TATA STEEL

Contiflo® Premium Galvanised Precision Tubes

Environmental Product Declaration

CONTENTS

Contiflo® Premium Galvanised Precision Tubes
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-2022-027
Date of Issue: 4th November 2022
Valid until: 3rd November 2027

Owner of the Declaration: Tata Steel Europe
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	Tata Steel Europe
Product	Contiflo® Premium Galvanised Precision Tubes
Manufacturer	Tata Steel Netherlands
Manufacturing sites	Oosterhout and IJmuiden (Netherlands) and Port Talbot (UK)
Product applications	Various applications such as closed heating systems, greenhouse roofs, industrial packaging, gardening tools, household appliances and automotive components
Declared unit	1 tonne of steel product
Date of issue	7th November 2022
Valid until	6th November 2027

This Environmental Product Declaration (EPD) is for Contiflo® galvanised precision tubes manufactured by Tata Steel in the Netherlands and the UK. The environmental indicators are average values for the product manufactured at the Oosterhout site, with feedstock supplied from Port Talbot and IJmuiden.

The information in this Environmental Product Declaration is based on production data from 2016 and 2017.

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

Third party verifier

Chris Foster, Eugeos Ltd, Suite 11, The Old Fuel Depot, Twemlow Lane, Twemlow, CW4 8GJ, UK

2 Product information

2.1 Product Description

Contiflo® (sometimes referred to as 'galvanised precision tubes'), is manufactured in a range of circular, square and rectangular shaped tubes. They are manufactured to standard grades in a range of sizes from 10 to 76.1mm, with wall thicknesses from 0.8 to 3mm. The full range of Tata Steel's Contiflo® tubes are included in this EPD.

Contiflo® galvanized precision tubes are made for various applications, such as closed heating systems for houses and office buildings, construction of greenhouse roofs including the tubes used for sun screens , industrial packaging (IBC's), gardening tools, sporting equipment like table tennis tables, household appliances and automotive components. Manufacturing is in line with international standards and agreed customer specific requirements. Contiflo® galvanized precision tubes are sold in countries all over Europe.

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
Port Talbot	Cold rolled coil	Tata Steel	UK
IJmuiden	Direct rolled coil	Tata Steel	UK
Oosterhout	Contiflo® tubes	Tata Steel	UK

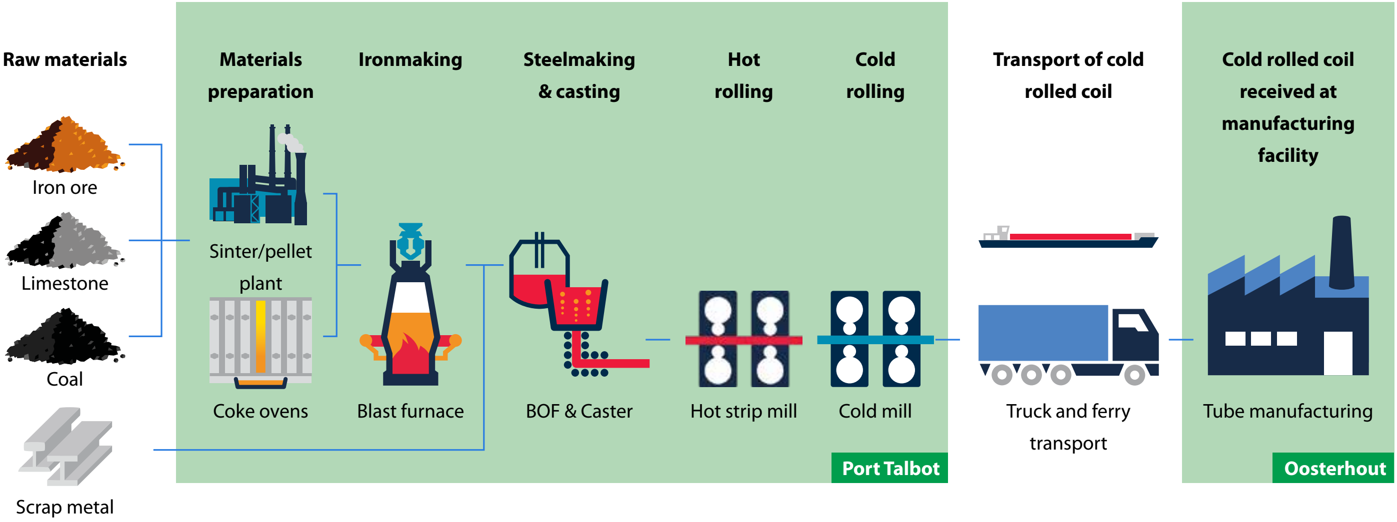
The process of Contiflo® manufacture at Tata Steel begins with sinter and/or pellet being produced from iron ore and limestone, and together with coke from coal, reduced in a blast furnace to produce iron. Steel scrap is added to the liquid iron and oxygen is blown through the mixture to convert it into liquid steel in the basic oxygen furnace. The liquid steel is continuously cast into discrete slabs, which are either rolled directly to produce direct rolled coil or subsequently reheated and rolled in a hot strip mill, before being cold rolled to produce cold rolled coil. Direct rolled coil and cold rolled coil ate the primary feedstocks of the Contiflo® manufacturing process. The coils are transported from Port Talbot by a combination of shipping and truck, and from IJmuiden by truck, to the tube manufacturing site at Oosterhout. An overview of the process from raw materials to cold rolled coil and direct rolled coil is shown in Figure 1.

