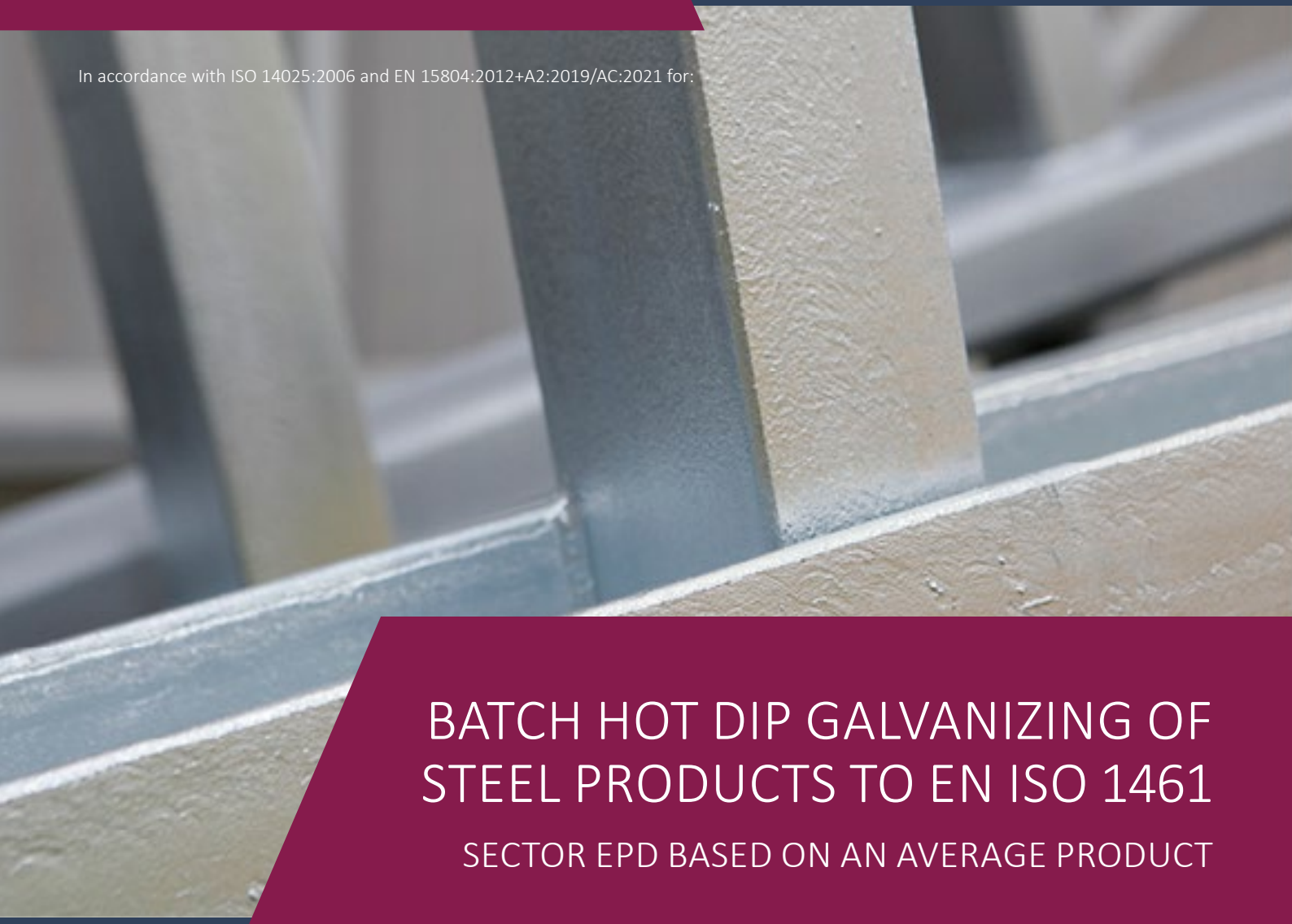
ENVIRONMENTAL PRODUCT DECLARATION

EGGA
GALVANIZING EUROPE

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



BATCH HOT DIP GALVANIZING OF STEEL PRODUCTS TO EN ISO 1461

SECTOR EPD BASED ON AN AVERAGE PRODUCT

PROGRAMME
The International EPD® System, www.environdec.com

PROGRAMME OPERATOR
EPD International AB

TYPE OF EPD
Sector EPD

EPD REGISTRATION NUMBER
EPD-IES-0027620:001

VERSION DATE
2026-02-06

VALIDITY DATE
2031-02-06

EPD®

ECO PLATFORM EPD VERIFIED

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

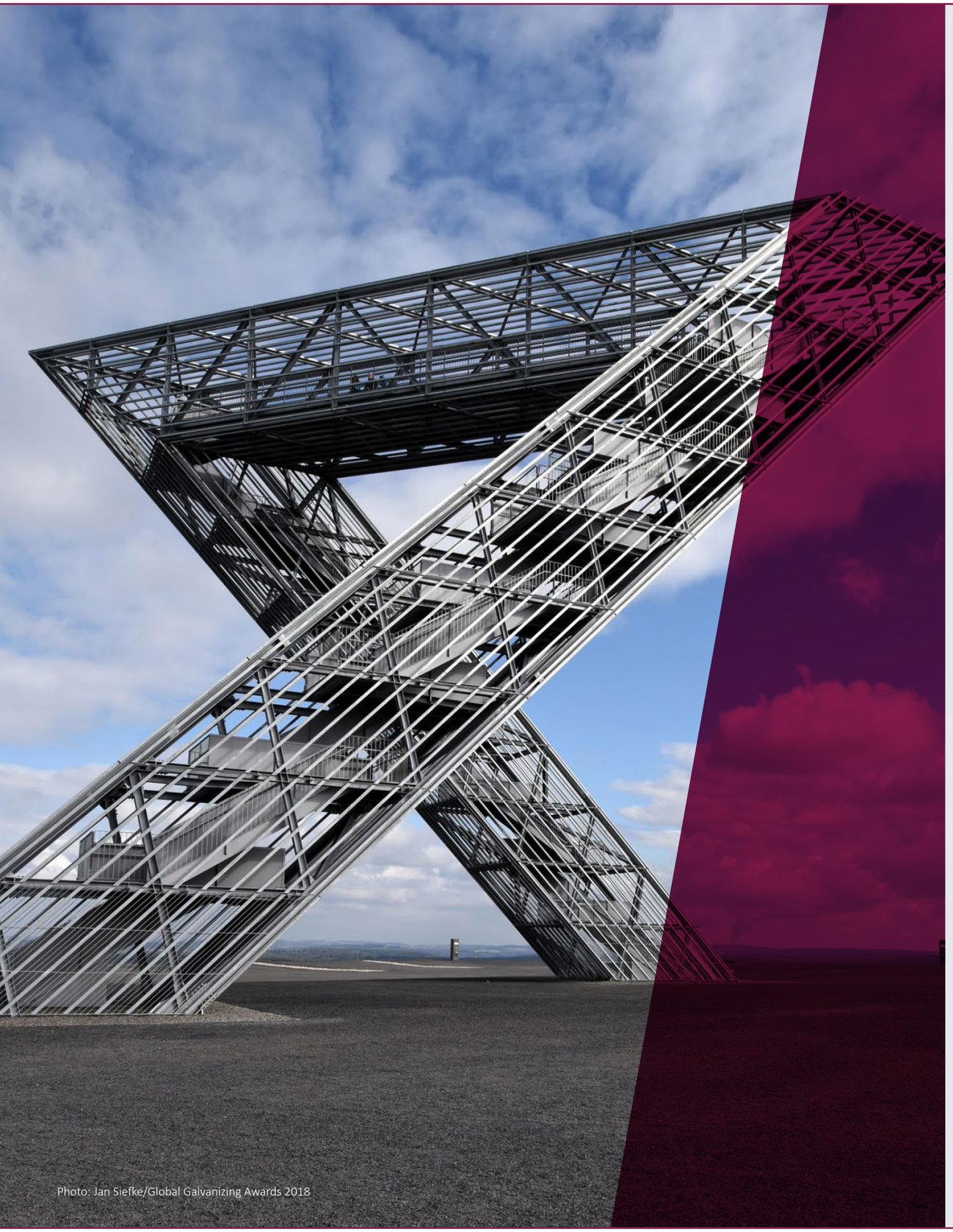


Photo: Jan Siefke/Global Galvanizing Awards 2018

GENERAL INFORMATION

PROGRAMME INFORMATION

PROGRAMME: The International EPD® System

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PRODUCT CATEGORY RULES (PCR)

CEN standard EN 15804 serves as the core Product Category Rules (PCR).

PRODUCT CATEGORY RULES (PCR): PCR 2019:14 Construction Products, version 2.0.1

PCR REVIEW WAS CONDUCTED BY: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.

REVIEW CHAIR: Rob Rouwette (chair), Noa Meron (co-chair).

The review panel may be contacted via the Secretariat www.environdec.com/contact.

LIFE CYCLE ASSESSMENT (LCA)

LCA ACCOUNTABILITY: Life Cycle Engineering SpA

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THIRD-PARTY VERIFICATION

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

INDIVIDUAL EPD VERIFICATION WITHOUT A PRE-VERIFIED LCA/EPD TOOL: Third party verifier Ugo Pretato - Studio Fieschi & Soci Srl

APPROVED BY: International EPD® System.

Procedure for follow-up of data during EPD validity involves third-party verifier:

☐ YES ☑ NO

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

EGGA-Galvanizing Europe
