

Environmental Product Declaration



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

Exact

Includes following product variations

Exact 1800W

Exact 1500W

Exact 1200W

Exact 960W

Exact 800W

Exact 600W

Exact 480W

Exact 400W

from

STRIHL Scandinavia AB

STRIHL
LIGHTING

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	
Type of EPD:	EPD of multiple products from a company based on a worst-case scenario
EPD registration number:	EPD-IES-0031017
Version date:	2026-04-06
Validity date:	2031-04-06

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



GENERAL INFORMATION

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

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>Construction products 2019:14, version 2.0.1, valid until 2030-04-07, UN CPC code: 4219</i>
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Chairs of the PCR Review: Rob Rouwette (chair), Claudia A. Peña (co-chair)

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
<input checked="" type="checkbox"/> Individual EPD verification without a pre-verified LCA/EPD tool Third-party verifier: Camilla Landen, Hållbarhetsjouren Approved by: International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier:
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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

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

INFORMATION ABOUT EPD OWNER

Owner of the EPD: STRiHL Scandinavia AB

Address: Åskatorpsvägen 6, 439 74 Fjärås

Contact: Andreas Andersson

Address and contact information of the LCA practitioner commissioned by the EPD owner, if applicable:
LCA Practitioner, Jonathan Grenthe, TMC Sweden, Jonathan.grenthe@tmceurope.com

Description of the organisation: STRiHL Scandinavia AB is a Swedish lighting company that develops, manufactures, and supplies luminaires as well as Swedish-made masts and poles for outdoor and professional lighting applications. The company serves customers across the Nordic region, including municipalities and electrical contractors, with a focus on long service life, quality, and energy-efficient solutions. STRiHL offers complete lighting solutions for public outdoor environments (e.g., streets, parks, and sports venues) as well as indoor professional settings such as industrial facilities, warehouses, and sports halls. Its operations include the manufacturing, import, and sale of lighting products, with production based in Sweden. The company is headquartered in Fjärås (Kungsbacka municipality), Sweden. STRiHL is part of the Indutrade group and works with structured environmental and quality ambitions, emphasizing durable products and responsible resource use.

Website link: <https://strihl.se/>

Product-related or management system-related certifications: ISO 9001, ISO 14001 certification.

PRODUCT INFORMATION

Product name: Exact 1800W

Product identification: The Exact product group comprises modular outdoor LED floodlights designed for large-area and high-performance lighting applications. The range includes variants from 400 W to 1800 W and is intended for use in environments such as sports facilities, arenas, parking areas, industrial sites, port areas, and other outdoor areas requiring precise and efficient illumination.



UN CPC code: 4219

Product description: The Exact series is a modular floodlight system developed for demanding outdoor lighting applications where controlled light distribution, operational reliability, and high lighting performance are important. The product range is intended for large-area environments such as football fields, sports grounds, arenas, multisport facilities, illuminated trails, parking areas, industrial sites, freight terminals, port areas, and similar outdoor settings. All variants are based on the same modular product concept and are intended for comparable uses, while differing primarily in rated power, physical size, weight, and the number of LED modules incorporated in the luminaire. The modular design, carefully selected lenses, press-cast aluminium housing with powder-coated corrosion protection, and effective heat dissipation are key product features. The series is available with either internal or external

drivers and includes 20 kV surge protection as standard. According to the product information, the Exact range covers 400–1800 W, provides up to 155 lm/W, is rated IP66 and IK08, and is ENEC certified.

Multiple products: The Exact product group included in this EPD comprises several product variants with different rated power levels, ranging from lower-output configurations to high-power versions for large-area floodlighting applications. All variants are based on the same modular product concept and are intended for comparable outdoor lighting uses, but they differ primarily in the number of LED modules incorporated in the luminaire. The Exact series is described as a modular floodlight system with individually adjustable LED modules, and this modular design is a key distinguishing feature between the included variants.

Within the product group, a higher-power variant includes a greater number of LED modules than a lower-power variant. In practice, this means that the larger variants require more material input, particularly in the lighting and electrical components, while also having higher operational electricity demand. This relationship is consistent with the product information for the series, where the modular design is combined with increasing rated power and substantially higher product weight between variants. The environmental differences between the Exact variants assessed in the EPD are therefore primarily driven by differences in module count, material content, and power consumption rather than by differences in intended application or overall product function.

