

Environmental Product Declaration

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



ENVIRONMENTAL FOOTPRINT INSTITUTE

Prime Steel Concast Billets



Programme :	The EFI Program
Programme Operator :	The Environmental Footprint Institute
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Reference Year :	2025

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 Rashtriya Ispat Nigam Limited (RINL)



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STEEL**
Pride of Steel

General Information

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Product Category Rules (PCR)

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PCR review was conducted by: The Environmental Footprint Institute.

Product category rules (PCR): Under the general rules of the Environmental Footprint Institute and PCR P-3100: Construction products in general (EN-15804)

Life Cycle Assessment (LCA)

LCA accountability: CQES International LLC



☐ Internal Verification

☒ Third Party Verification

Accredited by: THE ENVIRONMENTAL FOOTPRINT INSTITUTE

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Procedure for follow-up of data during EPD validity involves Internal verifier:

☐ Yes

☒ No

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

EPDs within the same product category but registered in different EPD programs may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison.

Company Information

Owner of the EPD :

Rashtriya Ispat Nigam Limited (RINL)

Visakhapatnam Steel Plant

Contact :

S Rajesh

Email:

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Company Description:

Rashtriya Ispat Nigam Ltd (abbreviated as RINL), also known as Vizag Steel, is a central public sector undertaking under the ownership of Ministry of Steel, Government of India based in Visakhapatnam, India. Rashtriya Ispat Nigam Limited (RINL) is the government entity of Visakhapatnam Steel Plant (VSP), India's first shore-based integrated steel plant built with state-of-the-art technology. Visakhapatnam Steel Plant (VSP) is a 7.3 MTPA plant. It was commissioned in 1992 with a capacity of 3.0 MTPA of liquid steel. The CPSU subsequently completed its capacity expansion to 6.3 MTPA in April 2015 and to 7.3 MTPA in December 2017. The PSU is having one subsidiary, viz. Eastern Investment Limited (EIL) with 51% shareholding, which in turn is having two subsidiaries, viz. M/s Orissa Mineral Development Company Ltd (OMDC) and M/s Bisra Stone Lime Company Ltd (BSLC). The CPSU has a partnership in RINMOIL Ferro Alloys Private Limited and International Coal Ventures Limited in the form of Joint Ventures with 50% and 26.49% shareholding respectively. RINL is wholly owned by the Government of India.



Certifications

Rashtriya Ispat Nigam Limited (RINL), a leading Indian steel producer and the corporate entity of Visakhapatnam Steel Plant (VSP), operates with a strong commitment to quality, environmental responsibility, energy efficiency, and sustainable steel production. The company's manufacturing operations are certified to internationally recognized ISO 9001 (Quality Management), ISO 14001 (Environmental Management), and ISO 50001 (Energy Management) standards. RINL's products and processes comply with applicable national and international standards and certifications, reflecting its focus on quality, reliability, energy efficiency, operational excellence, and sustainable steel manufacturing.



Product Information

Product Name : **Prime Steel Concast Billets**

Product identification :

The environmental performance results presented in this EPD are representative of Prime Steel Continuous Cast Billets manufactured by Rashtriya Ispat Nigam Limited (RINL). The results are calculated on a per-ton basis, considering the production volume, raw material and energy consumption, and waste and emissions generated during the defined reference period.

<u>UN CPC Code</u>	41220 - Semi-finished products of iron or non-alloy steel
<u>Geographical Scope</u>	India
<u>Location of Production Site :</u>	Visakhapatnam-530031, Andra Pradesh (INDIA)

Product Description :

Prime Steel Concast Billets are semi-finished steel products manufactured through steelmaking and continuous casting processes. The product grades covered under this EPD include 3SP, 4SP, 4SPM, 5SPM, 5SP, and 1008. The billets are produced in various dimensions and steel grades according to specified requirements. The billet dimensions covered under this EPD are 125 × 125 mm, 100 × 100 mm, 90 × 90 mm, 77 × 77 mm, 75 × 75 mm, 65 × 65 mm.

The billets are primarily used as input materials for downstream processes such as rolling, forging, and pipe manufacturing. Controlled steelmaking, continuous casting, cooling, and solidification processes ensure consistent metallurgical quality, dimensional characteristics, and suitability for further processing into a range of steel products.

Detailed ranges of raw material inputs and steel grades covered under this EPD are provided in the Product Content table (Page 8).

