epd-norge
The Norwegian EPD Foundation
Publisher: The Norwegian EPD Foundation
Registration number: NEPD-3341-1978-EN

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Steel billets and hot rolled steel (without vanadium and niobium) – Norwegian production from from Celsa Armeringsstål AS

Programme: The International EPD® System, environdec.com
Programme operator: EPD International AB
EPD registration number: SP-04910
Publication date: 2021-11-09
EPD version: 2021-11-09
Valid until: 2026-11-10
Geographical coverage: Norway
Climate change:
Steel Billets: 211 kg CO_2 eq./tonne, (A1 to A3).
Hot rolled: 305 kg CO_2 eq./tonne, (A1 to A3)

An EPD should provide current information and may be updated if conditions change.
The stated validity is therefore subject to the continued registration and publication at environdec.com

celsa nordic

NORDIC SUSTAINABILITY.
Renewable reinforcing steel manufactured with hydropower and passion.

GENERAL INFORMATION

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)	
Product category rules (PCR): PCR 2019:14 Construction products version1.11. 2021-02-05	
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.	
Independent third-party verification of the declaration and data, according to ISO 14025:2010	
Third party verifier: Bureau Veritas Certification Sverige AB, Fabrikgatan 14, 412 50 Göteborg Accredited by: Swedac	
☐ EPD process certification	EPD verification
Procedure for follow-up of data during EPD validity involves third party verifier:	
Yes	☐ No

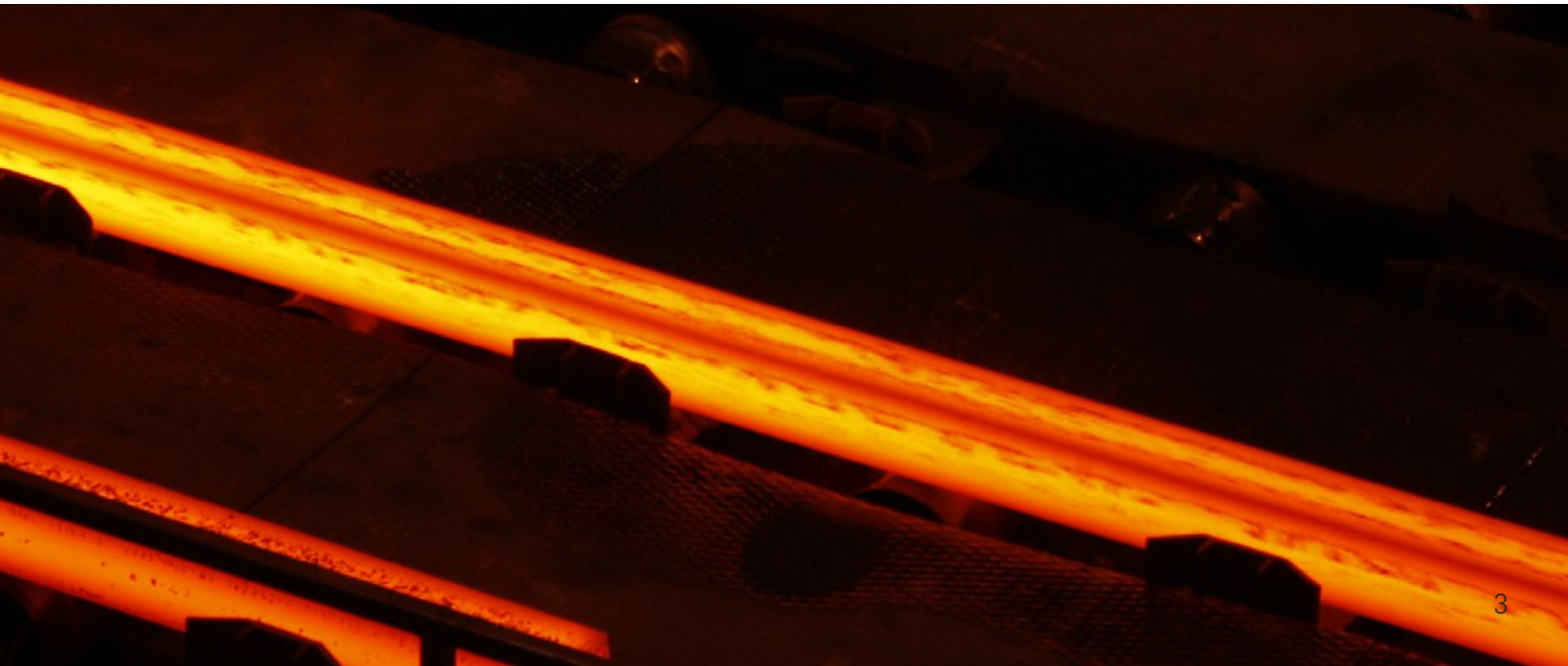
The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. It should be noted in particular that there are differences between the present version of EN 15804 and the earlier version. For further information about comparability, see EN 15804 and ISO 14025.

Company information

The company manufactures and sells reinforcing products in the form of rebars, rebar in coils and mesh wire rod. In addition, an increasing volume of steel products with a higher level of quality are produced and sold to different market segments other than the construction sector.

The production facilities cover a scrap-based steel mill for production of billets and a rolling mill for hot rolling of products from steel billets produced in the melt shop. Reinforcement products are sold mainly to the Nordic market.



ABOUT THE EPD

This EPD is based on a Life Cycle Assessment (LCA) and provides information that can be used in order to put into perspective different steel sourcing.

Methodology

The environmental impact of CELSA Armeringsstål products has been calculated according to the rules of the EPD (Environmental Product Declaration) International program. EN 15804:2012 + A2:2019 and PRODUCT CATEGORY RULES (PCR) 2019:14, version 1.11, Construction Products are the basis for the calculation of the life cycle assessment (LCA) from the cradle to end of life EPD. The environmental impacts from processes common to all products in CELSA Armeringsstål, i.e. the scrap preheating, ladle furnace and casting and the hot-rolling process, the transport to customers and the end-of-life stage make up 100% of the total impacts from the product chain, measured as GWP-fossil

In Denmark two different types of steel are used for the reinforcement products, namely steel alloyed with minor quantities of vanadium and niobium and steel without these alloying metals. The share of V- and Nb-alloyed steel was 30 % in 2020. The environmental impacts are calculated for steel without vanadium and niobium. The climate impact of alloying 1 tonne of steel with the required quantities of ferrovanadium and niobium to meet the specifications, is reported as additional information.

The environmental impacts from the use of energy wares, like electric power and fuels, include the impacts of extracting the necessary primary energy resources from nature, producing the energy ware and distributing it to the site where it is used, as well as the possible impacts from its use.

Recyclable wastes from the product chain, namely slags, zinc-containing dust, mill scales and steel waste, are treated as co-products. In principle, economic allocation based on the relative revenues from the allocatable products is applied to distribute the environmental impacts between the declared product and the co-products. In the actual practice, the environmental burdens thus allocated to these co-products are found to be negligible and are disregarded, i.e. 100 % of the environmental burden is allocated to reinforcement products.

