-10	-1.62E-08
	Resource use, energy carriers [MJ][1]	4.47E+01	3.83E-01	4.09E+00	0	0	0	0	0	0	0	5.71E-02	8.20E-02	4.63E-02	1.59E-02	-1.15E+01
	Water deprivation potential [m^3 world equiv.][1]	9.95E-01	3.21E-04	6.57E-02	0	0	0	0	0	0	0	1.84E-04	6.95E-05	4.58E-04	1.27E-04	-2.21E-02

[1] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Resources use

Resources use indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				D REUSE, RECOVERY, RECYCLING
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ]	3.37E+00	2.67E-02	1.08E+00	0	0	0	0	0	0	0	4.16E-04	5.80E-03	4.31E-03	2.09E-03	1.91E+00
Primary energy resources used as raw materials (PERM) [MJ]	2.23E-02	0	1.11E-03	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ]	3.39E+00	2.67E-02	1.09E+00	0	0	0	0	0	0	0	4.16E-04	5.80E-03	4.31E-03	2.09E-03	1.91E+00
Use of non-renewable primary energy (PENRE) [MJ]	4.47E+01	3.84E-01	4.09E+00	0	0	0	0	0	0	0	5.71E-02	8.22E-02	4.64E-02	1.59E-02	-1.16E+01
Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	3.04E-02	0	1.52E-03	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (PENRT) [MJ]	4.47E+01	3.84E-01	4.10E+00	0	0	0	0	0	0	0	5.71E-02	8.22E-02	4.64E-02	1.59E-02	-1.16E+01
Input of secondary material (SM) [kg]	1.39E-01	0	6.96E-03	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels (RSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels (NRSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water (FW) [m^3]	3.39E-02	2.95E-05	2.45E-03	0	0	0	0	0	0	0	4.29E-06	6.39E-06	1.32E-05	4.02E-06	-9.92E-04

Waste category and output flows

Waste category and output flows	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				D REUSE, RECOVERY, RECYCLING
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	3.96E-04	1.42E-12	1.98E-05	0	0	0	0	0	0	0	3.70E-07	3.04E-13	-1.20E-13	2.43E-10	-2.31E-02
Non-hazardous waste disposed (NHWD) [kg]	4.99E+00	5.51E-05	3.06E-01	0	0	0	0	0	0	0	3.67E-04	1.18E-05	1.22E-05	8.01E-02	-2.31E-02
Radioactive waste disposed (RWD) [kg]	7.12E-05	4.96E-07	2.31E-04	0	0	0	0	0	0	0	1.82E-08	1.06E-07	6.23E-07	1.81E-07	2.04E-04
Components for re-use (CRU) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	5.35E-02	0	2.67E-03	0	0	0	0	0	0	0	0	0	9.20E-01	0	0
Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Optional indicators

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				D REUSE, RECOVERY, RECYCLING
Optional indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Respiratory inorganics [Disease incidences]	3.89E-07	5.02E-10	2.22E-08	0	0	0	0	0	0	0	6.16E-10	2.07E-10	2.33E-10	1.08E-10	-5.11E-08
Ionising radiation - human health [kBq U235 eq.][2]	1.37E-01	7.16E-05	4.40E-02	0	0	0	0	0	0	0	4.57E-05	1.53E-05	1.00E-04	1.87E-05	2.26E-02
Ecotoxicity freshwater [CTUe][3]	2.37E+01	2.70E-01	1.67E+00	0	0	0	0	0	0	0	2.40E-02	5.77E-02	3.09E-02	9.07E-03	-1.77E+00
Cancer human health effects [CTUh][3]	1.73E-08	5.43E-12	9.40E-10	0	0	0	0	0	0	0	7.68E-12	1.17E-12	6.79E-13	1.35E-12	-2.39E-09
Non-cancer human health effects [CTUh][3]	4.64E-08	2.39E-10	3.00E-09	0	0	0	0	0	0	0	1.88E-11	5.14E-11	2.47E-11	1.42E-10	1.84E-09
Land use [Pt]	1.10E+01	1.57E-01	1.17E+00	0	0	0	0	0	0	0	3.74E-03	3.42E-02	1.25E-02	3.32E-03	1.08E+00

[2] The ionising radiation category deals mainly with the eventual impact of low-dose ionising radiation on the human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, radon and some construction materials is also not measured by this indicator.

[3] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Additional voluntary indicators from EN 15804 (according to ISO 21930:2017)

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				REUSE, RECOVERY RECYCLING
Environmental indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate Change [kg CO_2 eq.][4]	3.21E+00	2.82E-02	2.75E-01	0	0	0	0	0	0	0	5.15E-03	6.06E-03	2.33E-03	1.20E-03	-1.53E+00

[4] The indicator 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.

