TATA STEEL

TATA

Pickled Hot Rolled Steel Coil

Environmental Profile

(according to ISO 14021 and referring to relevant parts of ISO 14040 & 14044)

General information

Owner of declaration	Tata Steel in Europe
Product	Pickled hot rolled steel coil
Manufacturing sites	IJmuiden and Port Talbot
Product application	Construction & infrastructure, engineering and automotive
Declared unit	1 tonne of steel product
Date of issue	22nd April 2022
Profile number:	EP-TS-2022-02

This declaration has been produced according to ISO 14021 [1] and describes the specific environmental impact of the named product over its life cycle. The information in this Environmental Profile is based on production data from 2016 and 2017 and the Life Cycle Assessment supporting this profile has been third party critically reviewed according to ISO 14040/44 [2,3] by EuGeos [4] and applies the worldsteel LCI methodology for steel products. [5]

Product information

Pickled hot-rolled steel offers performance, versatility and value. Tata Steel's line of pickled hot-rolled strip steel includes forming and structural grades, heat-treatable steels and advanced and high-strength low-alloy steels. All are specially designed for specific and demanding applications. You can rely on the consistent quality of our pickled hot-rolled steel. Our products comply with all the relevant European standards. We have also enhanced many of our steel grades to deliver added benefits – both for end products and customer processes. Our hot-rolled steel line includes exclusive Tata Steel products developed to save you money and make your life easier. These include Ympress® Laser, developed specifically for fast and efficient laser-cutting, and Durbar® - a product that has become the byword for structural steel floor plate.

The main benefits of our pickled hot-rolled steel include:

- enhanced end product performance
- extended product life
- stronger, lighter products
- opportunities to cut costs
- repeatable, trouble-free processing
- opportunities to simplify processing
- maximised yield

The main applications of our pickled hot-rolled steel include:

- agricultural equipment
- automotive components
- construction and building components
- domestic appliances
- electrical goods
- infrastructure and street furniture
- pressure vessels and boilers
- ship plate
- trucks and trailers
- tubes and sections
- heavy vehicles equipment

The process of pickled hot rolled coil manufacture at Tata Steel begins with sinter/pellets being produced from iron ore and limestone/dolomite, and together with coke from coal, reduced in a blast furnace to produce iron. Steel scrap is then 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, which is then pickled to remove any surface oxides. The process is illustrated in

Figure 1. The hot rolled coils are then packaged for despatch, either direct to the customer or for further processing.

