ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Salzgitter AG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SMM-20210243-IBB1-EN
Issue date	18.05.2022
Valid to	17.05.2027

Oil Country Tubular Goods (OCTG)

Mannesmann Line Pipe GmbH

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

ECO PLATFORM EPD VERIFIED

1. General Information

Salzgitter AG	Oil Country Tubular Goods (OCTG)
Programme holder IBU – Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany	**Owner of the declaration** Salzgitter AG Eisenhüttenstraße 99 38239 Salzgitter Germany
Declaration number EPD-SMM-20210243-IBB1-EN	**Declared product / declared unit** 1 tonne hot-finished oilfield tube
This declaration is based on the product category rules: Steel pipes for pressure applications, 11.2017 (PCR checked and approved by the SVR)	**Scope:** This Environmental Product Declaration refers to cold and hot finished oil country tubular goods (OCTG) produced by
Issue date 18.05.2022	**Mannesmann Line Pipe GmbH** in Hamm and Siegen (Germany).
Valid to 17.05.2027	The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences. The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.
	Verification The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2011* ☐ internally ☒ externally
Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	
Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	Dr.-Ing. Wolfram Trinius (Independent verifier)

2. Product

2.1 Product description/Product definition
Steel oilfield pipes (Oil Country Tubular Goods, OCTG) involve pipes made of unalloyed and low-alloyed structural steel and fine-grade steel.

This Environmental Product Declaration refers to products recorded in the *API 5CT* (Casings and Tubings), for example.

The respective national regulations apply for usage.

2.2 Application
Oilfield pipes are used for conveying oil and gas but are also used in other areas of applications such as geothermics, for example.

2.3 Technical Data
The mechanical-technological properties for oilfield pipes can be found in Table C.5 of the *API 5 CT*, for example.

Sizes and dimensions are listed in accordance with Table C.1.

Technical construction data (API 5 CT as an example)

Name	Value	Unit
Hardness ASTM E110 (for areas > 50 mm)	max. 30	HRC
Modulus of elasticity	210000	N/mm^2
Coefficient of thermal expansion	11,5 - 11,9	10^-6K^-1
Thermal conductivity	35 - 47	W/(mK)
Melting point	1538	°C
Electrical conductivity at 20 °C	3,8 - 4,0	Ω^-1m^-1
Yield strength ASTM A370	276 - 759	N/mm^2
Tensile strength ASTM A370	414 - 862	N/mm^2
Elongation ASTM A370	17 - 26	1

2.4 Delivery status
The materials for oilfield pipes in accordance with *API 5 CT* are specified in groups 1 to 4.

2.5 Base materials/Ancillary materials

The base material for manufacturing hot-rolled coils as a preliminary material for cold- and hot-finished hollow sections is iron (percentage by mass >= 99.5%).

Other primary components are carbon, silicon and manganese. Chemical composition varies depending on the type of steel. The detailed percentages by mass are indicated in the *API 5 CT* product standard, for example.

Ancillary materials:
Various lubricants depending on the respective rolling process

The product contains substances from the *ECHA* list of candidates of Substances of Very High Concern (SVHC) (dated 17 January 2022) exceeding 0.1 percentage by mass: **no**

The product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass in at least one partial product: **no**

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the Ordinance on Biocide Products No. (EU) 528/2012): **no**

2.6 Manufacture

Hot-rolled strips of suitable width and sheet thickness, wound as coils, represent the preliminary material for manufacturing longitudinal seam-welded steel pipes. With Siegen and Hamm, Mannesmann Line Pipe GmbH has two production facilities with identical manufacturing processes.

Pipe production (circular oilfield pipes)
The process is broken down into three phases: **forming** the infinitely welded strip as open-seam pipes, **welding** and **annealing** the seam for achieving the requisite structure. The heated strip edges are welded together by pressing. The pipes are rounded and aligned followed by non-destructive testing of the high-frequency inductive (HFI) seam. The pipe string is then cut to the requisite length.

Processing (hot-finished oilfield pipes)
The cold-finished round pipes described above are heated to >870 °C by means of four inductors to produce hot-finished oilfield pipes. Production speed ranges from 0.5 to 4.0 m/min.

For product manufacturing and quality assurance, both sites are certified according to *ISO 9001* and based on *API Q1* for products according to *API 5 CT*.

2.7 Environment and health during manufacturing

During the entire manufacturing process, no other health protection measures are required extending beyond the legally specified industrial protection measures for commercial enterprises.

Certification of industrial safety and health protection in accordance with *ISO 45001* is in place for both sites.