LCA Information

<u>Declared Unit :</u>	The Declared Unit of the Life Cycle Assessments is one tonne (1000 kilogram) of Prime Steel Concast Billets. All direct and indirect environmental impacts, as well as the use of resources, are reported referred to this unit. This EPD presents the environmental impacts associated to the LCA of the analyzed products.
<u>Time Representativeness :</u>	Jan 2025 to Dec 2025
<u>Database(s) and LCA software used:</u>	Version 3.21.0.5 of software Air.e LCA™ with Ecoinvent™ 3.12.0 database has been used for LCA modeling and impacts calculations. EN15804 system model is used in this LCA.
<u>Electricity usage in A3 :</u>	A specific dataset with the Life Cycle Inventory (LCI) corresponding to electricity usage in A3, “market for electricity, medium voltage, IN-Southern grid”, is used. The dataset has a characterized carbon emission factor of 1.171 kg CO ₂ e/kWh (GWP-GHG).
<u>Cut-off rules:</u>	More than 99% of the materials and energy consumption have been included. The Polluter Pays Principle and the Modularity Principle have been followed.
<u>Allocation method:</u>	During steel production, slag is generated as a co-product and is sold for use in cement production and road construction. In accordance with EN 15804 allocation rules, environmental impacts between Prime Steel Concast Billets and slag have been allocated based on economic value. This allocation reduces the environmental burden attributed to Prime Steel Concast Billets, reflecting the real-world application of co-product utilization.

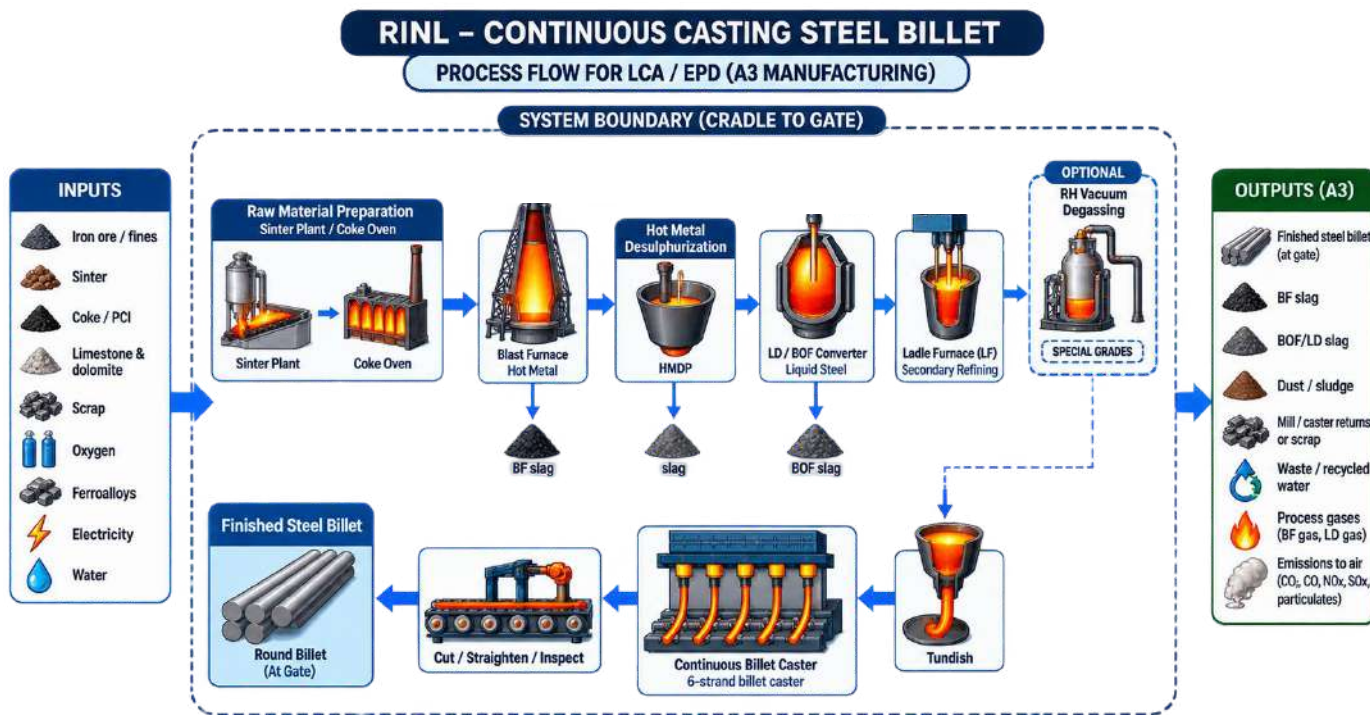
Description of system boundaries:

This Environmental Product Declaration (EPD) for Prime Steel Concast Billets follows a cradle-to-gate with options approach in accordance with EN 15804. The system boundary includes Modules A1–A3, A4, C1–C4 and D.

