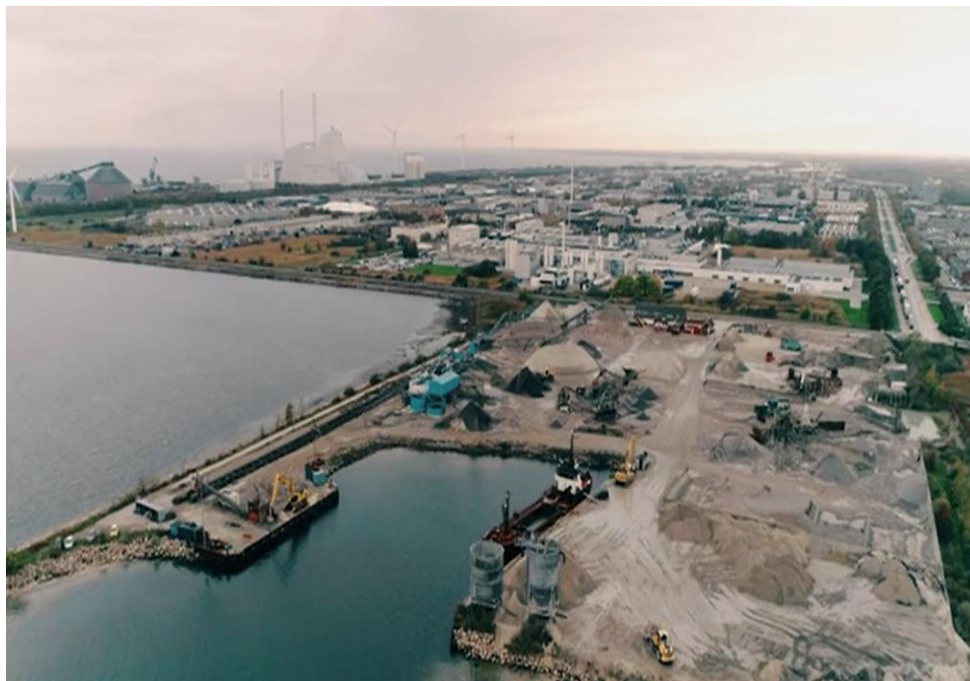


Environmental Product Declaration for aggregates from Copenhagen, terminal for marine aggregates – Avedøre



According to EN 15804:2012+A1:2013, ISO 14025, ISO 14040 and ISO 14044
Program operator: International EPD® System
EPD owner: NCC Industry Nordic AB
Address: Stamholmen 225, 2650 Hvidovre

First publication date 2020-11-02 Last revision date: 2022-03-08 Valid until 2025-11-01 Version 2020-11-02
Reg. no. S-P-02081 UN CPC 15310 & 15320

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product, its production process or its supply chain.

This is a “cradle-to-gate” EPD based on an LCA model described in the background report and in the corresponding annex (see list of references). The products declared are aggregates manufactured by NCC Industry, Division Stone Materials. The declared site is Copenhagen, terminal for marine aggregates - Avedøre of NCC Industry in Denmark.

In 2019, the declared products manufactured in Avedøre are intended to be used as e.g. filling material in civil engineering and construction projects and as bulk material in concrete and asphalt.

EPD INFORMATION

Declared unit:	1000 kg product, at the declared site
RSL:	Not specified
PCR:	Product Category Rules PCR 2012:01. Construction products and construction services. Version 2.33 of 2020-09-18.
Program operator:	The International EPD® System operated by EPD International AB Box 210 60 SE-100 31 Stockholm Sweden info@environdec.com

DESCRIPTION OF THE PRODUCT

Aggregates are manufactured in various fractions; from coarser fractions such as NCC Drænstabil®, to finer fractions like Concrete sand 0/2 mm material (grains between 0 and 2 mm in diameter). There are 19 types of aggregates declared in this EPD, representing

the products manufactured at the declared site, see Table 1. The technical standards which the aggregates are compliant with are also presented in the table below. The aggregates consist of dredged stone, gravel and sand.

Table 1: Products manufactured at the declared site, classified into product groups.