Via regular analyses of the environmental impacts and permanent improvement measures and action within the framework of IMS (Integrated Management System), the low environmental impacts attributable to the manufacturing process are continuously minimised.

Both production facilities operated by Mannesmann Line Pipe GmbH are certified to *ISO 14001* and *ISO 50001*.

2.8 Product processing/Installation

Pipe connection
J55 and N80Q pipe grades can be ordered for welding on site. As a rule, however, oilfield pipes are connected either by means of so-called API (American Petroleum Institute) round threads, BTC (Bulge Control Technology) or premium threads. The thread cutters are procured externally.

Industrial safety and health protection measures
When processing/installing the oilfield pipes, no health protection measures beyond the usual work safety measures (such as protective gloves) are to be taken.

Environmental protection measures
No noteworthy environmental pollution is triggered by processing/assembling the products in question. No special measures need to be taken to protect the environment.

Residual material incurred
Residual material and packaging incurred on the building site must be collected separately. The specifications of local waste authorities must be maintained during processing.

2.9 Packaging

Oilfield pipes up to an outer diameter of 168.3 mm are shipped bundled with steel straps and/or secured on wooden beams with wooden wedges (waste code numbers: 150103 packaging made of wood, 150104 packaging made of metal). All packaging can be re-used.

2.10 Condition of use

The material composition during the use phase is the same as at the time of production. Oilfield pipes are made of unalloyed or low-alloy structural steels and of fine-grained structural steels. The possible contents are referred to in section 2.5.

2.11 Environment and health during use

There are no health risks for users of oilfield pipes or for persons manufacturing or processing oilfield pipes. From an environmental perspective, there are no restrictions governing the use of oilfield pipes.

2.12 Reference service life

Life cycles are dependent on the respective structure design, use and maintenance. The use phase for oilfield pipes is not depicted as they involve maintenance-free and generally durable products.

2.13 Extraordinary effects

Fire
Oilfield pipes comply with the requirements of construction product class A1 “non-flammable” in

accordance with *DIN 4102-1* and *DIN EN 13501-1*. No smoke gas develops.

Fire Protection

Name	Value
Building material class	A1

Water
The effects of flooding on oilfield pipes do not lead to any changes in the product or any other negative environmental impact.

Mechanical destruction
In the event of extraordinary mechanical impact, steel oilfield pipes display very good characteristics thanks to the high degree of ductility (malleability) of the material. As a general rule, no chips, breaking edges or similar are incurred.

2.14 Re-use phase
Steel oilfield pipes are 100% recyclable. Steel oilfield pipes can be directed to electro-steel plants as scrap at the EoL.

2.15 Disposal
As steel is 100% recyclable, this material does not require disposal. Waste code in accordance with the European List of Wastes (EWC), as per the European List of Wastes Ordinance *AVV*: 17 04 05 Iron and steel.

2.16 Further information
Please refer to *Mannesmann Line Pipe* for further information on oilfield pipes.

3. LCA: Calculation rules

3.1 Declared Unit
As a representative of the group of cold- and hot-finished oilfield pipe (OCTG) products, 1 tonne hot-finished oilfield pipe serves as the declared unit.

Details on declared unit

Name	Value	Unit
Declared Unit	1000	kg
Thickness (max. wall thickness)	25.4	mm
Conversion factor to 1 kg	0.001	-

3.2 System boundary
Type of EPD: cradle to gate with Modules C1–C4 and Module D.

The EPD comprises the following life cycle phases:

- Product stage (Modules A1–A3)
- End-of-life stage (Modules C1–C4)
- Benefits and loads beyond the system boundary (Module D)

Modules A1–A3 cover both the upstream chain of production and provision of raw materials, auxiliary materials and energy sources, the production of hot strip on the basis of iron ore, as well as its transport to the plants of Mannesmann Line Pipe GmbH, and the energy and material costs there. Waste water treatment is also considered.

It is assumed for Modules C1–C4 that there are no other material or energetic expenses for waste processing and that no materials need to be disposed of.

Module D takes consideration of the reuse and recycling potential. Recycling credits are allocated in line with the "theoretically 100% primary furnace route" approach, in accordance with *Worldsteel 2017*.

3.3 Estimates and assumptions
The base material for manufacturing the oilfield pipes (OCTG) is low-alloyed hot-rolled coils via the furnace route with production facilities in Germany.
Estimates and assumptions were documented in detail and are based on real production data from hot strip and steel pipe production.