As a basic case, the environmental impacts of producing the steel in the recycled scrap used as charge to the steel mill are allocated to the products from which the scrap was obtained. All the scrap including the pre-consumer scrap is treated as post-consumer scrap, i.e. as if it had been used in a product and not wasted in a production process as virgin material before it could be used. No environmental impacts from previous products or processes are allocated to the declared product. The environmental burdens of transport to the steel mill in Mo i Rana and of scrap shredding are allocated to the declared product. As additional information, the content of pre-consumer scrap and the climate impact of producing the quantity of steel in the pre-consumer scrap are also calculated and reported.

Input data

Site-specific data on the use of fuels and commodities provided by CELSA Armeringsstål AS has been used for the steel production in Norway. Specific data for Celsa's core processes was collected as annual average data for the year 2020. Electricity consumption data according to country averages has been used for electricity consumed. Specific data from the suppliers has been collected wherever possible. Otherwise, generic data has been collected from commercial databases, mainly from the GaBi professional database (Sphera Solutions GmbH).

By the selection of data, the geographical location of each supplier has been considered to the extent possible. For by-products, economic allocation based on the relative revenues from the allocable products is applied.

For the steel works, the national consumption mix in Norway is applied. Norwegian Consumption Mix used has a GWP-fossil of 0.030 kg CO2 eq./kWh (1 kV - 60 kV).

The quality of the inventory data for energy and commodities has been assessed against the criteria of the UN Environment Global Guidance on LCA database development (EN 15804:2012+A2 (2019), Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products, European Committee for Standardization). These criteria are geographical, technical and temporal representativeness. For most of the commodities and energy wares, which cause significant environmental impacts, the data quality is good, with a few occasional exceptions, where the data quality is fair or poor.

Declared unit

The declared unit is 1 tonne of steel billets for the steel-billet product and 1 tonne of hot-rolled steel for the hot-rolled-steel product, ready for delivery at the factory gate. It is thus a declared functional unit according to the definition and terminology of the Product Category Rules.

Raw material

The steel is produced in an electric arc furnace (EAF). The production is entirely scrap based, apart from additions of virgin alloying metals to adjust the composition of the steel to specification. The charged scrap is preheated by furnace gas from the EAF. The steel melt from the EAF is adjusted to specification in a ladle furnace and then cast to billets. Steel for reinforcement products is hot-rolled to bars before delivery. By-products are slag, which is sold, and zinc which is extracted from recovered dust.

The scrap is delivered to Mo i Rana by ship from various locations. About 62 % of the scrap is collected in Norway. The remaining scrap is imported from Sweden, Denmark and Finland. Of the scrap, 16 % is shredded.

System boundaries

The system is of the type cradle to gate with options, and D, as defined by EN 15804:2012+A2 (modules declared).

The manufacturing module A3 consists of Celsa´s mill, i.e. the EAF + the ladle furnace (steel-billet EPD) and of the EAF+ the ladle furnace + the rolling mill (hot-rolled EPD). The extraction and manufacture of raw materials and commodities are modelled in module A1. The transports of these items to Mo i Rana are modelled in module A2. Module A4 describes deliveries to customers. Since customers and customer deliveries vary from time to time, we have used default scenarios to model deliveries to customers in Norway, Sweden, Denmark and Finland.

The product chain starts with the shredding of a fraction of the steel scrap and the transport of the scrap to the steel works. Commodities and energy are followed upstream to their origin in natural resources. The product chain ends with the recovery of steel from a scrapped product (module C). Benefits and loads beyond the system boundaries (resource-recovery stage) are also described in module D.

For production wastes, the transports to a collection site or to final disposal are included, as is waste destruction by landfilling (part of module A3). The impacts of waste incineration are allocated to the generation of heat and electricity for sale and are not included. Incinerated production wastes are treated as secondary fuels, since energy is generated with an efficiency of more than 60 %.

Scope

The objective of the life cycle assessment is to provide the basic environmental data necessary to prepare the EPD, i.e. to give an environmental profile of the manufacturing of CELSA Armeringsståls products. The aim of the LCA report and the EPD is to be a useful tool for different actors in the, steel, construction and real estate sector, (business to business).

The product chain starts with shredding of the steel scrap (if any) and the transport of the scrap to the steel works Commodities and energy are followed upstream to their origin in natural resources. The product chain ends with the recovery of reinforcement steel and other steel segment. Benefits and loads beyond the system boundaries (resource recovery stage) are also included.

Additional information

The product contains no substances in the REACH Candidate list. Products contain no substances in the Norwegian priority list. The estimated impact results are only relative statements, which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks. EPD of construction products may not be comparable if they do not comply with EN15804.

Verification

CEN standard EN 15804 serves as the Core Product Category Rules (PCR). Independent third-party verification of the declaration and data, according to ISO 14025:2006.

PRODUCT INFORMATION

Name and location of production site(s)

Celsa Armeringsstål As, Mo i Rana, Norway.

Product-related or management system-related certifications

ISO 45001:2018, ISO 14001:2015, ISO 9001:2015, EMAS, Lloyds Registerand DnV-GL

We have certifications to sell billets and hot rolled steel to: Norway, Sweden, Finland, Denmark, Germany and the Netherlands. In addition also tickets to the UK.

Registrations in other environmental assessment systems

ECOproduct

UN CPC code

41241 and 41242

Material Characteristics

Product diameter range from 4 mm to 40 mm
Yield stress, Re ⩾ 500 MPa - Rm/Re ⩾ 1.15
Elongation Agt ⩾ 7.5 %
Density 7700 kg/m^3

Product name and identification

Steel Billets and Hot rolled steel

Included products and description

Steel billets and hot rolled steel.

Product content (weight %)

Iron 98–99
Carbon 0.05–0.2
Manganese 0.3–0.7
Silicon 0.2

Steel billets

Dimensions: 140-160mm square
Length: 6-13m
Weight/meter: 150-200 kg
Final use: Rerolling into construction steel

Hot-rolled

Dimensions: 6-40mm
Bundle weight: 1-5 ton
Yield Strength: 500-1 000 Mpa
Final use: In concrete constructions or other drawn products

LCA INFORMATION

Declared unit

Declared unit Per tonne of steel billet/ hot-rolled products.

Reference service life

Not applicable

Time representativeness

Specific data for Celsa's core processes was collected as annual average data for the year 2020. Specific data for the manufacture of several major additives and commodities was collected as annual average data for the year 2019.

Generic data for modes of transport has 2020 as reference year. Materials, for which specific data was not available, have reference years between 2017 and 2020. Generic data for energy wares from primary energy sources has 2017 as reference year.

Database(s) and LCA software used

LCA software GaBi 10.5 with its Professional Database version 2021.1 (Sphera Solutions GmbH). Description of system boundaries Cradle to gate (A1-A3) with modules C1-C4, module D and with optional module A4.

Description of system boundaries

Cradle to gate with modules C1-C4, module D and with optional module A4.

