worldsteel LCA eco-profile
Global | Tinplate

Declared product	1 metric tonne 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 EN 15804+A2:2019
Allocation of co-products	System expansion
Owner of the declaration	World Steel Association
Publication date	June 2023
Verification	Externally - worldsteel methodology Internally - applied data Internally - eco-profile

worldsteel LCA eco-profile

This LCA eco-profile refers to the life cycle assessment results of Global tinplate 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 2022 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 the 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.

worldsteel ASSOCIATION

Daxner&Merl sustainability strategy responsibility

Scope

The assessment covers the cradle-to-gate LCA results of the declared steel products including 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 2017 to 2022 and is believed to be representative of global steel production during this time frame. 155 steel production sites from 43 companies have contributed to the 2022 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 2022 LCI Study Report for further details).

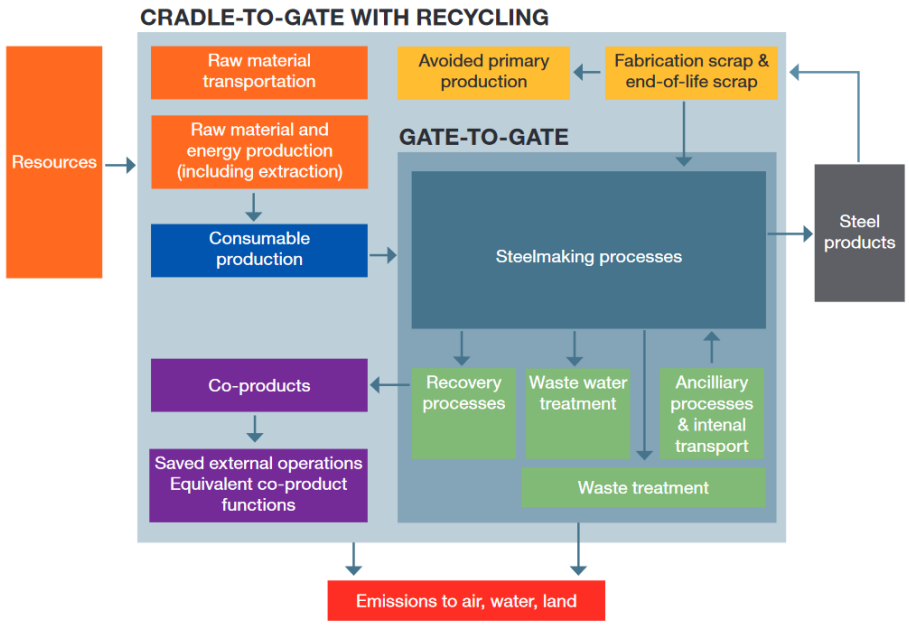

Figure 1: System boundaries overview of the cradle-to-gate analysis including end-of-life recycling (worldsteel methodology report, 2017).

The calculation is based on Sphera background data – LCA for Experts software version 10.7.0.183, database version 2022.2. Therefore, allocation in the supply chain follows the assumptions of the Sphera-database. Further information of the applied background data is given in the worldsteel 2022 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.

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 following EN 15804+A2:2019, given that this is a standard often used for construction products. The chosen indicators refer to the selection applicable for sustainable building certification according to the DGNB system.

Table 1: Results of the LCA - Environmental impact and indicators according to selected indicators of EN 15804+A2:2019: 1 metric tonne of steel product

Indicator	Unit	Cradle-to-gate results [module A1-A3*]	End of Life results [module C1-C4*]	Benefit of recycling results [module D*]
Climate Change - total	tonnes CO_2 eq.	2.80	3.64E-07	-1.51
Climate Change, fossil	tonnes CO_2 eq.	2.80	3.63E-07	-1.52
Climate Change, biogenic	tonnes CO_2 eq.	0.0003	1.82E-09	0.0087
Climate Change, land use and land use change	tonnes CO_2 eq.	0.0004	1.94E-11	-0.0002
Ozone depletion	kg CFC-11 eq.	1.01E-09	3.37E-16	1.97E-09
Acidification	Mole of H^+ eq.	6.8210	1.14E-06	-3.5905
Eutrophication, freshwater	kg P eq.	0.0018	9.83E-10	-0.0003
Eutrophication, marine	kg N eq.	1.4058	1.75E-07	-0.5767
Eutrophication, terrestrial	Mole of N eq.	15.0711	1.95E-06	-5.1684
Photochemical ozone formation, human health	kg NMVOC eq.	5.3741	8.67E-07	-2.3423
Resource use, mineral and metals	kg Sb eq.	0.1177	5.53E-11	-0.0083
Resource use, fossils	GJ	32.12	1.70E-05	-14.59
Water use	m^3 world equiv.	-527	7.82E-06	-99
Total use of renewable primary energy resources (PERT)	GJ	1.24	2.44E-07	0.58
Total use of non-renewable primary energy resources (PENRT)	GJ	32.13	1.71E-05	-14.59

*Modular approach according to EN 15804.

Content of recycled steel

The total amount of iron and steel scrap used to make the product is **0.105 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 tinplate production process that goes back into the BOF or EAF is not included as an external scrap input for tinplate.

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).

References

EN 15804+A2:2019	EN 15804:2019-04+A2, 2021. Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.
LCA for Experts	LCA for Experts 10, Software System and Database for Life Cycle Engineering. DB 2022.2. Sphera, 1992-2023. Available at: https://sphera.com/life-cycle-assessment-lca-software/
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, 2022	World Steel Association, 2022: 2022 LCI Study Report

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