The tube making process begins with the uncoiling, levelling and slitting of the hot rolled coil, which is then passed through a series of shaped rolls that gradually form the flat strip into a circular section. The two strip edges, now adjacent to one another, are welded using a high frequency induction process. Both external and internal weld beads are trimmed in-line before the tube undergoes degreasing then mid-frequency induction heating, in preparation for galvanising. Once the zinc coating has been applied, the tube is cooled and further rolled into its final shape and size.

100% non-destructive testing is performed in-line on the weld-seam to ensure integrity before a final passivation coating is applied to further enhance corrosion resistance. The tubes are then cut to length prior to despatch. An overview of the process from cold and direct rolled coil to Contiflo® tubes is shown in Figure 2.

Process data for the manufacture of cold and direct rolled coil at Port Talbot and IJmuiden respectively, were gathered as part of the latest data collection on behalf of worldsteel. For both Port Talbot and IJmuiden, as well as Oosterhout, the data collection was not only organised by site, but also by each process within each site. In this way it was possible to attribute resource use and emissions to each process, and using processed tonnage data, also attribute resources and emissions to specific products.

Figure 1 Process overview from raw materials to steel coil



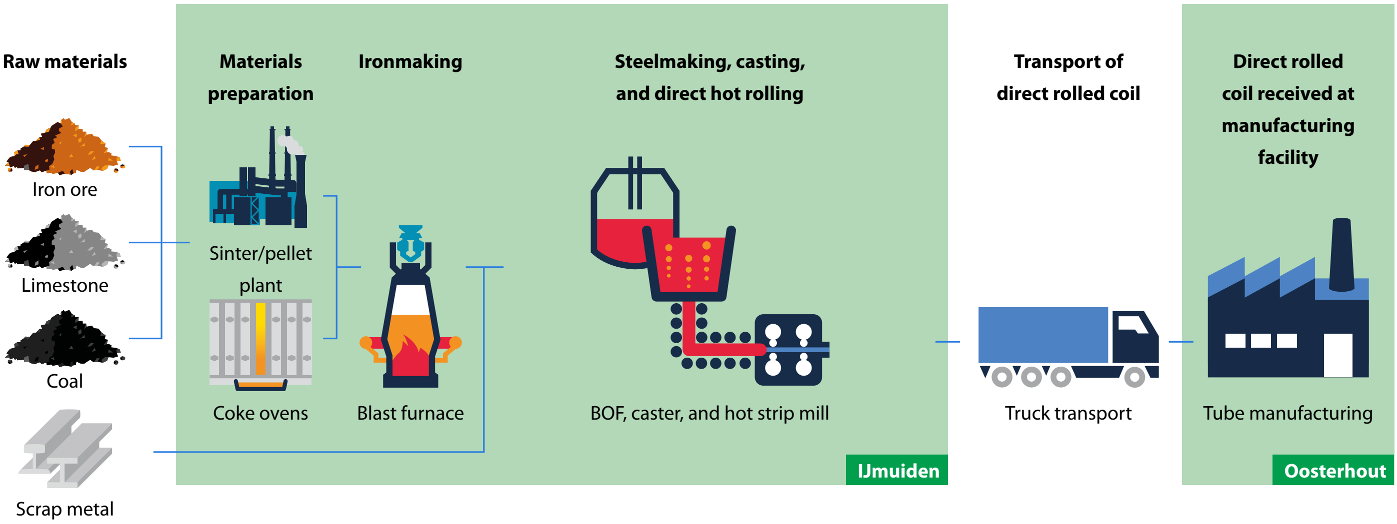
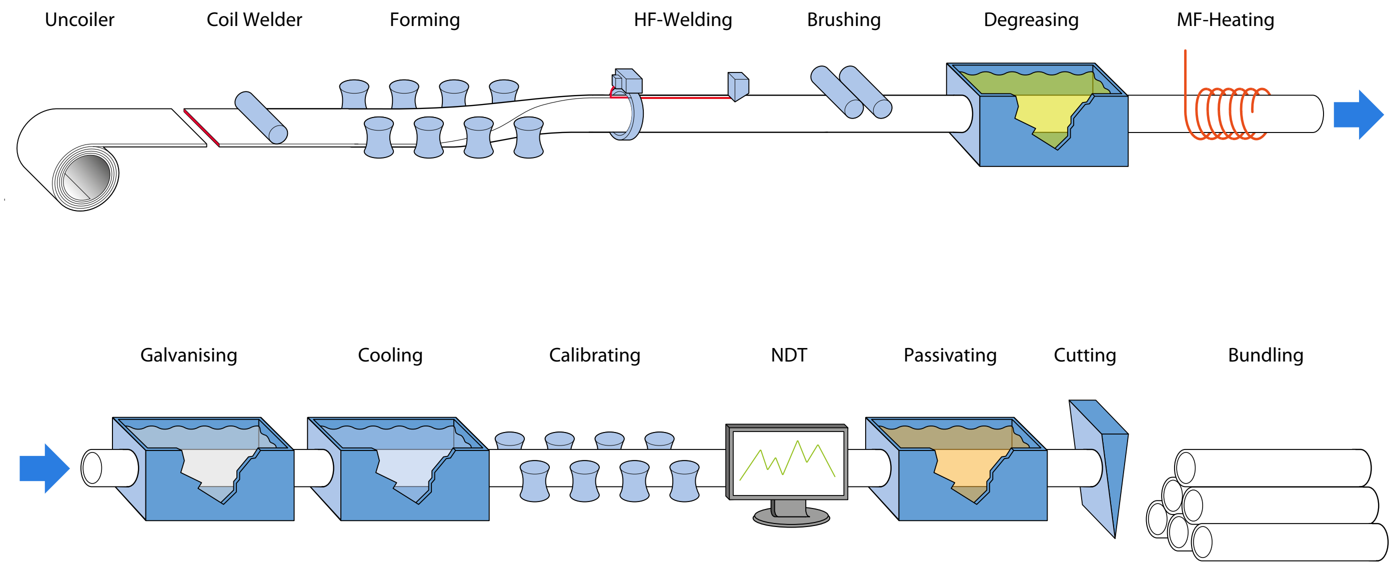


Figure 2 Process overview from coil to Contiflo® tubes



2.3 Technical data and specifications

The general properties of Contiflo® tubes are shown in Table 2, and the technical specifications of Contiflo® tubes are presented in Table 3. The relevant European standard for Contiflo® tubes is EN 10305-3&5[8][9].