Cut-off criteria

The principle is zero cut-off. All raw materials, all commodities, and all waste-treatment processes reported by the factory operators, for which specific, generic or (as a last possibility) estimated data could be obtained, are included. Commodities for which no data at all could be found, amount to less than 1 % weight.

Allocation

In the base case, the environmental impacts of the recycled scrap used in module A1 are allocated to the product from which the scrap was obtained. The environmental burdens of transport to the steel mill in Mo i Rana and of scrap shredding are allocated to the declared product.

As additional information, the content of preconsumer scrap and the climate impact of virgin production of the steel corresponding to the primary preconsumer scrap is also calculated and reported. Otherwise as a rule, economic allocation based on the relative revenues from the allocatable products is applied. This in principle also applies to recyclable steel waste from module A3, which is regarded as a co-product. The environmental impact thus allocated to the scrap is 0.4 %, which is disregarded.

Norwegian average consumption mix, high-voltage grid (1kV - 60kV)

Source of electricity for the manufacture (A3)

Electricity for the manufacture in Norway is supplied from the Norwegian average consumption mix.

Primary energy source 2019	**Contribution (%)**
Hydro power	95.92
Wind power	1.92
Biogas	0.01
Waste incineration	0.32
Fossil sources, mainly natural gas	1.84
Climate impact, kg CO_2 equiv./kWh	**0.03 Import 4.11 % of the gross production**

Scenarios

Transports to building sites (A4)

Fuel use and emission data for ships, trucks and rail were collected from the GaBi professional database (Sphera Solutions).

Recovery of steel from articles of steel

Operation	Data source	Energy use	Losses of steel by recovery, %	Environmental load to replace the lost steel (module D)
Dismantling and scrapping	Data for a car shredder, Germany, only electricity use considered, (Sphera Solutions)	0.2 MJ electricity/kg of scrapped material, EU28 electricity mix	5 [1)]	Modelled as cold-rolled steel, blast- furnace route, EU28 (World Steel Association 2019)
Disposal of lost steel	Modelled as ferro metals on land-fills, EU28 (Sphera Solutions)			

1) Estimated

Handling of recovered steel (modules C2 – C4)

The assumed scenario is that the steel, which is recovered from the dismantling of steel articles, is transported by truck to a scrap yard (module C2). A total transport distance of 100 km from the dismantling site to the scrap yard and further on to a shipping port is assumed as a default.

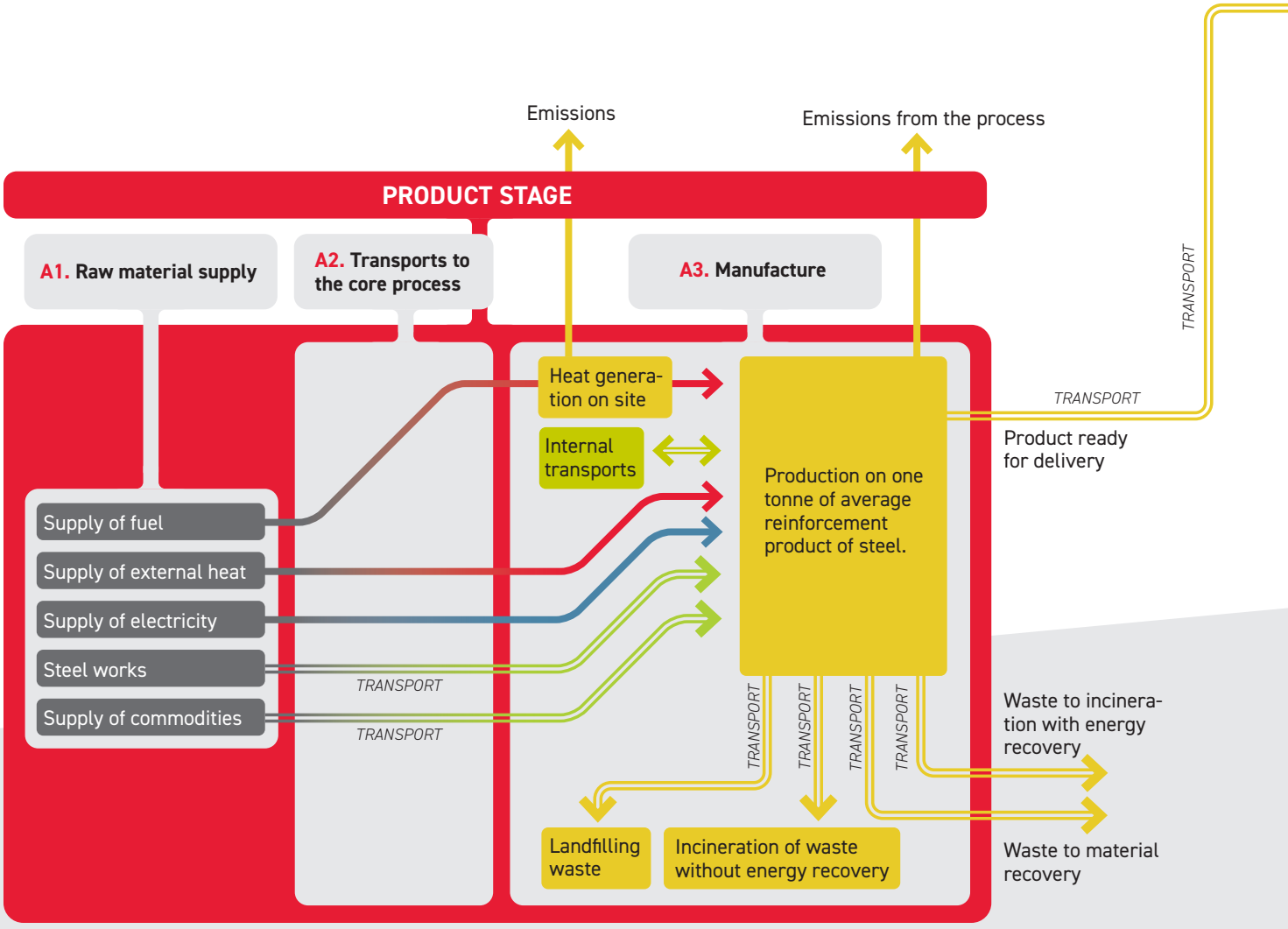
Part of the steel is further shredded. This is accounted for in the inventory of the supply of steel scrap (module A1) to the steel mill, as is the transport of scrap to the steel mill. The total share of shredded scrap is roughly 16 % of the total scrap input to the steel mill. An electric shredder with a power use of 0.16 MJ/kg shredded steel is assumed (Manouchehri 2008). The total power use which should be allocated to module C3 is thus $0.16 \cdot 950 \cdot 0.16 \approx 24$ MJ/tonne of reinforcement product, had this power use not already been accounted for in module A1. Module C3 is consequently left empty in the inventory.

