Environmental Product Declaration

Statement of Verification

CARES EPD No.: 0034

Issue 01

This is to verify that the

Environmental Product Declaration

Provided by:
Qatar Steel Company (Q.P.S.C.)

Is in accordance with the requirements of:
ISO 14025:2010 and EN 15804:2012 + A2:2019/AC2021
and CARES PCR for Type III EPD of Semi-Finished and Finished Steel Products, February 2025

This declaration is for:
Direct Reduced Iron (DRI) and Hot Briquetted Iron (HBI)

Company address:

Post Box 50090, Mesaieed
Industrial City, Doha
State of Qatar

قطر ستيل
QATAR STEEL

LadinCamci	Ladin Camci	02 March 2026
Signed for CARES	Operator	Date of this Issue
02 March 2026		01 March 2029
First Issue Date		Expiry Date

The validity of this Environmental Product Declaration can be verified by contacting CARES on +44 (0)1732 450 000 or visiting CARES website https://www.carescertification.com/certification-schemes/environmental-product-declarations.

CARES, Pembroke House, 21 Pembroke Road, Sevenoaks, Kent TN13 1XR

Environmental Product Declaration

EPD Number: CARES EPD 0034

General Information

EPD Programme Operator	CARES Pembroke House, 21 Pembroke Road, Sevenoaks, Kent, TN13 1XR UK www.carescertification.com
Applicable Product Category Rules	CARES Product Category Rules (PCR) for Type III Environmental Product Declaration (EPD) of Semi-Finished and Finished Steel Products, February 2025
Commissioner of LCA study	CARES Pembroke House, 21 Pembroke Road, Sevenoaks, Kent, TN13 1XR UK www.carescertification.com
LCA consultant/Tool	CARES SimaPro10.2 Expert Software system for life cycle assessment, developed by PRé Sustainability (PRé Sustainability B.V., 2024) https://pre-sustainability.com/
Declared/Functional Unit	1 tonne of direct reduced iron and hot briquetted iron.
Applicability/Coverage	Manufacturer-specific product produced at a single plant of one manufacturer
EPD Type	Cradle to Gate
Background database	ecoinvent 3.11, EN 15804 LCI database

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b]) Third party verifier: Dr Jane Anderson
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability

Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019/AC2021. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019/AC2021 for further guidance

Information modules covered

Product Stage			Construction Stage		Use Stage							End-of-life Stage				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Checks indicate the Information Modules declared.

Manufacturing site

Qatar Steel Company (Q.P.S.C.)
Post Box 50090,
Mesaieed Industrial City
Doha
State of Qatar

Construction Product:

Product Description

Gas based Direct Reduced Iron (DRI) is produced by reducing iron ore in its solid state using a reducing gas such as natural gas or hydrogen, without melting the ore. This process removes oxygen from the iron ore and results in a high-purity iron product with an iron content typically given in the Technical Information section and low residual elements. DRI is primarily used as a feedstock in Electric Arc Furnaces (EAF), offering a controlled and consistent alternative to scrap metal. Its use enables steelmakers to produce high-quality steel grades while reducing dependence on variable scrap sources.

Hot Briquetted Iron (HBI) is a compacted form of DRI, created by compressing DRI at high temperature into dense briquettes. This densification improves handling, storage, and transport safety by reducing the risk of reoxidation and self-heating, which are common issues with loose DRI. HBI is widely traded globally and serves the same metallurgical role as DRI in EAF steelmaking, with the added advantage of better logistics and safer long-distance transportation.

In Electric Arc Furnace (EAF) steelmaking, DRI and HBI are charged either with scrap or continuously during melting to provide a high-purity iron source for the production of steel billets which are rolled into carbon steel bar, coil or rod for the reinforcement of concrete for direct use as reinforcing steel and wire for further processing including BS 4449 or BS 4482 and/or other reinforcing steel standards, and other structural steel shapes and sections and flat structural steel products.

The declared unit is 1 tonne of direct reduced iron and hot briquetted iron.