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THE SECTOR

European General Galvanizers Association (EGGA) is the industry organization for Europe's general galvanizing sector. It is a federation of the National Associations **across Europe**. It is an industry that comprises just **over 600 general galvanizing plants**.

This EPD is a sector-wide declaration based on a sample of galvanizing plants affiliated with EGGA and representative of European production, defined as the EU27 plus the United Kingdom and EFTA countries. **The analyzed sample accounts for over 940 000 tonnes of production within EGGA's membership**, corresponding to approximately 13% of the total production in Europe (EU27+UK+EFTA).

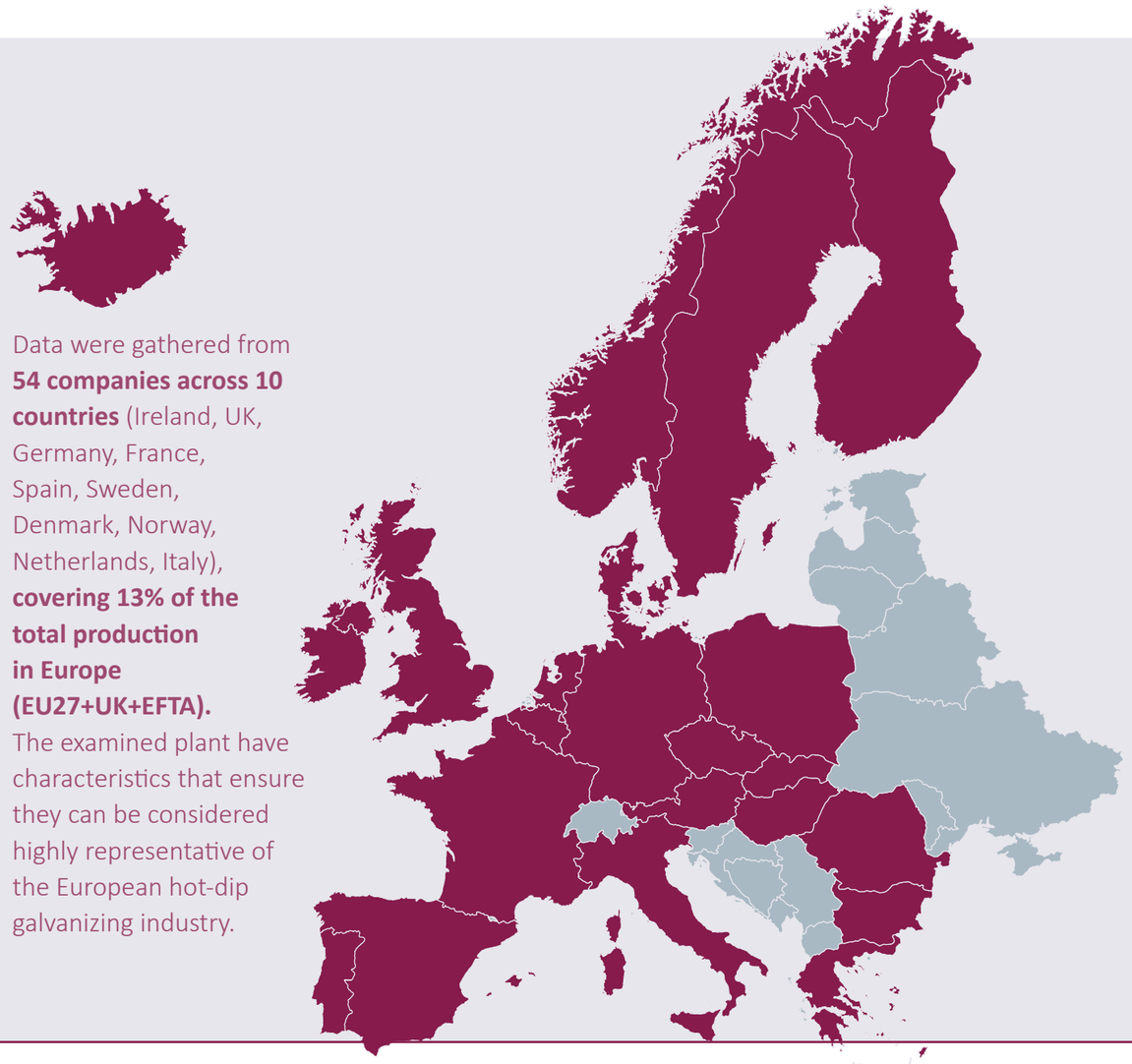
Data were gathered from 54 companies across 10 countries (Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden and UK),covering plants considered highly representative of the European hot dip galvanizing industry.

Data collection was carried out using an excel-based questionnaire developed by LCA specialists under the guidance of industry experts from EGGA. The sample was designed to include relevant countries and processes, ensuring a representative mix of production that covers heavy, medium, and light steel products.

The results are considered representative of the sector at European level in terms of technology, bath size, method of bath heating and product types.

The representative sample was selected, coordinated and implemented in conjunction with the following national associations that are members of EGGA:

- Zinkinfo Benelux;
- Galvazinc;
- Bundesverband Feuerverzinken;
- Associazione Italiana Zincatura;
- Nordic Galvanizers;
- Asociación Técnica Española de Galvanización;
- Galvanizers Association.