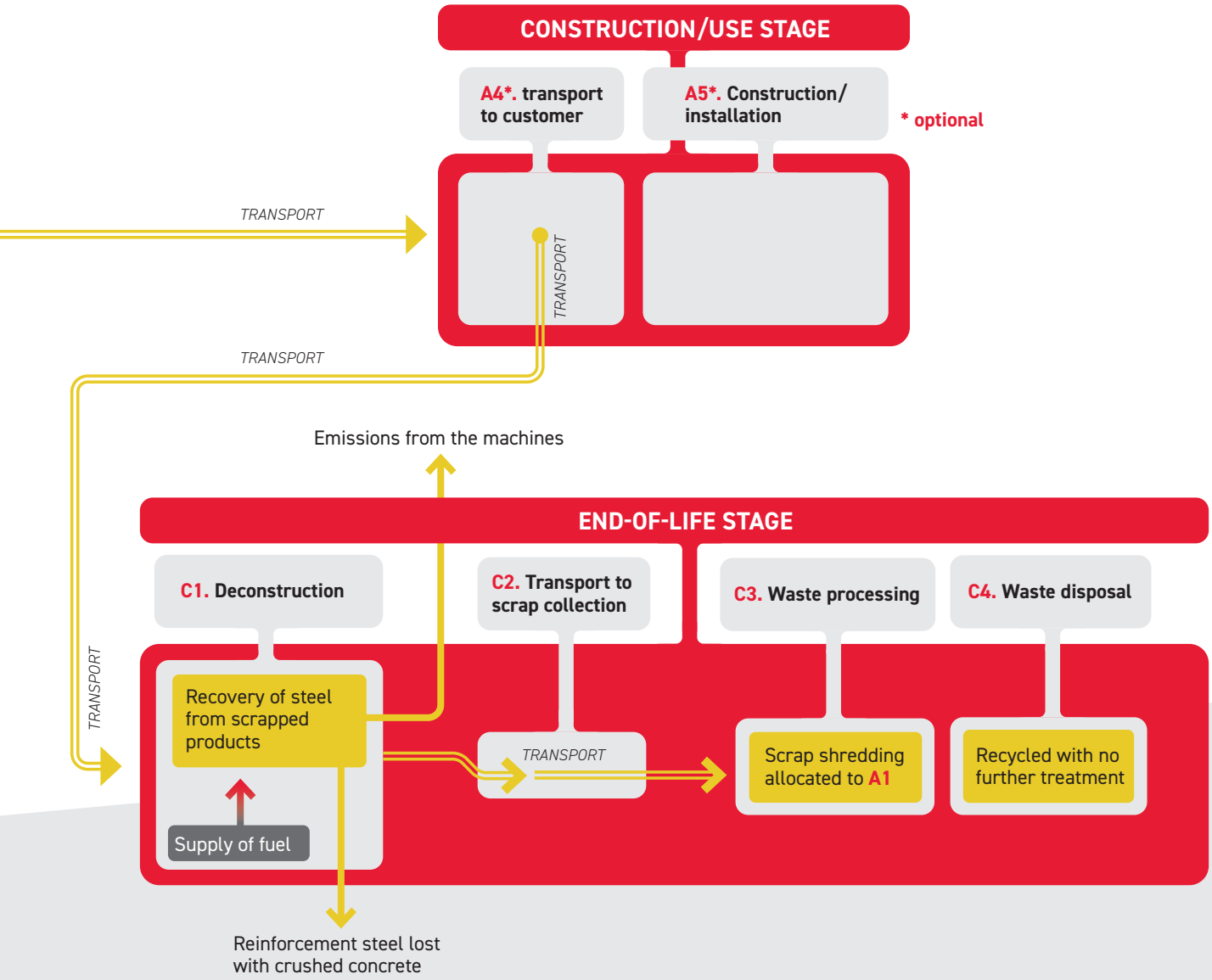
No further treatment is necessary. Module C4 is thus empty.

Benefits and loads beyond the system boundaries (D)

The benefits of recycling 950 kg of recovered steel for each tonne of steel product are already discounted in module A1, when we treat the scrap charge to the steel mill as post-consumer scrap, i.e. when we allocate no environmental impacts to the scrap used as charge to the still mill. Recovery scenario presumes, that 50 kg of steel/tonne of steel product are irretrievably lost from the steel cycle and will have to be replaced, even if the steel market would not expand. We calculate the environmental load from this loss by assuming that the lost steel is replaced by the same quantity of cold-rolled steel, manufactured from ore by the blast-furnace route.

SYSTEM DIAGRAM





BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY

D

No benefits beyond the benefits discounted by the use of scrap as raw material in A1. Loads corresponding to the loss of steel in C1.

SYSTEM BOUNDARIES (A1 TO D)