Table 2 General properties of Contiflo® tubes

	Contiflo®
Density (kg/m³)	7850
Modulus of elasticity (N/mm²)	210000
Coefficient of thermal expansion (10^{-6} /K)	12
Thermal conductivity (W/mK)	48
Melting point (°C)	1520
Electrical conductivity at 20°C (/Ωm)	3.9

Table 3 Technical specifications for Contiflo® tubes

	B&IS pressure pipework
Specification	EN 10305-3&5
Yield strength (N/mm²)	190-700
Tensile strength (N/mm²)	270-740
Elongation	5-26%
Impact strength (Joules)	N/A
Carbon equivalent (max)	0.00-0.20
Certification	Product certification 2.2 and 3.1 [10] Applicable to Tata Steel's Oosterhout site; ISO 9001 [11], ISO 14001 [12], ISO 45001[13], BES 6001 [14]

2.4 Packaging

The tubes are secured for transport using steel banding and clips, timbers and anti-slip mats. The mass of this packaging is 0.9kg/tonne for steel banding and clips, 2.7kg/tonne for timber, and 0.2kg/tonne for anti-slip mats. A small amount of polyethylene film and card/paper packaging (approximately 0.006kg/tonne) is used. Reuse of packaging material has not been considered in this study.

2.5 Reference service life

A reference service life for Contiflo® tubes is not declared because they can be used in a variety of different forms of construction, and the final application is not defined. To determine the full service life of Contiflo® tubes all factors would need to be included such as location and environment. Under 'normal' conditions, Contiflo® tubes would not need to be replaced over the life of the goods or structure of which they are part.

Tata Steel's Contiflo® tubes are supplied with full certification and factory production control (FPC) ensuring full traceability during and after the original service life. Contiflo® tubes can be recovered and re-used or recycled repeatedly without loss of quality.

2.6 Biogenic Carbon content

There are no biogenic carbon containing materials in the product. The biogenic carbon content of the packaging materials is shown in Table 4.

Table 4 Biogenic carbon content at the factory gate

	Contiflo®
Biogenic carbon content (product) (kg C)	0
Biogenic carbon content (packaging) (kg C)	2.46

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

3 Life Cycle Assessment (LCA) methodology

3.1 Declared unit

The unit being declared is 1 tonne of steel Contiflo® tube

3.2 Scope

This EPD can be regarded as Cradle-to-Gate with modules C and D and the specific modules considered in the LCA are;

A1-A3: Production stage (raw material supply, transport to production site, manufacturing)
C1-C4: End-of-life (demolition/deconstruction, transport, processing for recycling and disposal)
D: Reuse, recycling and recovery

The life cycle stages are explained in more detail in Figure 4, but where the text is in light grey, the impacts from this part of the life cycle are not considered.

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 steel Contiflo® tubes have been omitted. On this basis, there is no evidence to suggest that inputs 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.

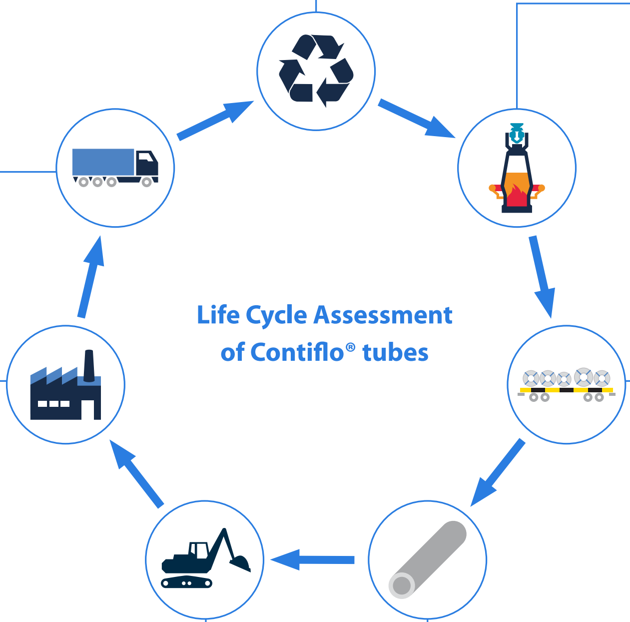
Figure 4 Life Cycle Assessment of Contiflo® tubes