Data were gathered from **54 companies across 10 countries** (Ireland, UK, Germany, France, Spain, Sweden, Denmark, Norway, Netherlands, Italy), **covering 13% of the total production in Europe (EU27+UK+EFTA).** The examined plant have characteristics that ensure they can be considered highly representative of the European hot-dip galvanizing industry.

PRODUCT INFORMATION

THE GALVANIZING SERVICE

Hot dip galvanizing is the most effective treatment for **steel corrosion protection** and can be applied to a wide range of steel products that are characterised by many different dimensions, geometries and functions. The operational sequence of the plant is essentially the same and the dimension of the kettles (i.e., the bath of molten zinc) is determined by the typical mix of products to be coated. For example, small components are normally processed by companies operating smaller kettles.

Galvanizing is a corrosion protection process for steel, in which the steel is coated with zinc to prevent it from rusting. The process involves dipping cleaned iron or steel components into molten zinc (which is usually at around 450°C).

A series of zinc-iron alloy layers are formed by a metallurgical reaction between the iron and zinc creating a strong bond between steel and the coating. A typical time of immersion is about four or five minutes, but it can be longer for heavy articles that have high thermal inertia or where the zinc is required to penetrate internal voids. Upon withdrawal from the galvanizing bath, a layer of molten zinc will be deposited on top of the alloy layer stopping corrosion of steel in two ways- a physical barrier and electrochemical protection. Typical coating thicknesses can range from 45µm to over 200µm and in case of damaged area, a galvanic cell is formed: the zinc around the point of damage corrodes in preference to the steel and forms corrosion products that precipitate on the steel surface and protect it.

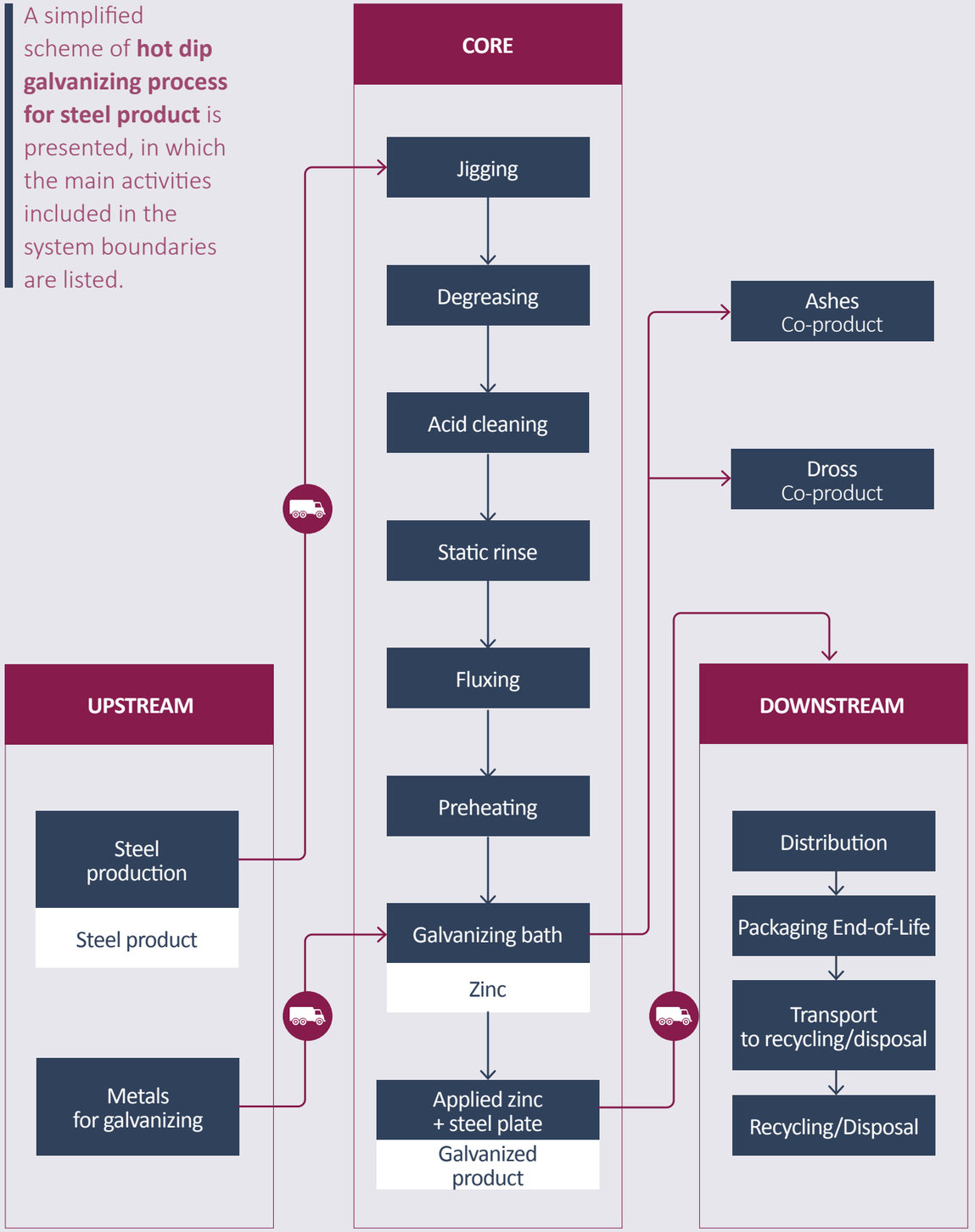
The hot dip galvanized coating is applied according to the requirements of **EN ISO 1461**.

In accordance with **ISO 14713-1**, the technical lifespan of the zinc coating is estimated at 63 years for corrosion class C3, assuming a medium corrosion risk and an average zinc thickness loss of 1,35 µm per year.

The reference UN CPC CODE is: **88731 – Metal treatment and coating services.**

For further information, please refer to the European General Galvanizers Association (EGGA) website: **www.galvanizingeurope.org.**

A simplified scheme of **hot dip galvanizing process for steel product** is presented, in which the main activities included in the system boundaries are listed.



CONTENT DECLARATION

This content declaration describes the material composition of a galvanized **steel plate measuring 1 m × 1 m, with a thickness of 8 mm and a zinc coating of 1,235 kg**.
It provides a representative overview of the galvanized plate's constituent materials.
This content declaration is not equivalent to the declared unit definition, as it does not consider the zinc coating's service life or durability.

DECLARED UNIT: 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

PRODUCT CONTENT		MASS kg	MASS %	PRE CONSUMER RECYCLED MATERIAL MASS - % OF PRODUCT	POST CONSUMER RECYCLED MATERIAL MASS - % OF PRODUCT	BIOGENIC MATERIAL MASS - % OF PRODUCT
STEEL PLATE (SUBSTRATE)	**Carbon steel**	62,4	98,4%	0,0%	0,0%	0,0%
GALVANIZED COATING	**Zinc and alloyed zinc (Zn)**	1,2	1,6%	0,0%	0,1%	0,0%
TOTAL		63,6	100%	0,0%	0,1%	0,0%

The recycled content in the product, consisting entirely of remelted zinc, has been assumed to be 100% post-consumer.

For the steel plate the secondary dataset used in the study assumes approximately 32% recycled material. According to the reference PCR, this recycled content is excluded from the content declaration, but it is still included in the LCA calculation, specifically in module D and in the SM indicator.

