



A Tata Steel Enterprise



THIRD PARTY VERIFIED ISO 14025 & EN 15804

SAB 135R/930 metallic coated steel structural

Environmental Product Declaration

Owner of the Declaration: SAB-profiel bv, Produktieweg 2, NL-3401 MG, IJsselstein
Programme Operator: Tata Steel UK Limited, 18 Grosvenor Place, London, SW1X 7HS



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SAB 135R/930 galvanised steel structural deep deck
Environmental Product Declaration
(in accordance with ISO 14025 and EN 15804)

This EPD is representative and valid for the specified (named) product

Declaration Number: EPD-TS-2025-037
Issue date: 7th January 2026
Valid until: 30th July 2030

Owner of the Declaration: SAB-profiel bv, Produktieweg 2. NL-3401 MG, IJsselstein
Programme Operator: Tata Steel UK Limited, 18 Grosvenor Place, London, SW1X 7HS

The CEN standard EN 15804:2012+A2:2019 serves as the core Product Category Rules (PCR)
supported by Tata Steel's EN 15804 verified EPD PCR documents

Independent verification of the declaration and data, according to ISO 14025

Internal ☐ External ☒

Author of the Life Cycle Assessment: Tata Steel UK
Third party verifier: Chris Foster, Eugeos Ltd.

1 General information

Owner of EPD	SAB-profiel
Product & module	SAB 135R/930 metallic coated steel structural deep deck
Manufacturer	SAB-profiel and Tata Steel Nederland
Manufacturing sites	IJsselstein and IJmuiden
Product applications	Construction
Declared unit	1m ² of steel structural deep deck
Date of issue	7 th January 2026
Valid until	30 th July 2030



This Environmental Product Declaration (EPD) is for SAB 135R/930 roof deep deck manufactured by SAB-profiel in the Netherlands using metallic coated steel. The environmental indicators are for products manufactured at SAB-profiel in IJsselstein with feedstock from IJmuiden.

The information in the Environmental Product Declaration is based on production data from 2021 and 2023.

EN 15804 serves as the core PCR, supported by Tata Steel's EN 15804 verified EPD programme Product Category Rules documents, and the LCA model supporting this declaration has been independently verified according to ISO 14025 ^[1,2,3,4,5,6,7].

Third party verifier

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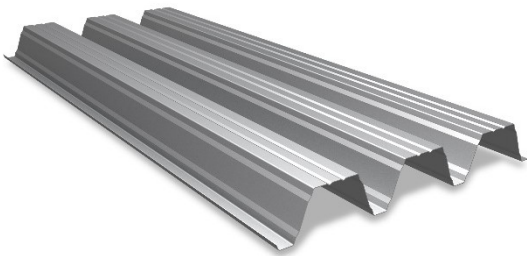
2 Product information

2.1 Product description

This EPD is for SAB 135R/930 with zinc metallic coating.

The SAB deep deck family of products consists of 14 steel roof trapezoidal profiles which are designed to support all types of insulated roof systems. SAB 135R/930 (Figure 1) has a profile depth of 137mm and a cover with of 930mm, to meet the designers’ needs for efficiency, aesthetics, and structural performance. It is manufactured from zinc metallic coated steel, with a guaranteed minimum yield stress of 320N/mm², and a fire rating of Class A1 to EN 13501^[8].

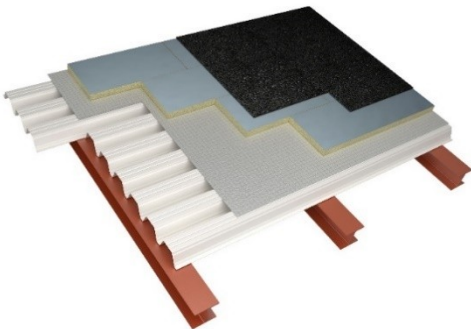
Figure 1 SAB 135R/930 roof deep deck



SAB 135R/930 is an ideal choice of roof deck profile when securing to purlins, typically spanning 4m to 8m. The SAB 135R/930 product has a 310mm profile pitch and the crown is 145mm, which provides an approximate 50% surface area and is more than sufficient for most adhesive systems when bonding to the deck. For those looking for additional architectural features, the SAB 135R/930 profile can be supplied perforated for additional acoustic requirements.