Technical Information

Property	Value, Unit
Production route	DRI Shaft Furnace
Bulk Density (DRI)	1600 - 1900 kg/m^3 (DRI) 2400 - 2700 kg/m^3 (HBI)

Main Product Contents

Material/Chemical Input	%
Total Iron (T. Fe)	90.5 min
Metallic Iron (M. Fe)	84.0 min
Metallisation	92.5 min
Carbon (C)	2.2 min
Phosphorus (P)	0.06 max
Sulphur (S)	0.01 max
Total Gangue (CaO + Al2O3 + MgO + SiO2)	4.8 max

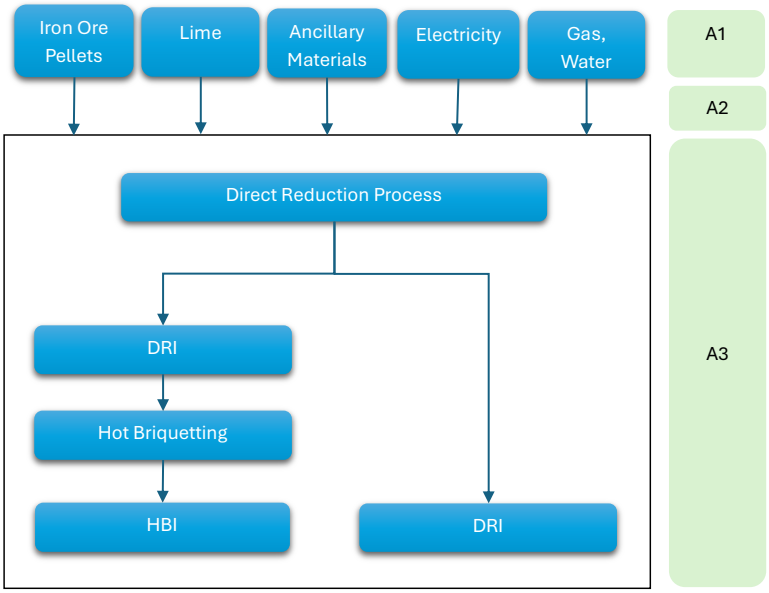
Manufacturing Process

DRI is produced by reducing iron ore typically pellets in its solid state using a reducing gas such as natural gas or hydrogen. The process occurs in a shaft furnace at high temperatures, below the melting point of iron. The reducing gas reacts with the oxygen in the iron ore, removing it and leaving behind porous metallic iron with some residual carbon. Iron ore pellets are reduced in a shaft furnace, producing DRI. Depending on discharge, plants can send DRI cold, hot to EAF, or compress it while still hot to form HBI; no binder is used for HBI.

HBI is produced as the subsequent process in DRI production, by compressing freshly produced DRI at high temperature into dense briquettes using hydraulic presses. This hot compaction reduces the porosity of DRI, minimizing the risk of reoxidation and self-heating during storage and transport associated with DRI. The resulting briquettes are durable, easy to handle, and suitable for long-distance shipping, making HBI the preferred form for international trade while retaining the metallurgical properties of DRI.

DRI and HBI are stored and transported in bulk form, thus generally no packaging required, they do not also contain any biogenic materials.

Process flow diagram



Construction Installation

Downstream installation module is excluded because DRI and HBI semi-finished products undergo complete physical and chemical transformation during steelmaking and cannot be identified at end-of-life. Additionally, their downstream scenarios vary widely and cannot be reliably estimated, which aligns with EN 15804+A2:2019 and CARES PCR guidance for semi-products.

Use Information

Downstream use module is excluded because DRI and HBI semi-finished products undergo complete physical and chemical transformation during steelmaking and cannot be identified at end-of-life. Additionally, their downstream scenarios vary widely and cannot be reliably estimated, which aligns with EN 15804+A2:2019 and CARES PCR guidance for semi-products.

End of Life

Downstream end-of-life module is excluded because DRI and HBI semi-finished products undergo complete physical and chemical transformation during steelmaking and cannot be identified at end-of-life. Additionally, their downstream scenarios vary widely and cannot be reliably estimated, which aligns with EN 15804+A2:2019 and CARES PCR guidance for semi-products.

