Environmental Product Declaration

SSAB Slag products

Air-cooled blast furnace slag (ABS)
Granulated blast furnace slag (GBS)
LD slag
Mix GBS/LD slag

EPD of multiple products, based on the worst-case results

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Programme: The International EPD® System, www.environdec.com
Programme operator: EPD International AB
EPD owner: SSAB Europe Oy
EPD registration number: EPD-IES-0026417:001
Version date: 2025-12-02
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An EPD may be updated or depublished if conditions change.
To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

SSAB

Contents

1. General information

PROGRAM INFORMATION

Program:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
Email:	support@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
Core product category rules: CEN standard EN 15804 serves as the core PCR.
Product category rules: PCR 2019:14 Construction products. Version 2.0.1. Date 2025-06-05.
Product group classification: UN CPC 3931.
PCR review was conducted by: The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com. Review chair: Rob Rouwette (chair), Noa Meron (co-chair)
Life Cycle Assessment (LCA)
LCA accountability: Emanuel Lindbäck, SSAB Europe Oy.
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: David Althoff Palm, Dalemarken AB. Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No [Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

1.1 SSAB'S VISION – A STRONGER, LIGHTER AND MORE SUSTAINABLE WORLD

SSAB is a global steel company with a leading position in high-strength steels and related services. The company is a frontrunner in the green transformation of the steel industry and aims to largely eliminate carbon dioxide emissions from its operations and together with suppliers and customers create a fossil-free value chain.

SSAB's production sites are in Sweden, Finland and the USA and have an annual crude steel production capacity of 8.8 million tonnes. SSAB Europe is responsible for sales of strip, heavy plate, and tubular products in Europe as well as for the global business in the Automotive customer segment. SSAB Special Steels has global responsibility for sales of SSAB's quenched and tempered (Q&T) steels and advanced high-strength steels (AHSS). SSAB Americas is the largest heavy plate producer in North America and has a strong position based on cost efficiency and quality.

1.2 COMPANY INFORMATION

EPD owner:
SSAB Europe Oy, Kaisa Ahvonen, Harvialantie 420, 13300 Hämeenlinna, Finland.

Description of the organizations:

- SSAB Europe is responsible for strip, heavy plate, and tubular products in Europe as well as for the global business in the Automotive customer segment. SSAB Europe is also responsible for color coated products. Besides steel products SSAB Europe is also responsible for the by-products business.

Name and location of production sites:

- SSAB EMEA AB (Luleå, Sweden): Svartövägen 20, 974 37 Luleå (Sweden).
- SSAB EMEA AB (Oxelösund, Sweden): Aspleden 1, 613 80 Oxelösund (Sweden).
- SSAB Europe Oy (Raahe, Finland): Rautaruukintie 155, 92100 Raahe (Finland).

Certifications:
Certificates applicable to SSAB sites are ISO 14001 and ISO 9001.

Contact:
EPDssab@ssab.com.

2. Product information

2.1 PRODUCT DESCRIPTION AND APPLICATION

SSAB' slag products are by-products from the blast furnace steel route. The EPD covers air-cooled blast furnace slag (ABS), granulated blast furnace slag (GBS), basic oxygen furnace (BOF)/Linz-Donawitz (LD) converter slag and blended GBS/LD slag products.

Blast furnace slag is formed when the non-metallic components of iron ore react with lime at temperatures between 1 400–1 500 °C, creating a molten slag layer above the liquid iron. The slag is subsequently separated from the liquid iron.

- ABS (air-cooled blast furnace slag) is produced by slow cooling the blast furnace slag in pits/beds and subsequently crushed/screened and metal separated to rock-like aggregates.
- GBS (granulated blast furnace slag) is produced by rapid water quenching of liquid slag, yielding a predominantly glassy, sand like material with latent hydraulic properties.