Modules A1–A3 cover raw material extraction and processing, transportation of inputs, and manufacturing of billets at the RINL facility. The production route includes blast furnace ironmaking, hot metal processing, LD/BOF steelmaking, secondary refining, vacuum degassing where applicable, and continuous casting, including cooling, cutting and handling of billets. Associated energy, water, process materials, emissions and manufacturing wastes/co-products are included. Module A4 covers transportation of finished billets from the manufacturing facility to the customer or project site based on defined transport assumptions.

Module A5 and B1–B7 are excluded because the product is a semi-finished steel product and its further processing and use depend on downstream applications.

Modules C1–C4 cover end-of-life processes, including collection, transportation, waste processing and disposal/recycling. Module D accounts for potential benefits and loads beyond the system boundary associated with steel recycling.



Core Processes

Upstream Stage (A1–A2)

This stage includes the extraction and processing of raw materials, upstream material production, and transportation of all input materials to the manufacturing facility for the production of Steel Billet.

A1-Raw Material Supply: The A1 module covers the extraction, processing, preparation, and upstream supply of all raw materials, fuels, alloying materials, and auxiliary materials required for the production of Prime Steel Concast Billets at Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant, India. The principal raw materials and auxiliary materials considered within the A1 system boundary include iron ore and iron ore fines, iron ore pellets, iron ore slime, coke, PCI (pulverized coal), limestone, dolomite, manganese ore, silico-manganese, ferro-silicon, aluminium, petroleum coke, BOF briquettes, micro pellets, lime, and other ferroalloys required for ironmaking, steelmaking, secondary refining, and continuous casting operations. The upstream production and processing of externally sourced materials, including associated energy consumption, resource use, and environmental emissions, are included within the A1 module. Where materials such as coke, PCI, ferroalloys, lime, petroleum coke, BOF briquettes, micro pellets, and alloying materials are procured from external suppliers, their upstream production is accounted for in A1. Materials produced internally within the RINL integrated steelmaking route are treated according to the defined LCA system boundary and allocation procedure to avoid double counting. The quantities of all raw materials and auxiliary materials are calculated based on their consumption required to produce the defined quantity of finished Prime Steel Concast Billets.

A2 - Transport: The A2 module includes the transportation of raw materials from their point of extraction or processing to the Rashtriya Ispat Nigam Limited (RINL) manufacturing site in India. Transport of raw materials to production site is taken as the weighted average values for transport from supplier for the year of 2025.

- Vehicle used for transport - freight, lorry, 16-32 metric ton, diesel, EURO 5
- Vehicle capacity - average load 5.79 tons and GVW 25 tons
- Fuel type and consumption - Diesel, as per ecoinvent
- Bulk transportation - Mass of the transported product.

Core Stage (A3–A4) and End-of-Life (C1–C4, D) — Prime Steel Concast Billets

The core stage includes all manufacturing processes involved in the production of Prime Steel Concast Billets at Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant, India. The manufacturing route considered for the billet product comprises raw-material preparation, coke and sinter production where applicable, blast furnace ironmaking, hot-metal treatment, LD/BOF steelmaking, secondary refining, continuous casting, billet cutting, inspection, and handling up to the manufacturing gate. Module A4 includes transportation of the finished Prime Steel Concast Billets from the RINL manufacturing facility to the customer, stockyard, port, or project site. Modules C1–C4 and Module D include standardized assumptions for the use and end-of-life treatment of steel products, including collection, processing, recycling, disposal, and potential benefits from steel recovery and recycling beyond the system boundary.

A3 – Manufacturing:

The A3 stage includes all manufacturing processes occurring within the RINL integrated steel plant, from receipt and internal preparation of raw materials through the production of finished Prime Steel Concast Billets at the factory gate. The manufacturing route includes raw-material handling and preparation, sinter production, coke production, blast furnace operation, hot-metal desulphurization/treatment, LD/BOF steelmaking, secondary metallurgy and ladle treatment, continuous casting, billet cutting, inspection, and internal handling. The A3 inventory includes the consumption of iron ore and iron ore fines, iron ore pellets, iron ore slime, coke, PCI/pulverized coal, limestone, dolomite, manganese ore, silico-manganese, ferro-silicon, aluminium, petroleum coke, BOF briquettes, micro pellets, lime, ferroalloys, electricity, natural gas, diesel, water, oxygen, and other process and auxiliary materials, as applicable to the RINL production route.