The SAB 135R/930 is usually part of roof system with a foil and insulation layer, and Bitumen or PVC top layer (see Figure 2). Our dedicated and experienced technical team are available to help develop a specification for your project and assist with project specific advice to ensure that all design aspects of the chosen deck system meet your project requirements.

Figure 2 SAB roof deep deck system



2.2 Manufacturing

The manufacturing sites included in the EPD are listed in Table 1 below.

Table 1 Participating sites

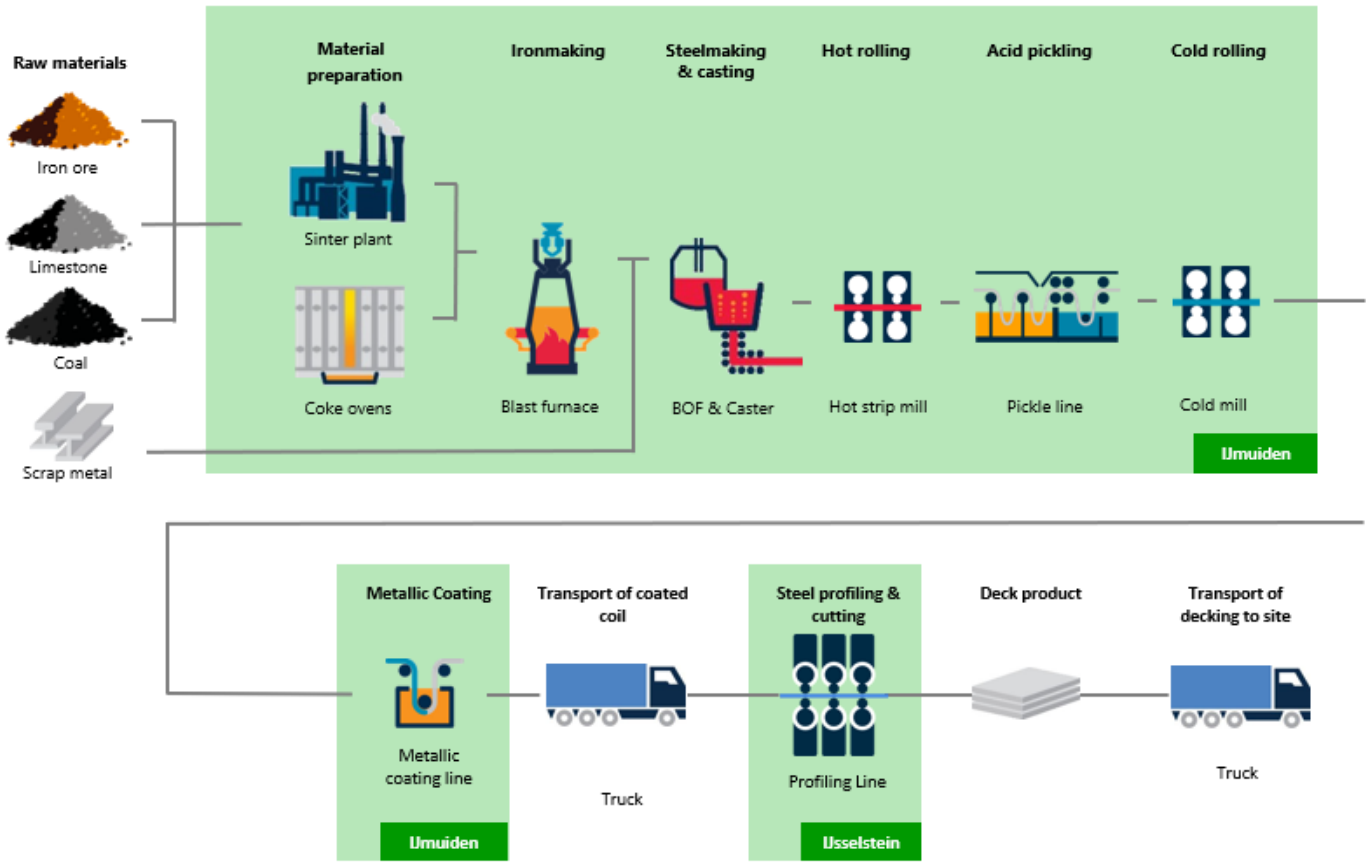
Site name	Product	Manufacturer	Country
Ijmuiden	Hot rolled coil	Tata Steel	NL
Ijmuiden	Cold rolled coil	Tata Steel	NL
Ijmuiden	Metallic coated coil	Tata Steel	NL
IJsselstein	Steel structural deck	SAB profiel	NL

The process of steel coil manufacture at Tata Steel begins with sinter being produced from iron ore and limestone, and together with coke from coal, reduced in a blast furnace to produce iron. Steel scrap is added to the liquid iron and oxygen is blown through the mixture to convert it into liquid steel in the basic oxygen furnace. The liquid steel is continuously cast into discrete slabs, which are subsequently reheated and rolled in a hot strip mill to produce steel coil. The hot rolled coils are pickled and cold rolled, before the zinc based metallic coating is applied.