BOF or LD slag is a by-product from the LD-converters i.e. basic oxygen furnace. In this process, oxygen is blown into molten pig iron to oxidize impurities. These oxidized elements react with slag forming agents added to the converter, forming a liquid slag. This slag floats on top of the molten steel and is removed after the refining process. The LD-slag is subsequently poured into pits/beds and later crushed/screened and magnetic separated to rock-like aggregates.

ABS is commonly applied in infrastructure and civil engineering works, particularly as base and sub-base layers in road and as frost protection material. GBS, like ABS, is also used in infrastructure and civil engineering works as construction material for roads. It is also used as a raw material to produce ground granulated blast furnace slag (GGBS), which serves as an additive in cement and concrete, reducing the need for cement as a

binder. Other areas of use for GBS are as fertilizer and soil improvement material and as raw material for sandblasting and production of mineral wool and glass. LD-slag is mainly used as a fertilizer in agriculture, but it can also be mixed with GBS in various ratios (e.g. LD/GBS: 90/10, 30/70, 50/50, where the most common ratio is 50/50 and 30/70). In such mixtures, it can be used similarly to GBS as base and sub-base material in road and railroad construction.

For more detailed information about the products and technical product properties, please visit www.ssab.com.

2.2 LABELLING AND PACKAGING

The slag products are delivered in bulk; no packaging materials are used.

3. Production and transportation

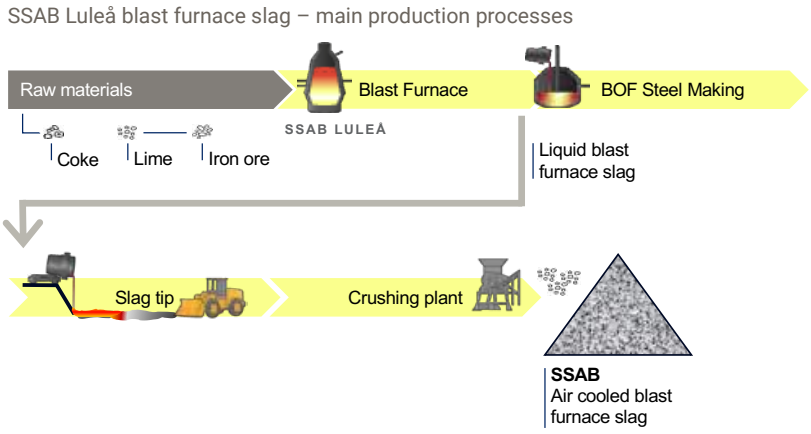
3.1 PRODUCTION SITES

Air-cooled blast furnace slag (ABS) is produced at SSAB Luleå (SE), Oxelösund (SE) and Raahe (FI). Granulated blast furnace slag (GBS) at SSAB Oxelösund and Raahe and LD-slag and mixed GBS/LD slag at SSAB Raahe. In Oxelösund the granulation plant is a separate process from the blast furnace, and the slag is transported by rail to the onsite granulation plant, while in Raahe the granulation plant is an integral part of the blast furnace.