3.4 Cut-off criteria
The End-of-Life scenario involves product losses of 3.1%. Landfilling is not considered. Likewise, the manufacture and utilisation of packaging material (steel bands, wooden beams) are not considered. Nor is the use of lubricants taken into consideration.

In their entirety, these unconsidered flows significantly comply with the cut-off criterion of max. 5% of energy and mass expenditure while also adhering to the criterion of 1% in relation to individual processes, *PCR, Part A + A2*.

3.5 Background data
The LCA results of the declared product are based on modelling in the *GaBi ts* software environment. Modelling is based on primary production data for the production of hot strip and the energy and media consumption values for an entire year.

This has been supplemented by secondary data from the GaBi database. The respective documentation can be viewed online.

3.6 Data quality
All primary data on steel/hot strip production and steel (line) pipe production refers to the financial year 2018. The annual volumes have been examined for representativity in relation to previous financial years.

The current GaBi database (GaBi version 10.5.1.124, database 2021.2) was used as background data sets.

The assessment model of the "Product Environmental Footprint (PEF)" approach of the EC Joint Research Centre 2012 was used to assess the quality of the primary and secondary data in this EPD. Accordingly, the overall data quality can be rated as "very good".

3.7 Period under review
The period under review is fiscal 2018. The volumes of hot-finished oilfield pipes (OCTG) produced in 2018 serve as averages for the Declaration.

3.8 Allocation
The methodology used for the co-products in the "coking plant" and "power plant" processes of primary steel production was physical allocation based on

calorific value. For the other co-products, a partitioning approach based on the product energy content was used according to the recommendation of *Worldsteel 2014*.

The use of steel scrap for the production of hot strip in Module A1 is considered unencumbered. However, a large percentage of scrap requirements is already covered by the cutting losses incurred during pipe production.

The remaining residual quantity is fed into Module A1 before the End-of-Life scenario is considered and deducted from the scrap material flow for recycling. The difference is the net scrap quantity that is transferred to the recycling process; please refer to *Helmus et al., 2019*. Recycling credits are allocated in line with the “theoretically 100% primary furnace route” approach, in accordance with *Worldsteel 2014*.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The background database used involves the GaBi data base, version 2021.2 (*GaBi ts*).

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon

End of Life (C3 – C4)

Name	Value	Unit
Collecting Rate	96,9	%
Loss	3,1	%
Recycling	969	kg

Reuse, recovery and recycling potential (D), relevant scenario information

Name	Value	Unit
Recycling	100	%

5. LCA: Results

Important:
EP freshwater: This indicator was calculated as "kg P equiv." in accordance with the characterisation model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	ND	ND	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 tonne hot-finished oilfield pipe

Core Indicator	Unit	A1-A3	C3	C4	D
Global warming potential - total	[kg CO_2-Eq.]	2.55E+3	0.00E+0	0.00E+0	-1.62E+3
Global warming potential - fossil fuels	[kg CO_2-Eq.]	2.55E+3	ND	ND	-1.62E+3
Global warming potential - biogenic	[kg CO_2-Eq.]	4.00E+0	0.00E+0	0.00E+0	1.94E+0
GWP from land use and land use change	[kg CO_2-Eq.]	1.56E+0	0.00E+0	0.00E+0	-2.77E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.74E-8	0.00E+0	0.00E+0	-2.82E-8
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	7.05E+0	0.00E+0	0.00E+0	-4.71E+0
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	2.69E-3	0.00E+0	0.00E+0	-5.12E-4
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	1.55E+0	0.00E+0	0.00E+0	-9.08E-1
Eutrophication, accumulated exceedance	[mol N-Eq.]	1.68E+1	0.00E+0	0.00E+0	-9.86E+0
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	4.42E+0	0.00E+0	0.00E+0	-2.43E+0
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	5.17E-4	0.00E+0	0.00E+0	-2.67E-4
Abiotic depletion potential for fossil resources	[MJ]	2.44E+4	0.00E+0	0.00E+0	-1.33E+4
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	4.79E+0	0.00E+0	0.00E+0	-5.66E-1

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 tonne hot-finished oilfield pipe

Indicator	Unit	A1-A3	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	2.20E+3	0.00E+0	0.00E+0	1.55E+3
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	2.20E+3	0.00E+0	0.00E+0	1.55E+3
Non-renewable primary energy as energy carrier	[MJ]	2.45E+4	0.00E+0	0.00E+0	-1.34E+4
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.45E+4	0.00E+0	0.00E+0	-1.34E+4
Use of secondary material	[kg]	1.88E+2	0.00E+0	0.00E+0	9.14E+2
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	4.79E+0	0.00E+0	0.00E+0	-5.66E-1

