worldsteel LCA eco-profile

Tinplate

Declared product	1 metric tonne of tinplate
System boundary	Cradle-to-gate + end-of-life
Production routes	BOF and EAF
Geographic scope	Global average
Normative reference	worldsteel LCI methodology report, ISO 14040/44
LCIA methodology	Selected indicators according to CML2001 Aug 2016 + energy and water indicators
Allocation of co-products	System expansion
Owner of the declaration	World Steel Association
Publication date	May 2022
Verification	Externally - worldsteel methodology Internally - applied data Internally - fact sheet

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worldsteel LCA eco-profile

This LCA eco-profile refers to the life cycle assessment results of global tinplate published by the World Steel Association. It aims at the transparent communication of life cycle related environmental indicators on a global basis. All presented impact assessment results build on the worldsteel 2021 LCI Study Report as well as the worldsteel Life Cycle Inventory Methodology Report 2017. Other LCI data may have different scopes, boundaries and implement different methodologies.

Declared product

The presented results refer to a declared unit of 1 metric tonne of tinplate representing a global industry average.

Product description

Obtained by electro plating a thin finished cold rolled coil with a thin layer of tin. It can be found on the market in coil or in sheets and is further processed into finished products by the manufacturers. Tin plated steel is used primarily in food cans, industrial packaging (e.g. small drums). Typical thickness between 0.13 - 0.49 mm. Typical width between 600 - 1100 mm.

Scope

The assessment covers the cradle-to-gate LCA results of the declared steel products including the end-of-life-recycling (see Figure 1).

The cradle-to-gate LCI study with end-of-life recycling includes net credits (the amount of end-of-life scrap minus any scrap consumed in the production of the product) associated with recycling the steel from the final products at the end-of-life (end-of-life scrap) with a 95% end-of-life recycling rate. This study does not include the manufacture of the downstream final products or their use.

The primary data collected from the steel companies relates to the production from 2016 to 2020 and is believed to be representative of global steel production during this time frame. 143 steel production sites from 37 companies have contributed to the 2021 worldsteel LCI data release. Allocation of environmental impacts between the steel product and resulting co-products follow the worldsteel methodology applying system expansion (see worldsteel 2021 LCI Study Report for further details).

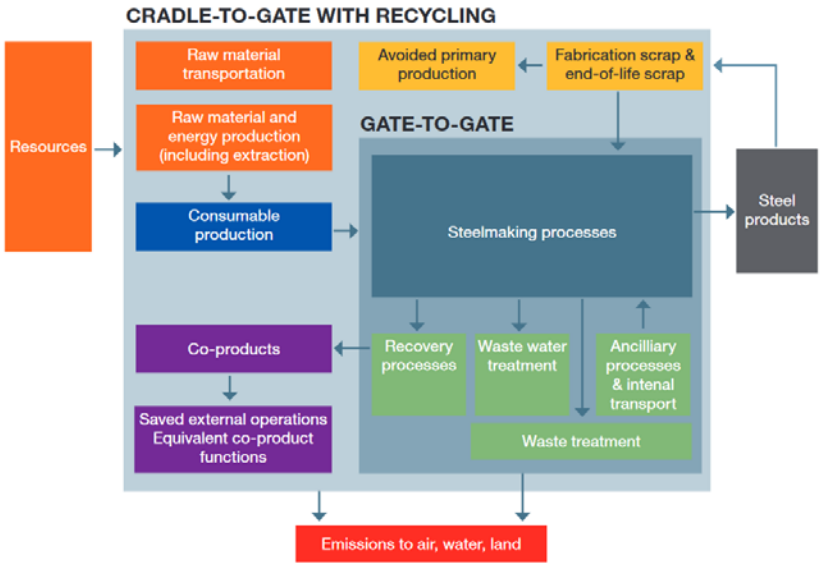

Figure 1 System boundaries overview of the cradle-to-gate analysis including end-of-life recycling (worldsteel methodology report, 2017).

The calculation is based on GaBi background data - GaBi software version 10.6.0.110, database version 2021.2. Therefore, allocation in the supply chain follows the assumptions of the GaBi-database. Further information of the applied background data is given in the worldsteel 2021 LCI Study Report.

End-of-life allocation follows the approach defined according to worldsteel's LCI methodology, whereby the net amount of scrap reaching the end-of-life stage is calculated. This is then reported separately to the cradle-to-gate impacts.

This evaluation complies with the requirements of ISO 14040 and ISO 14044. It represents a basis for potential B2B and B2C communication of the environmental impacts of the analysed steel products.

Content of recycled steel

The total amount of iron and steel scrap used to make the product is **0.084 metric tonnes scrap/tonne of steel product**.

In this case, the scrap input refers to the net scrap input, i.e., it does not consider the recirculating, internal or home scrap that is generated in the processes that are being studied, i.e., scrap from the coil production process that goes back into the BOF or EAF is not included as an external scrap input for cold rolled coil. Thus, the scrap input is often

considered to be external to the production of the product as well as post-consumer scrap, i.e., scrap produced in processes downstream of the production of the steel product in question: on the steel plant, fabrication and manufacturing scrap as well as end-of-life scrap (see further information in the worldsteel methodology report, 2017).

LCA Results

The presented results refer to the life cycle related environmental footprint of 1 metric tonne of steel product. Table 1 presents the product's potential environmental impact according to selected indicators. In addition, selected life cycle inventory indicators are illustrated in Table 2.

Table 1 Results of the LCA - Environmental impact according to selected indicators of CML 2001 – Aug 2016: 1 metric tonne of steel product

Indicator	Unit	Cradle-to-gate results	Benefit of recycling results
Global warming potential (GWP)	tonnes CO_2-eq	**2.63**	**-1.43**
Ozone layer depletion potential (ODP)	kg CFC11-eq	**2.45E-12**	**-4.37E-12**
Acidification potential (AP)	kg SO_2-eq	**5.5731**	**-2.7408**
Eutrophication potential (EP)	kg $(PO_4)^{3-}$-eq	**0.552**	**-0.190**
Photochemical ozone creation potential (POCP)	kg ethene-eq	**0.900**	**-0.692**

Table 2 Results of the LCA - Indicators to describe resource use according to selected indicators of 1 metric tonne of steel product

Indicator	Unit	Cradle-to-gate results	Benefit of recycling results
Total use of renewable primary energy resources (PED renewable)	GJ	**0.96**	**0.87**
Total use of non-renewable primary energy resources (PED non-renewable)	GJ	**30.03**	**-13.77**
Use of net fresh water	m^3	**5.27**	**-6.29**

External steel scrap processing is included in cradle-to-gate results.

References

CML2001 – Aug.2016	CML2001 – Aug.2016. University of Leiden.
GaBi 10	GaBi 10, Software System and Database for Life Cycle Engineering. DB 2020.1. Sphera, 1992-2022. Available at: http://documentation.gabi-software.com
ISO 14040	ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework.
ISO 14044	ISO 14044:2006-10. Environmental management – Life cycle assessment – Requirements and guidelines.
worldsteel, 2017	World Steel Association, 2017: Life cycle inventory methodology report.
worldsteel, 2021	World Steel Association, 2021: 2021 LCI Study Report.

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