The A3 stage also accounts for relevant direct process emissions, fuel-combustion emissions, electricity consumption, material losses, slag generation, dust and other process residues, wastewater where applicable, and waste-treatment activities associated with the production of Prime Steel Concast Billets. Carbon dioxide emissions from fuel and reductant consumption are calculated using the applicable carbon-content and emission factors, while process-related emissions associated with iron ore reduction, steelmaking reactions, and carbon-containing process materials are included where relevant. Emissions associated with the consumption and oxidation of carbon-containing materials, including coke, PCI/pulverized coal, natural gas, petroleum coke, and other applicable fuels or reductants, are accounted for in the A3 inventory. Where graphite electrodes or other carbon-containing consumables are used in secondary steelmaking operations, their consumption and associated emissions are included based on actual RINL inventory data. Electricity consumption is accounted for using the applicable electricity supply mix and corresponding LCA dataset for India.

Billet rolling is excluded from the A3 manufacturing boundary for this product where the declared product is the cast billet itself. Rolling is a subsequent downstream process in which the billet may be used as an input to manufacture rolled steel products and therefore is not included in the production of Prime Steel Concast Billets.

A4 - Transportation of Goods:

Stage A4 covers the transportation and distribution of Prime Steel Concast Billets from the manufacturing facility of Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant to customers, stockyards, or points of sale in east, south, southeast asia. This module includes emissions from fuel combustion during road, rail, and sea transport, taking into account the typical transport modes, distances, and logistics scenarios used for product delivery. The calculation is based on the mass of the transported billets and representative average delivery distances. The vehicle types, capacities, fuel consumption, and bulk transport basis applied in this module are the same as described in Module A2. Please refer to A2 — Transport to Manufacturing Site for detailed transport assumptions.

End-of-Life Stage

C1 – Deconstruction / Demolition :

Module C1 covers the activities associated with the deconstruction or demolition of the product at the end of its service life. This includes the removal of the product from its original location, dismantling of components, and preparation of materials for subsequent transport and treatment. No specific energy use or additional treatment processes related to demolition or deconstruction are considered at the end-of-life stage.

C2 – Transport :

Module C2 accounts for the transportation of deconstructed materials from the demolition site to appropriate recycling or disposal facilities. Transport of the demolished product to the recycling facility is considered, with an assumed average transport distance of 50 km by road. The vehicle types, capacities, fuel consumption, and bulk transport basis applied in this module are the same as described in Module A2. Please refer to A2 — Transport to Manufacturing Site for detailed transport assumptions.

C3 – Waste Processing

Module C3 covers the collection, sorting, processing, and preparation of steel recovered at the end of its service life for recycling and re-entry into the steel manufacturing system as secondary raw material. Steel is assumed to be separately collected and processed as recyclable metal scrap. The energy consumption associated with scrap collection and processing is included based on the applicable LCA database and methodology. For the end-of-life scenario of Prime Steel Concast Billets, an 85% steel recycling rate is assumed, consistent with the typical construction-sector steel end-of-life recycling rate reported by worldsteel. This value is considered a representative LCA assumption where product-specific Indian end-of-life data are not available. It is assumed that steel waste is separately collected, and electrical energy required for sorting is 0.05 kWh per kg of steel.

C4 – Disposal :

Module C4 represents the final disposal of waste materials that cannot be reused, recycled, or further treated. After the end of its useful life, the remaining 15% of the product is assumed to be disposed of via landfill.

Module D – Benefits and Loads Beyond the System Boundary :

Module D accounts for the potential environmental benefits and loads associated with the recycling of materials beyond the system boundary. Due to the absence of billet-specific end-of-life statistics, national steel recycling data for India is used as a proxy in accordance with EN 15804. Industry statistics indicate that approximately 85% of steel in India is recycled, based on the share of scrap used in crude steel production, while the remaining 15% is assumed to be disposed of or not recovered.

More Information

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

Module	Product Stage			Construction Process Stage		Use Stage	End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use, maintenance, repair, replacement, refurbishment, operational energy and water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery- Recycling-potential
	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	X	X	X	X	X
Geography	IN GLO	IN GLO	IN	IN GLO	IN GLO	--	IN GLO	IN GLO	IN GLO	IN GLO	IN
Specific data used	>75%			--	--	--	--	--	--	--	--

* X - Included IN - India ND - Not Included GLO - Global

Assumptions and Allocations :

The LCA for Prime Steel Concast Billets manufactured at RINL, Visakhapatnam, is conducted using a cradle-to-gate with options approach in accordance with EN 15804 and ISO 14044. The assessment is based on a finished production quantity of 16,875 t, with total process input of 17,578.13 t, corresponding to approximately 4% production loss. Secondary data are obtained from Ecoinvent and other recognized LCA sources where primary data are unavailable.

Transportation in A2 is modelled using supplier-specific or weighted-average distances and applicable road, rail, and marine transport datasets. Upstream impacts of externally purchased raw materials and fuels are included in A1.