Table 1: Product characteristics

Product name	Unit	Mass (kg)	Height (mm)	Length (mm)	Width (mm)
EXACT 400 W	Piece	9,9	185	479	250
EXACT 480 W	Piece	11,2	185	479	266
EXACT 600 W	Piece	17,3	185	479	283
EXACT 800 W	Piece	18,7	232	510	429
EXACT 960 W	Piece	21,4	298	510	527
EXACT 1200 W	Piece	25,0	298	510	560
EXACT 1500 W	Piece	33,0	310	515	777
EXACT 1800 W	piece	41,5	109	587	280

Name and location of production site(s): Åskatorpsvägen 6, 439 74 Fjärås

CONTENT DECLARATION

Table 2 presents the content declaration of the worst-case scenario product (Exact worst case). Note, however, that the environmental impact results are calculated per declared unit and are allocated across the product's constituent materials according to their respective shares. The product does not contain any substances of very high concern (SVHC) listed on the ECHA Candidate List in concentrations exceeding 0.1% (w/w) in any individual component, in accordance with REACH Article 33. Therefore, the product does not exceed any applicable threshold for SVHC and no SVHC substances need to be declared in this Environmental Product Declaration.

Table 2: Material content declaration, Exact worst case.

Category	Source variant selected	Selected mass per 1 kg declared unit (kg/kg)
Aluminium	Exact 1800	0,24
Stål	Exact 1800	0,20
PVC Kablar	Exact 1800	0,00
Gummi kabel	Exact 600W	0,33
Floruplastic kabel	Exact 600W	0,00
Silikon	Exact 600W	0,06
Polykarbonat	Exact 600W	0,06
Nylon	Exact 1800	0,01
Mässing	Exact 1800	0,03
Elektronik	Exact 600W	0,15
Övrigt	Exact 1800	0,08
Total share		1,15

Table 3: Material content declaration, Exact 600W

Category	Source variant selected	Selected mass per 1 kg declared unit (kg/kg)
Aluminium	Exact 600W	0,18
Stål	Exact 600W	0,15
PVC Kablar	Exact 600W	0,00
Gummi kabel	Exact 600W	0,33
Floruplastic kabel	Exact 600W	0,00
Silikon	Exact 600W	0,06
Polykarbonat	Exact 600W	0,06
Nylon	Exact 600W	0,00
Mässing	Exact 600W	0,01
Elektronik	Exact 600W	0,15
Övrigt	Exact 600W	0,06
Total share		1,00

Table 4: Material content declaration, Exact 1800W

Category	Source variant selected	Selected mass per 1 kg declared unit (kg/kg)
Aluminium	Exact 1800	0,24
Stål	Exact 1800	0,20
PVC Kablar	Exact 1800	0,00
Gummi kabel	Exact 1800	0,26
Floruplastic kabel	Exact 1800	0,00
Silikon	Exact 1800	0,03
Polykarbonat	Exact 1800	0,05
Nylon	Exact 1800	0,01
Mässing	Exact 1800	0,03
Elektronik	Exact 1800	0,10
Övrigt	Exact 1800	0,08
Total share		1,00

Table 5: Packaging material

Component	Material	Weight (kg)
Packaging	Cardboard	0,00723

Note: The smallest packaging is used for worst-case declaration.

In Table 6 biogenic carbon content for both product and packaging is presented. The product does not contain any biogenic carbon and is therefore valued to 0. For the packaging following assumptions have been made:

Biogenic share: 1

Dry matter: 0,95

Carbon fraction: 0,342

Table 6: Biogenic carbon content.

Materials	Mass (kg)	Biogenic carbon content (Dry weight)	Biogenic material, kg c/declared content
Packaging (Cardboard)	0,00723	34,2%	0,021
Product	-	-	-
Total	0,00723	34,2%	0,021

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

Table 7: Recycled content

Component	Recycled content in %	Pre/Post consumer	Source
Aluminium	0		
Stål	0		
PVC Kablar	0		
Gummi kabel	0		
Floruplastic kabel	0		
Silikon	0		
Polykarbonat	0		
Nylon	0		
Mässing	0		
Elektronik	0		
Övrigt	0		
Total amount	0		

LCA INFORMATION

Declared unit: 1 kg

Product lifespan: 100 000 hours

Time representativeness: 2025

Geographical scope: Upstream material supply and component manufacturing for Exact are modelled with global representativeness in modules A1–A2, based on supplier-specific information combined with ecoinvent datasets. The main supplier for Exact is located in China, and the upstream transport scenario therefore reflects shipment from Shanghai to Sweden together with road transport within Sweden to the relevant production-related locations. Manufacturing and assembly (module A3) represent production at STRIHL's facility in Fjärås, Sweden, based on site-specific primary data for assembly operations, electricity use, and allocated production waste.

Distribution to customers (module A4) is modelled as transport from Fjärås to the main sales markets in Sweden, Norway and Finland, using an average transport distance derived from the 2025 sales split between these three countries. Installation (module A5) is also modelled in a Nordic market context and includes a small transport distance together with electricity use for powered lifting equipment. The use stage is likewise represented in a Swedish, Norwegian and Finnish context.

