ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019

KONE MiniSpace™ HighRise with KONE UltraRope®

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

Program:	The International EPD® System EPD International AB www.environdec.com
EPD registration number:	S-P-05407
Published:	2022-05-03
Revision date:	2022-05-20
Valid until:	2027-05-02
Product group classification:	UN CPC 4354

KONE IN BRIEF

At KONE, our mission is to improve the flow of urban life. As a global leader in the elevator and escalator industry, KONE provides elevators, escalators and automatic building doors, as well as solutions for modernization and maintenance to add value to buildings throughout their life cycle. KONE's equipment moves over 1 billion users each day. Through more effective People Flow®, we make people's journeys safe, convenient and reliable in taller, smarter buildings.

We serve more than 450,000 customers across the globe, and have more than one million elevators and escalators in our service base. Key customer groups include builders, building owners, facility managers and developers. The majority of these are maintenance customers. Architects, authorities and consultants are also key influencers in the decision-making process regarding elevators and escalators.

DRIVING INNOVATION AND IMPROVING RESOURCE EFFICIENCY

At KONE, innovation means putting the customer and the equipment user at the center. Innovations can have an important role in addressing climate change. Increasing resource efficiency is among our top priorities with regards to both our solutions and our operations. Our solution design contributes to the circular economy with a long lifetime and modularity as key features of our products, supported by our maintenance and modernization services.

LEADER IN SUSTAINABILITY

At KONE, sustainability is embedded in our organizational culture. It is how we treat each other and our stakeholders, how we take the environment into account in all of our actions, and how we foster economic performance now and in the future. Our vision is to deliver the best People Flow experience. Sustainability is a source of innovation and a competitive advantage for us. KONE is committed to conducting our business in a responsible and sustainable way and we expect the same commitment from our partners.

PROGRAM INFORMATION AND DECLARATION SCOPE

ENVIRONMENTAL MANAGEMENT

KONE'S corporate units, manufacturing and R&D units are ISO 14001 and ISO 9001 certified.

Majority of KONE's key suppliers are ISO 14001 certified.

KONE supports sustainable construction practices with efficient operations and guidelines for waste & chemical management and overall environmental excellence.

Our manufacturing unit in Finland have the FSC Chain of Custody certification for elevator car wood materials.

A CLASS ENERGY RATING

More than 23 elevator models from KONE are certified with ISO 25745 highest energy efficiency rating of A class, 8 escalators and autowalks with the best A+++ classification.

CLIMATE LEADERSHIP

In 2021 KONE achieved a CDP Climate leadership score of A or A- for nine consecutive years, which shows our long term commitment to environmental work and sustainability.

CLIMATE PLEDGE

KONE has set science-based targets for significant reductions in its greenhouse gas (GHG) emissions by the year 2030.

KONE commits to a 50% cut in the emissions from its own operations (scope 1 and 2 emissions) by 2030, compared to a 2018 baseline. This target is in line with limiting global warming to 1.5°C.

In addition, KONE targets a 40% reduction in the emissions related to its products' materials and lifetime energy use (scope 3 emissions) over the same target period, relative to orders received.

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

CDP
DISCLOSURE INSIGHT ACTION

The number of the A class ratings and the year for CDP scores are representative of the document publication date. Actual number may be different in the following years.

Owner of the EPD, manufacturer	**Kone Corporation** Keilasatama 3 02150 Espoo, Finland The EPD owner has sole ownership, liabilty and responsibility for the data contained within this EPD.
Program Operator	EP International AB Box 60, SE-100 31 Stockholm, Sweden info@environdec.com
Author of the LCA and declaration	Tian Tan KONE Corporation tian.tan@kone.com
LCA software and database	One Click LCA, Ecoinvent v3.6
Product Category Rules and the scope of the declaration	This Environmental Product Declaration (EPD) has been prepared in accordance with EN 15804:2012+A2:2019 and ISO 14025 standards. Complementary PCR C-PCR-008 Lifts version 2020-10 to PCR 2019:14 Construction Products version 1.11 is used for the declaration. This EPD is product-specific. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.
Geographical scope	Global
Reference year for data	2019
Additional information	www.kone.com

VERIFICATION

CEN standard EN 15804 serves as the core Product Category Rules (PCR).

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent verification of the declaration and data according to ISO 14025:2010	☐ Internal	☑ External
Procedure for follow-up during EPD validity involves third party verifier	☑ Yes	☐ No

Third party verifier:
Anni Oviir, Rangi Maja OÜ

Comparability between EPDs based on this c-PCR-008 (to PCR 2019:14) and EPDs based on PCR 2015:05 is not conceivable and shall be avoided. Any comparability of this kind shall be considered as false and misleading the EPD user.

Comparability between EPDs based on this c-PCR-008 (to PCR 2019:14) is only achievable, if the following performance characteristics are equivalent: Functional unit, Reference Service Lifetime, Usage Category, travel height, number of stops, rated load, rated speed and geographic region.

PRODUCT INFORMATION

PRODUCT DESCRIPTION

KONE MiniSpace™ with KONE Ultrarope® is a flexible high-quality elevator for high-rise commercial buildings and residential buildings utilizing very light carbon fiber reinforced plastic based ropes with excellent eco-efficiency, superb ride comfort and a range of design options, This compact machine-room elevator is energy- and space-efficient and come with the eco-efficient KONE EcoDisc® hoisting machine, regenerative drives, efficient lighting and advanced stand-by solutions. The components are manufactured in KONE's manufacturing units and our suppliers in Austria, China, Czech Republic, Estonia, Finland, Germany, Italy, and Lithuania. The operation of this product are all over the world.