The A3 module includes RINL's relevant manufacturing processes, energy and fuel consumption, process emissions, material losses, and waste/co-product generation. BOF slag and BF slag totaling 126 t are considered as co-products.

Allocation between Prime Steel Concast Billets and slag is performed according to the applicable EN 15804/PCR allocation hierarchy. Where economic allocation is applied, the allocation factors are determined using the relative economic value of the billet and slag co-products.

Content Information

Product Content:

Product Components	Weight %	Post-Consumer material weight - %	Biogenic material, kg C/kg
Iron-bearing raw materials	68-72	0	0
Carbonaceous materials & reductants	17-20	0	0
Fluxes	8.5-11	0	0
Alloying materials / ferroalloys	1-2	0	0
Recycled / secondary materials	0-1	0	0
Total	100	0	0

Packaging Material Content:

Packaging Material	Weight (kg)/DU	Weight % (Versus the Product)
Wooden Blocks	5.00E-01	5.00E-02

Dangerous substances from the candidate list of SVHC for Authorisation:

Dangerous substances from the candidate list of SVHC for Authorisation:	EC No.	CAS No.	Weight-% per declared unit
None	--	--	--
None	--	--	--

Biogenic carbon content:

Biogenic carbon content	A1-A3/Unit
Biogenic carbon content in product	0.00E+00 kg C
Biogenic carbon content in accompanying packaging	2.23E-01 kg C

Manufacturing Process:

Prime Steel Concast Billets are produced through an integrated steelmaking route at RINL, Visakhapatnam Steel Plant, comprising raw-material preparation, sintering and coke production, blast furnace ironmaking, hot-metal treatment, BOF steelmaking, secondary refining, and continuous casting. Iron ore and other iron-bearing materials, coke, PCI/pulverized coal, fluxes, ferroalloys, and auxiliary materials are used as inputs. The molten steel is refined to achieve the required chemical composition and quality before being continuously cast into billets. The billets are subsequently cut to the required dimensions, inspected, cooled, and prepared for dispatch. Billet rolling is not included, as the declared product is the finished Prime Steel Concast Billet.

Technical information:

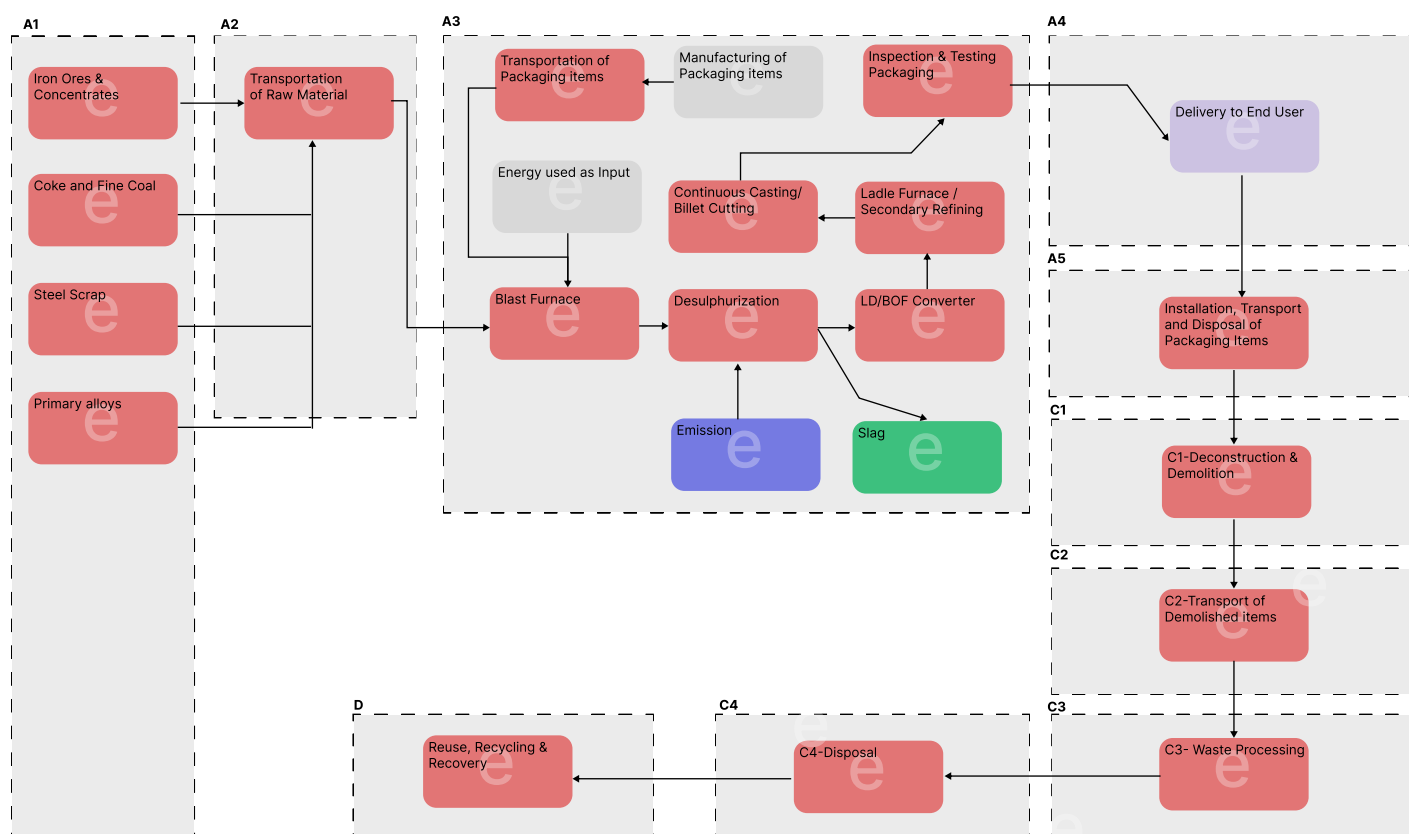
For more technical information about the Prime Steel Concast Billets, please refer to the Product Mill Test Certificate (MTC) and product catalogs.