Life Cycle Assessment Calculation Rules

This EPD applies the recycled content ("cut-off by classification") allocation method permitted by CARES PCR version 2025 for DRI and HBI semi-products. In this approach, the environmental burdens of primary (virgin) material production are assigned to the first user; recyclable materials enter recycling burden-free; and secondary materials bear only the impacts of collection, sorting and reprocessing. Wastes are allocated to the waste producer in line with the polluter-pays principle. The declared scope covers modules A1–A3 only; end-of-life stages and benefits/loads beyond the system boundary (Module D) are not declared. Internal by-products and scrap are treated within the system boundary without external credits.

This approach follows ISO 14040 and ISO 14044 standards for Life Cycle Assessments.

The Life Cycle Impact Assessment (LCIA) has been carried out using the characterisation method described in EN 15804+A2. The characterisation factors from Environmental Footprint v3.1 (EF 3.1) was applied.

Declared unit description

1 tonne of Direct Reduced Iron and Hot Briquetted Iron.

System boundary

The system boundary of the EPD follows the modular design defined by EN 15804+A2. Type of this EPD is Cradle to Gate.

This limitation is justified based on the nature of the product and applicable standards for Type III environmental declarations with reference to EN 15804+A2:2019 and CARES PCR.

- Type III environmental declarations for DRI & HBI are restricted to A1, A2 and A3 modules because such products undergo significant physical and chemical transformation during subsequent processing and cannot be identified at end-of-life.
- Additional life cycle stages beyond A3 cannot be estimated reliably due to variability of downstream applications and processes.
- These products are often physically integrated with other products during installation, making them inseparable at end-of-life.
- The products do not contain biogenic carbon

Impacts and aspects related to losses/wastage during production is considered in the modules in which the losses/wastage occur.

Data sources, quality and allocation

Data Sources and Quality:

The selection of data and the data quality requirements have been provided according to the requirements of BS EN 15941:2024.

Data Sources: Manufacturing data of the period 01/01/2024 - 31/12/2024 has been provided by Qatar Steel Company (Q.P.S.C.) operating on the geographical area noted in Manufacturing Site. A brief description of technology and inputs for the product is given in Manufacturing Process and in simplified Process Flow Diagram

The primary data collection was thorough, considering all relevant flows and these data were verified by CARES, including also the verification of mass balance, to ensure that data for all the inputs and outputs for the process over the period of data collection have been collected, and that the unit process data will comply with the cut-off rules of EN 15804. The EPD does not cover construction, use and end-of-life modules.

The selection of the background data for electricity generation is in line with the CARES PCR, 2025. Country or region-specific power grid mixes are selected from ecoinvent 3.11, EN 15804 LCI database; thus, consumption grid mix of Qatar has been selected to suit specific manufacturing location, and also for fabrication, installation and demolishing location. The emission factor of carbon footprint of the applied consumption grid mix of Qatar in 0.607 kg CO_2 eq/kWh.

Data Quality: Background data is consistently sourced from the ecoinvent 3.11, EN 15804 LCI database. The primary data collection was thorough, considering all relevant flows and these data was verified during the audit conducted by CARES in April 2025.

There isn't any data from different LCI/LCA databases are used considering that the overall consistency of the study is not adversely affected.

Schemes applied for data quality assessment was as per EN 15804:2012+A2:2019, Annex E, Table E.1 — Data quality level and criteria of the UN Environment Global Guidance on LCA database development. No poor or very poor data was found during the assessment of relevant data.

Data quality level and criteria of the UN Environment Global Guidance on LCA database development:

Geographical Representativeness	: Good
Technical Representativeness	: Very good
Time Representativeness	: Good

Allocation:

Allocation is not applied because the DRI production process is modelled as a single-output system without significant co-products. This approach is consistent with ISO 14044:2006 (Clause 4.3.4.2) and EN 15804+A2:2019 (Section 6.3.6), which require allocation to be avoided where possible.