PACKAGING MATERIALS	MASS kg	MASS % versus the product	BIOGENIC MATERIAL kg C/DU
STEEL WIRE	8,39E-02	65,9%	0,00E+00
GALVANIZED STEEL STRAPPING	2,76E-03	2,2%	0,00E+00
HOOKS AND CHAINS	6,78E-04	0,5%	0,00E+00
STEEL RACKS	4,42E-04	0,3%	0,00E+00
WOOD PALLET	1,88E-02	14,8%	7,40E-03
SQUARED TIMBER	1,91E-02	15,0%	7,85E-03
PLASTIC STRAPPING	1,10E-03	0,9%	0,00E+00
POLYETHYLENE FILM	3,13E-04	0,2%	0,00E+00
EXPANDED PLASTIC FILM	2,36E-04	0,2%	0,00E+00
KRAFT PAPER	3,03E-05	< 0,1%	1,19E-05
PET RIBBON	3,61E-05	< 0,1%	0,00E+00
CORRUGATED CARDBOARD	2,36E-06	< 0,1%	9,82E-07
OTHER PLASTIC MATERIALS	6,36E-08	< 0,1%	0,00E+00
TOTAL	**1,27E-01**	**100%**	**1,53E-02**

No substance listed as a candidate for Authorization (Candidate List SVHC) or subject to Authorization (Annex XIV- REACH) is contained in the product at a concentration greater than 0,1% weight/weight.

LCA INFORMATION

Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results).

PRODUCT STAGE			DISTRIBUTION/ INSTALLATION STAGE		USE STAGE							END OF LIFE STAGE				BEYOND PRODUCT LIFE CYCLE
RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	CONSTRUCTION INSTALLATION	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DE-CONSTRUCTION DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL	REUSE-RECOVERY-RECYCLING POTENTIAL
MODULES																
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
MODULES DECLARED																
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
GEOGRAPHY																
GLOBAL	EU27+UK (+EFTA)											EU27+UK (+EFTA)				EU27+UK (+EFTA)
SPECIFIC DATA USED																
38%*																
VARIATIONS SITES																
-2,8% / +1,6%**																
VARIATIONS PRODUCTS																
0%																

Included Modules (X), Modules not declared (ND)

*The percentage was calculated for the hot dip galvanizing process, excluding the contribution of the steel plate. When considering the coated steel plate, the percentage of specifific data amounts to: 2%
**The site variation was assessed for the hot dip galvanized steel plate. When excluding the steel plate and considering only the hot dip galvanizing process, the site variation is:-44,1%/+37,5%

LCA INFORMATION

DECLARED UNIT

Data are presented for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

The data contained in this EPD refer to an hypothetical reference steel product, consisting of a steel plate with two sides each of of 1m x 1m and a thickness of 8 mm. Results presented include both the steel plate and hot dip galvanizing process.

The mass of the galvanizing coating per unit surface area for given steel products (grams per square meter) is defined by EN ISO 1461, and this specified coating mass determines the durability of the coating during its service life. For a given environment, the service life is directly proportional to the thickness of the galvanizing coating (i.e., the coating mass per surface area).

The expected durability of the zinc coating is assessed according to ISO ISO 14713-1. Reference is made to class C3, with a medium corrosion risk and zinc corrosion rate between 0,7 and 2,2 µm/year. The calculations were carried out using the average coefficient value (1,35 µm/year). The resulting service life is 63 years.

SUBSTRATE	Steel plate of dimension 1m x 1m x 8mm and weight 62,4 kg
GALVANIZED COATING THICKNESS	85 µm (corresponding to 1,235 kg)
EXPOSURE ENVIRONMENT	Category C3 with average zinc corrosion rate of 1,35 microns/year
PREDICTED MAINTENANCE-FREE COATING LIFE	Minimum of 63 years
UNITS (RESULTS)	Burdens per year of protection

TIME REPRESENTATIVENESS

35 plants: calendar year 2023
18 plants: calendar year 2022
1 plant: fiscal year October 2022 – September 2023

GEOGRAPHICAL SCOPE FOR WHICH GEOGRAPHICAL LOCATION OF END-OF-LIFE THE PRODUCT'S PERFORMANCE HAS BEEN CALCULATED

EU27+UK (+EFTA)

DATABASES AND LCA SOFTARE USED

Ecoinvent v 3.11 and Industry Data 2.0 are the reference databases for secondary data. The software used is SimaPro 10.2.0.3.

DESCRIPTION OF THE SYSTEM BOUNDARIES

Cradle to gate with options, modules C1–C4, module D and with optional modules (module A4 and A5). Modules from B1 to B7 are all excluded.

ENVIRONMENTAL IMPACT ASSESSMENT METHOD

EN 15804 reference package based on EF 3.1

ENERGY SOURCES BEHIND THE ELECTRICITY MIX IN MODULE A3

Most plants use medium-voltage electricity from the national grid. In this study, grid electricity is modeled using the country-specific Residual Mix at medium-voltage level. Some plants also use self-produced renewable electricity (photovoltaic installations and wind turbines), for which country-specific datasets were applied. The average GWP-GHG impact of electricity is 0,54 kg CO_2-eq/kWh.

CUT-OFF

The data for elementary flows to and from the product system included in the calculations comply with the cut-off criteria defined by the reference PCR 2019:14, as follow:

- The included LCI data collectively account for at least 99% of the total mass and energy inputs and outputs per unit process.
- The included LCI data collectively account for at least 95% of the total mass and energy inputs and outputs per life-cycle stage (A1:A3, A4:A5, C1:C4 and D).
- The included LCI data collectively represent at least 95% of the environmental impacts associated with each life-cycle stage (A1:A3, A4:A5, C1:C4 and D).

The following elementary flows are included in the cut-off threshold:

- Bismuth is primarily obtained as a by-product of lead and copper metallurgy and is added to the galvanizing bath only in very small quantities and has no function in the performance of the coating. Bismuth production was excluded due to the lack of specific datasets and insufficient information to perform the allocation.

ALLOCATION

The dross and ashes produced during the galvanizing process are considered as co-products in the data processing, as both are part of the company's sold products. Therefore, a share of the environmental impact from the hot dip galvanizing process is allocated to these products.

The distribution of environmental burdens was carried out through economic allocation based on the market values of the zinc consumed, dross, and ashes. Economic value-based allocation was adopted because the revenue difference between the co-products is higher than 25%.

AVERAGING

The declared results represent a weighted average based on the annual coated steel production of each plant.

MODELLING OF INFRASTRUCTURES

The construction of power plant for electricity and heat datasets used in manufacturing process in module A3 has been included in the LCA model as relevant infrastructures.

LCA INFORMATION

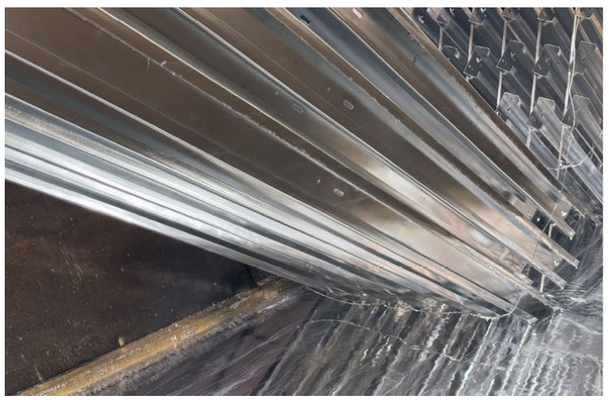
DATA QUALITY ASSESSMENT

Data quality assessment was implemented in the study considering the requirements of GPI verion 5.0.1 and the reference PCR 2019:14 version 2.0.1 (referring to EN 15941).