Data quality:

The environmental impact assessment for Prime Steel Concast Billets is conducted in accordance with ISO 14025, ISO 14040, ISO 14044, and EN 15804:2012+A2:2019, together with the applicable Product Category Rules (PCR). Primary data for raw material consumption, transportation, and manufacturing processes (A1–A3) are based on RINL, Visakhapatnam Steel Plant data for the reference year 2025. Where primary data are unavailable, appropriate generic background datasets from Ecoinvent v3.12 and other recognized sources are used for upstream and downstream processes.

The LCA is modelled using the applicable LCA software and EN 15804+A2:2019 characterization factors. The data are considered representative of the 2025 production year and the defined RINL manufacturing system.

Life Cycle Assessment Modelling



Environmental Performance

Potential Environment Impacts

The following tables present the environmental performance of the declared unit, one tonne of Prime Steel Concast Billets, manufactured at RINL, Visakhapatnam Steel Plant. As product-specific consumption data for electricity, water, raw materials, fuels, and auxiliary materials are not separately available for each individual product, the assessment is based on the total annual consumption and total production quantity, with the resulting impacts allocated to the declared billet production. The assessment represents the 2025 production year and the defined production output of 16,875 tonnes of Prime Steel Concast Billets.

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

Core Environmental Impact Indicators

Impact category indicators according to EN 15804 (Results per declared unit)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-Total	kg CO ₂ eq.	2.68E+03	1.50E+02	2.75E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.89E+00	5.86E+01	9.40E-01	1.26E+01
GWP-fossil	kg CO ₂ eq.	2.67E+03	1.50E+02	2.78E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.88E+00	5.83E+01	9.39E-01	-1.23E+01
GWP-biogenic	kg CO ₂ eq.	4.89E-01	3.34E-02	2.47E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.24E-03	2.89E-02	2.89E-04	2.49E+01
GWP-luluc	kg CO ₂ eq.	1.01E+00	6.70E-02	7.63E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.45E-03	1.92E-01	5.34E-04	-2.29E-02
ODP	kg CFC 11 eq.	1.40E-05	2.05E-06	2.21E-10	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.44E-07	9.03E-08	2.74E-08	-2.38E-07
AP	mol H ⁺ eq.	9.89E+00	5.45E-01	8.44E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.36E-02	2.70E-01	6.47E-03	-1.93E-01
EP-freshwater	kg P eq.	7.00E-01	1.63E-02	3.65E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.08E-03	5.79E-02	8.27E-05	-7.70E-03
EP-marine	kg N eq.	2.23E+00	1.82E-01	8.93E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.81E-03	6.14E-02	2.58E-03	-1.74E-02
EP-terrestrial	mol N eq.	2.40E+01	1.96E+00	2.65E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.08E-02	5.68E-01	2.79E-02	-4.64E-01
POCP	kg NMVOC eq.	8.83E+00	7.46E-01	1.84E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.29E-02	1.50E-01	1.01E-02	-1.29E-01
ADP-minerals & metals*	kg Sb eq.	2.17E-03	4.93E-04	2.91E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.33E-05	3.43E-05	1.39E-06	-1.26E-03
ADP-fossil*	MJ	2.17E+04	1.89E+03	1.82E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.25E+02	6.57E+02	2.09E+01	-2.53E+02
WDP*	m ³	4.02E+02	1.13E+01	-8.06E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.72E-01	1.31E+01	1.02E+00	-2.61E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption															

Note on Declared Modules:

The environmental impacts presented above are for modules A1-A3, A4,A5, C1-C4 and D only.