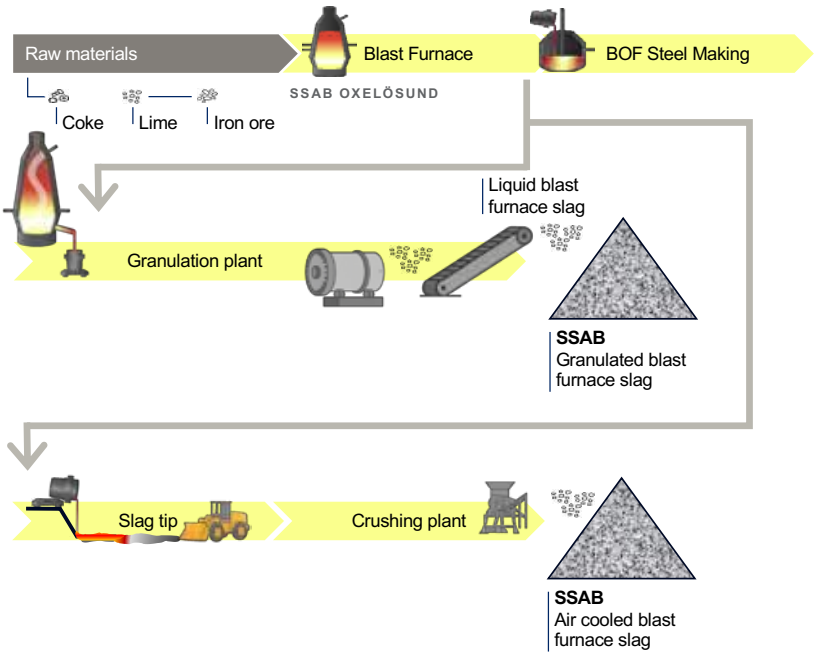
The blast furnace process is using iron ore pellets and, as an energy source and reducing agent, coke from coal, and injection carbon. These raw materials are charged into a blast furnace to produce molten hot metal, pig iron and slag as a by-product.

In the steel mill, steel scrap and alloying elements are added to the hot metal along with slag forming burnt lime, and oxygen is blown through the mixture to convert it into liquid steel in the basic oxygen furnace (BOF). From this process BOF or LD slag is produced.

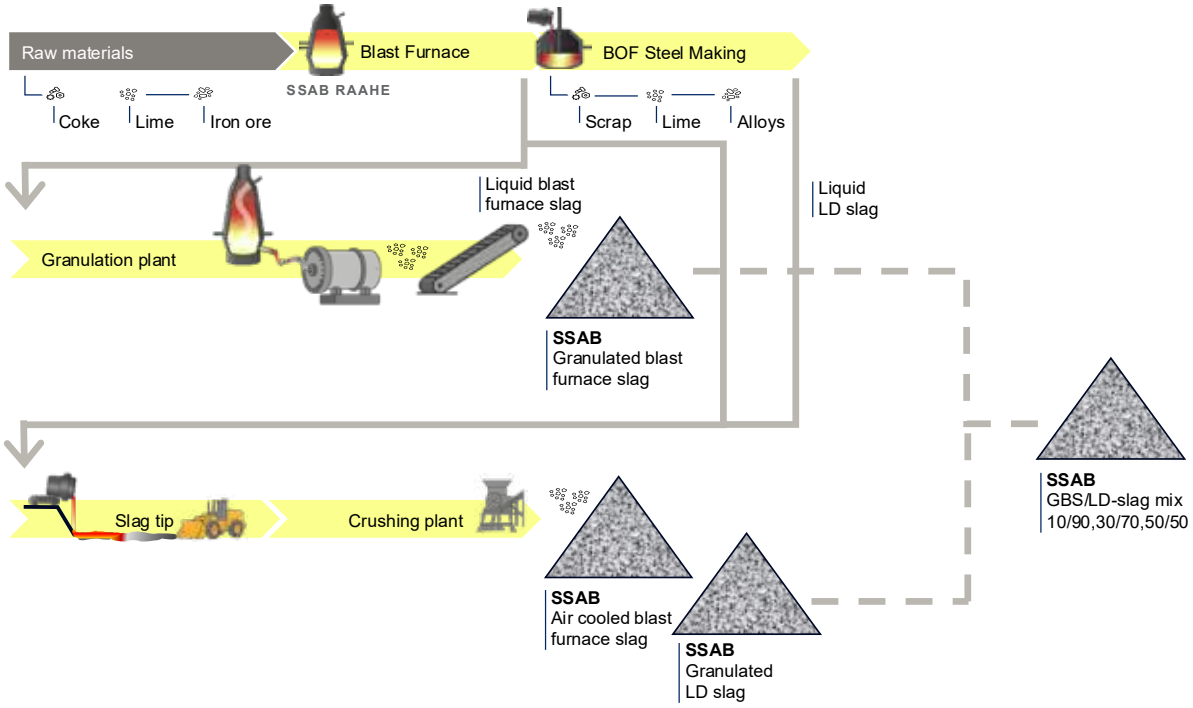
FIGURE 1. SSAB production sites and process steps for slag aggregate production.