GEOGRAPHICAL REPRESENTATIVENESS	TECHNICAL REPRESENTATIVENESS	TEMPORAL REPRESENTATIVENESS
4,3	4,3	5,0

PROCESS	SOURCE TYPE	SOURCE	REFERENCE YEAR	DATA CATEGORY	SHARE OF PRIMARY DATA, OF GWP-GHG RESULTS FOR A1-A3
GENERATION OF ELECTRICITY USED IN THE HOT DIP GALVANIZING PROCESS	Database energy + collected data	Ecoinvent v.3.11	2023-2024	Primary data	10,8%
GENERATION AND USE OF NATURAL GAS USED IN THE HOT DIP GALVANIZING PROCESS	Database energy + collected data	Ecoinvent v.3.11	2024	Primary data	26,9%
PRODUCTION OF SHG ZINC	Database	Ecoinvent v.3.11	2024	Secondary data	0,0%
PRODUCTION OF ALLOYS	Database	Ecoinvent v.3.11	2024	Secondary data	0,0%
OTHER PROCESSES	Database	Ecoinvent v.3.11	< 5 years old	Secondary data	0,0%
TOTAL SHARE OF PRIMARY DATA, OF GWP-GHG RESULTS FOR A1:A3					**37,7%**

The data quality assessment was carried out solely for the hot-dip galvanizing process, excluding the contribution from the steel plate.



TOPIC	DESCRIPTION
DATA COLLECTION PERIOD OF PRIMARY DATA FOR MANUFACTURING	2023 and 2022 (France and Germany only)
SITE	Data were gathered from 54 companies across 10 countries (Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden and UK),covering plants considered highly representative of the European hot dip galvanizing
GEOGRAPHY	EU27+UK (+EFTA) (collective EPD as the average hot dip galvanizing service for steel products manufactured in Europe).
TECHNOLOGY	Hot dip galvanizing is a coating process in which steel products are immersed in a bath of molten zinc. During this process, a metallurgical reaction occurs between the molten zinc that reacts with the steel surface, forming a series of zinc-iron alloy layers that create a cohesive metallurgical bond. The overall galvanizing process consists of a series of operations summarised as follow: Jigging, degreasing, pickling, pre-fluxing, wet fluxing, dryng and pre-heating, galvanizing kettle, cooling, dejigging, quenching/passivation, finishing and loading setup.
AVERAGING	As this is a collective EPD representing a single, generic product manufactured across multiple facilities, the results for each indicator are expressed as weighted averages of the participating plants. Weighting and averaging were performed based on each plant's total production of coated steel.
LCI/LCA DATABASE	Ecoinvent v.3.11
EPD USED	n.a.
DATA QUALITY SCHEME	EN 15804:2012+A2:2019, Annex E, Table E.2
USE OF FAIR DATA WITH MORE THAN 30% OF A CORE IMPACT	"Fair" data for core impacts associated to Heat production with propane {RoW} for a different geographical scope. No more detailed data are available. It accounts for <1% of all environmental impacts
USE OF POOR RELEVANT DATA	n.a.
USE OF VERY POOR RELEVANT DATA	n.a.
USE OF PROXY RELEVANT DATA	n.a.

The share of primary data is calculated based on GWP-GHG results, It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs.

Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

LCA INFORMATION

SYSTEM BOUNDARIES

UPSTREAM PROCESS

A1

- Steel plate production
- Zinc (and other alloying metals) production

CORE PROCESS

A2

- Transport of raw materials to the plant

A3

- Electricity and natural gas consumption during the galvanizing process
- Consumption of auxiliary fuels and materials
- Water consumption
- Emissions to air
- Treatment of manufacturing process waste, including transportation
- Production of packaging materials used for the distribution of the final galvanized product

DOWNSTREAM PROCESS

A4

- Market product transport

A5

- Packaging end-of-life processes

C1

- Dismantling and demolition

C2

- Final product transport to disposal

C3

- Waste treatment

C4

- Waste product disposal

D

- Benefits and loads beyond the system boundary

LCA INFORMATION

UPSTREAM PROCESS

UPSTREAM PROCESS | CORE PROCESS | DOWNSTREAM PROCESS

A1 RAW MATERIALS SUPPLY

Steel plate production. Data are sourced from the Worldsteel Association.
The dataset refers to a steel plate manufactured through hot rolling. It represents an average for the European area (geography: RER) and combines two technologies: Electric Arc Furnace (EAF) and Blast Oxygen Furnace (BOF).
The Life Cycle Inventory (LCI) does not include recycling credits for steel at the end of life and environmental burdens associated with steel scrap during production.

Specific pre-treatment operations for remelted zinc

Production of zinc and other alloying metals.
The dataset for Special High Grade (SHG) zinc is based on a study conducted by the International Zinc Association, with 2012 as the reference year.

LCA INFORMATION

CORE PROCESS

UPSTREAM PROCESS — **CORE** PROCESS — DOWNSTREAM PROCESS

A2 MATERIALS TRANSPORT

Transportation of materials from production or collection sites to the manufacturing plant.

Incoming transport data were partly provided by each plant, specifying distances and transport modes.

Where data were not provided, the following assumptions were applied:

- **Fuel type**: Diesel;
- **Vehicle type**: Freight lorry, European mix (Ecoinvent v3.11; tonnage and emission-class–specific);
- **Transport distance**: 1 000 km (national) for steel plates, packaging materials, fuels, and auxiliaries;
  1 500 km (international within EU) for zinc bath materials and alloys.

For the steel plate, the assumed distance represents the cumulative transport from the steel production plant to the rolling mill, and subsequently from the rolling mill to the zinc galvanizing plant.

A3 HOT-DIP GALVANIZING PROCESS

Hot dip galvanizing process

Energy consumption and auxiliary fuels. The galvanizing plants use electricity, natural gas, or propane to heat the zinc kettle, and electricity, natural gas, LPG, or fuel oil for general operations and auxiliary services.

Chemicals used in pre-treatment and post-treatment operations. Each plant reported detailed compositions, allowing accurate modeling based on the mass percentage of constituents.

Emissions to air

Water consumption

Treatment of manufacturing waste includes transportation to the respective disposal or recovery facilities.

Production of the packaging used for the distribution of the final product

LCA INFORMATION

DOWNSTREAM PROCESS

UPSTREAM PROCESS

CORE PROCESS

DOWNSTREAM PROCESS

A4 MARKET PRODUCT TRANSPORT

Each plant provided data on the distribution of finished products by market share, distinguishing between national and intra-continental transport (EU27 + UK + EFTA). Distribution is considered from the galvanizing plant gate to the final client—typically the steel plate manufacturer or commissioning entity—while transport to the installation site is excluded.

The distribution scenario is defined as follows:

- **Fuel type**: Diesel
- **Vehicle type**: Freight lorry, European mix (Ecoinvent v3.11; tonnage and emission-class–specific)
- **Transport distance:** 500 km for national transport and 1 000 km for intra-continental transport
- **Capacity utilisation** (including empty returns): 85%
- **Bulk density of transported products**: 7 850 kg/m³
- **Volume capacity utilisation factor**: 1.0

A5 PACKAGING END-OF-LIFE PROCESSES

Module A5, as defined by the reference PCR, covers installation and packaging end-of-life. Since the galvanized steel plate is a virtual product, installation is excluded; A5 is declared only for packaging. End-of-life scenarios are based on Eurostat 2022 data for paper, wood, steel, and plastic packaging.