- Module B (Use Stage) is considered null for this semi-finished product, as its use phase depends on further downstream processing.

*CO₂ emissions from fuel combustion in A3 were calculated using standard carbon content factors and the 44/12 molecular weight ratio, in accordance with IPCC guidelines.

Environmental Impact -GWP-GHG

Additional mandatory and voluntary impact category indicators (Results per declared unit)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	2.84E+03	1.51E+02	2.89E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.96E+00	5.89E+01	9.62E-01	4.42E+01

Use of Natural Resources

Resource use indicators (Results per declared unit)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	8.88E+02	2.88E+01	-3.54E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.93E+00	5.41E+01	2.13E-01	2.04E+01
PERM	MJ	5.24E+01	0.00E+00	3.55E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.41E+02	2.88E+01	3.88E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.93E+00	5.41E+01	2.13E-01	2.04E+01
PENRE	MJ	1.08E+04	2.06E+03	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.37E+02	6.89E+02	2.29E+01	1.43E+02
PENRM	MJ	2.94E+05	0.00E+00	2.32E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.58E+04	2.06E+03	2.06E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.37E+02	6.89E+02	2.29E+01	1.43E+02
SM	kg	4.43E+00	9.20E-01	7.57E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.11E-02	4.55E-02	5.70E-03	2.60E-01
RSF	MJ	4.45E+06	1.17E-02	1.27E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.94E-04	3.71E-04	1.20E-04	2.06E-02
NRSF	MJ	1.45E+06	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	5.06E+04	2.75E-01	-1.87E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.88E-02	3.19E-01	2.38E-02	7.17E-02
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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water															

End of Life - Outflows

Output flow indicators (Results per declared unit)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	1.39E+00	9.74E-02	7.83E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.67E-03	6.21E-02	7.68E-04	8.16E+02
Materials for energy recovery	kg	1.90E-03	1.33E-04	1.37E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.02E-06	3.31E-04	4.15E-07	2.82E-05
Exported energy, electricity	MJ	3.80E+00	1.76E-01	2.36E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.18E-02	1.15E-02	1.42E-03	7.29E-02
Exported energy, thermal	MJ	1.85E+00	3.06E-01	2.26E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.07E-02	1.99E-02	7.90E-04	2.02E-02

End of Life - waste

Waste indicators (Results per functional or declared unit)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.49E+02	1.44E+01	1.26E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.59E-01	4.41E+00	7.44E-02	1.07E+01
Non-hazardous waste disposed	kg	3.99E+03	1.86E+02	1.36E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.25E+01	2.81E+02	1.51E+02	6.83E+01
Radioactive waste disposed	kg	8.14E-03	3.87E-04	5.68E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.59E-05	1.02E-03	3.12E-06	1.80E-04



Additional information

No additional information is provided.