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 tonne hot-finished oilfield pipe

Indicator	Unit	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	2.34E+0	0.00E+0	0.00E+0	-1.25E-1
Non-hazardous waste disposed	[kg]	2.89E+1	0.00E+0	0.00E+0	-2.42E+1
Radioactive waste disposed	[kg]	2.67E-1	0.00E+0	0.00E+0	1.84E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	1.89E+2	9.69E+2	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 tonne hot-finished oilfield pipe

Indicator	Unit	A1-A3	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND

Limitation note 1 – applies to the indicator “Potential impact of exposure to people to U235”: This impact category mainly addresses the potential impact of low-dose ionising radiation on human health in the nuclear fuel cycle. This does not consider impacts attributable to possible nuclear accidents and occupational exposure, nor to the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is not measured by this indicator either.

Limitation note 2 – applies for the indicators: "Potential for Abiotic Resource Depletion - Non-Fossil Resources", "Potential for Abiotic Resource Depletion - Fossil Fuels", "Water Depletion Potential (User)", "Potential Ecosystem Toxicity Comparison Unit", "Potential Human Toxicity Comparison Unit - Carcinogenic Effect", "Potential Human Toxicity Comparison Unit - Non-Carcinogenic Effect", "Potential Soil Quality Index". The results of this environmental impact indicator must be used with caution, as the uncertainties in these results are high or there is limited experience with the indicator.

6. LCA: Interpretation

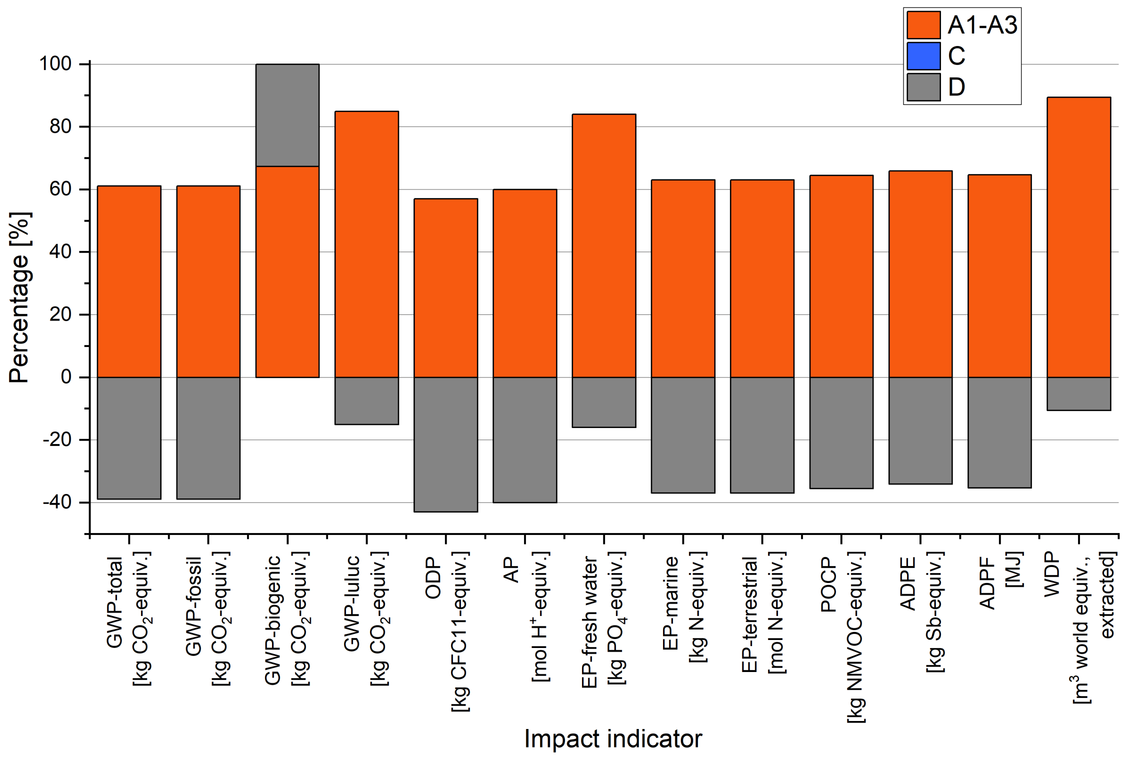

Fig.: Environmental impacts on the declared modules

Steel – as a material with inherent properties – is infinitely recyclable. Therefore, the aim when analysing steel products and products containing a high percentage of steel is to consider End-of-Life scenarios in particular and analyse them comprehensively across all life cycle phases. This advantage is obvious with the examination of the diagram: almost all impact categories receive credit in Module D due to the recyclability of steel and the established recycling system with maximum collection rates.