Cut-off criteria

On the input side all flows entering the system and comprising more than 1% in total mass or contributing more than 1% to primary energy consumption are considered. All inputs used as well as all process-specific waste and process emissions were assessed. For this reason, material streams which were below 1% (by mass) were captured as well. In this manner the cut-off criteria according to the PCR requirements are fulfilled).

LCA Results (DRI)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators									
Life Cycle Stage	Impact Category		GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	Kg P eq
Product stage	Raw material supply	A1	2.06E+02	2.05E+02	7.25E-01	1.66E-01	2.31E-06	1.89E+00	1.04E-02
	Transport	A2	1.11E+02	1.11E+02	1.68E-02	3.61E-03	1.68E-06	2.82E+00	8.71E-05
	Manufacturing	A3	8.30E+02	8.30E+02	1.61E-01	3.04E-02	1.49E-05	6.04E-01	9.82E-04
	Total (of product stage)	A1-3	1.15E+03	1.15E+03	9.03E-01	2.00E-01	1.89E-05	5.32E+00	1.14E-02
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND
100% Landfill Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND
100% Recycling Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators

Life Cycle Stage	Impact Category		EP-marine	EP-terrestrial	POCP	ADP-mineral & metals	ADP-fossil	WDP
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived
Product stage	Raw material supply	A1	4.33E-01	5.23E+00	1.87E+00	6.35E-04	2.45E+03	6.54E+01
	Transport	A2	6.44E-01	7.18E+00	1.97E+00	1.11E-06	1.37E+03	1.05E+00
	Manufacturing	A3	1.92E-01	2.06E+00	1.72E+00	5.57E-06	1.32E+04	1.03E+01
	Total (of product stage)	A1-3	1.27E+00	1.45E+01	5.56E+00	6.41E-04	1.71E+04	7.67E+01
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.
The results of the three environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
PM = Particulate matter.

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts

Life Cycle Stage	Impact Category		PM	IRP	ETP-fw	HTP-c	HTP-nc	SQP
			disease incidence	kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	4.52E-05	4.26E+00	1.57E+03	5.80E-08	1.60E-06	2.79E+02
	Transport	A2	3.02E-06	1.06E-01	4.42E+01	1.53E-08	2.90E-07	1.77E+00
	Manufacturing	A3	2.25E-06	9.99E-01	3.60E+02	6.43E-08	6.56E-07	2.02E+01
	Total (of product stage)	A1-3	5.04E-05	5.37E+00	1.97E+03	1.38E-07	2.54E-06	3.01E+02
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

IRP = Potential human exposure efficiency relative to U235; 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.

HTP-nc = Potential comparative toxic unit for humans; and
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
SQP = Potential soil quality index.
The results of the four environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use

Life Cycle Stage	Impact Category		PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.42E+02	0	1.42E+02	2.45E+03	0	2.45E+03
	Transport	A2	2.68E+00	0	2.68E+00	1.37E+03	0	1.37E+03
	Manufacturing	A3	2.78E+01	0	2.78E+01	1.32E+04	0	1.32E+04
	Total (of product stage)	A1-3	1.73E+02	0	1.73E+02	1.71E+04	0	1.71E+04
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use						
Life Cycle Stage	Impact Category		SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0	0	0	1.60E+00
	Transport	A2	0	0	0	2.56E-02
	Manufacturing	A3	0	0	0	2.55E-01
	Total (of product stage)	A1-3	0	0	0	1.88E+00
Construction process stage	Transport	A4	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND
100% Landfill Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND
100% Recycling Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
Life Cycle Stage	Impact Category		HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.29E+01	2.81E+02	2.62E-03
	Transport	A2	1.23E-01	4.39E+00	5.88E-05
	Manufacturing	A3	1.76E+00	5.09E+01	5.13E-04
	Total (of product stage)	A1-3	1.22E-06	7.95E+01	2.05E-01
Construction process stage	Transport	A4	ND	ND	ND
	Construction	A5	ND	ND	ND
Use stage	Use	B1	ND	ND	ND
	Maintenance	B2	ND	ND	ND
	Repair	B3	ND	ND	ND
	Replacement	B4	ND	ND	ND
	Refurbishment	B5	ND	ND	ND
	Operational energy use	B6	ND	ND	ND
	Operational water use	B7	ND	ND	ND
%92 Recycling / %8 Landfill Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	2.30E-09	0.090	8.15E-04
	Waste processing	C3	0	0	0
	Disposal	C4	3.49E-10	80.1	1.82E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.93E-08	-23.0	0.204
100% Landfill Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	1.08E-10	0.004	3.78E-05
	Waste processing	C3	0	0	0
	Disposal	C4	4.36E-09	1.00E+03	0.002
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	9.76E-09	7.68	-0.068
100% Recycling Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	2.49E-09	0.097	8.82E-04
	Waste processing	C3	0	0	0
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.27E-08	-25.7	0.227