Module D: Benefits & loads beyond the system boundary
Includes impacts from:
- Reuse (7%) and recycling (92%) of Contiflo® tubes

Module C: End of Life stage
Includes impacts from:
- Deconstruction/demolition of the steel tubes
- Transport from site to end-of-life
- Processing of tubes for reuse or recycling
- Disposal to landfill (1%)

Module B: Use stage
Includes impacts from:
- Use or application of the steel tube
- Maintenance, repair, replacement, refurbishment of the steel tube

Module A4 & A5: Construction process stage
Includes impacts from:
- Delivery of Contiflo tubes to site
- Installation of Contiflo tubes at construction site



Module A1: Product stage (primary processing)
Includes impacts from:
- Raw material extraction and processing (iron ore, coal)
- Preparation of recycled scrap
- Steelmaking, casting, and production of steel coil at Port Talbot & IJmuiden
- Responsible sourcing of materials to BES 6001 standard

Module A2: Production stage (transport)
Includes impacts from:
- Transport of steel coil from Port Talbot and IJmuiden to Oosterhout

Module A3: Product stage (steel tube manufacture)
Includes impacts from:
- Processing for tube manufacture
- Packaging of tubes for delivery to site

3.4 Background data

For life cycle modelling of Contiflo® tubes, the GaBi Software System for Life Cycle Engineering is used [14]. The GaBi database contains consistent and documented datasets which can be viewed in the online GaBi documentation [15].

Specific data derived from Tata Steel's own production processes at Port Talbot, IJmuiden and Oosterhout, were the first choice to use where available.

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

3.5 Data quality

The data from Tata Steel's own production processes are from 2016 and 2017, 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 GaBi software database, and the last revision of these datasets took place less than 10 years ago. An assessment of the quality of data used in this study has been made using the scheme provided in the UN Environment Global Guidance on LCA database development, referenced in EN 15804. 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 [16].

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 Port Talbot and 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).

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 [23]. 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 in Table 5. The end-of-life percentages are taken from a Tata Steel/ EUROFER recycling and re-use survey of UK demolition contractors carried out in 2012 [19].

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 3.0 [20]. In GaBi, 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/infrastructure assessment, in order to capture any differences in other aspects of the building or infrastructure 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 or infrastructure, or, a higher strength product may require less material for the same function.

Table 5 Main scenario assumptions

Module	Scenario assumptions
A1 to A3 – Product stage	Manufacturing data from Tata Steel's sites at Port Talbot in the UK, and IJmuiden and Oosterhout in the Netherlands
A2 – Transport to the tube manufacturing site	The cold rolled coils are transported from Port Talbot to Dover a distance of 407km by truck, then by ferry to Calais for 40km, and finally by truck to Oosterhout a distance of 267km. The direct rolled coils from IJmuiden are transported to Oosterhout a distance of 118km by truck. In each case the truck has a 25t load capacity. The Ferry is modelled as Ro-ro ship of 1,200-10,000 dwt. A utilisation of 0.45 is assumed in all cases to allow for empty returns.
C1 – Deconstruction and demolition	Energy consumption estimated based upon published data for the dismantling of steel constructions in Germany [21]
C2 – Transport for recycling, reuse, and disposal	In the Netherlands, a distance 150km is assumed from installation site to both recycling and reuse sites, whereas distance of 100km is assumed from the installation site to landfill. A 25 load capacity truck is used with a load capacity utilisation of 0.45 to allow for empty returns.
C3 – Waste processing for reuse, recovery and/or recycling	This considers the energy associated with cutting the tubes for recycling and is based upon the same data as C1
C4 - Disposal	At end of life, 1% of product is disposed to landfill
D – Reuse, recycling, and energy recovery	At end of life, 92% of product is recycled and 7% is re-used