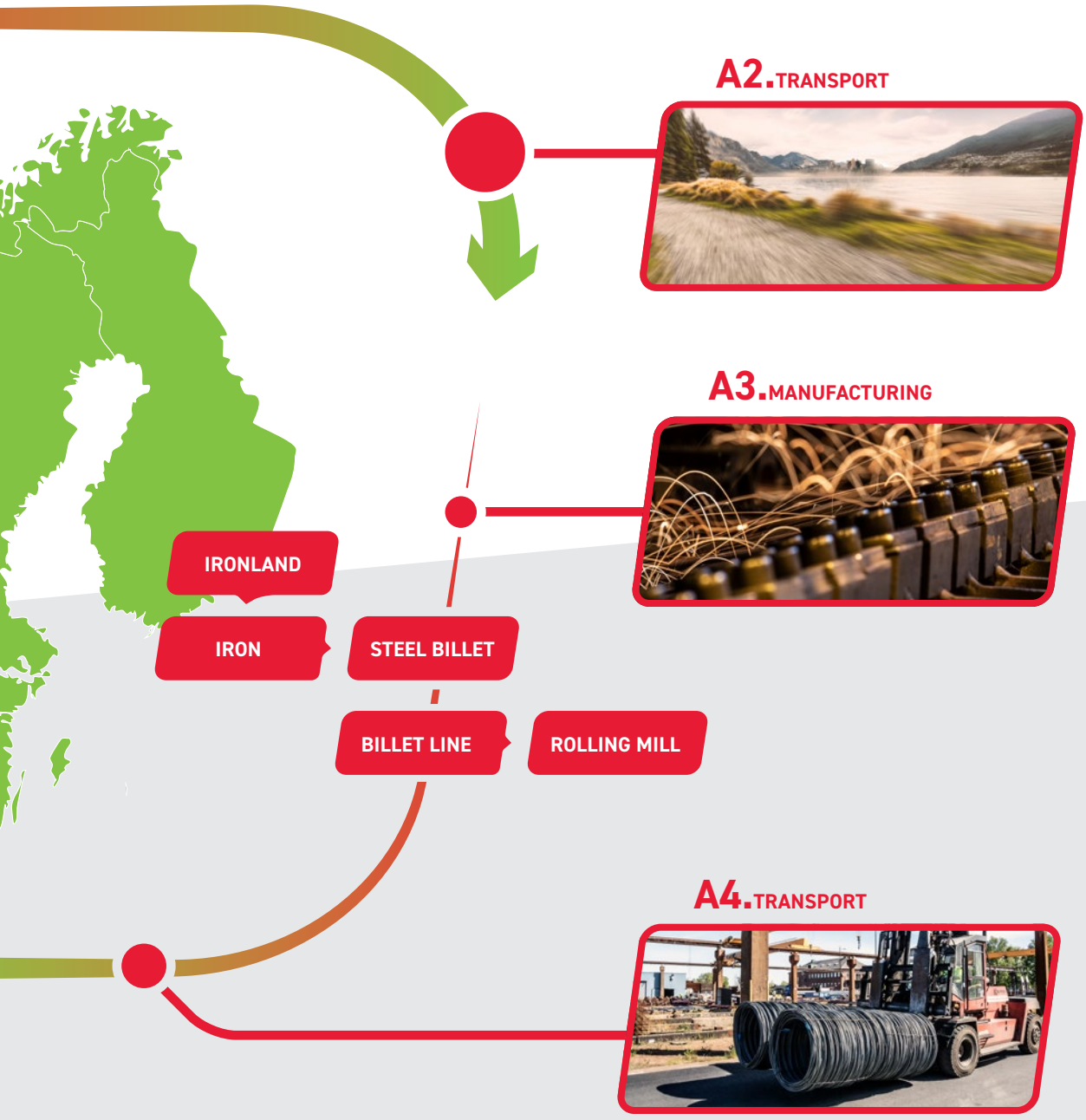
A1. RAW MATERIAL SUPPLY

D. RECYCLING

Ironsand, coal, limestone, scrap.

C4. DISPOSAL

C3. WASTE PROCESSING


A2. TRANSPORT
A3. MANUFACTURING
IRONLAND
IRON
STEEL BILLET
BILLET LINE
ROLLING MILL
A4. TRANSPORT

Modules declared, geographical scope, share of specific data and data variation:

	Product stage			Installation stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De0construction demolition	Transport	Waste processing	Disposal	Reuse0Recovery0Recycling-Opotential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	NO/ EU/ GLO	NO/ EU/ GLO	NO	SC	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data	66% [2]	20% [3]	100%	0% [4]	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	10 % or less [1]					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	10 % or less [1]					-	-	-	-	-	-	-	-	-	-	-	-

ND: Not declared. SC = Scandinavia.
1) See the Methodology chapter
2) Measured as contribution to the potential fossil climate impact from specifically inventoried processes.
3) Modes of transports and distances are specific, the data for vehicles and fuel production is generic.
4) Deduced logistics with measured distances for most of the transports of raw materials.
The data for vehicles and fuel production is generic.

Content information of the steel

Celsa Armeringsstål declares that their products do not contain substances of very high concern (SVHC) as defined and listed in the European Chemicals Agency (ECHA) Candidate List of substances of very high concern for Authorization, in levels above 0.0 % by weight for the products that concern this LCA report.

Steel	Weight (kg)	Post-consumer material (weight-%)	Renewable material (weight-%)
Iron	980 – 990	73	0
Carbon	0.5 - 2	0	0
Manganese	3 - 7	0	0
Silicon	2	0	0
TOTAL	1000	73	0

ENVIRONMENTAL INFORMATION

The indicators, with one exception, are calculated with the characterisation factors published by the Joint Research Centre (ILCD 2013, characterization factors according to EC-JRC EF3.0, 2019), as they can be accessed in GaBi (Sphera Solutions GmbH) in the data set Environmental quantities/EN15804+A2. The climate impact indicator GWP-GHG is calculated with characterisation factors published in the Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC AR5) as they can be accessed in GaBi in the data set Environmental quantities/IPCC AR5/ GWP100, excl. biogenic carbon.

Steel Billets

Potential contribution to the core environmental impacts of the production of steel billets without vanadium or niobium by Celsa Armeringsjärn AS at Mo i Rana. Core impacts are impacts mandatory to declare according to EN15804:2012+A2.
(The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
GWP-fossil	kg CO_2 eq.	121	29,2	60,4	211	40,3	41,8	44,2	69,2	24	6,85	0	0	123
GWP-biogenic	kg CO_2 eq.	7,46	0,198	0,141	7,80	0,104	0,108	0,114	0,179	4,86	0,324	0	0	0,571
GWP-luluc	kg CO_2 eq.	0,0523	0,0198	0,00592	0,0780	9,17E-04	9,52E-04	0,00101	0,00158	0,0374	1,62E-04	0	0	0,0247
GWP-total	kg CO_2 eq.	129	29,4	60,5	218	40,4	41,9	44,3	69,4	28,9	7,17	0	0	124
ODP	kg CFC 11 eq.	1,56E-06	3,43E-15	3,5E-09	1,56E-06	4,44E-15	4,61E-15	4,88E-15	7,63E-15	5,14E-13	7,85E-16	0	0	1,52E-14
AP	mol H^+ eq.	0,28	0,509	0,0779	0,867	0,759	0,788	0,833	1,3	0,057	0,00621	0	0	0,305
EP-freshwater	kg PO_4^{3-} eq.	0,0018	3,83E-05	1,29E-05	0,0019	2,52E-05	2,62E-05	2,77E-05	4,35E-05	2,10E-04	4,48E-06	0	0	1,35E-04
EP-freshwater	kg P eq.	6,0E-04	1,25E-05	4,2E-06	6,2E-04	8,23E-06	8,55E-06	9,04E-06	1,42E-05	6,84E-05	1,46E-06	0	0	4,39E-05
EP-marine	kg N eq.	0,0832	0,258	0,0233	0,365	0,385	0,4	0,423	0,662	0,0126	0,00208	0	0	0,0642
EP-terrestrial	mol N eq.	0,884	2,82	0,245	3,95	4,22	4,38	4,63	7,25	0,134	0,023	0	0	0,68
POFP	kg NMVOC eq.	0,236	0,691	0,0599	0,987	1,03	1,07	1,14	1,78	0,0351	0,00596	0	0	0,232
ADP-minerals & metals*	kg Sb eq.	9,44E-05	1,11E-06	4,38E-07	9,59E-05	1,35E-06	1,4E-06	1,48E-06	2,32E-06	6,69E-06	2,39E-07	0	0	4,52E-05
ADP-fossil*	MJ	1160	396	14,8	1571	547	568	601	941	434	96,8	0	0	1140
WDP	m^3	50	0,06	0,03	50	0,06	0,07	0,07	0,1	3,3	0,01	0	0	5,7

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.
1) ADP-fossil as defined by EN15804+A2 includes uranium and is thus equal to the resource indicator PENRE.