Module B2 includes annual cleaning of the product and associated transport, module B4 includes one assumed replacement of the driver during the reference service life, and module B6 is modelled using low-voltage electricity mixes for Sweden, Norway and Finland in proportion to market share over an assumed lifetime of 100,000 hours. End-of-life (modules C1–C4) is also modelled in a Swedish/Norwegian/Finnish context, including transport to treatment and waste-management scenarios reflecting an average Nordic context. Overall, the geographical scope for Exact can therefore be summarized as global representativeness for upstream material and component supply (A1–A2), Swedish representativeness for manufacturing (A3), and Nordic representativeness for distribution, installation, relevant use-stage processes, and end-of-life management (A4–A5, B2, B4, B6 and C1–C4).

Database(s) and LCA software used: Ecoinvent 3,11 and Simapro software.

EPD/LCA Tool used: Simapro Software

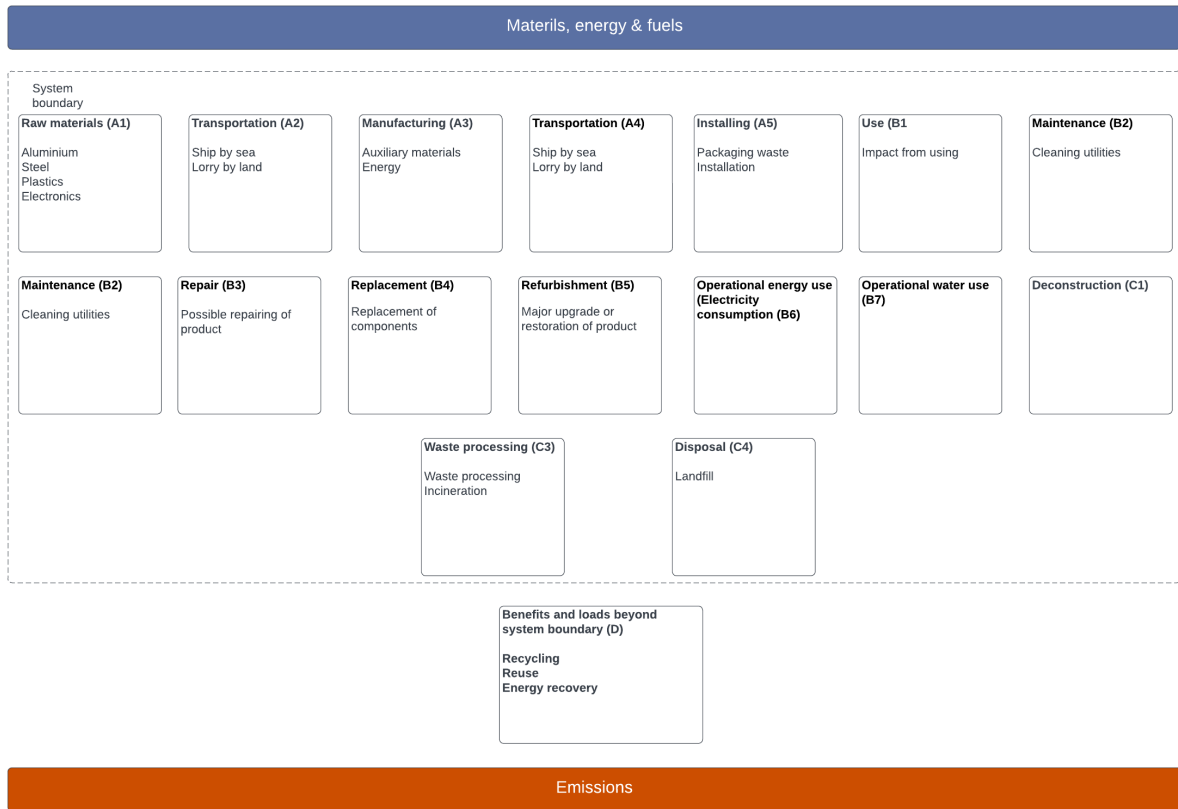
Description of system boundaries:

The system boundary applied in this EPD is cradle-to-grave including module D, i.e., modules A1–A3, A4–A5, B1–B7, C1–C4 and D are covered in accordance with EN 15804+A2 and the applicable PCR. For Exact, the product stage includes raw material supply, upstream transport, and manufacturing/assembly. Modules A1 and A2 cover raw material extraction, component manufacturing, and transport of materials and components to STRIHL's facility, while A3 represents assembly and testing at the production site in Fjärås, Sweden. Module A4 covers transport from Fjärås to the average customer market in Sweden, Norway, and Finland. Module A5 is included and comprises installation-related transport, electricity use for powered lifting equipment, and treatment of packaging waste. During the use stage, all B-modules are declared. Modules B1, B3, B5 and B7 are considered negligible or not relevant under the stated assumptions, while B2 includes annual cleaning of the product and B4 includes one assumed replacement of the driver during the reference service life. As Exact is an energy-using outdoor LED floodlight, module B6 is included and modelled over an assumed lifetime of 100,000 hours based on the declared power demand of the worst-case variant, using electricity mixes for Sweden,

Norway, and Finland in proportion to market share. End-of-life is represented through modules C1–C4, where C1 covers deconstruction/dismantling, C2 transport to waste treatment, C3 waste processing including recycling preparation and incineration with energy recovery, and C4 final disposal such as landfilling of remaining fractions. Module D reports the potential benefits and loads beyond the system boundary associated with recycling and energy recovery, in line with the cut-off approach and the PCR allocation principles applied in the study. No required life cycle stages within the declared cradle-to-grave system boundary have been omitted; where individual modules are described as negligible, this reflects the modelling assumptions applied for Exact.