Information on biogenic carbon content

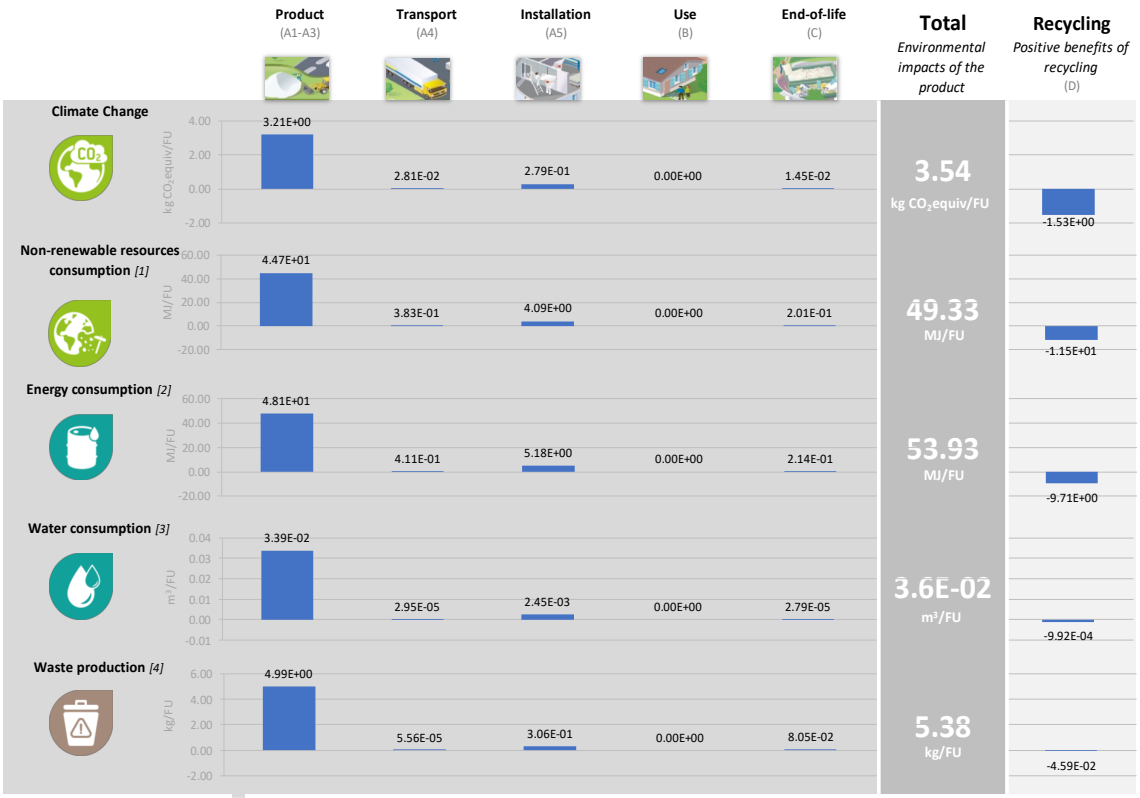
		PRODUCT STAGE
Biogenic carbon content		**A1 / A2 / A3**
	Biogenic carbon content in product [kg]	0
	Biogenic carbon content in packaging [kg]	7.08E-4

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

The product contains no biogenic carbon. However, packaging has some biogenic carbon content, this is due to wood materials are used as packaging.

LCA interpretation

The following figure refers to a declared unit of 1 kg of Gypframe® Metal Profiles, as installed, and for application within buildings for an expected average service life of 60 years. The product stage (A1-A3) is responsible for > 85% of the product's total impact over its lifetime (Modules A to C) for most impact categories, including climate change, ozone depletion, freshwater, marine and terrestrial eutrophication, resource use, energy carriers and water scarcity. Impacts can be observed for the distribution (A4), installation (A5) and end-of-life (C) of the product. Module D declares the environmental benefits of reusable products, recyclable materials, or energy recovery. In this analysis, the benefits come from the recycling process for steel.



[1] This indicator corresponds to the abiotic depletion potential of fossil resources (Resource use, energy carriers MJ/FU).
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Climate change total

Most impact derives from the Product stage (A1-A3), contributing 90.9% to the total climate change impact value. Further analysis showed that Module A1 contributes 3.02 $kgCO_2eq/kg$ (85.6% of the total), which derives mainly from the production of galvanised steel coils with a zinc coating (99.9% of A1). The next highest contributing module is Module A5 (7.88% of the total); most of the impact in this module stems from the resupply of product losses during installation. Module A2 contributed 4.91% to the total; this is attributed to using HFO and diesel for transporting raw materials (mainly from Asia to the UK). All other modules, individually, contribute < 1% to the overall impact.