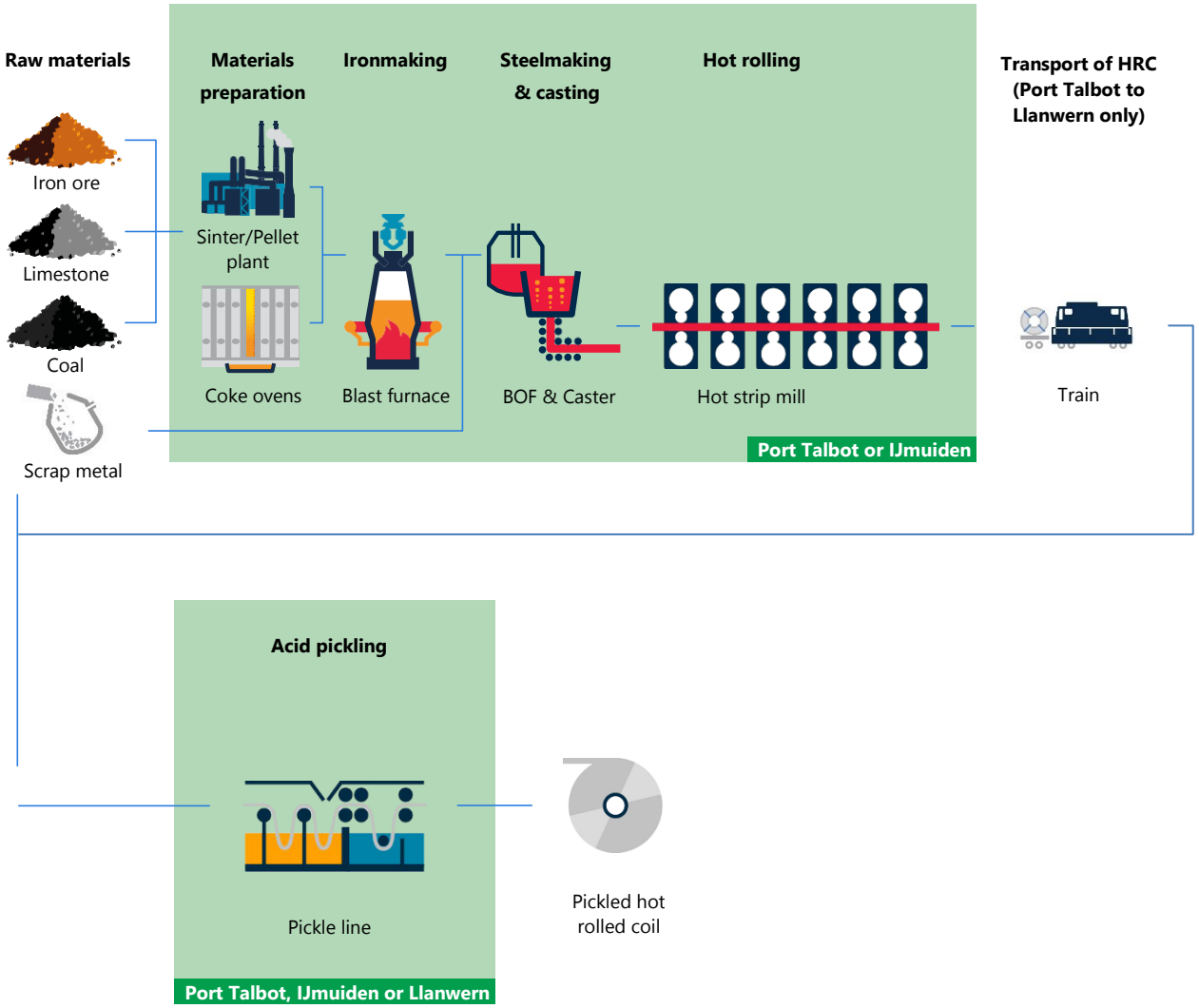

Figure 1 **Process overview from raw materials to pickled hot rolled coil**

Life Cycle Assessment (LCA) methodology

The life cycle modelling was carried out using the GaBi software system for life cycle engineering [6,7] and data was gathered from all parts of the process route, including Tata Steel's own data for the steel production. The model was used to calculate the Global Warming Potential (GWP) impact for the manufacture and end-of-life processing of pickled hot rolled steel coil. This Life Cycle Inventory study has been undertaken in accordance with ISO 14040 and ISO 14044 and the manufacturing stage includes all steps from the extraction of raw materials to the production of steel coils that leave the factory gate.

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 declaration. The methodology used to develop the data is detailed in the latest World Steel Association Life Cycle Inventory Study Report [8]. Where specific data were not available, background data provided in the GaBi LCA software were used for the end-of-life processing and landfill parts of the life cycle. System expansion was applied to assign impacts to the production of slag and hot metal from the blast and basic oxygen furnaces (co-products from steel manufacture) and this method was also used to account for the process gases that arise during the production of the cast slabs.

The Life Cycle Assessment of pickled hot rolled coil is illustrated in Figure 2, with the life cycle stages not included in grey text. The following assumptions were used to calculate the results;

- The declared unit is 1 tonne of pickled hot rolled steel coil
- Impacts from packaging of the pickled hot rolled coil and transport to the customer are not included because these can vary considerably depending on the customer and mode of transport
- Further processing of the pickled hot rolled coil is not included
- No impacts from construction/assembly, or use of the product are included
- Deconstruction/dismantling of the product is not included
- Transport to end-of-life fate is based on a 25t capacity truck over a distance of 100km with a utilisation of 40% to allow for empty returns
- At end-of-life, steel to be recycled is processed in a mechanical shredder
- At end-of-life, 95% of the steel product is recycled and 5% of the steel product is sent to landfill. [9]

