worldsteel LCA eco-profile

Electrogalvanized Steel

Declared product	1 metric tonne of electrogalvanized steel
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+A1:2013
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

worldsteel ASSOCIATION

in cooperation with

Daxner & Merl GmbH

worldsteel
ASSOCIATION

worldsteel LCA eco-profile

This LCA eco-profile refers to the life cycle assessment results of global electrogalvanized steel 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 electrogalvanized steel representing a global industry average.

Product description

Obtained by electro plating finished cold rolled steel with a thin layer of zinc or zinc-nickel to provide corrosion resistance; can be further processed. They have excellent forming properties, paintability, weldability, and are suitable for fabrication by forming, pressing and bending. Applications include domestic applications, building applications (e.g. wall elements, roofing applications), automotive applications (e.g. body in white for vehicles underbody auto parts), lighting fixtures, drums and various kinds of sections applications, profiled sheets, etc. Typical thickness between 0.3 - 3 mm. Typical width between 600 - 2100 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).

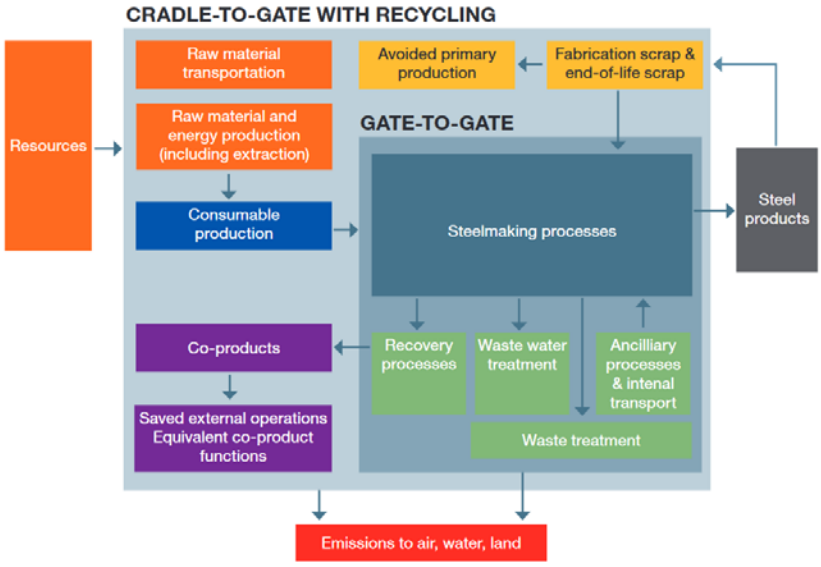

Figure 1 System boundaries overview of the cradle-to-gate analysis including end-of-life recycling (worldsteel methodology report, 2017).

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 **0.050 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 electrogalvanized steel processes that goes back into the BOF or EAF is not included as an external scrap input for electrogalvanized steel. 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 following EN 15804+A1, given that this is a standard often used for construction products. In addition, selected life cycle inventory indicators are illustrated in Table 2. 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 according to selected indicators of EN 15804+A1: 1 metric tonne of steel product

Indicator	**Unit**	**Cradle-to-gate results** [module A1-A3*]	**Benefit of recycling results** [module D*]
Global warming potential (GWP)	tonnes CO_2-eq	**2.58**	**-1.48**
Ozone layer depletion potential (ODP)	kg CFC11-eq	**2.20E-11**	**-4.53E-12**
Acidification potential (AP)	kg SO_2-eq	**5.788**	**-2.8504**
Eutrophication potential (EP)	kg $(PO_4)^{3-}$-eq	**0.495**	**-0.197**
Photochemical ozone creation potential (POCP)	kg ethene-eq	**0.946**	**-0.720**

Table 2 Results of the LCA - Indicators to describe resource use according to selected indicators of EN 15804+A1: 1 metric tonne of steel product

Indicator	**Unit**	**Cradle-to-gate results** [module A1-A3*]	**Benefit of recycling results** [module D*]
Total use of renewable primary energy resources (PED renewable)	GJ	**0.99**	**0.90**
Total use of non-renewable primary energy resources (PED non-renewable)	GJ	**30.13**	**-14.32**
Use of net fresh water	m^3	**23.02**	**-6.54**

*Modular approach according to EN 15804. External steel scrap processing is included in modules A1-A3.

References

EN 15804+A1	EN 15804:2012-04+A1, 2013. Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
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.

worldsteel ASSOCIATION	**Owner of the fact sheet** World Steel Association Avenue de Tervueren 2709751 1150 Brussels Belgium Tel 0032 2 702 89 00 Mail steel@worldsteel.org Web **www.worldsteel.org**
Daxner&Merl sustainability strategy responsibility	**Supported by** Daxner & Merl GmbH Lindengasse 39/8 1070 Vienna Austria Tel 0043 676 849477826 Mail office@daxner-merl.com Web **www.daxner-merl.com**