C1 DE-CONSTRUCTION DEMOLITION

Dismantling and demolition operations required to remove the component from the building. In the LCA model, a diesel consumption of 0,626 MJ per kg of steel plate was considered (data source: Ecoinvent).

C2 TRANSPORT

Transport to the recovery/disposal site. A representative distance of 50 km by lorry was assumed for transporting waste to recovery or final disposal sites.

C3 WASTE PROCESSING

According to current technologies, galvanized products can potentially be recycled without pre-treatment, allowing recovery of the steel plate, as the galvanized coating protects the steel from atmospheric agents. The end-of-life scenario for the galvanized steel plate assumes an 85% recycling rate, reflecting the global recovery rate for construction steel reported by WorldSteel (2021).

C4 DISPOSAL

A disposal rate of 15% to inert material landfill is applied to the remaining steel component.

D RESOURCE RECOVERY

This module considers environmental impacts from steel recycling, offset by avoided impacts of the substituted material, represented by a steel plate reflecting average European production.

ENVIRONMENTAL PERFORMANCE

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Mandatory impact category indicators according to EN 15804

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

ENVIRONMENTAL IMPACTS		A1:A3	DOWNSTREAM						
			A4	A5	C1	C2	C3	C4	D
GWP,t	kg CO_2 eq	**2,39E+00**	6,89E-02	5,49E-05	5,99E-02	5,97E-03	1,05E-03	4,14E-04	-6,79E-01
GWP, f	kg CO_2 eq	**2,38E+00**	6,89E-02	3,70E-05	5,99E-02	5,97E-03	1,05E-03	4,14E-04	-6,80E-01
GWP, b	kg CO_2 eq	**2,03E-03**	2,17E-06	1,79E-05	2,72E-06	1,88E-07	2,05E-06	3,48E-08	1,93E-05
GWP, luluc	kg CO_2 eq	**6,53E-04**	1,09E-06	7,74E-10	2,47E-06	9,43E-08	2,99E-06	2,09E-08	2,06E-04
GWP, GHG**	kg CO_2 eq	**2,39E+00**	6,89E-02	5,49E-05	5,99E-02	5,97E-03	1,05E-03	4,14E-04	-6,79E-01
ODP	kg CFC-11 eq	**4,87E-09**	1,57E-09	4,09E-13	9,11E-10	1,36E-10	1,63E-11	5,94E-12	3,79E-09
AP	mol H+ eq	**1,21E-02**	2,94E-04	1,07E-07	5,53E-04	2,54E-05	5,38E-06	3,72E-06	-1,19E-03
EP,f	kg P eq	**7,58E-06**	4,26E-08	3,67E-11	5,64E-08	3,69E-09	9,84E-08	1,36E-09	1,46E-05
EP,m	kg N eq	**1,62E-03**	1,29E-04	4,91E-08	2,61E-04	1,11E-05	9,05E-07	1,70E-06	-2,41E-04
EP,t	mol N eq	**4,03E-02**	1,41E-03	5,31E-07	2,86E-03	1,22E-04	1,01E-05	1,86E-05	-2,46E-03
POCP	kg NMVOC eq	**4,92E-03**	4,58E-04	1,69E-07	8,53E-04	3,96E-05	3,18E-06	5,65E-06	-5,63E-04
ADPe*	kg Sb eq	**4,85E-05**	1,80E-09	1,32E-12	2,10E-09	1,56E-10	6,73E-11	1,38E-11	-7,01E-06
ADPf*	MJ	**2,80E+01**	9,17E-01	2,59E-04	7,83E-01	7,93E-02	2,42E-02	5,29E-03	-6,76E+00
WDP*	m^3	**2,72E-01**	3,00E-04	1,22E-06	5,85E-04	2,59E-05	2,12E-04	4,62E-06	1,76E+01

RESOURCE USE		A1:A3	DOWNSTREAM						
			A4	A5	C1	C2	C3	C4	D
PERE	MJ	**1,65E+00**	2,25E-03	4,81E-03	1,68E-03	1,95E-04	6,18E-03	2,31E-05	-2,47E-02
PERM	MJ	**7,52E-03**	0,00E+00	-4,81E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	**1,66E+00**	2,25E-03	1,64E-06	1,68E-03	1,95E-04	6,18E-03	2,31E-05	-2,47E-02
PENRE	MJ	**2,80E+01**	9,17E-01	7,84E-04	7,83E-01	7,93E-02	2,42E-02	5,29E-03	-6,76E+00
PENRM	MJ	**2,15E-03**	0,00E+00	-5,25E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	**2,80E+01**	9,17E-01	2,59E-04	7,83E-01	7,93E-02	2,42E-02	5,29E-03	-6,76E+00
SM	kg	**3,16E-01**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	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
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^3	**5,44E-03**	1,77E-05	1,35E-07	2,35E-05	1,53E-06	1,41E-05	1,77E-07	8,09E-03

GWP,t Global warming potential, total
GWP,f Global warming potential, fossil
GWP,b Global warming potential, biogenic
GWP,luluc Global warming potential, land use & land use change
GWP,GHG Global warming potential, excluding biogenic uptake, emission and storage
ODP Ozone depletion potential
AP Acidification potential
EP,f Eutrophication potential, freshwater
EP,m Eutrophication potential, marine
EP,t Eutrophication potential, terrestrial
POCP Photochemical ozone creation potential
ADPE Abiotic depletion potential minerals & metals*
ADPF Abiotic depletion potential fossil fuels*
WDP Water use deprivation potential*

PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM Use of renewable primary energy resources used as raw materials
PERT Total use of renewable primary energy resources
PENRE Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM Use of non-renewable primary energy resources used as raw materials
PENRT Total use of non-renewable primary energy resources
SM Use of secondary raw materials
RSF Use of renewable secondary fuels
NRSF Use of non-renewable secondary fuels
FW Use of net fresh water

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.
**This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

Method B reported in Annex 3 of the PCR is adopted for calculation of energy use indicator.

ENVIRONMENTAL PERFORMANCE

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

WASTE		A1:A3	DOWNSTREAM						
			A4	A5	C1	C2	C3	C4	D
HWD	kg	**1,05E-02**	1,64E-05	1,18E-06	4,44E-05	1,42E-06	1,58E-05	9,09E-07	1,98E-01
NHWD	kg	**8,70E-02**	1,31E-03	9,67E-04	7,69E-04	1,14E-04	9,88E-05	1,52E-01	8,13E-02
RWD	kg	**5,05E-06**	5,53E-08	2,85E-11	3,65E-08	4,79E-09	1,72E-07	2,99E-10	2,03E-05

OUTPUT FLOWS		A1:A3	DOWNSTREAM						
			A4	A5	C1	C2	C3	C4	D
CRU	kg	**4,20E-03**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,94E-03
MFR	kg	**8,92E-03**	0,00E+00	1,37E-03	0,00E+00	0,00E+00	8,59E-01	0,00E+00	0,00E+00
MER	kg	**0,00E+00**	0,00E+00	1,88E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	**0,00E+00**	0,00E+00	5,24E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	**0,00E+00**	0,00E+00	9,51E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HWD Hazardous waste disposed
NHWD Non-hazardous waste disposed
RWD Radioactive waste disposed

CRU Components for re-use
MFR Materials for recycling
MER Materials for energy recovery
EEE Exported electricity energy
EET Exported thermal electricity

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

ALTERNATIVE END-OF-LIFE SCENARIOS

Alternative End-of-Life scenarios assessed: 100% recycling of the product and 100% disposal of the product in landfill.