Potential environmental impact – additional mandatory and voluntary indicators

Potential contribution to an additional mandatory impact (GWP-GHG) and additional voluntary impacts of the production of steel billets without vanadium or niobium (The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
GWP-GHG 1)	kg CO_2 eq.	120	28,9	60,4	209	39,8	41,4	43,7	68,5	23,8	6,78	0	0	120
PM	Disease incidences	2,55E-06	8,57E-06	4,42E-07	1,16E-05	1,28E-05	1,33E-05	1,41E-05	2,2E-05	4,99E-07	3,92E-08	0	0	3,93E-06
IRP	kBq U235 eq.	4,49	0,0638	0,0139	4,57	0,0832	0,0863	0,0914	0,143	5,56	0,0147	0	0	1,03
ETP-fw	CTUe	919	288	19,6	1227	397	412	436	682	164	70,1	0	0	136
HTP-c	CTUh	8,97E-08	5,39E-09	3,26E-08	1,28E-07	7,37E-09	7,66E-09	8,09E-09	1,27E-08	6,08E-09	1,3E-09	0	0	4,82E-09
HTP-nc	CTUh	4,5E-07	2,5E-07	1,37E-06	2,1E-06	3,38E-07	3,51E-07	3,7E-07	5,81E-07	2,98E-07	5,47E-08	0	0	1,49E-06
SQP	-	243	11,7	71,8	327	1,4	1,46	1,54	2,41	148	0,248	0	0	45,1

1) The indicator is calculated with characterization factors from IPCC AR5 GWP 100, excl biogenic carbon, and includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources

Results per functional or declared unit

Resource use of the production of steel billets without vanadium and niobium. (The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
PERE	MJ	2980	3,01	5,08	2988	1,81	1,88	1,98	3,11	185	0,319	0	0	16,7
PERM	MJ	4,3	0	0	4,3	0	0	0	0	0	0	0	0	0
PERT	MJ	2984	3,01	5,08	2992	1,81	1,88	1,98	3,11	185	0,319	0	0	16,7
PENRE	MJ	1160	397	14,8	1572	548	569	602	942	434	96,9	0	0	1140
PENRM	MJ	0,45	0	0	0,45	0	0	0	0	0	0	0	0	0
PENRT	MJ	1160	397	14,8	1572	548	569	602	942	434	96,9	0	0	1140
SM	kg	1069	0	0	1069	0	0	0	0	0	0	0	0	4,17
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	150 1)	0	0	150	0	0	0	0	0	0	0	0	0
FW	m^3	21	0,0040	0,0013	21	0,0029	0,0030	0,0032	0,0050	0,11	5,E-04	0	0	0,16
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water													

1) Carbon monoxide

2) Low net consumption with a high deprivation potential.

Waste generation and output flows

(The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
Hazardous waste disposed	kg	0,0041	4,17E-09	0,0293	0,033	3,77E-09	3,92E-09	4,14E-09	6,49E-09	1,21E-07	6,67E-10	0	0	9,32E-07
Non-hazardous waste disposed	kg	196	0,953	0,599	198	1,21	1,25	1,33	2,08	138	0,214	0	0	4,1
Radioactive waste disposed	kg	0,0359	4,48E-04	7,25E-05	0,0364	5,87E-04	6,1E-04	6,45E-04	0,00101	0,0598	1,04E-04	0	0	1,04E-05

Waste generation and output flows

(The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0,0226	0,0	151	151	0,0	0,0	0,0	0,0	0,0	0,0	0,0	950	4,33E-17
Materials for energy recovery	kg	0,0	0,0	0,397	0,397	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0

Hot rolled Steel

Potential contribution to the core environmental impacts of the production of Hot rolled steel without vanadium or niobium.
(The data refers to a unit of 1 tonne of hot-rolled steel)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
GWP-fossil	kg CO_2 eq.	134	31,1	140	305	40,3	41,8	44,2	69,2	24	6,85	0	0	123
GWP-biogenic	kg CO_2 eq.	8,57	0,238	0,259	9,07	0,104	0,108	0,114	0,179	4,86	0,324	0	0	0,571
GWP-luluc	kg CO_2 eq.	0,0752	0,0253	0,00643	0,107	9,17E-04	9,52E-04	0,00101	0,00158	0,0374	1,62E-04	0	0	0,0247
GWP-total	kg CO_2 eq.	143	31,4	140,3	314	40,4	41,9	44,3	69,4	28,9	7,17	0	0	124
ODP	kg CFC 11 eq.	1,64E-06	3,69E-15	5,1E-09	1,65E-06	4,44E-15	4,61E-15	4,88E-15	7,63E-15	5,14E-13	7,85E-16	0	0	1,52E-14
AP	mol H^+ eq.	0,312	0,532	0,174	1,018	0,759	0,788	0,833	1,3	0,057	0,00621	0	0	0,305
EP-freshwater	kg PO_4^{3-} eq.	0,0020	4,51E-05	1,63E-05	0,0020	2,52E-05	2,62E-05	2,77E-05	4,35E-05	2,10E-04	4,48E-06	0	0	1,35E-04
EP-freshwater	kg P eq.	6,4E-04	1,47E-05	5,3E-06	0,00066	8,23E-06	8,55E-06	9,04E-06	1,42E-05	6,84E-05	1,46E-06	0	0	4,39E-05
EP-marine	kg N eq.	0,0911	0,269	0,0496	0,410	0,385	0,4	0,423	0,662	0,0126	0,00208	0	0	0,0642
EP-terrestrial	mol N eq.	0,969	2,95	0,543	4,46	4,22	4,38	4,63	7,25	0,134	0,023	0	0	0,68
POFP	kg NMVOC eq.	0,263	0,723	0,133	1,119	1,03	1,07	1,14	1,78	0,0351	0,00596	0	0	0,232
ADP-minerals & metals*	kg Sb eq.	1,04E-04	1,21E-06	6,19E-07	1,06E-04	1,35E-06	1,4E-06	1,48E-06	2,32E-06	6,69E-06	2,39E-07	0	0	4,52E-05
ADP-fossil*	MJ	1670	421	16,4	2107	547	568	601	941	434	96,8	0	0	1140
WDP	m^3 world eq.	70	0,1	0,04	70	0,06	0,07	0,07	0,1	3,3	0,01	0	0	5,7

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.
1) ADP-fossil as defined by EN15804+A2 includes uranium and is thus equal to the resource indicator PENRE.

Potential environmental impact – additional mandatory and voluntary indicators

Potential contribution to an additional mandatory impact (GWP-GHG) and additional voluntary impacts of the production of steel billets without vanadium or niobium (The data refers to a unit of 1 tonne of hot-rolled steel).