Product group	Product names (English)	Product names (Danish)	EN-12620 ¹⁾	EN-13285 ²⁾
1	Filling sand 0/8	Harpet sandfyld 0/8		
2	Subbase gravel 0/8 kv. I	Bundsikringsgrus 0/8 kv. I		X
3	Cable sand 0/4	Kabelsand 0/4		
	Subbase gravel 0/20 kv. II	Bundsikringsgrus 0/20, kv. II		X
	Mortar/Plaster gravel 0/4	Mure-/pudsegrus 0/4		
	De-icing sand 0/4	Glatføregrus 0/4		
4	Concrete sand 0/4 kl. P/E	Betonsand 0/4 kl.P/E	X	
	Concrete sand 0/4 kl. E Metro	Betonsand kl. E Metro	X	
	Sandbox sand	Sandkassesand		
	Washed sand 0/2	Vasket sand 0/2		
	Pebbles 16/25 kl. P	Nøddesten 16/25 kl. P	X	
	Concrete gravel 0/8	Betongrus 0/8		
	Filler sand	Fillersand/DrySand		
5	Pebble 2/8 kl. P/M	Perlesten 2/8 kl. P/M	X	
	Pebble 8/16 kl. P/M	Ærtesten 8/16 kl. P/M	X	
	Casting mix 0/16	Støbemix 0/16		
	Casting mix 0/25	Støbemix 0/25		
6	Rock fines 0/4	Stenmel 0/4		
	NCC DrænStabil®	NCC DrænStabil®		X

1) EN-12620+A1:2008 - Aggregates for Concrete

2) EN-13285:2018 – Unbound mixtures - Specifications

The annual average environmental impacts are calculated for each product and are then classified into product groups. Products within the same group have a similar environmental impact.

The process of extracting natural sand & gravel at sea starts with an empty ship that leaves the harbour and travels to a dredging area out at sea. Once at the dredging area the ship uses either a stationary dredger or a trailing suction hopper dredger. A first screening

of the material is done at the ship to remove oversize material. When the ship is full it returns to the harbour and is unloaded with an excavator directly into the production process.

The continued production process is a combination of material feeders, conveyor belts, a washing plant, crushers and screens that transports, washes, breaks and sorts the material into different products. The production process set-up is illustrated in Figure 1.

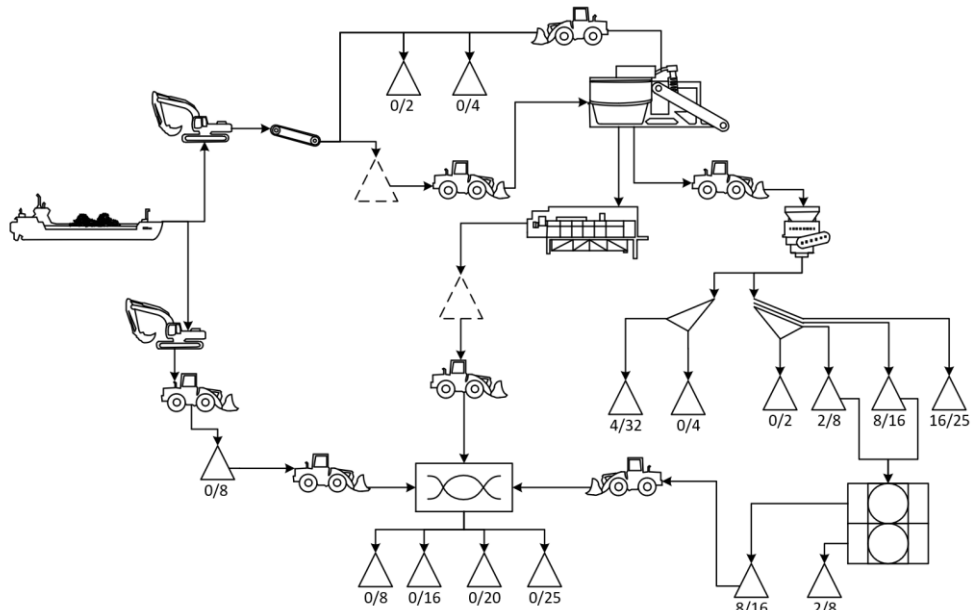


Figure 1: Process set-up for the manufacture of aggregates at the declared site.

The products declared are classified according to the United Nations Central Product Classification (UN CPC) 15310 and 15320. All materials which conforms to EN-1260+A1:2008, are manufactured according to the Construction Products Regulation (CPR) within the EU regulation 305/2011. The products declared do not

contain any substances of very high concern (SVHC) according to REACH.