The metallic coated steel is transported by road from Ijmuiden to IJsselstein and is profiled and cut into suitable lengths on a dedicated process line. An overview of the process from raw materials to manufacture of the steel roof deck product, is shown in Figure 3.

Process data for the manufacture of hot and cold rolled coil, and metallic coated steel at Ijmuiden was gathered as part of the latest worldsteel data collection. The data collection was not only organised by site, but also by each process line within the site. In this way it was possible to attribute resource use and emissions to each process line, and using processed tonnage data for that line, also attribute resources and emissions to specific products. For the manufacture of the roof deck, process data was also collected from the profiling lines at IJsselstein.

Figure 2 Process overview from raw materials to deck product



2.3 Technical data and specifications

The general properties of the deck product are shown in Table 2.

Table 2 General characteristics and specification of the decking

135R/930 roof deck	
Thickness of decking (mm)	0.88
Cover width (mm)	930
Standard maximum single span (mm)	5570
Standard maximum double span (mm)	6168
Profile weight (kg/m ²)	11.14
CE marking	DOP spec to EN 1090-1 ^[9]
Certification	Certifications applicable to SAB IJsselstein site are; ISO 9001 ^[10] , ISO 14001 ^[11] , ISO 45001 ^[12] , BES 6001 certification ^[13] Certifications applicable to Tata Steel's IJmuiden site are; ISO 9001 ^[10] , ISO 14001 ^[11] , ISO 45001 ^[12] , BES 6001 ^[13] , EN 10346 ^[14]

2.4 Packaging

The deck profiles are packaged timber supports and plastic strapping in order to protect them during delivery to site and prior to installation.

Plastic packaging: 1.03-03 kg/m²

Timber packaging: 2.24E-01 kg/m²

2.5 Reference service life

A reference service life for structural deck is not declared because the steel profiles are part of a composite roofing system that also comprises an insulating roofing material such as slate or tiles, or felt, and the final construction application of the composite roof deck is not defined. To determine the full service life of steel structural deck, all factors would need to be included such as the type of roof material used, and the location and environment.

The indicative design working life of a structure is classed in accordance with EN 1990 ^[15] clause 2.3. The design life ranges from category 1 at 10 years, to category 5 at 100 years. Common building structures are classed as category 4 at 50 years. In accordance with EN 1994-1-1 ^[16], clause 4.2, the exposed surface of the steel decking shall be adequately protected to resist the particular atmospheric conditions. A zinc coating mass of 275g/m² (including both sides) is sufficient for the internal floors in a non-aggressive environment. Under 'normal' conditions, steel deck would not need to be replaced over the life of the building and structure.

2.6 Biogenic Carbon content

There are no materials containing biogenic carbon in SAB roof deck products. Timber is used to package the profile products and comprises a measurable mass of the total packaging as shown in Table 3 below.

Table 3 Biogenic carbon content at the factory gate

135R/930 roof deck	
Biogenic carbon content (product) (kg)	0
Biogenic carbon content (packaging) (kg)	0.112

Note: 1kg biogenic carbon is equivalent to 44/12 kg of CO₂

3 LCA methodology

3.1 Declared unit

The unit being declared is 1m² steel structural deck.