Non-renewable resources consumptions

The consumption of non-renewable resources has the highest value during the Product Stage (A1-A3) – 90.5% of the total. The main source of non-renewable resource consumption is the use of fossil fuel for the production of galvanised steel coils (86.0% of the total), where fossil fuel is required to operate the blast furnace (the main component for steel production). Similar to the Climate Change impact category, the next highest module is Module A5 (8.29% of the total), where the main contributor is the resupply of product losses during installation. Module A2 generates 4.34% of the total; this is attributed to using HFO and diesel for transporting raw materials (mainly from Asia to the UK). All other modules, individually, contribute < 1% to the overall impact.

Energy consumption

Energy consumption combines both the total use of renewable primary energy resources and the total use of non-renewable primary energy resources. The figure illustrates that the Product Stage (A1-A3) contributes the largest (89.2% of the total). The highest contributing module is Module A1 (85.0% of the total) and Module A5 is the second highest (9.61% of the total). This also can be attributed to the energy requirements for producing steel via the blast furnace route. Module A2 contributes 4.03% of the total, which can be attributed to the energy required to transport materials to the production site at Smethwick. All other modules, individually, contribute < 1% to the overall impact.

Water consumption

Water consumption is the use of freshwater throughout the product's life cycle. For Gypframe® Metal Profiles, the highest contributor is the product stage (Module A1-A3) – 93.1% of the total. The main sources of water consumption are within Module A1, this lies with galvanised steel production (92.8% of the total), where large amounts of water are required for indirect/direct cooling purposes, but also other purposes such as maintaining equipment and dust scrubbing. Besides Module A5 (6.74% of the total), which accounts for the remanufacture of the steel product, all other modules, individually, contribute < 1% to the overall impact.

Waste production

Waste production includes all hazardous, non-hazardous and radioactive waste disposed of. Waste production doesn't follow the same trend as the other environmental impacts. For Gypframe® Metal Profiles, 92.8% of the waste generated is at Module A1-A3, most of which derived from Module A1 (99.8% of the A1-A3 and 92.6% of the total). This, again, can be attributed to the steel production process. Module A5 contributes 5.69% of the total; Module C, where the end of life of the product was assumed 92% recycled and 8% landfilled based on UK Waste Statistics, contributes 1.50% to the total; and all other modules contribute less than < 1% to the total waste produced after the product's life cycle.

Additional information

Electricity information

TYPE OF INFORMATION	DESCRIPTION
Electricity purchaser	Hadley Industries Holdings Limited*
Electricity provider	EDF
Electricity mix	Hydro – 2%; Biodegradable – 3%; Landfill gas – 6% Solar PV – 15%; Biomass – 29%; Wind – 45%
Reference year	2022
Type of dataset	Sphera Database 2023.1, all datasets reference 2022 emissions • Hydro - "GB: Electricity from hydro power Sphera" • Biodegradable and landfill gas - "GB: Electricity from biogas Sphera" • Solar PV - "GB: Electricity from photovoltaic Sphera" • Biomass - "GB: Electricity from biomass Sphera" • Wind - "GB: Electricity from wind power Sphera"
CO_2 emissions kg CO_2 eq. / kWh	Certificate issue = 0 kg CO_2 / kWh Modelled impact = 0.057 kg CO_2 / kWh

*Hadley Group manages the manufacturing site that produces Gypframe® Metal Profiles.

Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal/supplier records and reporting documents from Saint-Gobain British Gypsum and Saint-Gobain Gyproc Ireland. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects good inventory data quality.

Environmental impacts according to EN 15804:2012 + A1

The following table presents the results of 1 kg Gypframe® Metal Profiles, as installed. Note that EN 15804:2012 +A1 is expired [22].

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				REUSE, RECOVERY, RECYCLING
Environmental impacts	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Global Warming Potential (GWP) [kg CO_2 eq.]	3.17E+00	2.77E-02	2.76E-01	0	0	0	0	0	0	0	5.09E-03	5.88E-03	2.27E-03	1.03E-03	-1.53E+00
Ozone depletion (ODP) [kg CFC 11eq.]	1.52E-07	2.90E-15	7.59E-09	0	0	0	0	0	0	0	8.98E-11	6.22E-16	4.64E-15	6.00E-18	5.37E-12
Acidification potential (AP) [kg SO_2eq.]	2.16E-02	3.68E-05	1.29E-03	0	0	0	0	0	0	0	2.04E-05	2.42E-05	8.60E-06	6.93E-06	-2.83E-03
Eutrophication potential (EP) [kg $(PO_4)^3$-eq.]	7.43E-03	6.33E-06	4.07E-04	0	0	0	0	0	0	0	5.21E-06	6.13E-06	1.99E-06	7.80E-07	-2.74E-04
Photochemical ozone creation (POCP) - [kg Ethylene eq.]	2.47E-03	-1.11E-06	1.46E-04	0	0	0	0	0	0	0	3.83E-06	-1.03E-05	9.85E-07	5.26E-07	-4.26E-04
Abiotic depletion potential for non-fossil resources (ADP-elements) [kg Sb eq.]	7.21E-05	3.74E-06	4.59E-06	0	0	0	0	0	0	0	1.84E-09	3.90E-10	2.52E-09	1.10E-10	-1.49E-08
Abiotic depletion potential for fossil resources (ADP-fossil fuels) [MJ]	4.28E+01	1.80E-09	3.33E+00	0	0	0	0	0	0	0	5.64E-02	8.09E-02	4.41E-02	1.54E-02	-1.19E+01