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (DRI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
Life Cycle Stage	Impact Category		CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0	0	0	0	0	0
	Transport	A2	0	0	0	0	0	0
	Manufacturing	A3	0	0	0	0	0	0
	Total (of product stage)	A1-3	0	0	0	0	0	0
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	920	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	0	1.00E+03	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

LCA Results (HBI)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators									
Life Cycle Stage	Impact Category		GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	Kg P eq
Product stage	Raw material supply	A1	2.06E+02	2.05E+02	7.25E-01	1.66E-01	2.30E-06	1.89E+00	1.04E-02
	Transport	A2	1.11E+02	1.11E+02	1.68E-02	3.61E-03	1.68E-06	2.82E+00	8.71E-05
	Manufacturing	A3	8.58E+02	8.58E+02	1.64E-01	3.08E-02	1.56E-05	6.28E-01	9.98E-04
	Total (of product stage)	A1-3	1.17E+03	1.17E+03	9.06E-01	2.01E-01	1.95E-05	5.34E+00	1.14E-02
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND
100% Landfill Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND
100% Recycling Scenario									
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND	ND

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators

Life Cycle Stage	Impact Category		EP-marine	EP-terrestrial	POCP	ADP-mineral & metals	ADP-fossil	WDP
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived
Product stage	Raw material supply	A1	4.33E-01	5.23E+00	1.87E+00	6.34E-04	2.44E+03	6.54E+01
	Transport	A2	6.44E-01	7.18E+00	1.97E+00	1.11E-06	1.37E+03	1.05E+00
	Manufacturing	A3	2.01E-01	2.15E+00	1.79E+00	5.77E-06	1.37E+04	1.21E+01
	Total (of product stage)	A1-3	1.28E+00	1.46E+01	5.64E+00	6.41E-04	1.75E+04	7.85E+01
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.
The results of the three environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
PM = Particulate matter.

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts

Life Cycle Stage	Impact Category		PM	IRP	ETP-fw	HTP-c	HTP-nc	SQP
			disease incidence	kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	4.52E-05	4.26E+00	1.57E+03	5.80E-08	1.60E-06	2.79E+02
	Transport	A2	3.02E-06	1.06E-01	4.42E+01	1.53E-08	2.90E-07	1.77E+00
	Manufacturing	A3	2.28E-06	1.01E+00	3.71E+02	6.58E-08	6.81E-07	2.05E+01
	Total (of product stage)	A1-3	5.05E-05	5.38E+00	1.99E+03	1.39E-07	2.57E-06	3.02E+02
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

IRP = Potential human exposure efficiency relative to U235; 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.

HTP-nc = Potential comparative toxic unit for humans; and
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
SQP = Potential soil quality index.
The results of the four environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use

Life Cycle Stage	Impact Category		PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.42E+02	0	1.42E+02	2.44E+03	0	2.44E+03
	Transport	A2	2.68E+00	0	2.68E+00	1.37E+03	0	1.37E+03
	Manufacturing	A3	2.81E+01	0	2.81E+01	1.37E+04	0	1.37E+04
	Total (of product stage)	A1-3	1.73E+02	0	1.73E+02	1.75E+04	0	1.75E+04
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND	ND	ND