The results of the impact assessment show that almost the “entire greenhouse gas emissions (**GWP total**)” of Modules A1-A3 come from fossil sources (cf. indicator **GWP fossil**). As expected, the more detailed analysis shows that hot strip production (Module A1) has the greatest influence on GWP total or GWP fossil, accounting for almost 94%. Here, the fossil carbon input in the blast furnace process is particularly noteworthy, leading to direct, process-related CO2 emissions and to further indirect emissions in the power plant process. Within Module A1, approx. 70% of greenhouse gas emissions come from the direct plant emissions and about 30% from the emissions of the preliminary processes for the production of the raw materials such as the coal, iron ore carriers and lime. In Module A3, the majority of greenhouse gas emissions are accounted for by upstream emissions in the production of electricity

In contrast, the absolute shares of the "greenhouse potentials from biogenic sources (**GWP biogenic**)" and from "landscape use and landscape use change (**GWP luluc**)" have only a negligible share of the total greenhouse potential. As expected, the contributions in Modules A1 and A3 come exclusively from the upstream processes, and here primarily from the electricity mix used or the raw material supplies.

For the "Water Depletion Potential (User) (**WDP**)", the upstream chains of electricity generation to cover the electricity demand in Module A3 are decisive with 66.4%.

The other core indicators of environmental impacts are predominantly determined by steel and hot strip production in Module A1. The "Potential for stratospheric ozone depletion (**ODP**)" should be emphasised. The ODP is almost exclusively caused by the use of methanol in wastewater treatment in Module A1, as halogenated hydrocarbons are emitted during the production of methanol.

For the remaining impact indicators, the provision of raw materials for steel production (Module A1) also has the greatest influence on the absolute size of the environmental indicators. As expected, the largest contributions are made by the provision of iron ore carriers, coal and lime, i.e. those input materials that are used in the largest quantities. In addition, the impact indicators describing the acidification potential (**AP**), the eutrophication potential (**EP freshwater**, **EP marine**, **EP terrestrial**) and the ozone creation potential (**POCP**) are increased by the direct NOx and SO2 emissions of the sintering plant and the power plant.

The overall small shares of the pipe manufacturing process (Module A3) in the impact categories of this class are mainly attributable to power generation and its upstream chains.

In contrast to fossil-based primary steel production, recycling by means of the electric arc process is mainly based on electricity. This is largely provided by renewable energies. For this reason, Module D leads to an increase rather than a decrease in the use of renewable energy, while at the same time reducing the use of fossil energy, as can be seen from the indicators **PERE** (Renewable Primary Energy as Energy Source) and **PENRE** (Non-renewable Primary Energy as Energy Source). For this reason, recycling in Module D also increases the **GWP biogenic** impact indicator.

In summary, almost every LCA indicator is determined by the steel production process in Module A1. Only electricity generation and its upstream chains have a significant overall impact on the pipe manufacturing process (Module A3). For Mannesmann Line Pipe, material efficiency is therefore the biggest lever in this and most categories.

7. Requisite evidence

This EPD concerns oilfield pipes made of unalloyed and low-alloyed structural steel. Further processing depends on the respective application. Evidence of tests in line with the technical conditions governing delivery is provided by inspection certificates.

Verification for mechanical pipe properties

Apart from the structural technical data provided in section 2.3, evidence and results of additional mechanical tests such as a flattening test in accordance with *ASTM A 370* must be provided depending on customer requirements.

8. References

Standards

EN 13501-1
DIN EN 13501-1:2019-05, Classification of construction products and methods by reaction to fire – Part 1: Classification with the results of tests on reaction to fire of construction products

EN 15804
DIN EN 15804 + A2:2020-03, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

DIN 4102-1
DIN 4102-1:1998-05, Fire behaviour of building materials and building components – Part 1: Building materials, terms, requirements and tests

ISO 9001
DIN EN ISO 9001:2015-11, Quality management systems – Requirements

ISO 14001
DIN EN ISO 14001:2015-11, Environmental management systems – Requirements with guidance for use (ISO 14001:2015)