Process flow diagram:

The process flow diagram summarizes the product system contributing to the environmental impacts of the Exact product group across its life cycle. In this EPD, Exact is declared using a worst-case approach based on the included product variants, with a declared unit of 1 kg of product and a reference service life of 100,000 hours. Module A1 includes the extraction and processing of raw materials and component manufacturing, primarily related to aluminium, electronics, steel, glass, plastics, rubber-based materials, and smaller auxiliary materials used in the luminaire. Module A2 covers transport of materials and components from the Chinese supplier to STRIHL's facility in Sweden. Module A3 represents the manufacturing stage at the Fjärås site and mainly consists of manual assembly and testing, meaning that the environmental impact of this module is primarily associated with supporting electricity use, packaging, and allocated production waste rather than energy-intensive manufacturing operations. Module A4 covers outbound distribution from Fjärås to the average customer market in Sweden, Norway, and Finland. Module A5 includes installation-related transport, electricity use for powered lifting equipment, and treatment of packaging waste. All use-stage modules B1–B7 are declared; however, the most relevant contribution arises in module B6, which reflects operational electricity consumption during the product's service life. Maintenance in B2 is limited to annual cleaning, while B4 includes one assumed driver replacement; other use-stage modules are considered negligible or not relevant under the stated assumptions. Modules C1–C4 include deconstruction, transport to waste treatment, waste processing, and final treatment through recycling, incineration with energy recovery, or disposal. For recyclable material fractions, the potential benefits and loads beyond the system boundary are reported separately in module D.



More information

Module A1–A2

The raw material and component supply for Exact worst case consists mainly of aluminium parts, steel parts, electronic components, glass, plastics, rubber-based parts, and cables. The most significant component groups by mass include the aluminium heat sink, cables, steel brackets and panels, the glass panel, the driver, and the PCB board with chips. Additional components include PMMA lenses, polycarbonate parts, PVC, synthetic rubber, brass/nickel details, and smaller fastening elements. Packaging included in the product stage consists of corrugated board packaging. Primary product-specific bill-of-material data was collected from STRIHL Lighting AB and its suppliers where available. Supplier involvement is described as covering all suppliers in the study, with particular focus on the dominant material groups such as aluminium, plastics and steel, while electrical component suppliers were also included. Where detailed upstream information was not available, representative ecoinvent 3.11 background datasets were selected to model the materials and components in a consistent way.

Transport of materials and components to STRIHL’s assembly operations (module A2) is modelled using a combination of sea freight and road freight. For Exact, all components are described as being delivered from Chinese manufacturers, and the model assumes that raw materials are extracted, processed, and shipped from China. The documented transport route for Exact consists of sea freight from Shanghai to Gothenburg, followed by road transport via intermediate locations in Sweden before final assembly. Road transport is modelled using freight transport by lorry (16–32 metric ton, EURO 5), and all road transport in the study is assumed to include empty returns. Where supplier-specific logistics parameters were unavailable, the default assumptions embedded in the selected ecoinvent transport datasets were applied. Following datasets were used.

Load factor	Fuel type	Vehicle type	Transport Dataset
50%	Diesel	Truck	Transport, freight, lorry 16-32 metric ton, EURO5 transport, freight, lorry 16-32 metric ton, EURO5 Cutoff, U
50%	Heavy fuel oil	Ferry	Transport, freight, sea, ferry, heavy fuel oil {GLO} transport, freight, sea, ferry, heavy fuel oil Cut-off, U

Module A3

The manufacturing of Exact worst case is modelled using primary data collected at STRIHL Lighting AB’s production site for the year 2025. The manufacturing stage includes all relevant site activities related to the declared product, including packaging. For Exact, production is described as consisting mainly of manual assembling and testing, with no complex machining or transformation processes at the STRIHL site. Since this assembly and testing share workspace and stations with other products, the related environmental burdens from shared site operations are allocated using economic allocation based on yearly sales/turnover. According to the allocation model used in the study, Exact accounts for 17% of annual sales and therefore receives its corresponding share of the shared site processes. The shared processes are mainly electricity use associated with maintaining the facility and testing products. No co-product allocation is applied in the foreground system.