SSAB Oxelösund blast furnace slag – main production processes



SSAB Raahe blast furnace and LD-slag – main production processes



4. LCA

4.1 LCA INFORMATION

Declared unit:
1 kg of product

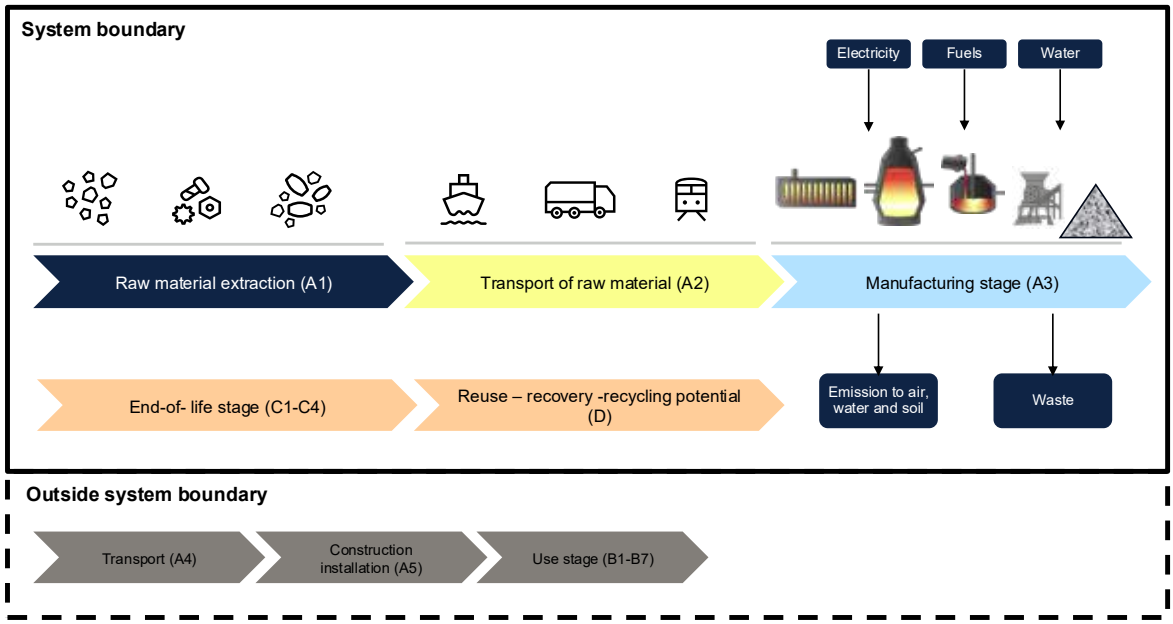
Reference service life:
Not applicable

Description of system boundaries:
The system boundaries are type a, Cradle to gate with modules C1– C4 and module D (A1– A3 + C + D).

Time representativeness:
2023 for the slag production at SSAB Luleå
2023 for the slag production at SSAB Oxelösund
2021 for the slag production at SSAB Raahe

Database(s) and LCA software used:
The LCA was modelled using the LCA software LCA for Experts and corresponding database (version 2025.2) provided by Sphera.

System diagram:



Product stage (A1–A3)

- Module A1: Production of raw materials and production of fuels
- Module A2: Transportation of raw materials to SSAB's manufacturing site (including transportation of steel between SSAB sites)
- Module A3: Manufacturing of steel products and management of production waste

End-of-life stage (C1–C4):
The end-of-life scenario considered is recycling to filling material.