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use						
Life Cycle Stage	Impact Category		SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0	0	0	1.60E+00
	Transport	A2	0	0	0	2.56E-02
	Manufacturing	A3	0	0	0	2.97E-01
	Total (of product stage)	A1-3	0	0	0	1.92E+00
Construction process stage	Transport	A4	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND
100% Landfill Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND
100% Recycling Scenario						
End of life	Deconstruction, demolition	C1	ND	ND	ND	ND
	Transport	C2	ND	ND	ND	ND
	Waste processing	C3	ND	ND	ND	ND
	Disposal	C4	ND	ND	ND	ND
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	ND	ND	ND	ND

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
Life Cycle Stage	Impact Category		HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.29E+01	2.81E+02	2.62E-03
	Transport	A2	1.23E-01	4.39E+00	5.88E-05
	Manufacturing	A3	1.86E+00	5.28E+01	5.20E-04
	Total (of product stage)	A1-3	1.22E-06	7.95E+01	2.05E-01
Construction process stage	Transport	A4	ND	ND	ND
	Construction	A5	ND	ND	ND
Use stage	Use	B1	ND	ND	ND
	Maintenance	B2	ND	ND	ND
	Repair	B3	ND	ND	ND
	Replacement	B4	ND	ND	ND
	Refurbishment	B5	ND	ND	ND
	Operational energy use	B6	ND	ND	ND
	Operational water use	B7	ND	ND	ND
%92 Recycling / %8 Landfill Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	2.30E-09	0.090	8.15E-04
	Waste processing	C3	0	0	0
	Disposal	C4	3.49E-10	80.1	1.82E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.93E-08	-23.0	0.204
100% Landfill Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	1.08E-10	0.004	3.78E-05
	Waste processing	C3	0	0	0
	Disposal	C4	4.36E-09	1.00E+03	0.002
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	9.76E-09	7.68	-0.068
100% Recycling Scenario					
End of life	Deconstruction, demolition	C1	1.57E-11	0.004	7.03E-06
	Transport	C2	2.49E-09	0.097	8.82E-04
	Waste processing	C3	0	0	0
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.27E-08	-25.7	0.227

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (HBI) (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
Life Cycle Stage	Impact Category		CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0	0	0	0	0	0
	Transport	A2	0	0	0	0	0	0
	Manufacturing	A3	0	0	0	0	0	0
	Total (of product stage)	A1-3	0	0	0	0	0	0
Construction process stage	Transport	A4	ND	ND	ND	ND	ND	ND
	Construction	A5	ND	ND	ND	ND	ND	ND
Use stage	Use	B1	ND	ND	ND	ND	ND	ND
	Maintenance	B2	ND	ND	ND	ND	ND	ND
	Repair	B3	ND	ND	ND	ND	ND	ND
	Replacement	B4	ND	ND	ND	ND	ND	ND
	Refurbishment	B5	ND	ND	ND	ND	ND	ND
	Operational energy use	B6	ND	ND	ND	ND	ND	ND
	Operational water use	B7	ND	ND	ND	ND	ND	ND
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	920	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	0	1.00E+03	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0		0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

The Environmental Product Declaration (EPD) for Direct Reduced Iron (DRI) and Hot Briquetted Iron (HBI) is limited to Modules A1 (raw material supply), A2 (transport), and A3 (manufacturing), representing a cradle-to-gate system boundary. Downstream modules such as installation, use, and end-of-life are excluded because these semi-finished products undergo complete physical and chemical transformation during steelmaking and cannot be identified at end-of-life. Additionally, their downstream scenarios vary widely and cannot be reliably estimated, which aligns with EN 15804+A2:2019 and CARES PCR guidance for semi-products.

Summary, comments and additional information

Interpretation

The production stage (A1-A3) is the module for all impact categories. Main process steps such as iron ore reduction, natural gas consumption contributing most to environmental impacts. Key materials such as iron ore and energy carriers are influencing results.

Significant emissions are carbon dioxide emissions and nitrous oxides account for the majority of impacts with methane being the other significant contributor driving GWP and acidification potential.

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