Module A4

The distribution of the finished Exact worst case product to the customer is modelled based on STRIHL’s market distribution in Sweden, Norway and Finland. In the absence of product-specific logistics data for each delivery, an average customer distance was calculated using representative destinations and combined using the known sales split between the three markets. The resulting average transport scenario consists mainly of road freight transport by lorry, with an additional ferry leg where relevant. Road transport is modelled using the ecoinvent dataset for freight transport by lorry (16–32 metric ton, EURO 5), and empty returns are assumed in line with the general transport assumptions used throughout the study. Following datasets were used:

Load factor	Fuel type	Vehicle type	Transport Dataset
50%	Diesel	Truck	Transport, freight, lorry 16-32 metric ton, EURO5 transport, freight, lorry 16-32 metric ton, EURO5 Cutoff, U
50%	Heavy fuel oil	Ferry	Transport, freight, sea, ferry, heavy fuel oil {GLO} transport, freight, sea, ferry, heavy fuel oil Cut-off, U

Module A5

Module A5 includes installation and packaging waste handling. For Exact worst case, installation is assumed to be carried out by hand and is therefore considered to have negligible environmental impact. No machinery, fuel use, or additional installation materials are included for this module.

The relevant contribution in A5 therefore comes mainly from packaging waste. The packaging for Exact is modelled as corrugated board box packaging, and in the life cycle model this packaging is treated as waste arising at installation. This means that A5 captures the downstream treatment of packaging rather than any significant installation operation for the luminaire itself.

Module B1, B3, B5 + B7

The products do not generate any direct emissions during their intended use. No repair activities are assumed to be required during the service life of the products, due to their long expected lifetime. Likewise, refurbishment is not considered necessary for the assessed products. Water consumption is not required for these products use stage as well.

Module B2 – Maintenance

Maintenance is assumed to occur for all three products, however the only maintenance is cleaning of the product which includes a few cleaning agents. It is assumed to be performed once a year. Following data is used:

Product	Activity	Dataset	Amount	Unit
Exact	Cleaning	Soap {RoW} soap production Cut-off, U	0,090	kg
Exact	Transport	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 5 {RER} transport, freight, lorry, 16-32 metric ton, diesel, EURO 5 Cut-off, U	1,355422	kgkm

Module B4 – Replacement

A reasonable assumption is that the driver will need to be replaced at least once during the service life of the Exact luminaires, since the driver is typically one of the most lifetime-limiting electronic components in LED lighting systems. Although the luminaires are designed for long service life, the driver is exposed to continuous thermal and electrical stress during operation, which may reduce its durability compared with the mechanical and structural parts of the product. The assumption of one driver replacement is therefore a conservative and technically justified approach intended to reflect a realistic maintenance scenario over the full lifetime of the luminaires. This also improves the robustness of the assessment by avoiding an underestimation of impacts in the use stage.

Module B6

Module B6 covers operational energy use during the use phase and is the only relevant use-stage module for Exact worst case. The report assumes a reference service life of 100,000 hours. Exact worst case is modelled using a rated power of 160 W, and electricity consumption is distributed according to the product's market share in Sweden, Norway and Finland. Accordingly, Swedish, Finnish and Norwegian low-voltage electricity mixes are used in proportion to the sales distribution.

The lifetime energy use is calculated on the basis of product wattage, lifetime hours and market share. The report also notes that supplier datasheets were reviewed in order to verify the assumed lifetime, particularly with regard to driver durability under expected operating temperatures. Module B6 is therefore modelled as the cumulative operational electricity demand over the declared service life of Exact worst case.

Modules C1–C4

f Exact and its constituent materials after the use phase, including deconstruction, transport to waste treatment, waste processing, and final disposal. The modelling follows the ecoinvent cut-off system model, meaning that burdens and benefits related to recycled materials are assigned to the subsequent product system, while the waste treatment burdens up to the end-of-waste point remain with the product system generating the waste. In this study, 100% of the discarded Exact product is assumed to be sent to recycling-oriented waste management after de-installation. Module C1 is modelled in accordance with the PCR default assumptions for end-of-life and represents deconstruction/demolition of the mixed product materials using the prescribed default energy input. Module C2 is modelled as road transport of waste over 80 km, in line with the PCR default scenario for products assumed to be collected for recycling. Modules C3 and C4 describe the treatment of the different waste fractions arising from the product's mixed material composition, including aluminium, steel, electronics, plastics, glass, and smaller auxiliary materials. Module C3 includes sorting, preparation of recyclable fractions, and incineration processes with energy recovery, while Module C4 includes final disposal processes such as landfilling of remaining fractions and other treatment routes without energy recovery where relevant. For the luminaire products, the broader life cycle interpretation indicates that C3 is generally the most visible contribution among the C-modules, reflecting the importance of waste processing and recovery-oriented end-of-life treatment.