The geographical location of the declared site is shown in Figure 2.

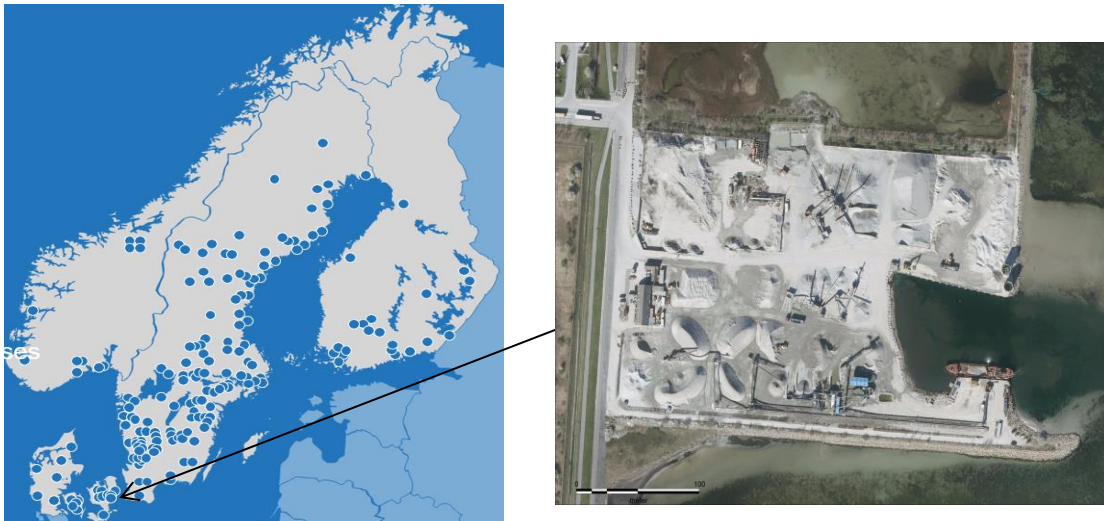


Figure 2: Map and aerial view showing the geographical location of the declared site.

ENVIRONMENTAL GENERAL INFORMATION

1. Declared unit and reference flow

The declared unit is 1 tonne (1000 kg) of aggregates.
The reference flow is calculated at the production gate.

2. System boundary

The system boundaries cover several aspects such as temporal, geographical and which unit processes to include in the system model. The setting of system boundaries follows two principles according to EN 15804: (1) The “modularity principle” entails that the environmental impacts are declared in the life cycle stage where they appear, (2) the “polluter pays principle” means that waste processing shall be assigned to the flow diagram that generates the waste until the end-of-waste state is reached (i.e. until a new user pays for it as a raw material).

The EPD is cradle-to-gate, declaring the modules A1-A3, see Figure 3.

Data that represent the current situation production process at the plant is used. All input data for the core module and for raw materials that NCC Industry has influence over are site specific data for the production year 2019.

The environmental impact from infrastructure, construction, production equipment and tools that are not directly consumed in the production process are not accounted for in the LCI. Personnel-related impacts, such as transportation to and from work, are neither accounted for in the LCI.

Upstream	Core			Downstream												Other environmental information
	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 use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Figure 3: The system boundaries of the LCA. Modules of the production life cycle included in the EPD (X = declared module; MND = module not declared)

3. Assumptions and approximations

Various oils and lubricants used in the production process, is approximated with a dataset for lubricants. This is because the impacts are judged to be similar and no dataset or EPD were found for hydraulic oil or grease.

When a transport distance on land is unknown, 25 km is used. This is mainly applied to materials which have a minor contribution in terms of weight compared to the total weight of the product. Thus, the impact from the transport work has minor contribution

independent of the distance the raw material is transported.

4. Allocation

The production does not deliver any co-products.

The total amount of diesel consumed by the ships is known and is allocated based on total number of active hours working for Avedøre. The diesel used for general activities and transport on site, has been allocated to products based on mass, depending on which process steps each product passes through.

Avedøre acts as a collection point for waste generated by three ships working for NCC Industry A/S. All waste generated by the ships has been allocated to Avedøre because of the difficulty in determining how much of the waste is generated when working for other sites. The waste generated by the ships and the waste generated in the production process is allocated equally by mass to all the products.