ISO 14025
DIN EN ISO 14025:2011-10, Environmental labels and declarations – Type III environmental declarations – Principles and procedures (ISO 14025:2006); German and English versions EN ISO 14025:2011

ISO 14044
DIN EN ISO 14044:2021-02, Environmental management – Life cycle assessment – Requirements and guidelines (ISO 14044:2006 + Amd. 1:2017 + Amd. 2:2020)

ISO 45001
ISO 45001:2018-03, Occupational health and safety management systems – Requirements with guidance for use (ISO 45001:2018)

ISO 50001
ISO 50001:2018-08, Energy management systems – Requirements with guidance for use (ISO 50001:2018)

PCR, Part A
Product category guidelines for building-related products and services, Part A: Calculation rules for the Life Cycle Assessment and requirements on the Project Report, in accordance with EN 15804+A2:2019, version 1.8, Berlin: Institut Bauen und Umwelt e.V. (pub.), 01.07.2020

PCR, Part B
Steel pipes for pressure applications; Product category guidelines for building-related products and services, Part B: Requirements on the EPD for steel pipes for pressure applications, version 1.0, Berlin: Institut Bauen und Umwelt e.V. (pub.), www.ibu-epd.com, 2016-05

API 5 CT
Casing and Tubing; API Specification 5CT, Tenth Edition, June 2018; Errata 1 (2018-12), Errata 2 (2019-5), Errata 3 (2020-6); Addendum 1 (2021-1)

API Q1
Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry; API Specification Q1: Ninth Edition, Juni 2013; Errata 1 (2014-06), Errata 2 (2014-03), Errata 3 (2019-10); Addendum 1 (2016-06) and Addendum 2 (2018-06)

API RP 5L3
Drop-Weight Tear Tests on Line Pipe; issue date: 2014-08

ASTM A 370
Test on the mechanical properties of steel products; issue date: 2015

ASTM E 110
Testing metallic materials; determining Rockwell and Brinell hardness using portable hardness testers; issue date: 2014

AVV
Ordinance on the list of wastes (Directive governing the European Waste Index): 10 December 2001 (Federal Law Gazette No. I S. 337s9), last amended: 4 July 2020

ECHA
https://echa.europa.eu/de/candidate-list-table

PRTR
REGULATION (EC) No. 166/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC

Other literature

GaBi ts
GaBi version 10.5.1.124; database used: 2021.2 GaBi ts data set documentation for the software system and databases, LBP, University of Stuttgart and thinkstep, Leinfelden-Echterdingen, 2021 (http://documentation.gabi-software.com/)

GaBi EN 15804
EN 15804-conformant LCIA calculation methods of GaBi software; https://gabi.sphera.com/international/support/gabi/gabi-lcia-documentation/en-15804/

Mannesmann Line Pipe
www.mannesmann-linepipe.com

SZFG
Overview of current SZFG certificates at: https://www.salzgitter-flachstahl.de/de/informationsmaterial/zertifikate.html

World steel 2014
World Steel Association, A methodology to determine the LCI of steel industry co-products, Brussels, Belgium, 2014

World steel 2015
World Steel Association, Steel in the circular economy: a life cycle perspective, Brussels, Belgium, 2015

World steel 2017
World Steel Association, Life Cycle Inventory Methodology Report, Brussels, Belgium, 2017, ISBN 978-2-930069-89-0

Publisher
Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Tel	+49 (0)30 3087748- 0
Fax	+49 (0)30 3087748- 29
Mail	info@ibu-epd.com
Web	**www.ibu-epd.com**

Programme holder
Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Tel	+49 (0)30 - 3087748- 0
Fax	+49 (0)30 – 3087748 - 29
Mail	info@ibu-epd.com
Web	**www.ibu-epd.com**

Author of the Life Cycle Assessment
Salzgitter Mannesmann Forschung GmbH
Eisenhüttenstraße 99
38239 Salzgitter
Germany

Tel	+49 5341 21-2222
Fax	+49 5341 21-4750
Mail	info.service@sz.szmf.de
Web	**www.szmf.de**

Owner of the Declaration
Salzgitter AG
Eisenhüttenstraße 99
38239 Salzgitter
Germany

Tel	+49 5341 21-01
Fax	+49 5341 21-2727
Mail	pk@salzgitter-ag.de
Web	**https://www.salzgitter-ag.com/**

Mannesmann Line Pipe GmbH
In der Steinwiese 31
57074 Siegen
Germany

Tel	+49 271 691-0
Fax	+49 271 691-299
Mail	info.mlp@mannesmann.com
Web	**www.mannesmann-linepipe.com**