References

[1] International Organization for Standardization, “ISO 14001:2015, Environmental management systems,” *BSI Standards Limited*. 2015.

[2] International Organization for Standardization, “ISO 50001:2018, Energy management systems - Requirements with guidance for use,” *BSI Standards Limited*. 2018.

[3] International Organization for Standardization, “ISO 9001:2015, Quality management systems - Requirements,” *BSI Standards Limited*. 2015.

[4] Saint-Gobain British Gypsum, “Gypframe.” Accessed: Nov. 23, 2023. [Online]. Available: https://www.british-gypsum.com/specification/our-products/gypframe

[5] Saint-Gobain British Gypsum, “Gypframe Profiles - Dimension Specifications.” 2018. Accessed: Nov. 10, 2023. [Online]. Available: https://www.gyproc.ie/sites/default/files/PDS-Gypframe-profiles%202020.pdf

[6] International Organization for Standardization, “ISO 14025:2010, Environmental labels and declarations — Type III environmental declarations — Principles and procedures,” *BSI Standards Limited*. 2010.

[7] EPD International AB, “The International EPD System.” Accessed: Jan. 10, 2023. [Online]. Available: https://www.environdec.com/home

[8] European Committee for Standardization, “EN 15804:2012 +A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products,” *BSI Standards Limited*. 2019.

[9] EPD International AB, “PCR 2019:14, Product Category Rules for Construction Products Version 1.3.2.” 2023. Accessed: Jan. 16, 2024. [Online]. Available: https://api.environdec.com/api/v1/EPDLibrary/Files/66ce94c8-4165-460c-f22a-08dbf976d236/Data

[10] European Committee for Standardization, “EN 13501-2:2023, Fire classification for construction products and building elements. Classification using data from fire resistance and/or smoke control tests, excluding ventilation services,” *BSI Standards Limited*. 2023.

[11] European Committee for Standardization, “EN 14195:2014, Metal framing components for gypsum plasterboard systems - Definitions, requirements and test methods,” *BSI Standards Limited*. 2014.

[12] European Committee for Standardization, “EN 10345:2015, Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions,” *BSI Standards Limited*. 2015.

[13] Saint-Gobain British Gypsum, “Declaration of Performance - Gypframe(r) Metal Profiles.” 2022. Accessed: Nov. 23, 2023. [Online]. Available: https://www.british-gypsum.com/documents/declaration-performance-dop/british-gypsum-dop-m100-uk-gypframe-metal-profiles.pdf

[14] European Chemical Agency, “Candidate List of substances of very high concern for Authorisation.” Accessed: Jun. 07, 2023. [Online]. Available: https://echa.europa.eu/candidate-list-table

[15] Sphera, “Product Sustainability (GaBi) Data Search | Sphera.” Accessed: Jan. 10, 2023. [Online]. Available: https://sphera.com/product-sustainability-gabi-data-search/

[16] ecoinvent, “ecoinvent v3.8 - ecoinvent.” 2021. Accessed: Jan. 10, 2023. [Online]. Available: https://ecoinvent.org/the-ecoinvent-database/data-releases/ecoinvent-3-8/

[17] Sphera, “Life Cycle Assessment (LCA) Software | LCA for Experts.” Accessed: May 23, 2023. [Online]. Available: https://sphera.com/life-cycle-assessment-lca-software/

[18] International Organization for Standardization [ISO], “ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework,” *BSI Standards Limited*. 2006.

[19] International Organization for Standardization, “ISO 14044:2006 +A2:2020, Environmental management — Life cycle assessment — Requirements and guidelines,” *BSI Standards Limited*. 2020.

[20] EPD International AB, “General Programme Instructions for the International EPD(R) System - Version 4.0,” 2021. Accessed: May 22, 2023. [Online]. Available: https://www.datocms-assets.com/37502/1617181375-general-programme-instructions-v-4.pdf
[21] F. & R. A. Department for Environment, “ENV23 - UK Statistics on Waste,” 2023. Accessed: Nov. 14, 2023. [Online]. Available: https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management
[22] European Committee for Standardization, “EN 15804:2012 +A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products,” *BSI Standards Limited*. 2013.