3.2 Scope

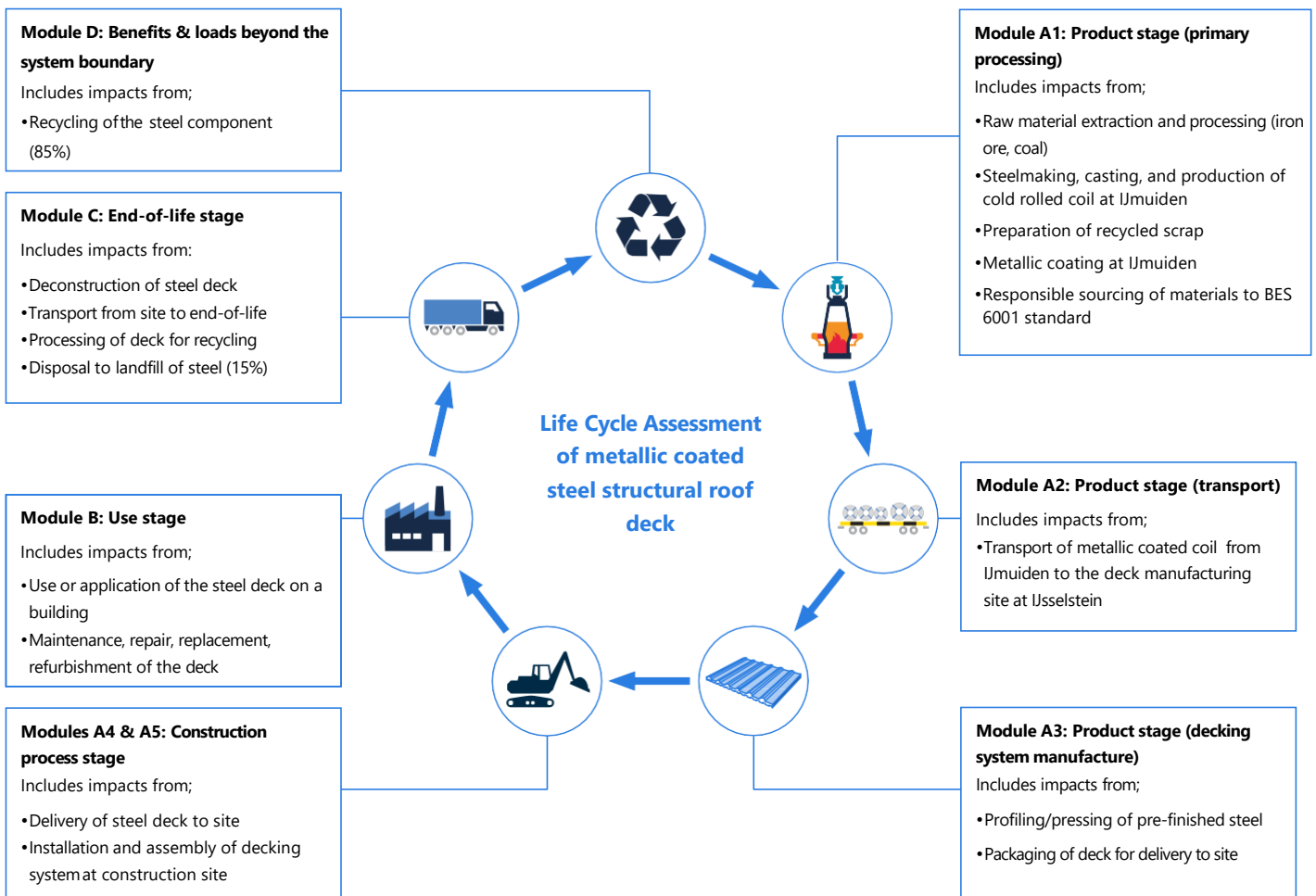
This EPD can be regarded as Cradle-to-Grave and the modules considered in the LCA are;

- A1-A3: Production stage (Raw material supply, transport to production site, manufacturing)
- A4 & A5: Production stage (Transport to the construction site and installation)
- B1-B7: Use stage (related to the building fabric including maintenance, repair, replacement)
- C1-C4: End-of-life (Deconstruction, transport, processing for recycling and disposal)
- D: Reuse, recycling and recovery

3.3 Cut-off criteria

All information from the data collection process has been considered, covering all used and registered materials, and all fuel and energy consumption. On-site emissions were measured, and those emissions have been considered. Data for all relevant sites were thoroughly checked and also cross-checked with one another to identify potential data gaps. No processes, materials or emissions that are known to make a significant contribution to the environmental impact of the decking system have been omitted. On this basis, there is no evidence to suggest that input or outputs contributing more than 1% to the overall mass or energy of the system, or that are environmentally significant, have been omitted. It is estimated that the sum of any excluded flows contribute less than 5% to the impact assessment categories. The manufacturing of required machinery and other infrastructure is not considered in the LCA.

Figure 3 Life Cycle Assessment of steel deck



3.4 Background data

For life cycle modelling of the decking system, the Sphera LCA for Experts Software System for Life Cycle Engineering (formerly GaBi) is used^[17]. The LCAfE database contains consistent and documented datasets which can be viewed in the online Managed LCA Content (MLC) documentation^[18].