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
GWP-GHG [1)]	kg CO_2 eq.	133	30,8	140	304	39,8	41,4	43,7	68,5	23,8	6,78	0	0	120
PM	Disease incidences	2,81E-06	8,95E-06	8,53E-07	1,26E-05	1,28E-05	1,33E-05	1,41E-05	2,2E-05	4,99E-07	3,92E-08	0	0	3,93E-06
IRP	kBq U235 eq.	5,18	0,0686	0,0196	5,27	0,0832	0,0863	0,0914	0,143	5,56	0,0147	0	0	1,03
ETP-fw	CTUe	1300	307	22,6	1630	397	412	436	682	164	70,1	0	0	136
HTP-c	CTUh	1,09E-07	5,74E-09	3,38E-08	1,49E-07	7,37E-09	7,66E-09	8,09E-09	1,27E-08	6,08E-09	1,3E-09	0	0	4,82E-09
HTP-nc	CTUh	7,36E-07	2,67E-07	1,43E-06	2,43E-06	3,38E-07	3,51E-07	3,7E-07	5,81E-07	2,98E-07	5,47E-08	0	0	1,49E-06
SQP	-	282	14,8	105	402	1,4	1,46	1,54	2,41	148	0,248	0	0	45,1

1) The indicator is calculated with characterization factors from IPCC AR5 GWP 100, excl biogenic carbon, and includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources

Results per functional or declared unit

Resource use of the production of steel billets without vanadium and niobium. (The data refers to a unit of 1 tonne of steel billets)

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
PERE	MJ	3520	3,58	7,31	3531	1,81	1,88	1,98	3,11	185	0,319	0	0	16,7
PERM	MJ	6,4	0	0	6,4	0	0	0	0	0	0	0	0	0
PERT	MJ	3526	3,58	7,31	3537	1,81	1,88	1,98	3,11	185	0,319	0	0	16,7
PENRE	MJ	1670	422	16,4	2108	548	569	602	942	434	96,9	0	0	1140
PENRM	MJ	0,67	0	0	0,67	0	0	0	0	0	0	0	0	0
PENRT	MJ	1671	422	16,4	2109	548	569	602	942	434	96,9	0	0	1140
SM	kg	1110	0	0	1110	0	0	0	0	0	0	0	0	4,17
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	650 1)	0	0	650	0	0	0	0	0	0	0	0	0
FW	m^3	47	0,005	0,002	47	0,0029	0,0030	0,0032	0,0050	0,11	5,E-04	0	0	0,16
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water													

1) Carbon monoxide, rubber granulate and drilling mud

Waste generation and output flows

(The data refers to a unit of 1 tonne of hot-rolled steel)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
Hazardous waste disposed	kg	0,0042	4,76E-09	0,204	0,208	3,77E-09	3,92E-09	4,14E-09	6,49E-09	1,21E-07	6,67E-10	0	0	9,32E-07
Non-hazardous waste disposed	kg	211	1,03	1,12	213	1,21	1,25	1,33	2,08	138	0,214	0	0	4,1
Radioactive waste disposed	kg	0,0416	4,82E-04	1,0E-04	0,0422	5,87E-04	6,1E-04	6,45E-04	0,00101	0,0598	1,04E-04	0	0	1,04E-05

Waste generation and output flows

(The data refers to a unit of 1 hot-rolled steel)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4				C1	C2	C3	C4	D
						NO	SE	DK	FI					
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0,0252	0,0	157	157	0,0	0,0	0,0	0,0	0,0	0,0	0,0	950	4,33E-17
Materials for energy recovery	kg	0,0	0,0	0,587	0,587	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0

Information on biogenic carbon content

Biogenic carbon content	Unit	Quantity
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0 [2)]

Note 1: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2
Note 2. Minor amounts of wooden pallets are occasionally being used. The quantities are of the order of magnitude of 0.5 – 1.0 kg/tonne of reinforcement steel.

Additional information

As a calculation example the climate impact to produce the pre-consumer steel scrap used by Celsa is calculated. Of the steel scrap used as charge for the steel mill, ca. 27 % consists of pre-consumer steel scrap and 0.42 % of pre-consumer cast iron. Of the steel scrap, an estimated share of 46 % originates from scrap-based steel. The rest of the pre-consumer steel scrap and the entire quantity of pre-consumer cast iron scrap are produced from iron ore via the blast-furnace route. Generic average data for steel production in Europe is used to calculate the potential climate impact, GWP-fossil, of producing these steel and iron quantities. The climate impact, GWP-fossil, of manufacturing the quantities of pre-consumer scrap used per declaredunit, 1 tonne of hot rolled steel.

	Quantity (kg)	GWP-fossil,(kg CO_2 eq.)	Specific GWP-fossil (kg CO_2 eq./ kg steel or iron)
Ore-based steel, blast-furnace route, cold rolled	162	395	2,44
Scrap-based engineering steel, electric-arc furnace route	138	143	1,04
Cast iron, ore based	4.7	7.5	1,60

Environment and energy

The protection and improvement of the environment are essential to us. Every day we try to improve our methods and installations by establishing controls, looking for new applications for the reuse or valorization of our waste and investing in technological improvements that benefit the environment. Our plants stand out for their recycling capacity.

CELSA Nordic aims for excellence in environmental management. Hence, in recent years we have been working on implementing the most demanding environmental management systems in our parent companies such as the European EMAS.

Health and Safety

In CELSA Nordic, we are committed to achieving a safe and healthy work environment for all the people who work with us. Our goal is to become an organization where we all believe in the value of our safety and of our colleagues.

Beyond compliance with the legal requirements in terms of occupational risk prevention, in CELSA Nordic we have incorporated into our Occupational Health and Safety Management System a series of programs that allow us to move towards our objective of Zero Accidents.

Environmental policy

- Comply with the legal obligations and requirements in the areas we operate. Information, collaboration and transparency with the Administrations.
- Consider the needs and expectations of the stakeholders. Enter into commitments and voluntary agreements with our closest communities in environmental improvement projects and in the dissemination and training of workers and neighbors in an environmental matter.
- Work with different environmental management systems, certified and adapted to the nature of our activities that ensure care and respect for the environment by encouraging each person in our organization to act in an environmentally responsible manner.
- Apply continuous improvement in all our processes and develop and invest in new technologies that allow us to prevent and minimize atmospheric emissions, generation of waste and inefficient use of resources. Consider the life cycle of the product to determine environmental aspects and impacts.
- Promote commitment and an environmentally responsible performance of our suppliers, contractors and subcontractors, which in this regard are the decisive factor of choice.
- Promote the recovery, recycling and reuse of our products and work with our clients in raising awareness of the steel life cycle. Participate in initiatives that promote the use of environmentally responsible products.

Environmental Principles

- Effective and responsible use of natural resources and energy.
- Systematic appliance of continuous improvement and prevention of pollution in the management of processes that include the establishment and periodic review of environmental objectives and goals.
- Develop a productive system that respects the environment and complies with the legal obligations and commitments and voluntary agreements signed by CELSA Group™ related to its environmental aspects.
- Encourage the implementation of the waste hierarchy in a manner that favors the following management processes: prevention, minimization, reusing, recycling, energy valorization and leaving landfill disposal as a residual management channel.
- Consider and minimize the impact of environmental aspects from the extraction of raw materials to the end-of-life conditions of the equipment, the facilities and the manufactured products, by using the best available and affordable technologies of the company.
- Develop the environmental commitment of each person that will be linked to our business including management, employees, contractors, customers and suppliers, making awareness, information and training an essential tool
- Communicate in an open and transparent way our environmental performance with all the interested parties with the objective of achieving an environmentally respectful integration in our environment.