Module D

Module D reports potential benefits and loads beyond the system boundary associated with material recycling and energy recovery from the end-of-life stage. At the end of life, 100% of the product is assumed to be collected and sent to relevant waste treatment processes for recycling. In line with the cut-off and polluter-pays approach applied in the study, recovered materials leaving the product system are assumed to substitute corresponding primary materials in subsequent product systems, and the resulting avoided burdens are reported in module D. For Exact worst case, the most important potential benefits are associated with the recovery of metals, particularly aluminium and steel, due to their relatively high recycling rates and material significance in the product. Additional benefits may also arise from recovery related to electronics treatment and from energy recovery of combustible fractions that are incinerated. Module D is therefore used to show the potential downstream value of recovered materials and energy without assigning those benefits to the product system itself.

Allocation

Allocation procedures follow the cut-off approach described in the report and aligned with the PCR principles. No co-product allocation is applied in the Exact foreground system. For shared A3 processes, economic allocation is used, based on yearly sales of the included product groups relative to STRIHL's total sales. Exact accounts for 17% of annual sales according to the allocation basis used in the study.

Further, the only shared processes are mainly electricity usage related to maintaining the facility and testing products. This means that Exact receives an allocated share of these common A3 supporting processes, while product-specific material inputs and downstream modules are modelled directly for the product itself.

Summary of dataquality assessment:

Overall, the study applies a structured data quality assessment combining a general evaluation of temporal, geographical and technical representativeness with a screening of the most influential background datasets for Exact worst case. The modelling is performed in SimaPro using ecoinvent v3.11. For the product stage (A1–A3), the climate-change result is dominated by secondary background datasets, while the share of primary data contributing to GWP-GHG in A1–A3 is limited to 0.66%. The primary data contribution is related to site-specific electricity use in module A3, while upstream materials,

components, packaging and transport are predominantly represented by secondary ecoinvent datasets. For Exact worst caseW, the A1–A3 result is concentrated in a small number of key background datasets, in particular electronics for control units, aluminium cast alloy, printed wiring board production, and primary aluminium ingot production. This means that the robustness of the A1–A3 result depends mainly on the representativeness of these datasets. Temporal representativeness is considered good, as site-specific production data were collected for the year 2025 and the applied background datasets are regarded as recent, although some supporting sources used in the modelling are older than 2025. Geographical representativeness is assessed as moderate, since supplier and customer information has been used where available, but it cannot be guaranteed that all purchased components originate directly from the stated suppliers, and broader proxy regions such as RER, RoW and GLO are used when no country-specific dataset is available. Technical representativeness is generally good for the foreground system, as the manufacturing step is limited to assembly and allocated electricity use, but lower for upstream raw material extraction and component production where modelling relies on supplier descriptions and generic background datasets. To strengthen reliability, secondary ecoinvent datasets were subjected to a proportionate plausibility screening, including checks of reference flow and unit, process fit, geographical and technical representativeness, and mass/energy logic. The remaining limitations are therefore mainly associated with generic background datasets for electronics and metals rather than with the site-specific manufacturing data.

Infrastructure and capital goods: Infrastructure and capital goods are included in the background datasets applied in this study. The study uses Ecoinvent v3.11 datasets, which inherently contain contributions from infrastructure and capital goods as part of the dataset system modelling. Consequently, these contributions are reflected in the results through the use of the selected background data.

Infrastructure and capital goods related to electricity and energy supply are included in this LCA through the applied ecoinvent 3.11 datasets. The electricity and energy datasets used in the model include the upstream infrastructure required for generation and supply (e.g., power plants and associated equipment) in accordance with the dataset system boundaries, and no additional, separate modelling of electricity/energy infrastructure has therefore been performed outside the selected ecoinvent processes.

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle	
	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	Reuse-Recovery-Recycling- potential	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	SE	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI	SE, NO, FI
Share of primary data	0,18%					-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	24%					-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-	-

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
A1 manufacturing of aluminium and steel components	Database	Suppliers/Ecoinvent v3.11	2025	Secondary data	0%
A1 manufacturing of plastic components	Database/	Suppliers/Ecoinvent v3.11	2025	Secondary data	0%
A1 manufacturing of electronic components	Database	Suppliers/Ecoinvent v3.11	2025	Secondary data	0%
A1 Packaging	Collected data	EPD Owner/Ecoinvent v3.11	2025	Secondary data	0%
A2 Transportation of raw materials	Database	EPD owner/Ecoinvent v3.11	2025	Secondary data	0%
A3 Generation of electricity used in manufacturing/assembly	Collected data	EPD Owner	2025	Primary data	0,18%
Other Processes (A1-A3)	Collected data/Database	Ecoinvent v3.11	2025	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3				0,18%	

The table below presents the four datasets that each contribute more than 10% to GWP-total in modules A1–A3. As shown, electronics production is the largest contributor, followed by virgin aluminium production.