5. Release of dangerous substances during the use phase

According to EN 15804, the EPD does not need to give this information if the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available. This criterion is fulfilled for aggregates.

6. Cut-offs

The cut-off criteria are 1% of the renewable and non-renewable primary energy usage, 1% of the total mass input of the manufacture process (according to the EN 15804 standard).

In the assessment, all available data from the production process are considered, i.e. all raw materials used, utilised ancillary materials and energy consumption, are using the best available GaBi LCI datasets. All raw materials and energy used in the aggregate manufacture are included.

The following cut-offs have been made:

The amount of oil-contaminated soil due to spillage from machines/vehicles is very difficult to estimate. Based on internal expert knowledge, this amount is deemed negligible and very rarely occurring.

The oil used for dust prevention in the production is omitted since it is judged to have a minor contribution to the environmental impact and because it is used in a low quantity (about 0,001 litre per tonne product).

The packaging for the input materials used in the production process are negligible.

7. Software and database

The LCA software GaBi Professional and its integrated database from Sphera has been used in the LCA modelling. See the list of references.

8. Data quality

The primary data collected by the manufacturer are based on the materials and energy required and the waste generated in the manufacture of the product to create a general model. The data are collected per declared unit. All necessary life cycle inventories for the basic materials are available in the GaBi database or via EPDs. No generic selected datasets (secondary data) used are older than ten years and no specific data

collected is older than five years and represent a period of about one year.

The representativeness, completeness, reliability and consistency are judged as good.

9. Comparability

EPDs of construction products may not be comparable if they do not comply with EN 15804. Neither may EPD within the same product category from different programs be comparable.

A comparison of EPDs is only possible if all the data sets to be compared are created according to ISO 14025 and EN 15804, and the building context, particularly the product-specific characteristics of performance, is taken into account.

ENVIRONMENTAL PERFORMANCE-RELATED INFORMATION

The results of the life cycle assessment, based on the declared unit, can be found in Table 2 (potential environmental impact), Table 3 (resource use) and Table 4 (output flows and waste categories). The products are grouped into product groups based on their total Global Warming Potential (GWP). Products in one product group differ no more than 10% from each other based on GWP. The sectioning of the products in product groups simplifies the presentation of results in the EPD, which are declared per product group. For the potential environmental impact categories, an average of the products within a group has been declared. For resource use and waste category indicators presented in the LCIA, the highest value within each product group has been presented. This is an even more conservative approach than the grouping guidelines in the PCR 2012:01.

Table 2: Results of the LCA – Potential environmental impact for 1 tonne (1000 kg) of aggregates.

Potential environmental impact			Product group 1	Product group 2	Product group 3	Product group 4	Product group 5	Product group 6
			Filling sand 0/8	Subbase gravel 0/8 kv.I	Cable sand 0/4, Subbase gravel 0/20 kv. II, Mortar/Plaster gravel 0/4, De-icing sand 0/4	Concrete sand 0/4 kl. P/E, Concrete sand 0/4 Metro, Sandbox sand, Washed sand 0/2, Pebbles 16/25 kl. P, Concrete gravel 0/8, Filler sand	Pebble 2/8 kl. P/M, Pebble 8/16 kl.P/M, Casting mix 0/16, Casting mix 0/25	Rock fines 0/4, NCC Drænstabil
Parameter	Unit		A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	
Global warming potential (GWP100)	Fossil*	kg CO ₂ eq	2.1	2.6	2.9	3.3	3.6	3.7
	Biogenic**	kg CO ₂ eq	0**	0**	0**	0**	0**	0**
	Land use / land transformation*	kg CO ₂ eq	1.3E-4	1.5E-4	1.7E-4	2.2E-4	2.4E-4	4.3E-4
	TOTAL	kg CO ₂ eq	2.1	2.6	2.9	3.3	3.6	3.7
Ozone depletion potential (ODP)	kg CFC 11 eq		5.5E-16	6.7E-16	8.8E-16	1.3E-15	1.4E-15	3.1E-15
Acidification potential of land and water (AP)	kg SO ₂ eq		1.5E-02	1.8E-02	2.2E-02	2.4E-02	2.5E-02	2.4E-02
Eutrophication potential (EP)	kg PO ₄ ³⁻ eq		3.5E-03	4.2E-03	5.1E-03	5.6E-03	6.0E-03	5.6E-03
Photochemical ozone creation potential (POCP)	kg C ₂ H ₂ eq		1.2E-03	1.5E-03	1.8E-03	2.0E-03	2.2E-03	2.1E-03
Depletion of abiotic resources (elements) (ADPE)	kg Sb eq		8.9E-08	1.1E-07	1.3E-07	1.8E-07	1.9E-07	2.1E-07
Depletion of abiotic resources (fossil) (ADPF)	MJ, net calorific value		30	36	43	49	52	54

*This is additional information that is not required in the standard. Only the total GWP100 is compulsory to report.