- Module C1: Deconstruction of slag used for road construction. For this module has been considered diesel consumption of 1.1 kWh/tonne for machinery used.
- Module C2: Transport of end-of-life slag.
- Module C3: The slag product does not require additional waste treatment before being used as fill material.
- Module C4: As the end-of-life slag is recycled as fill, no material is landfilled.

Transport of end-of-life slag

Scenario information for C2	
Vehicle and fuel type	Truck, Diesel, Euro V, 26 – 28t gross weight
Distance	80 km
Capacity utilization	50 %
Bulk density	1 100 – 1 300 kg/m^3

Benefits and loads beyond the system boundary (D)
As the slag product is recycled as fill material without substituting any marketable material and no further processing occurs after the end-of-waste state, no environmental benefits or loads are reported.

Allocation:
Co-products from blast furnace and coke making operations have been allocated based on economic value as per PCR 2019:14. Similarly, impact associated with internal energy generation have been allocated based on economic value

Pre-consumer scrap is used in the basic oxygen furnace. The environmental burden from the use of this scrap is allocated based on economic value by making a conservative assumption equal to 5 % of virgin (blast furnace-based) steel. This corresponds to a value of 0.1 kg CO_2eq per kg of pre-consumer scrap.

Cut-off criteria:
The maximum cut-off criteria established by the PCR and EN 15804:2012+A2:2019 standard is 1 % of all material and energy flows to a single unit process and 5 % of total inflows (mass and energy) to the upstream and core module. No cut-offs exceeding this limit have been made.

Inclusion of infrastructure and capital goods:
Infrastructure and capital goods are not included in any of the modules covered in this EPD. For the electricity sources of renewable origin (within the residual mix), the infrastructure of the power plant is included.

Electricity information:
At SSAB Oxelösund, SSAB Luleå, and SSAB Raahe some of the electricity used is produced internally (corresponding to a GWP-GHG impact of 0.63, 0.37 and 2.03 kg CO_2eq per kWh, respectively). For external electricity, the residual electricity mix for Sweden and for Finland has been applied (corresponding to a GWP-GHG impact of 0.13 kg CO_2eq per kWh, and 0.58 kg CO_2eq per kWh, respectively).

Worst case results for the EPD:
The results represent the worst-case results for the product group.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

Life cycle stage	Module		Modules declared	Geography	Share of primary data	Variation - products	Variation - sites
Product stage	Raw material supply	A1	X	GLO	84 %	-41 %	18 %
	Transport	A2	X	GLO			
	Manufacturing	A3	X	SE & FI			
Construction process stage	Transport	A4	ND	-	-	-	-
	Construction installation	A5	ND	-	-	-	-
Use stage	Use	B1	ND	-	-	-	-
	Maintenance	B2	ND	-	-	-	-
	Repair	B3	ND	-	-	-	-
	Replacement	B4	ND	-	-	-	-
	Refurbishment	B5	ND	-	-	-	-
	Operational energy use	B6	ND	-	-	-	-
	Operational water use	B7	ND	-	-	-	-
End of life stage	De-construction demolition	C1	X	EU	-	-	-
	Transport	C2	X	EU	-	-	-
	Waste processing	C3	X	EU	-	-	-
	Disposal	C4	X	EU	-	-	-
Resource recovery stage	Reuse-Recovery-Recycling-potential	D	X	EU	-	-	-

X: Module Declared
ND: Module not declared
The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

Data quality assessment:
A data quality assessment has been carried out for all processes contributing to ≥80 % of the impact on any of the included environmental impact indicators for the cradle to gate (A1– A3) life cycle stages. Processes contributing to >10 % of the impact on GWP-GHG are listed below.