Please note that in the GaBi 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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

X = Included in LCA; ND = module not declared

Environmental impact:

1 tonne of Contiflo® tube

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	2.79E+03	4.31E+01	1.22E+01	7.59E-01	1.45E-01	-1.73E+03
GWP-fossil	kg CO_2 eq	2.79E+03	4.30E+01	1.23E+01	7.57E-01	1.49E-01	-1.73E+03
GWP-biogenic	kg CO_2 eq	-3.95E-02	6.09E-02	-1.08E-01	1.91E-03	-4.42E-03	7.87E-01
GWP-luluc	kg CO_2 eq	5.37E-01	6.88E-04	1.92E-04	5.11E-05	2.75E-04	-6.93E-02
ODP	kg CFC11 eq	1.78E-09	1.18E-11	1.33E-12	3.45E-12	3.51E-13	-1.28E-10
AP	mol H^+ eq	6.71E+00	4.41E-02	4.11E-02	8.73E-04	1.06E-03	-3.77E+00
EP-freshwater	kg PO_4 eq	1.18E-03	9.94E-06	2.72E-06	8.40E-07	2.53E-07	-3.61E-04
EP-marine	kg N eq	1.72E+00	1.47E-02	1.96E-02	3.01E-04	2.71E-04	-7.00E-01
EP-terrestrial	mol N eq	1.78E+01	1.63E-01	2.15E-01	3.27E-03	2.97E-03	-6.34E+00
POCP	kg NMVOC eq	5.79E+00	4.78E-02	3.88E-02	9.30E-04	8.22E-04	-2.76E+00
ADP-minerals&metals	kg Sb eq	2.50E-02	1.52E-06	6.01E-07	7.13E-08	1.53E-08	-5.57E-03
ADP-fossil	MJ net calorific value	2.78E+04	5.62E+02	1.61E+02	1.01E+01	1.95E+00	-1.60E+04
WDP	m^3 world eq deprived	4.52E+01	1.04E-01	1.43E-02	1.01E-02	1.64E-02	-2.88E+02
PM	Disease incidence	ND	ND	ND	ND	ND	ND
IRP	kBq U235 eq	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND
SQP		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
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources
ADP-fossil = 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:

1 tonne of Contiflo® tube

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
PERE	MJ	1.80E+03	6.64E+00	9.61E+00	1.82E+00	2.93E-01	7.62E+02
PERM	MJ	6.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.71E+00
PERT	MJ	1.87E+03	6.64E+00	9.61E+00	1.82E+00	2.93E-01	7.58E+02
PENRE	MJ	2.78E+04	5.63E+02	1.62E+02	1.01E+01	1.96E+00	-1.60E+04
PENRM	MJ	1.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.24E+00
PENRT	MJ	2.78E+04	5.63E+02	1.62E+02	1.01E+01	1.96E+00	-1.60E+04
SM	kg	3.60E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.54E+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	2.41E+00	5.39E-03	7.94E-04	9.14E-04	4.97E-04	-6.61E+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 = Input 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:

1 tonne of Contiflo® tube

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
HWD	kg	6.25E-04	1.95E-09	3.03E-10	4.08E-10	1.00E-10	-4.38E-05
NHWD	kg	1.61E+02	1.35E-01	1.75E-02	6.53E-03	1.00E+01	2.02E+02
RWD	kg	2.11E-01	6.06E-04	1.17E-04	1.32E-04	2.17E-05	-1.30E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E+01	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E+02	0.00E+00
MER	kg	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.04E-01
EEE	MJ	1.61E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.12E+00
EET	MJ	1.71E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.20E+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