** This indicator is set to zero, due to inconsistencies in the datasets used delivered by Sphera. The net result over the life cycle is zero since carbon uptake and emission is zero during a life-cycle.

Table 3: Results of the LCA – Resource use for 1 tonne (1000 kg) of aggregates.

Use of resources		Product group 1	Product group 2	Product group 3	Product group 4	Product group 5	Product group 6
		Filling sand 0/8	Subbase gravel 0/8 kv.I	Cable sand 0/4, Subbase gravel 0/20 kv. II, Mortar/Plaster gravel 0/4, De-icing sand 0/4	Concrete sand 0/4 kl. P/E, Concrete sand 0/4 Metro, Sandbox sand, Washed sand 0/2, Pebbles 16/25 kl. P, Concrete gravel 0/8, Filler sand	Pebble 2/8 kl. P/M, Pebble 8/16 kl.P/M, Casting mix 0/16, Casting mix 0/25	Rock fines 0/4, NCC Drænstabil
Parameter	Unit	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	
Use of renewable primary energy (PERE)	MJ, net calorific value	0.58	0.89	1.2	3.0	3.0	3.4
Use of renewable primary energy resources used as raw materials (PERM)	MJ, net calorific value	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ, net calorific value	0.58	0.89	1.2	3.0	3.0	3.4
Use of non-renewable primary energy (PENRE)	MJ, net calorific value	30	37	43	48	52	54
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ, net calorific value	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT)	MJ, net calorific value	30	37	43	49	52	54
Use of secondary material (SM)	kg	0	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ, net calorific value	0	0	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value	0	0	0	0	0	0
Use of net fresh water (FW)	m ³	2.4E-04	2.9E-04	4.0E-04	3.2E-04	6.3E-04	1.3E-03

Table 4: Results of the LCA – Waste categories for 1 tonne (1000 kg) of aggregates.

Waste		Product group 1	Product group 2	Product group 3	Product group 4	Product group 5	Product group 6
		Filling sand 0/8	Subbase gravel 0/8 kv.I	Cable sand 0/4, Subbase gravel 0/20 kv. II, Mortar/Plaster gravel 0/4, De-icing sand 0/4	Concrete sand 0/4 kl. P/E, Concrete sand 0/4 Metro, Sandbox sand, Washed sand 0/2, Pebbles 16/25 kl. P, Concrete gravel 0/8, Filler sand	Pebble 2/8 kl. P/M, Pebble 8/16 kl.P/M, Casting mix 0/16, Casting mix 0/25	Rock fines 0/4, NCC Drænstabil
Parameter	Unit	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3
Hazardous waste disposed (HWD)	kg	4.6E-3	4.6E-3	4.6E-3	4.6E-3	4.6E-3	4.6E-3
Non-hazardous waste disposed (NHWD)	kg	0.10	0.10	0.10	0.10	0.11	0.11
Radioactive waste disposed (RWD)	kg	4.3E-05	5.3E-05	6.6E-05	8.2E-05	8.8E-05	1.8E-4

ADDITIONAL ENVIRONMENTAL INFORMATION

Sea aggregates is a finite resource. Dredging aggregates from seabeds will affect the environment which means changed conditions in existing habitats.

The dredging may have a negative impact on the local marine environment in the licensed areas. Both the sea and land-based operations requires equipment and vehicles running on fossil and renewable energy. The operations, including transports, cause emissions to air, water and soil and disturbances such as noise, vibrations and dust.

Therefore, quarries, gravel pits and terminals need to be environmentally assessed in accordance with current legislation. During the application procedure consultations are held with interested parties. Decisions and permits can be appealed.

All sites in NCC Industry, Division Stone Materials, are operated according to a given permit/decision from actual authority which include different conditions. Those conditions might regulate e.g. distance to groundwater level, noise, vibrations, dust, emissions to water and air, and rehabilitation of the finalized operation area. Dredging is only done in specific areas according to current permits.