Output indicators

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1–A3
Internal generation of energy used in manufacturing	Collected data	EPD owner	2021– 2023	Primary data	2 %
Process gas used as energy or flared	Collected data	EPD owner	2021– 2023	Primary data	44 %
Transport of raw material	Database	Sphera MLC 2025.2	2021– 2023	Primary data	5 %
BF Coke	Database	EPD owner Sphera MLC 2025.2	2021– 2023	Primary data Secondary data	26 %
Iron ore pellet	Collected data	Supplier data	2021– 2023	Primary data	2 %
PCI coal	Database	Sphera MLC 2025.2	2021– 2023	Secondary data	0 %
Other processes	Databases	EPD owner Sphera MLC 2025.2	2021– 2023	Primary data Secondary data	3 %
Total share of primary data, of GWP-GHG results for A1– A3					84 %

4.2 PRODUCT CONTENT DECLARATION

The EPD covers multiple slag products from SSAB's steel operations, including:

- Air-cooled blast furnace slag (ABS)
- Granulated blast furnace slag (GBS)
- LD slag (Linz-Donawitz, also known as BOF slag)
- Mixtures of GBS and LD slag in different ratios (50/50, 30/70, 90/10)

The declared unit is 1 kg of slag product. As the EPD represents a worst-case scenario, the content declaration may cover a range from 0 % to 100% of the included slag products.

Content declaration per kg

Product composition	Weight (kg)	Post-consumer recycled material (%)	Biogenic carbon weight (%)	Biogenic carbon weight (kg)
Slag products	1	0 %	0 %	0

The product is sold in bulk; no packaging is included.

SSAB slag products do not contain any of the substances of very high concern (SVHC) regulated by Regulation (EC) No 1907/2006 (REACH) or Regulation (EC) No 1272/2008 of the European Parliament and of the Council in concentrations >1 % of the weight of the product.

4.3 ENVIRONMENTAL PERFORMANCE INDICATORS RESULTS

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Potential environmental impact – mandatory indicators according to EN 15804+A2 (version EF 3.1)

Results per declared unit: 1 kg of product								
Indicator		**Unit**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP)	Climate Change - fossil	kg CO_2 eq	6.1E-02	4.2E-04	1.2E-02	0.0E+00	0.0E+00	0.0E+00
	Climate Change - biogenic	kg CO_2 eq	4.2E-05	1.0E-06	2.8E-05	0.0E+00	0.0E+00	0.0E+00
	Climate Change - land use and land use change (LULUC)	kg CO_2 eq	3.2E-05	3.5E-08	1.3E-04	0.0E+00	0.0E+00	0.0E+00
	Climate Change - total	kg CO_2 eq	6.1E-02	4.2E-04	1.2E-02	0.0E+00	0.0E+00	0.0E+00
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC-11 eq	2.3E-13	4.7E-18	1.4E-15	0.0E+00	0.0E+00	0.0E+00
Acidification potential (AP)		mole H+ eq	1.6E-04	3.8E-06	6.1E-05	0.0E+00	0.0E+00	0.0E+00
Eutrophication potential (EP)	Freshwater	kg P eq	1.5E-08	8.7E-11	3.3E-08	0.0E+00	0.0E+00	0.0E+00
	Marine	kg N eq	5.9E-05	1.9E-06	3.0E-05	0.0E+00	0.0E+00	0.0E+00
	Terestrial	mole N eq	6.5E-04	2.1E-05	3.3E-04	0.0E+00	0.0E+00	0.0E+00
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq	1.6E-04	5.3E-06	5.7E-05	0.0E+00	0.0E+00	0.0E+00
Abiotic depletion potential (ADP)	Minerals and metals*	kg Sb eq	9.2E-08	9.4E-12	8.1E-10	0.0E+00	0.0E+00	0.0E+00
	Fossil resources*	MJ	9.7E-01	5.4E-03	1.5E-01	0.0E+00	0.0E+00	0.0E+00
Water scarcity potential (WDP)*		m^3	4.3E-02	8.1E-07	4.9E-05	0.0E+00	0.0E+00	0.0E+00

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator. Note: Biogenic carbon in packaging is balanced in A1–A3.*

Additional mandatory and voluntary impact category indicators

Results per declared unit: 1 kg of product								
Indicator		**Unit**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP)	GWP-GHG (1)	kg CO_2 eq	6.1E-02	4.2E-04	1.2E-02	0.0E+00	0.0E+00	0.0E+00

(1) This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the characterization factor for biogenic CO_2 is set to zero.