Where possible, specific data derived from Tata Steel and SAB's own production processes were the first choice to use where available.

To ensure comparability of results in the LCA, the basic data of the Sphera MLC were used for energy, transportation and auxiliary materials.

3.5 Data quality

The data from Tata Steel's own production processes are from 2021 and 2023, and the technologies on which these processes were based during that period, are those used at the date of publication of this EPD. All relevant background datasets are taken from the Sphera MLC, and the last revision of all but three of these data sets took place less than 10 years ago. However, the contribution to impacts of these three datasets is of low significance, and therefore, the study is considered to be based on good quality data.

3.6 Allocation

To align with the requirements of EN 15804, a methodology is applied to assign impacts to the production of slag and hot metal from the blast furnace (co-products from steel manufacture), that was developed by the World Steel Association and EUROFER^[19]. This methodology is based on physical and chemical partitioning of the manufacturing process, and therefore avoids the need to use allocation methods, which are based on relationships such as mass or economic value. It takes account of the manner in which changes in inputs and outputs affect the production of co-products and also takes account of material flows that carry specific inherent properties. This method is deemed to provide the most representative method to account for the production of blast furnace slag as a co-product

Economic allocation was considered, as slag is designated as a low value co-product under EN 15804. However, as neither hot metal nor slag are tradable products upon leaving the blast furnace, economic allocation would most likely be based on estimates. Similarly BOF slag must undergo processing before being used as a clinker or cement substitute. The World Steel Association and EUROFER also highlight that companies purchasing and processing slag work on long term contracts which do not follow regular market dynamics of supply and demand.

Process gases arise from the production of the continuously cast steel slabs at IJmuiden and are accounted for using the system expansion method. This method is also referenced in the same EUROFER document and the impacts of co-product allocation, during manufacture, are accounted for in the product stage (Module A1).

Where there is site wide material and energy usage, these have been allocated to the relevant products in this study by mass.

End-of-life assumptions for recovered steel and steel recycling are accounted for as per the current methodology from the World Steel Association 2017 Life Cycle Assessment methodology report^[20]. A net scrap approach is used to avoid double accounting, and the net impacts are reported as benefits and loads beyond the system boundary (Module D).

3.7 Additional technical information

The main scenario assumptions used in the LCA are detailed below in Table 4. The end of life percentages are based on the results of a survey carried out by the Steel Construction Institute in 2000^[21].

For all indicators the characterisation factors from the EC-JRC are applied, identified by the name EN_15804, and based upon the EF Reference Package 3.1^[22]. In LCAfE, the corresponding impact assessment is used, denoted by EN 15804 +A2.

3.8 Comparability

Care must be taken when comparing EPDs from different sources. EPDs may not be comparable if they do not have the same functional unit or scope (for example, whether they include installation allowances in the building), or if they do not follow the same standard such as EN 15804. The use of different generic data sets for upstream or downstream processes that form part of the product system may also mean that EPDs are not comparable.

Comparisons should ideally be integrated into a whole building assessment, in order to capture any differences in other aspects of the building design that may result from specifying different products. For example, a more durable product would require less maintenance and reduce the number of replacements and associated impacts over the life of the building.

Table 4 Main scenario assumptions

Module	Scenario assumptions
A1 to A3 – Product stage	Manufacturing data from Tata Steel's site at IJmuiden is used, as well as data from SAB-profiel at IJsselstein
A2 – Transport to the decking manufacturing site	The deck manufacturing facility is located at IJsselstein and the pre-finished steel coils are transported there from IJmuiden a distance of 69km by road by a 25t capacity truck. A utilisation factor of 45% was used to account for empty returns.
A4 – Transport to construction site	A transport distance of 250km by road on a 25 tonne capacity truck was considered representative of a typical installation. Utilisation factor of 30% was assumed to account for empty returns
A5 – Installation at construction site	Energy consumption estimated based upon published data for the erection of steel constructions in Germany ^[23] .
B1 to B7 – Use stage	This stage includes any maintenance or repair, replacement or refurbishment of the decking over the life cycle. This is not required over the life of the decking system under normal conditions.
C1 – Deconstruction & demolition	Energy consumption estimated based upon published data for the dismantling of steel constructions in Germany ^[23]
C2 – Transport for recycling, reuse, and disposal	A transport distance of 100km to landfill or to a recycling site is assumed. Transport is on a 25 tonne load capacity lorry with 30% utilisation to account for empty returns
C3 – Waste processing for reuse, recovery and/or recycling	The recycled decking is processed in a shredder.
C4 - Disposal	At end-of-life, 15% of the steel deck is disposed on landfill
D – Reuse, recycling, and energy recovery	At end-of-life, 85% of the steel is recycled

Please note that in the LCAfE software, an empty return journey is accounted for by halving the load capacity utilisation of the outbound journey.