Category	Unit	Value	Dataset
GWP-Total	kg CO ₂ eq.	3,60E+00	Electronics, for control units {RER} electronics production, for control units Cut-off, S
GWP-Total	kg CO ₂ eq.	1,79E+00	Aluminium, cast alloy {GLO} aluminium ingot, primary, to aluminium, cast alloy market Cut-off, S
GWP-Total	kg CO ₂ eq.	1,39E+00	Printed wiring board, surface mounted, unspecified, Pb free {GLO} printed wiring

			board production, surface mounted, unspecified, Pb free Cut-off, S
GWP-Total	kg CO ₂ eq.	6,66E-01	Polycarbonate {RoW} market for polycarbonate Cut-off, S

Impact from 1 kWh electricity using “Electricity, high voltage {SE} electricity production, hydro, reservoir, non-alpine region Cut-off, U”		
Impact category	Unit	Unit
GWP-total	kg CO ₂ -eq	0,051

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

Results per functional or 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.	1,12E+01	1,25E-01	1,03E-02	0,00E+00	2,11E-01	0,00E+00	3,60E+00	0,00E+00	1,07E+07	0,00E+00	3,99E-04	1,52E-02	2,36E+00	6,53E-02	-3,47E+00
GWP-biogenic	kg CO ₂ eq.	-4,36E-02	8,13E-05	2,65E-04	0,00E+00	1,74E-07	0,00E+00	2,67E-04	0,00E+00	2,45E+05	0,00E+00	8,07E-08	1,04E-05	1,22E+00	5,58E-02	-3,88E-03
GWP-fossil	kg CO ₂ eq.	1,12E+01	1,25E-01	9,45E-03	0,00E+00	8,43E-02	0,00E+00	3,60E+00	0,00E+00	9,89E+06	0,00E+00	3,99E-04	1,52E-02	1,14E+00	9,52E-03	-3,45E+00
GWP-luluc	kg CO ₂ eq.	6,17E-02	4,21E-05	5,53E-04	0,00E+00	1,27E-01	0,00E+00	6,81E-03	0,00E+00	5,24E+05	0,00E+00	4,08E-08	5,04E-06	1,95E-04	2,49E-08	-9,01E-03
ODP	kg CFC 11 eq.	4,77E-06	2,68E-09	2,25E-10	0,00E+00	1,84E-09	0,00E+00	1,74E-07	0,00E+00	0,262223	0,00E+00	5,92E-12	3,32E-10	3,49E-09	3,63E-12	-1,4E-07
AP	mol H ⁺ eq.	1,37E-01	5,38E-04	4,60E-05	0,00E+00	1,15E-03	0,00E+00	3,22E-02	0,00E+00	8,92E+04	0,00E+00	3,56E-06	4,89E-05	1,49E-03	5,79E-06	-3,91E-02
EP-freshwater	kg P eq.	1,26E-02	8,33E-06	3,64E-06	0,00E+00	3,84E-05	0,00E+00	4,92E-03	0,00E+00	7,07E+03	0,00E+00	1,28E-08	1,04E-06	1,48E-04	7,86E-06	-4,76E-03
EP-marine	kg N eq.	1,73E-02	1,68E-04	1,18E-05	0,00E+00	1,21E-03	0,00E+00	5,17E-03	0,00E+00	1,37E+04	0,00E+00	1,66E-06	1,65E-05	9,82E-04	1,61E-04	-5,44E-03
EP-terrestrial	mol N eq.	1,93E-01	1,84E-03	1,20E-04	0,00E+00	4,30E-03	0,00E+00	5,74E-02	0,00E+00	1,48E+05	0,00E+00	1,82E-05	1,79E-04	5,55E-03	1,17E-05	-6,02E-02
POCP	kg NMVOC eq.	5,97E-02	6,99E-04	3,17E-05	0,00E+00	5,78E-04	0,00E+00	1,73E-02	0,00E+00	3,98E+04	0,00E+00	5,43E-06	7,41E-05	1,49E-03	2,42E-05	-1,78E-02
ADP-minerals&metals*	kg Sb eq.	2,58E-03	4,08E-07	1,17E-07	0,00E+00	1,27E-06	0,00E+00	1,27E-03	0,00E+00	7,21E+02	0,00E+00	1,42E-10	5,13E-08	1,91E-06	8,71E-11	-1,12E-03
ADP-fossil*	MJ	1,47E+02	1,76E+00	7,75E-01	0,00E+00	9,48E-01	0,00E+00	4,85E+01	0,00E+00	7,43E+08	0,00E+00	5,19E-03	2,16E-01	2,26E+00	3,17E-03	-4,93E+01
WDP*	m ³	3,69E+00	6,71E-03	1,03E-02	0,00E+00	2,53E-01	0,00E+00	8,84E-01	0,00E+00	1,06E+07	0,00E+00	1,11E-05	8,37E-04	2,15E-01	6,78E-06	-1,05E+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															

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. Disclaimer: The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3). Biogenic carbon leaving the product system in module A5 has not been balanced out in modules A1-A3. The associated biogenic carbon flow is therefore accounted for in module A5 in accordance with Annex 2 of the PCR.