The sites in Denmark, Finland and Sweden are certified according to ISO 14001. The Business Management

System in NCC Industry, including Norway, contains routines corresponding to this standard.

However, aggregates are important when building the future society since aggregates is a core building material in residential buildings, offices, public buildings and infrastructure. Building a normal sized single-family house requires about 100 tonnes of aggregates (SGU, 2018).

The average yearly European demand of aggregates is about 5 tonnes per capita (UEPG, 2018). In the Nordic countries the demand is higher; 8-13 tonnes per capita and year, mainly due to a lower population density.

If aggregates are not contaminated, they may be reused many times through recycling which is key in resource efficiency. At many of our sites NCC recycle smaller amounts of aggregates, concrete, asphalt, bricks and different soils. Recycled materials can then be used again. In the end of life, aggregates are usually reused as filling material in construction projects.

Explanatory material is given in the background report to this EPD.

To read more about NCCs general sustainability work, please refer to our webpage; <https://www.ncc.group/sustainability/>

VERIFICATION DETAILS

Table 5: Verification details.

CEN standard EN 15804 served as the core PCR	
PCR:	Product Category Rules PCR 2012:01. Construction products and construction services. Version 2.33 of 2020-09-18
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com .
Independent verification of the declaration and data, according to ISO 14025:	<input checked="" type="checkbox"/> EPD process certification (Internal) <input type="checkbox"/> EPD verification (External)
Third party verifier:	Bureau Veritas
Accredited or approved by:	SWEDAC
Procedure for follow-up of data during EPD validity involves third party verifier:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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- SS-EN-13285:2018 - Unbound mixtures - Specifications
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ABOUT THE EPD

This environmental product declaration (EPD) describes, from a lifecycle perspective, the environmental impact of aggregates from Copenhagen, terminal for marine aggregates – Avedøre, manufactured by NCC Industry AB.

The EPD is drawn up in accordance with Product Category Rules (PCR) PCR 2012:01. Construction products and construction services. Version 2.33 of 2020-09-18. The program operator is the International EPD® System (see www.environdec.com for more information).

The aim of this EPD is that it should provide objective and reliable information on the environmental impact of the production of the declared product. Manufactured by NCC Industry AB, division Stone Materials.

This EPD is developed by NCC. It is a result from an EPD certification process verified by Bureau Veritas. The EPD is valid for five years (after which it can be revised and reissued). NCC Industry Nordic AB is the declaration owner.

ABOUT NCC

NCC is one of the leading construction and property development companies in the Nordic region, with sales of 5,5 billion Euro and approximately 15 300 employees in 2019. With the Nordic region as its home market, NCC is active throughout the value chain – developing commercial properties and constructing housing, offices, industrial facilities and public buildings, roads, civil engineering structures and other types of infrastructure. NCC also offers input materials used in construction and accounts for paving and road services.

NCC's vision is to renew our industry and provide superior sustainable solutions. NCC aims to be the leading society builder of sustainable environments and will proactively develop new businesses in line with this.

NCC works to reduce both our own and our customers' environmental impact and continues to further refine our offerings with additional products and solutions for sustainability. In terms of the environment, this entails that NCC, at every step of the supply chain, is to offer resource and energy-efficient products and solutions to help our customers reduce their environmental impact and to operate more sustainably.

NCC's sustainability work is based on a holistic approach with all three dimensions of sustainability – social, environmental and economical. In NCC's sustainability framework, our focus areas with regards to sustainability are defined; Climate and Energy, Materials & Waste, Social Inclusion, Health & Safety, Compliance and Portfolio Performance. Our sustainability strategy includes the aim of being both a leader and a pioneer in these areas.

NCC reports on its sustainability progress each year and the report has been included in NCC's Annual Report since 2010. NCC applies Global Reporting Initiative (GRI) Standards, the voluntary guidelines of the GRI for the reporting of sustainability information. In addition to GRI, NCC also reports the Group's emission of greenhouse gases to the CDP each year. NCC is a member in BSCI (Business Social Compliance Initiative), which is the broadest business-driven platform for the improvement of social compliance in the global supply chain, and has been a member of the UN Global Compact since 2010. The UN Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with 10 defined and universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

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