4 Results of the LCA

Description of the system boundary

Product stage			Construction stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X = Included in LCA; MND = module not declared

Environmental impact:

1m² of SAB 135R/930 metallic coated steel roof deck

Parameter	Unit	A1 – A3	A4	A5	B1 – B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.79E+01	3.53E-01	5.09E-01	0.00E+00	7.71E-01	1.07E-01	1.12E-01	2.55E-02	-1.61E+01
GWP-fossil	kg CO ₂ eq	2.83E+01	3.36E-01	1.81E-01	0.00E+00	7.70E-01	1.08E-01	1.13E-01	2.54E-02	-1.62E+01
GWP-biogenic	kg CO ₂ eq	-3.43E-01	1.74E-02	3.28E-01	0.00E+00	9.04E-04	-2.39E-03	-1.16E-03	-8.24E-05	9.57E-02
GWP-luluc	kg CO ₂ eq	4.95E-03	0.00E+00	9.59E-05	0.00E+00	2.99E-05	1.11E-03	5.42E-04	1.04E-04	-2.16E-03
ODP	kg CFC11 eq	2.48E-11	0.00E+00	2.05E-12	0.00E+00	1.45E-13	1.79E-14	2.60E-12	7.09E-14	2.18E-11
AP	mol H ⁺ eq	6.34E-02	3.30E-04	2.30E-04	0.00E+00	7.88E-04	1.82E-04	3.68E-04	1.80E-04	-3.97E-02
EP-freshwater	kg P eq	9.56E-06	0.00E+00	2.19E-07	0.00E+00	2.72E-07	2.91E-07	3.96E-07	3.78E-08	-3.78E-06
EP-marine	kg N eq	1.58E-02	1.63E-04	7.86E-05	0.00E+00	2.41E-04	7.57E-05	6.82E-05	4.70E-05	-6.38E-03
EP-terrestrial	mol N eq	1.74E-01	1.86E-03	8.89E-04	0.00E+00	2.68E-03	8.08E-04	7.30E-04	5.13E-04	-5.72E-02
POCP	kg NMVOC eq	4.85E-02	3.15E-04	2.28E-04	0.00E+00	9.08E-04	1.65E-04	1.96E-04	1.41E-04	-2.59E-02
ADP-minerals&metals	kg Sb eq	6.02E-04	0.00E+00	2.12E-08	0.00E+00	2.77E-08	7.18E-09	4.11E-08	1.57E-09	-9.19E-05
ADP-fossil	MJ net calorific value	2.71E+02	0.00E+00	2.59E+00	0.00E+00	1.07E+01	1.38E+00	2.31E+00	3.34E-01	-1.61E+02
WDP	m ³ world eq deprived	9.64E-01	0.00E+00	2.44E-03	0.00E+00	1.87E-03	4.94E-04	2.23E-02	2.75E-03	-1.10E+00
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND
IRP	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP		ND	ND	ND	ND	ND	ND	ND	ND	ND

GWP-total = Global Warming Potential total

GWP-fossil = Global Warming Potential fossil fuels

GWP-biogenic = Global Warming Potential biogenic

GWP-luluc = Global Warming Potential land use and land use change

ODP = Depletion potential of stratospheric ozone layer

AP = Acidification potential, Accumulated Exceedance

EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment

EP-terrestrial = Eutrophication potential, Accumulated Exceedance

POCP = Formation potential of tropospheric ozone

ADPE = Abiotic depletion potential for non-fossil resources

ADPF = Abiotic depletion potential for fossil resources

WDP = Water (user) deprivation potential, deprivation-weighted water consumption

PM = Potential incidence of disease due to PM emissions

IRP = Potential Human exposure efficiency relative to U235

ETP-fw = Potential Comparative Toxic Unit for ecosystems

HTP-c = Potential Comparative Toxic Unit for humans

HTP-nc = Potential Comparative Toxic Unit for humans

SQP = Potential soil quality index

The following indicators should be used with care as the uncertainties on these results are high or as there is limited experience with the indicator : ADP-minerals&metals, ADP-fossil, and WDP.