Additional mandatory and voluntary impact category 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
GWP-GHG ¹	kg CO ₂ eq.	1,13E+01	1,25E-01	6,86E-02	0,00E+00	2,11E-01	0,00E+00	3,60E+00	0,00E+00	1,04E+07	0,00E+00	3,99E-04	1,52E-02	1,12E+00	9,32E-03	- 3,46E+00

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

The indicator SM reflects the use of secondary materials in the life cycle model, including secondary material inputs embedded in background datasets. It does not necessarily mean that recycled content is declared in the product itself. In this study, no supplier-documented recycled content has been declared for the product.

Resource use 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
PERE	MJ	2,13E+01	2,81E-02	5,84E-01	0,00E+00	5,18E+00	0,00E+00	6,18E+00	0,00E+00	5,66E+08	0,00E+00	3,27E-05	3,51E-03	1,87E-01	1,96E-05	- 6,72E+00
PERM	MJ	8,00E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,21E+01	2,81E-02	5,84E-01	0,00E+00	5,18E+00	0,00E+00	6,18E+00	0,00E+00	5,66E+08	0,00E+00	3,27E-05	3,51E-03	1,87E-01	1,96E-05	- 6,72E+00
PENRE	MJ	1,57E+02	1,87E+00	7,82E-01	0,00E+00	1,20E+00	0,00E+00	5,18E+01	0,00E+00	7,50E+08	0,00E+00	5,52E-03	2,29E-01	2,41E+00	3,30E-03	- 5,26E+01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,57E+02	1,87E+00	7,82E-01	0,00E+00	1,20E+00	0,00E+00	5,18E+01	0,00E+00	7,50E+08	0,00E+00	5,52E-03	2,29E-01	2,41E+00	3,30E-03	- 5,26E+01
SM	kg	6,09E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	7,66E+01	1,11E-01	2,63E+00	0,00E+00	2,48E-01	0,00E+00	2,40E+01	0,00E+00	2,50E+09	0,00E+00	1,44E-04	1,39E-02	7,33E-01	8,65E-05	- 2,81E+01

Acronyms PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Output flow 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
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	8.13E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	5.69E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,13E+00	0,00E+00	0,00E+00

Additional LCA results (other environmental performance results) of the product(s)

Conversion factors

Conversion factors can be used to translate the environmental impact results from the declared worst-case product to the individual product variants Exact 600W and Exact 1800W. For example, the climate change result for Exact 1800W is obtained by multiplying the worst-case result by the conversion factor for Exact 1800W in the climate change category (0.88).

Impact category	Unit	Exact - A1-A3 (600W)	Exact - A1-A3 (1800W)	Exact - A1-A3 (Worst case)
Climate change	kg CO2 eq	0,85	0,78	1
Climate change - Biogenic	kg CO2 eq	1,24	1,74	1
Climate change - Fossil	kg CO2 eq	0,85	0,78	1
Climate change - Land use and LU change	kg CO2 eq	0,95	0,94	1
Ozone depletion	kg CO2 eq	0,87	0,60	1
Acidification	kg CO2 eq	0,89	0,82	1
Eutrophication, freshwater	kg CO2 eq	0,89	0,76	1
Eutrophication, marine	kg CO2 eq	0,88	0,82	1
Eutrophication, terrestrial	kg CO2 eq	0,89	0,81	1
Photochemical ozone formation	kg CO2 eq	0,88	0,80	1
Resource use, minerals and metals	kg CO2 eq	0,90	0,75	1
Resource use, fossils	kg CO2 eq	0,85	0,76	1
Water use	kg CO2 eq	0,85	0,79	1

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
SE	Sweden
FI	Finland
NO	Norway
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO ₂ eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO ₂ eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO ₂ eq.)

GWP-luluc	Global Warming Potential from land use and land use change (kg CO ₂ eq.)
GWP-total	Total Global Warming Potential (kg CO ₂ eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO ₂ eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H ⁺ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m ³)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)

PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m ³)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number

MJ	Megajoule
kg	Kilogram
m ³	Cubic Meter
NMVOG	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalent
P eq.	Phosphorus Equivalent
N eq.	Nitrogen Equivalent
CFC-11 eq.	Chlorofluorocarbon-11 Equivalent
CO ₂ eq.	Carbon Dioxide Equivalent
kg C	Kilograms of Carbon
kg CO ₂ eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

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VERSION HISTORY

Original Version of the EPD, 2026-04-06

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