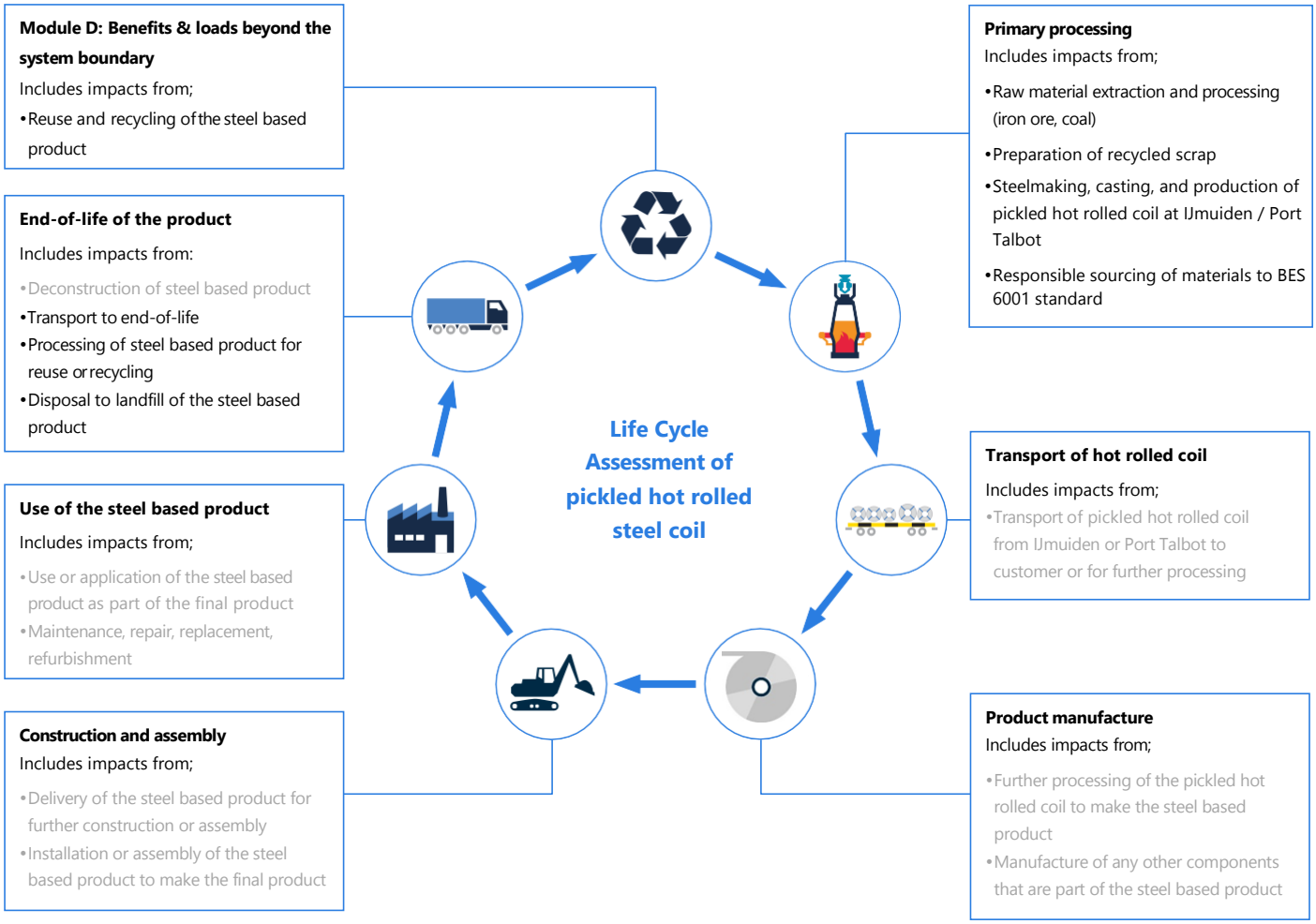

Figure 2 Life Cycle Assessment of pickled hot rolled steel coil

Results of the LCA

The environmental impacts are for 1 tonne of pickled hot rolled steel coil and are expressed using the CML 2001-January 2016 method for life cycle impact assessment [10]. The results for global warming potential are shown in Table 1 and those for other environmental indicators are presented in Table 2.

Table 1 Global warming potential for the life cycle of 1 tonne of pickled hot rolled coil

	Manufacture	End-of-life	Recycling benefit
Global Warming potential (t CO_2 eq.)	2.16	0.06	-1.34

Table 2 Other environmental impact indicators for the life cycle of 1 tonne of pickled hot rolled coil

	Manufacture	End-of-life	Recycling benefit
Ozone layer depletion potential (kg CFC11 eq.)	3.20E-12	1.94E-12	-3.11E-12
Acidification potential of land & water (kg SO_2 eq.)	4.65E+00	7.50E-02	-2.11E+00
Eutrophication Potential (kg PO_4^{3-} eq.)	4.67E-01	1.30E-02	-1.10E-01
Photochemical ozone creation potential (kg Ethene eq.)	7.21E-01	5.00E-03	-6.66E-01
Abiotic depletion potential for non-fossil resources (kg Sb eq.)	5.08E-05	1.98E-05	-2.75E-03
Abiotic depletion potential for fossil resources (GJ)	2.20E+01	6.54E-01	-1.28E+01

References

1. EN14021:2016, Environmental labels and declarations – Self-declared environmental claims (Type II environmental labelling)
2. ISO 14040:2006, Environmental management – Life Cycle Assessment. Principles and framework
3. ISO 14044:2006, Environmental management - Life Cycle Assessment. Requirements and guidelines
4. Critical Review Statement, EuGeos, April 2022
5. Worldsteel Life Cycle Inventory (LCI) methodology report for steel products, World Steel Association, Brussels (2017).
6. Sphera; GaBi: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2022
7. Documentation of GaBi: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2022 http://documentation.gabi-software.com
8. World Steel Association, Life Cycle Inventory (LCI) Study – 2020 data release, May 2021
9. The actual recycling rate will depend on the final end-user product that the steel is converted into but recycling rates are typically more than 95% in the construction, engineering and automotive sectors
10. CML LCA methodology, Institute of Environmental Sciences (CML), Faculty of Science, University of Leiden, The Netherlands

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Language English UK 0422