Resource use:

1m² of SAB 135R/930 metallic coated steel roof deck

Parameter	Unit	A1 – A3	A4	A5	B1 – B7	C1	C2	C3	C4	D
PERE	MJ	1.80E+01	0.00E+00	7.83E-01	0.00E+00	6.57E-02	1.04E-01	6.60E-01	6.44E-02	6.37E+00
PERM	MJ	3.36E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.13E+01	0.00E+00	7.83E-01	0.00E+00	6.57E-02	1.04E-01	6.60E-01	6.44E-02	6.37E+00
PENRE	MJ	2.70E+02	0.00E+00	2.59E+00	0.00E+00	1.07E+01	1.38E+00	2.31E+00	3.34E-01	-1.61E+02
PENRM	MJ	5.36E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.71E+02	0.00E+00	2.59E+00	0.00E+00	1.07E+01	1.38E+00	2.31E+00	3.34E-01	-1.61E+02
SM	kg	8.80E-02	0.00E+00	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	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	0.00E+00
FW	m ³	3.47E-02	0.00E+00	2.22E-04	0.00E+00	7.09E-05	5.16E-05	9.50E-04	8.06E-05	-1.64E+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 material

RSF = Use of renewable secondary fuels

NRSF = Use of non-renewable secondary fuels

FW = Use of net fresh water

Output flows and waste categories:

1m² of SAB 135R/930 metallic coated steel roof deck

Parameter	Unit	A1 – A3	A4	A5	B1 – B7	C1	C2	C3	C4	D
HWD	kg	7.61E-06	0.00E+00	1.42E-09	0.00E+00	4.48E-10	5.55E-11	2.12E-08	7.30E-11	-1.21E-06
NHWD	kg	9.65E-01	0.00E+00	1.76E-03	0.00E+00	2.12E-03	1.93E-04	1.27E-03	3.33E+00	1.95E+00
RWD	kg	2.39E-03	0.00E+00	3.56E-05	0.00E+00	9.94E-06	2.61E-06	2.93E-04	3.54E-06	1.77E-05
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.45E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.34E+00
MER	kg	7.95E-03	0.00E+00	0.00E+00	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	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	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 reuse

MFR = Materials for recycling

MER = Materials for energy recovery

EEE = Exported electrical energy

EET = Exported thermal energy

5 Interpretation of results

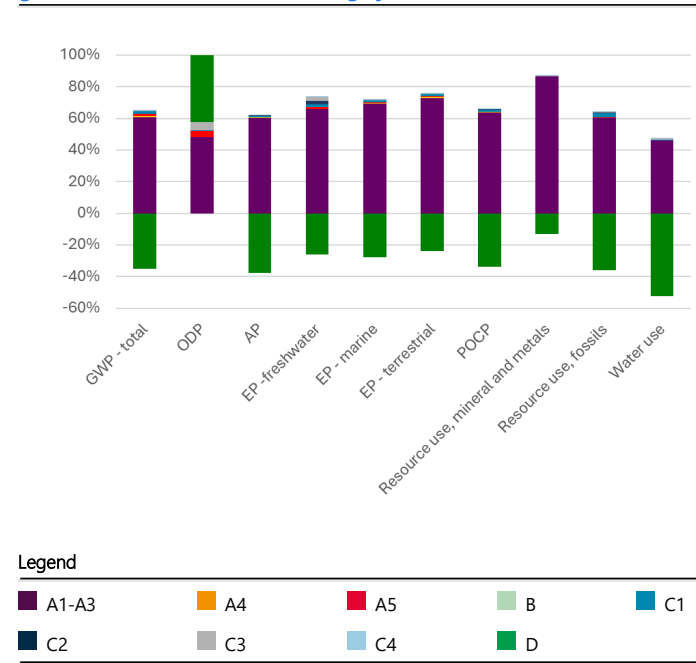
Figure 4 shows the relative contribution per life cycle stage for selected environmental impact categories for 1m² of SAB 135R/930 roof deck profiles. Each column represents 100% of the total impact score, which is why all the columns have been set with the same length. A burden is shown as positive (above the 0% axis) and a benefit is shown as negative (below the 0% axis). The main contributors across all impact categories are A1-A3 (burdens) and D (benefits beyond the system boundary).