ENVIRONMENTAL IMPACTS		100% RECYCLING			100% LANDFILL		
		C3	C4	D	C3	C4	D
GWP, t	kg CO_2 eq	**1,24E-03**	0,00E+00	-8,71E-01	0,00E+00	2,76E-03	0,00E+00
GWP, f	kg CO_2 eq	**1,23E-03**	0,00E+00	-8,71E-01	0,00E+00	2,76E-03	0,00E+00
GWP, b	kg CO_2 eq	**2,42E-06**	0,00E+00	2,47E-05	0,00E+00	2,32E-07	0,00E+00
GWP, luluc	kg CO_2 eq	**3,52E-06**	0,00E+00	2,63E-04	0,00E+00	1,39E-07	0,00E+00
GWP, GHG	kg CO_2 eq	**1,24E-03**	0,00E+00	-8,71E-01	0,00E+00	2,76E-03	0,00E+00
ODP	kg CFC-11 eq	**1,92E-11**	0,00E+00	4,86E-09	0,00E+00	3,96E-11	0,00E+00
AP	kg H+ eq	**6,33E-06**	0,00E+00	-1,52E-03	0,00E+00	2,48E-05	0,00E+00
EPf	kg P eq	**1,16E-07**	0,00E+00	1,87E-05	0,00E+00	9,06E-09	0,00E+00
EPm	kg N eq	**1,06E-06**	0,00E+00	-3,09E-04	0,00E+00	1,13E-05	0,00E+00
EPt	mol N eq	**1,19E-05**	0,00E+00	-3,16E-03	0,00E+00	1,24E-04	0,00E+00
POCP	kg NMVOC eq	**3,74E-06**	0,00E+00	-7,21E-04	0,00E+00	3,76E-05	0,00E+00
ADPe	kg Sb eq	**7,92E-11**	0,00E+00	-8,98E-06	0,00E+00	9,17E-11	0,00E+00
ADPf	MJ	**2,85E-02**	0,00E+00	-8,67E+00	0,00E+00	3,53E-02	0,00E+00
WDP	m^3 depriv.	**2,49E-04**	0,00E+00	2,25E+01	0,00E+00	3,08E-05	0,00E+00

GWP,t Global warming potential, total
GWP,f Global warming potential, fossil
GWP,b Global warming potential, biogenic
GWP,luluc Global warming potential, land use & land use change
GWP,GHG Global warming potential, excluding biogenic uptake, emission and storage
ODP Ozone depletion potential
AP Acidification potential
EP,f Eutrophication potential, freshwater
EP,m Eutrophication potential, marine
EP,t Eutrophication potential, terrestrial
POCP Photochemical ozone creation potential
ADPE Abiotic depletion potential minerals & metals
ADPF Abiotic depletion potential fossil fuels
WDP Water use deprivation potential

ENVIRONMENTAL PERFORMANCE

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

Results for 1 year of protection by galvanizing to EN ISO 1461 of 1m x 1m steel plate of 8mm thickness, calculated on the basis of the life span (63 years) predicted using EN ISO 14713-1.

ALTERNATIVE END-OF-LIFE SCENARIOS

RESOURCE USE		100% RECYCLING			100% LANDFILL		
		C3	C4	D	C3	C4	D
PERE	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERM	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	**7,28E-03**	0,00E+00	-3,17E-02	0,00E+00	1,54E-04	0,00E+00
PENRE	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	**2,85E-02**	0,00E+00	-8,67E+00	0,00E+00	3,53E-02	0,00E+00
SM	kg	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	**1,65E-05**	0,00E+00	1,04E-02	0,00E+00	1,18E-06	0,00E+00

PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials

PERM Use of renewable primary energy resources used as raw materials

PERT Total use of renewable primary energy resources

PENRE Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials

PENRM Use of non-renewable primary energy resources used as raw materials

PENRT Total use of non-renewable primary energy resources

SM Use of secondary raw materials

RSF Use of renewable secondary fuels

NRSF Use of non-renewable secondary fuels

FW Use of net fresh water

WASTE		100% RECYCLING			100% LANDFILL		
		C3	C4	D	C3	C4	D
HWD	kg	**1,86E-05**	0,00E+00	2,54E-01	0,00E+00	6,06E-06	0,00E+00
NHWD	kg	**1,16E-04**	0,00E+00	1,04E-01	0,00E+00	3,59E-05	0,00E+00
RWD	kg	**2,03E-07**	0,00E+00	2,60E-05	0,00E+00	2,00E-09	0,00E+00

OUTPUT FLOWS		100% RECYCLING			100% LANDFILL		
		C3	C4	D	C3	C4	D
CRU	kg	**0,00E+00**	0,00E+00	-2,48E-03	0,00E+00	0,00E+00	0,00E+00
MFR	kg	**1,01E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HWD Hazardous waste disposed

NHWD Non-hazardous waste disposed

RWD Radioactive waste disposed

CRU Components for re-use

MFR Materials for recycling

MER Materials for energy recovery

EEE Exported electricity energy

EET Exported thermal electricity

ADDITIONAL ENVIRONMENTAL INFORMATION

CONVERSION FACTOR

In this EPD, data refer to a hypothetical reference product: a steel plate of 1m x 1m and 8mm thickness.

The declared unit is defined as "**1 year of protection by galvanizing to EN ISO 1461 for 1m x 1m of coated steel plate of 8mm thickness, based on the predicted service life according to EN ISO 14713-1:2017**".

For modules A1–A3 only, in order to quantify the impacts associated exclusively with the galvanizing service—thereby excluding the dominant contribution of the steel plate—the conversion factors reported in the table shall be applied.

For each impact indicator, the A1:A3 result must be multiplied by its respective conversion factor.

EXAMPLE

- GWP-fossil (A1:A3) for the DU examined: 2,38E+00 kg CO_2 eq
- Conversion factor to "galvanizing service, per year of protection": 0,0429

GWP-fossil for "galvanizing service, per year of protection of a steel plate of 1m x 1m and 8mm thickness" (A1:A3)= 2,38E+00 kg CO_2 eq × 0,0429 = 1,02E-01 kg CO_2 eq

CONVERSION FACTORS TO IDENTIFY BURDENS FOR GALVANIZING SERVICE (A1:A3)

ENVIRONMENTAL IMPACTS

PARAMETER	CONVERSION FACTOR TO GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm	EXAMPLE RESULT FOR GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm (galvanizing only)
GWP, t	0,0435	1,04E-01
GWP, f	0,0429	1,02E-01
GWP, b	0,6280	1,27E-03
GWP, luluc	0,3458	2,26E-04
GWP, GHG	0,0435	1,04E-01
ODP	0,4540	2,21E-09
AP	0,5250	6,34E-03
EPf	0,8529	6,46E-06
EPm	0,1991	3,22E-04
EPt	0,6537	2,64E-02
POCP	0,1010	4,97E-04
ADPe	0,6779	3,29E-05
ADPf	0,0586	1,64E+00
WDP	0,9975	2,71E-01