People and Society

Our commitment to people and society is absolute. We believe in equal opportunities, in the diversity of our people and in the integration of all people who want to be part of the Group. We are proud to have people from different places, races, ideologies, nationalities, religions and abilities.

Not only that, but in CELSA Nordics we promote work-life balance policies and we fully respect the personal and family life of all the employees.

Commitment to the community

Within the framework of our commitment to the community, we are firmly devoted to promoting training projects that result in personal and professional development, not only of those people who make up our organization, but also of those students who aspire to be part of it in the future. We show full respect to the local cultures of the countries and communities where we operate, contributing to their development and aiming to achieve a sustainable and beneficial activity for society.

Code of Ethics and Professional Conduct

CELSA Nordics has a Code of Ethics and Professional Conduct that governs the behavior guidelines of each employee who is part of the Group.

Compliance with the Code is the responsibility of each person, who, through their conduct, must respect the laws, values, principles and rules of the Code, as well as other existing provisions or those that may exist in the future. Likewise, the Code contemplates that employees promote that the subsidiaries and affiliates of CELSA Nordics as well as their suppliers and interest groups, are governed by standards of conduct and values analogous to those established in this Code.

You may find more information about CELSA Nordic Sustainability & Environmental work at:
www.celsanordic.com & celsa-steelservice.no

References

Almemark, M. (2020), LCA of Reinforcement steel products from Celsa Steel Service in Sweden, Norway, Denmark and Finland, report to Celsa Nordic.

Almemark, M. (2021), LCA of Reinforcement steel products from Celsa Steel Service in Sweden, Norway, Denmark and Finland, report to Celsa Nordic. .

CONSTRUCTION PRODUCTS (2019), Product Category Rules (PCR), PCR 2019:14, version 1.11, EPD®.

Ecoinvent 3.7, ecoinvent, Zürich, www.ecoinvent.org

EN 15804:2012+A2 (2019), Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products, European Committee for Standardization.

ILCD (2013), Characterisation factors of the ILCD Recommended Life Cycle Impact Assessment methods, Database and supporting information, Joint Research Centre, Institute for Environment and Sustainability, European Union, http://europa.eu

Manouchehri, H. R. (2008): Mapping and Development of the Shredder Product Stream. Evaluation of the Environmental Potential of Increased Scrap Yield and Increased Scrap Density. Data from Stena Recycling as given by Northland Oretech Consulting Co, Luleå, collected during the course of Project 88011 of the Steel Eco-Cycle, phase 1.

Sphera Solutions GmbH, LCA software GaBi 10.5 with its Professional Database version 2021.1, Leinfelden-Echterdingen, Germany, www.gabi-software.com

Practitioner

This environmental declaration is prepared by Mats Almemark June 2021.

IVL Swedish Environmental Research Institute- independent qualified environmental competence.

www.ivl.se
Phone +46 10 788 65 00
e-mail: mats.almemark@ivl.se

General information

EPD Programme
The International EPD® System.
For more information, www.environdec.com

Programme operator
EPD International AB, Box 210 60 SE-100 31 Stockholm Sweden

PCR review conducted by
The Technical committee of the International EPD® System

EPD registration number: SP-04910

Product category rules: PCR 2019:14 Construction products version 1.0

Central Product Classification
CPC 4126, drawn and folded products of iron or steel

Publication date: 2021-11-09
EPD Version: 2021-11-09
Valid until: 2026-11-10

Owner:
Celsa Armeringsstål, Postboks 500, N-8601 Mo i Rana, Norway

Contact
Halvard Meisfjord
halvard.meisfjord@celsanordic.com
+47 90782164

Declared unit
Per tonne of steel billet/ hot-rolled products.

Geographical coverage: Norway

2021-10-04

celsa nordic

EPD®

ECO PLATFORM EPD EN 15804 VERIFIED

ANNEX 1

ANNEX 1: Self declaration from EPD owner

Specific Norwegian requirements

1 Applied electricity data set used in the manufacturing phase

The electricity mix for the electricity used in manufacturing (A_3) is the electricity grid mix

Norwegian average consumption mix, high-voltage grid (1kV - 60kV)

Source of electricity for the manufacture (A3)

Electricity for the manufacture in Norway is supplied from the Norwegian average consumption mix.

Primary energy source 2019	Contribution (%)
Hydro power	95.92
Wind power	1.92
Biogas	0.01
Waste incineration	0.32
Fossil sources, mainly natural gas	1.84
Climate impact, kg CO_2 equiv./kWh	**0.03 Import 4.11 % of the gross production**

2 Content of dangerous substances

xThe product contains no substances given by the REACH Candidate list or the Norwegian priority list.

- ☐ The product contains substances that are less than 0.1% by weight given by the REACH Candidate or the Norwegian priority list.
- ☐ The product contains dangerous substances more than 0.1% by weight given in the REACH candidate list or the Norwegian Priority List, concentrations is given in the EPD:

Dangerous substances from the REACH candidate list or the Norwegian Priority List	CAS No.	Quantity (concentration, wt%/FU(DU)).
Substance 1		
Substance n		

3 Transport from the place of manufacture to a central warehouse

Transport distance, and CO_2-eqv./DU from transport of the product from factory gate to central warehouse in Oslo shall be given. The following table shall be included in the EPD:

For S-P- 04910

Transports to building sites (A4)

Fuel use and emission data for ships, trucks and rail were collected from the GaBi professional database (Sphera Solutions).

Recovery of steel from articles of steel

Operation	Data source	Energy use	Losses of steel by recovery, %	Environmental load to replace the lost steel (module D)
Dismantling and scrapping	Data for a car shredder, Germany, only electricity use considered, (Sphera Solutions)	0.2 MJ electricity/kg of scrapped material, EU28 electricity mix	5 [1]	Modelled as cold-rolled steel, blast- furnace route, EU28 (World Steel Association 2019)
Disposal of lost steel	Modelled as ferro metals on land-fills, EU28 (Sphera Solutions)			

1) Estimated

For S-P- 00306

Transports to building sites (A4)

For deliveries of reinforcement products to building sites in Norway an average distance of 119 km by truck is used to calculate the environmental impacts, based on data from CELSA Steel Service in Norway.

Transport of reinforcement products from the site of production to the building site in Norway

Mode of transport	Type of vehicle (Gross weight, tonnes)	Payload capacity (tonnes)	Cap. use (%)	Distance (km)	Fuel consumpt (l/tkm)
Truck, Euro 6	26-28	18.4	70	119	0.024

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy use	Unit	Value (l/t)	Kg CO_2-eqv./DU
Boat							
Truck	<xx>	<Truck xx tonn, EURO4,?>	<xxxx>	<xxxx>	l/tkm	<xxxx>	
Railway							
Rail							
Air							
Total							

4 Impact on the indoor environment

☐ Indoor air emission testing has been performed; specify test method and reference; M1, _____

☐ No test has being performed

X Not relevant; specify _____