The manufacture of the cold rolled coil during stage A1-A3 is responsible for around 80-90% of each impact in most of the categories.

The majority of emissions come from the process of making crude steel, in the use of coal and coke in the blast furnace, and from the injection of oxygen into the basic oxygen furnace, as well as combustion of the process gases. These processes, give rise to emissions of CO₂ which contribute around 96% to Global Warming Potential (GWP), and sulphur oxides, which contribute 52% to the Acidification Potential (AP) category. In addition, oxides of nitrogen are emitted which contribute 46% to Acidification Potential, and the vast majority of the marine and terrestrial Eutrophication Potential (EP). Freshwater EP is contributed mostly by phosphorous (59%). The combined emissions of nitrogen oxides, carbon monoxide, and sulphur oxides, together contribute 94% towards the Photochemical Ozone indicator (POCP).

Figure 4 clearly indicates the relatively small contribution to each impact from the other life cycle stages considered. Of these stages, the most significant contributions are from stages A5 (installation) in GWP, Freshwater EP and Ozone Depletion Potential (ODP), stage C1(deconstruction) in GWP, Freshwater EP, and Fossil Resource Use indicator, and stage C3 (waste processing) in ODP and EP.

Figure 4 LCA results for the decking system



Module D values are largely derived using worldsteel’s value of scrap methodology which is based upon many steel plants worldwide, including both BF/BOF and EAF steel production routes. At end-of-life, the recovered steel decking is modelled with a credit given as if it were re-melted in an Electric Arc Furnace and substituted by the same amount of steel produced in a Blast Furnace^[20]. The specific emissions that represent the burden in A1-A3, are essentially the same as those responsible for the impact benefits in Module D. It is important that the life cycle of the steel product is considered here, because in most cases, the Module D credit provides significant benefits in terms of reducing the whole life environmental impacts.

Referring to the LCA results, the impact in Module D for ODP and the Use of Renewable Primary Energy indicator (PERT) are different to other impact categories, being a burden or load rather than a benefit. For ODP, this is because there is greater use of electricity in recycling steel compared to manufacturing it through the BF/BOF route, leading to larger ODP impacts. This also applies to the use of renewable energy, hence why PERT is positive in module D as well.

6 References and product standards

1. Tata Steel's EN 15804 verified EPD programme, General programme instructions, V2 January 2022
2. Tata Steel's EN 15804 verified EPD programme, Product Category Rules Part 1, V2 January 2022
3. Tata Steel's EN 15804 verified EPD programme, Product Category Rules Part 2 – Steel Structural Deck, V2 June 2022
4. ISO 14044:2006+A2:2020, Environmental management - Life Cycle Assessment – Requirements and guidelines
5. ISO 14025:2006, Environmental labels and declarations - Type III environmental declarations - Principles and procedures
6. ISO 14040:2006+ A1:2020, Environmental management - Life Cycle Assessment - Principles and framework
7. EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
8. EN 13501-1:2018, Fire classification of construction products and building element
9. EN 1090-1:2009+A1:2011, Requirements for conformity assessment for structural components
10. ISO 9001:2015, Quality management systems - Requirements
11. ISO 14001:2015, Environmental management systems – Requirements with guidance for use
12. ISO 45001:2018, Occupational health and safety management systems. Requirements with guidance for use
13. BES 6001, Responsible sourcing of construction products
14. EN 10346:2015, Continuously hot-dip coated steel flat products for cold forming
15. EN 1990:2002, Eurocode. Basis of structural design
16. EN 1994-1-1:2004, Eurocode 4. Design of composite steel and concrete structures. General rules and rules for buildings
17. Sphera; LCAfE: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2025
18. Documentation of LCAfE: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2025
19. EUROFER in cooperation with the World Steel Association, 'A methodology to determine the LCI of steel industry co-products', February 2014
20. World Steel Association: Life Cycle Assessment methodology report, 2017
21. Steel Construction Institute (SCI), Survey of recycling and reuse rates for UK demolition contractors, European Commission funded research project on LCA for steel construction, Sansom M and Meijer J, 2000
22. EC -JRC, EN 15804 Reference Package, <https://eplca.jrc.ec.europa.eu/LCDN/EN15804.xhtml>
23. Siebers R. (2021), Dissertation: Development of sustainability key figures for the value chain stages – erection and dismantling – in steel construction, Bergische Universität Wuppertal