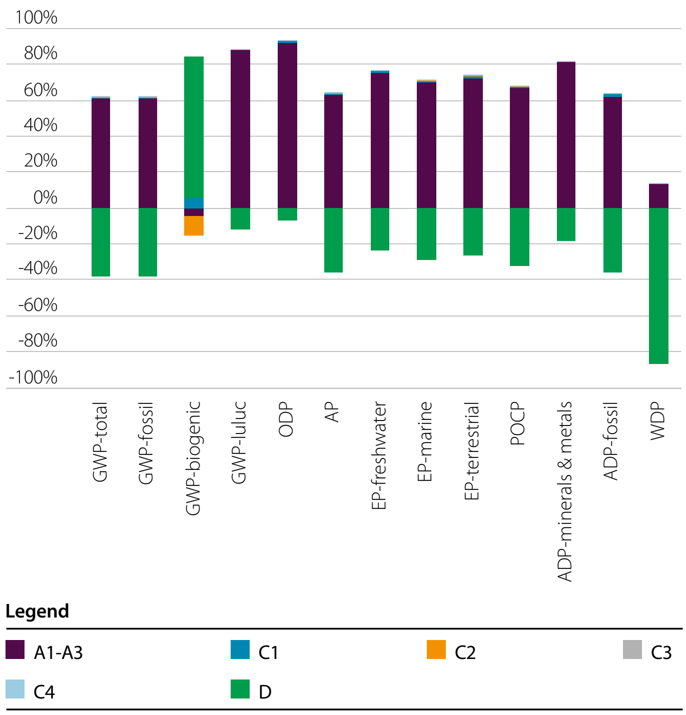
Figure 4 shows the relative contribution per life cycle stage for selected environmental impact categories for 1 tonne of Tata Steel's Contiflo® product. Each column represents 100% of the total impact score, which is why all the columns have been set with the same length. A burden is shown as positive (above the 0% axis) and a benefit is shown as negative (below the 0% axis). The main contributors across the impact categories are A1-A3 (burdens) and D (benefits beyond the system boundary). The manufacture of cold and direct rolled coil during stage A1-A3 is responsible for over 90% of each impact in almost all of the categories, specifically, the conversion of iron ore into liquid steel which is the most energy intensive part of the overall tube manufacturing process. The main exception to this is in the GWP-bio indicator, which shows a small credit. This is the result of incinerating the wooden pallet packaging after use, which doesn't release all the biogenic carbon contained in the wood back into the atmosphere.

The primary site emissions come from 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 CO_2, which contributes 91% of the Global Warming Potential (GWP), and sulphur oxides, which are responsible for 53% of the impact in the Acidification Potential (AP) category. In addition, oxides of nitrogen are emitted which contribute 45% of the A1-A3 Acidification Potential, and over 90% of the Eutrophication Potentials (EP-marine and EP-terrestrial), and the combined emissions of nitrogen oxides (70%) together with sulphur oxides, carbon monoxide and methane, contribute to the Photochemical Ozone indication (POCP).

Figure 4 clearly indicates the relatively small contribution to each impact from the other life cycle stages, which are the end-of-life stages C1 to C4. The exception to this is in the GWP-bio indicator from C1 and C2, but this only because the emission from A1-A3 is comparatively very small as explained previously.

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 pipe 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 [18]. The specific emissions that represent the burden in A1-A3, are essentially the same as those responsible for this Module D credit. 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 overall environmental impacts across successive uses.

Figure 4 LCA results for steel Contiflo®



It is worth noting that for the WDP indicator, the benefit in Module D is much greater than the manufacturing impact in A1-A3. This is a feature of the worldsteel 'value of scrap' calculation being based upon many steel plants worldwide. The tube making process does not consume as much water compared to the global average, so this burden is small when compared with the 'value of scrap' which features higher water 'saved' from avoiding virgin steel production. Additionally, the GWP-bio indicator shows a large burden from module D relative to the other modules, which comes from biogenic carbon emissions arising from the processes involved in recycling scrap.

Referring to the LCA results, the impact in Module D for the Use of Renewable Primary Energy indicator (PERT) is also different to the other impact categories, being a burden or load rather than a benefit. Renewable energy consumption is strongly related to the use of electricity, during manufacture, and as the recycling (EAF) process uses significantly more electricity than primary manufacture (BF/BOS), there is a positive value for renewable energy consumption in Module D but a negative value for non-renewable energy consumption.

6 References and product standards

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