Information related to Sector EPD

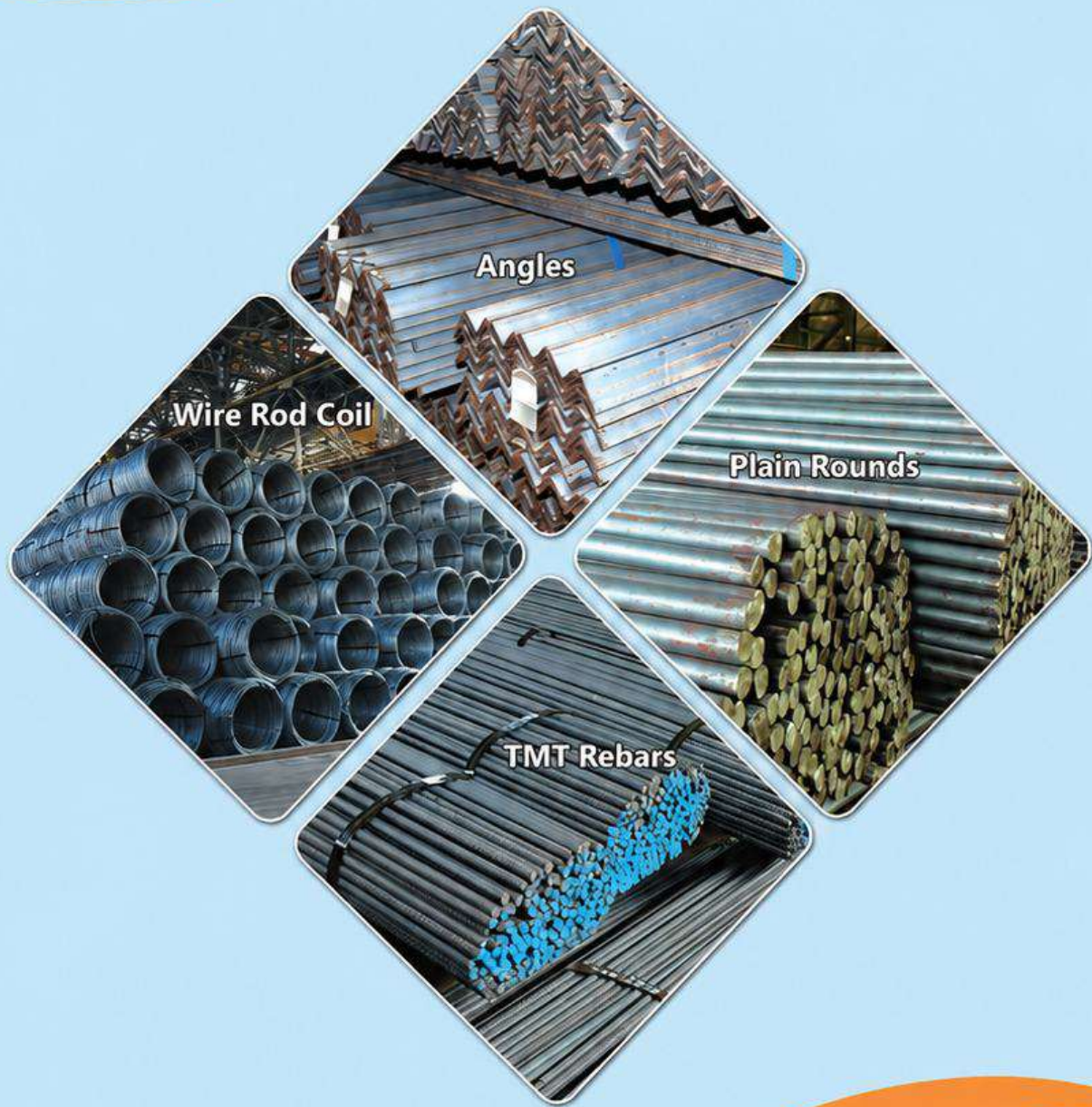
This is not a sector EPD.

Differences versus previous versions

This is the first version of the EPD.

References

1. LCA Report: Life Cycle Inventory of Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant, India – Prime Steel Concast Billets
2. Software: Air.e LCA Version 3.21.0.5, Solid Forest
www.solidforest.com
3. Main database: Ecoinvent 3.12
4. Ecoinvent confirms that version 3.12 was released in November 2025 and includes updated datasets for metals, electricity, fuels, transport and other sectors.
5. Geographical scope of the EPD: India, with the manufacturing system located at Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant, Andhra Pradesh, India. RINL identifies Visakhapatnam Steel Plant as an integrated steel plant and a Government of India enterprise.
6. Standards and methodological references
 - ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and framework.
 - ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines.
 - ISO 14020:2000 – Environmental labels and declarations – General principles.
 - ISO 14025:2006 – Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
 - EN 15804:2012+A2:2019/AC:2021 – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
 - Applicable Product Category Rules (PCR) for construction products under the selected EPD programme. The current International EPD System PCR for construction products is PCR 2019:14, version 2.0.1, which is EN 15804+A2 compliant.
7. India/RINL-specific references
 - Rashtriya Ispat Nigam Limited (RINL) – Visakhapatnam Steel Plant: Official information on the integrated steelmaking process, facilities and production system.
 - Ministry of Steel, Government of India – Greening the Steel Sector in India: Reference for the Indian steel sector, scrap utilization, steel production and recycling/recovery considerations.
 - Tata Steel – Environmental Product Declaration for TISCON: Indian steel EPD reference. The EPD applies an 85% steel recycling/recoverability rate and 15% landfill scenario at end of life and states that Indian-specific datasets were used where available.
 - World Steel Association (worldsteel) – Life Cycle Inventory/LCA methodology and steel recycling data: Used as an international reference for steel recycling, recovery and life-cycle modelling.
 - Ecoinvent 3.12: Used for appropriate background datasets where RINL primary data are unavailable.



RASHTRIYA ISPAT NIGAM LIMITED

(A Govt. of India Enterprise)

CIN: U27109AP1982GOI003404

Visakhapatnam Steel Plant

Visakhapatnam-530031, Andhra Pradesh

ISO 9001:2015, ISO 14001:2015, ISO 27001:2013, ISO 50001:2018 & OHSMS 45001:2018 Certified Company