RESOURCE USE

PARAMETER	CONVERSION FACTOR TO GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm	EXAMPLE RESULT FOR GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm (galvanizing only)
PERE	0,1146	1,89E-01
PERM	0,0159	1,19E-04
PERT	0,1141	1,89E-01
PENRE	0,0586	1,64E+00
PENRM	-0,3400	-7,32E-04
PENRT	0,0586	1,64E+00
SM	0,0042	1,33E-03
RSF	0,0000	0,00E+00
NRSF	0,0000	0,00E+00
FW	1,2380	6,73E-03

WASTE

PARAMETER	CONVERSION FACTOR TO GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm	EXAMPLE RESULT FOR GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm (galvanizing only)
HWD	0,9968	1,04E-02
NHWD	0,9649	8,40E-02
RWD	0,9772	4,94E-06

OUTPUT FLOWS

PARAMETER	CONVERSION FACTOR TO GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm	EXAMPLE RESULT FOR GALVANIZING SERVICE, per year of protection of the steel plate of dimensions 1m x 1m x 8mm (galvanizing only)
CRU	0,0000	0,00E+00
MFR	0,9994	8,91E-03
MER	0,0000	0,00E+00
EEE	0,0000	0,00E+00
EET	0,0000	0,00E+00

INFORMATION RELATED TO SECTOR EPD

This EPD is a sector-wide declaration based on a sample of galvanizing plants affiliated with EGGA and representative of European production, defined as the EU27 plus the United Kingdom and EFTA countries. The analyzed sample accounts for **over 940 000 tonnes of production** within EGGA's membership, corresponding to approximately 13% of total European production.

The initiative was coordinated with national associations including Zinkinfo Benelux, Galvazinc, Bundesverband Feuerverzinken, Associazione Italiana Zincatura, Nordic Galvanizers, Asociación Técnica Española de Galvanización, and the Galvanizers Association.

Data were gathered from **54 companies across 10 countries** (Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden and UK), covering plants considered highly representative of the European hot dip galvanizing industry.

The sample covers heavy, medium, and light steel products and is considered representative of the European hot dip galvanizing industry in terms of technology, bath size, heating methods, and product types.

The declared results represent a weighted average based on the annual galvanized steel production of each plant.

The document presents average case values representing the wide range of galvanizing facilities across Europe. Consequently, the declared product is an average case that is not available for purchase on the market.

The GWP-GHG results across the sites show a variation of more than 10% for modules A1-A3 when considering only the galvanizing process and excluding the steel plate.

This variability is primarily driven by differences in raw material use (e.g., the proportion of remelted zinc versus SHG zinc), the mix and consumption of energy sources (electricity, natural gas, propane), variations in product size and kettle capacity and in differences in plant production levels and shift patterns.

These factors together explain the site-to-site differences in environmental impact.

Photo: Lucas van der Wee / Global Galvanizing Awards 2018

ABBREVIATIONS

EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
C-PCR	Complementary Product Category Rules
CPC	Central product classification

OTHER GENERAL TERMS

SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m^3	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO_2eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO_2eq.	Kilograms of Carbon Dioxide Equivalent

UNITS AND QUANTITIES

The thousand separator and decimal mark used in this EPD follow the SI style (French notation), in which a space is used as the thousands separator and a comma ‘,’ is used as the decimal marker: 1 234,56.

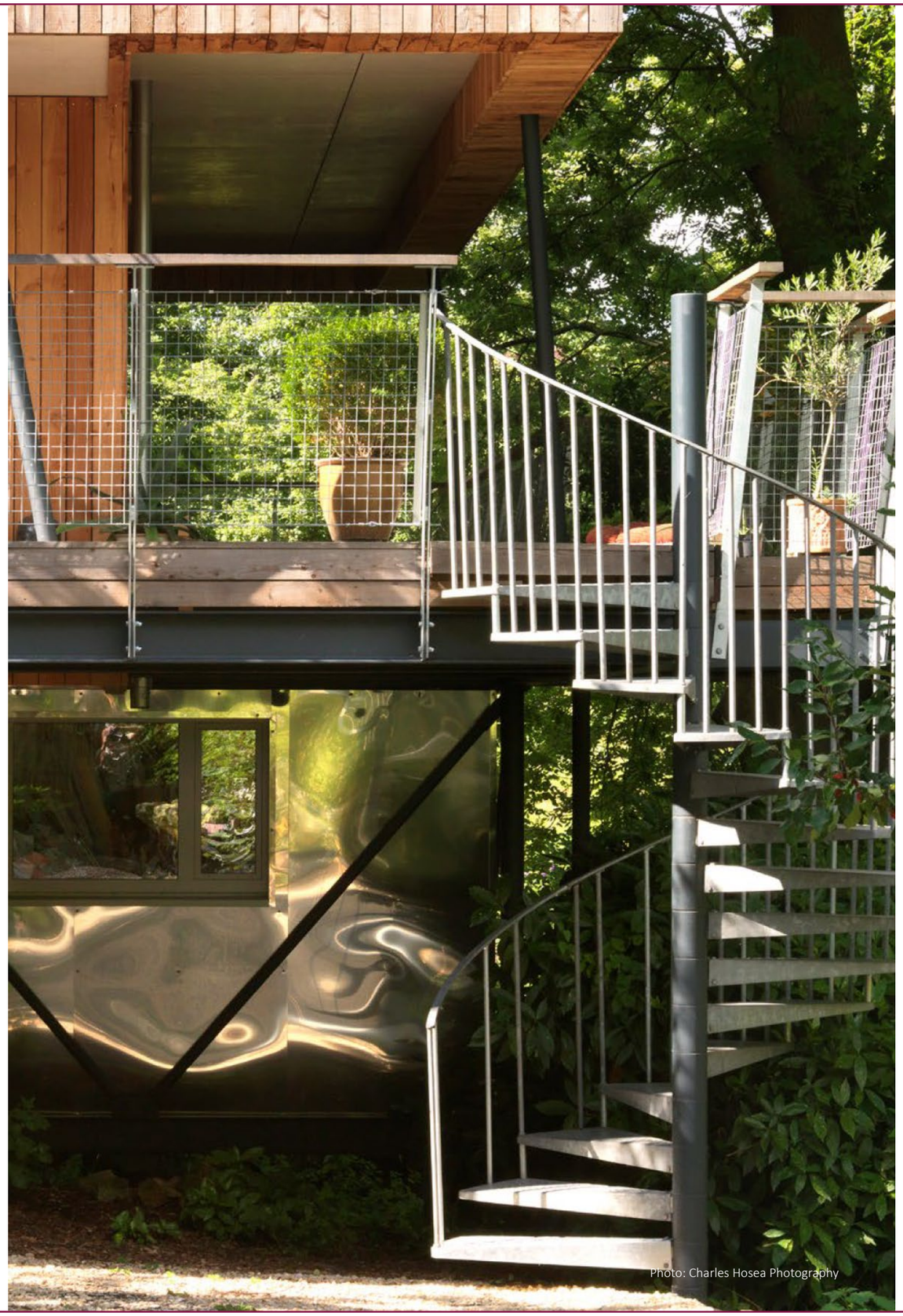


Photo: Charles Hosea Photography

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VERSION HISTORY

Original version of the EPD: 2026-02-06

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