Resource use indicators

Results per declared unit: 1 kg of product								
Indicator		**Unit**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Primary energy resources – Renewable	Used as energy carrier (PERE)	MJ	5.5E-02	1.2E-05	1.1E-02	0.0E+00	0.0E+00	0.0E+00
	Used as raw materials (PERM)	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Total (PERT)	MJ	5.5E-02	1.2E-05	1.1E-02	0.0E+00	0.0E+00	0.0E+00
Primary energy resources – Non-renewable	Used as energy carrier (PENRE)	MJ	9.7E-01	5.4E-03	1.5E-01	0.0E+00	0.0E+00	0.0E+00
	Used as raw materials (PENRM)	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Total (PENRT)	MJ	9.7E-01	5.4E-03	1.5E-01	0.0E+00	0.0E+00	0.0E+00
Use of secondary material (SM)		kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Use of renewable secondary fuels (RSF)		MJ	3.1E-27	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Use of non renewable secondary fuels (NRSF)		MJ	3.6E-26	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Net use of fresh water (FW)		m^3	1.1E-03	4.8E-08	5.5E-06	0.0E+00	0.0E+00	0.0E+00

Waste indicators

Results per declared unit: 1 kg of product							
Indicator	**Unit**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	4.9E-08	1.2E-13	5.6E-12	0.0E+00	0.0E+00	0.0E+00
Non-hazardous waste disposed (NHWD)	kg	4.6E-04	1.0E-06	2.0E-05	0.0E+00	0.0E+00	0.0E+00
Radioactive waste disposed (RWD)	kg	1.2E-05	8.3E-09	2.0E-07	0.0E+00	0.0E+00	0.0E+00

Output indicators

Results per declared unit: 1 kg of product							
Indicator	**Unit**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (CRU)	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Materials for recycling (MFR)	kg	0.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Material for energy recovery (MER)	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported electrical energy (EEE)	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported thermal energy (EET)	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Disclaimer

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance(EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Variation in environmental indicators

The table below shows the variation for modules A– C where the difference between products is greater than 10 %.

Slag products	
Environmental impact indicator	**Difference (%)**
GWP-fossil	34 %
GWP-biogenic	42 %
GWP-LULUC	13 %
GWP-total	34 %
GWP-GHG	34 %
ODP	84 %
AP	38 %
EP-fresh	22 %
EP-marine	37 %
EP-terrestrial	38 %
POCP	41 %
ADP-minerals and metals	97 %
ADP-fossil	39 %
WDP	98 %

5. Abbreviations

Abbreviation	Definition
ABS	Air cooled blast furnace slag
GBS	Granulated blast furnace slag
LD slag	Linz-Donawitz (LD) converter slag
BOF	Basic oxygen furnace
BF	Blast furnace
EN	European norm (Standard)
EF	Environmental footprint
GPI	General programme instructions
PCR	Product category rules
CEN	European Committee for Standardization
CPC	Central product classification
SE	Sweden
FI	Finland
GLO	Global
ND	Not Declared
SVHC	Substances of Very High Concern

6. References

- General Programme Instructions of the International EPD® System. Version 5.0
- PCR 2019:14 Construction products. Version 2.0.1 (2025-06-05)
- CEN European Committee for Standardisation (2021). EN15804:2012+A2:2019/ AC:2021 (CEN 2021), Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- LCA for experts Software System and database for Life Cycle Engineering, sphera, Leinfelden-Echterdingen, Germany
- Lindbäck, E., LCA methodology report – SSAB By-products, as basis for the publication of EPDs within the International EPD® System, November 2025

7. Version history

Original version of the EPD, version 1.0.

SSAB

www.ssab.com