Table 1. Product specification for MiniSpace™

Index	Possible values	Representative values
Type of installation	New generic lift without modernization	
Commercial name	KONE MiniSpace™	
Main purpose	Transport of passengers	
Type of lift	Electric	
Type of drive system	Gearless Traction	
Rated load	1000 kg – 2000 kg	1600 kg
Rated speed	3.5 m/s – 10 m/s	6 m/s
Number of stops	Max. 126	20
Travelled height	Max. 400 m	200 m
Number of operating days per year	60–365	365
Applied usage category (UC) according to ISO 25745-2	1-6	4
Designed Reference service life (RSL)	25	
Geographic region of intended installation	Global Electricity mix from China is used to model use stage impacts	

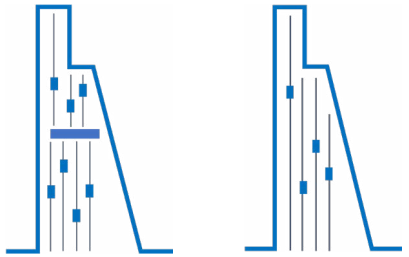
KONE ULTRAROPE®

Single core
Up to 1,000 m

Sky lobbies
Not required

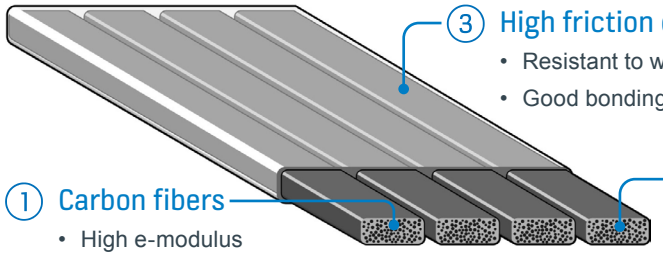
Direct access
To top floors

Smaller machine room
For design flexibility



CONVENTIONAL
Steel Rope

CARBON FIBRE
KONE UltraRope



3 High friction coating
- Resistant to wear and abrasion
- Good bonding with polymer and carbon fiber

2 Polymer matrix
- Transfers the tension between carbon fibers
- Keeps fiber bar in shape

1 Carbon fibers
- High e-modulus
- High strength
- Inert to high temperatures

Lower
energy consumption

Less
material

No
lubrication

Longer
lifetime of ropes

Better
performance in high wind

Easier
maintenance and replacement

CONTENT DECLARATION

PRODUCT

The Table below shows the material summary of the elevator studied, as delivered and installed in a building and handed over to customer. The total mass of the elevator is 42220 kg and is mainly composed of ferrous metals majority of which can be recycled after use. Product-specific (pre-consumer and post-consumer) recycled content is unknown. Global average of recycled content in metals is considered in calculations. KONE continues to focus on optimizing material usage including packaging, avoiding the use of hazardous substances and maximizing recycled content and recyclability of our products.

PACKAGING

The table below shows the content of packaging materials used for packaging the reference elevator and its components as delivered to the site. The total amount of packaging components is 3209 kg where wood is the most common material. Majority of the packaging components can either be reused or recycled at the end of life.

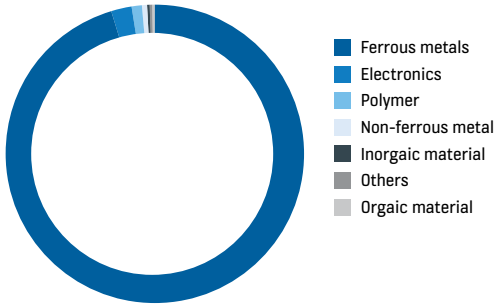
Table 2. Raw materials used in MiniSpace™

Materials	Weight %
Ferrous metals	95.31
Electronics	2.41
Polymer	1.00
Non-ferrous metal	0.61
Inorgaic material	0.36
Others	0.26
Orgaic material	0.05

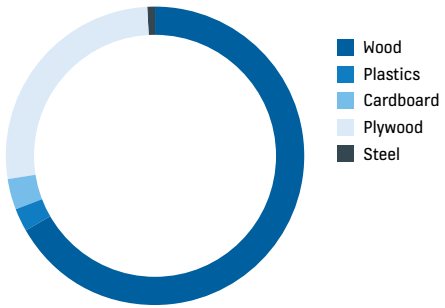
Table 3. Raw materials used in MiniSpace™ packaging

Materials	Weight %	Biogenic carbon (kg)
Wood	66.66	962.73
Plastics	2.64	0.00
Cardboard	3.42	44.13
Plywood	26.66	342.26
Steel	0.61	0.00

Material summary of MiniSpace™



Material summary of MiniSpace™ packaging



Following the requirements of EN 15804 for the declaration of substances on the candidate list of substances of very high concern (SVHC), we can conclude that to the best of our knowledge and based on the evidence provided by our suppliers the studied reference product does not contain substances on the SVHC list above 0.1% by weight of the product.

SYSTEM BOUNDARY

This EPD covers the full life cycle stages from cradle to grave. In the product stage (A1-A3) raw material extraction, processing of materials, transportation to the manufacturing site and manufactring of components are considered. The different components of the product, also known as elevator modules are manufactured at specific sites in different parts of the world.

The construction process stage (A4-A5) includes transportation of the modules from manufacturing sites to a common distribution center and from there to the installation site by truck, installation activities and waste treatment of the packaging components.

In the use stage (B1-B7) only Maintainance (B2) and operational energy use (B6) are included as other stages within the usage phase are irrelevant for the product. Replacement component production, transportation involved, waste treatment and energy usage for products lifetime are included.

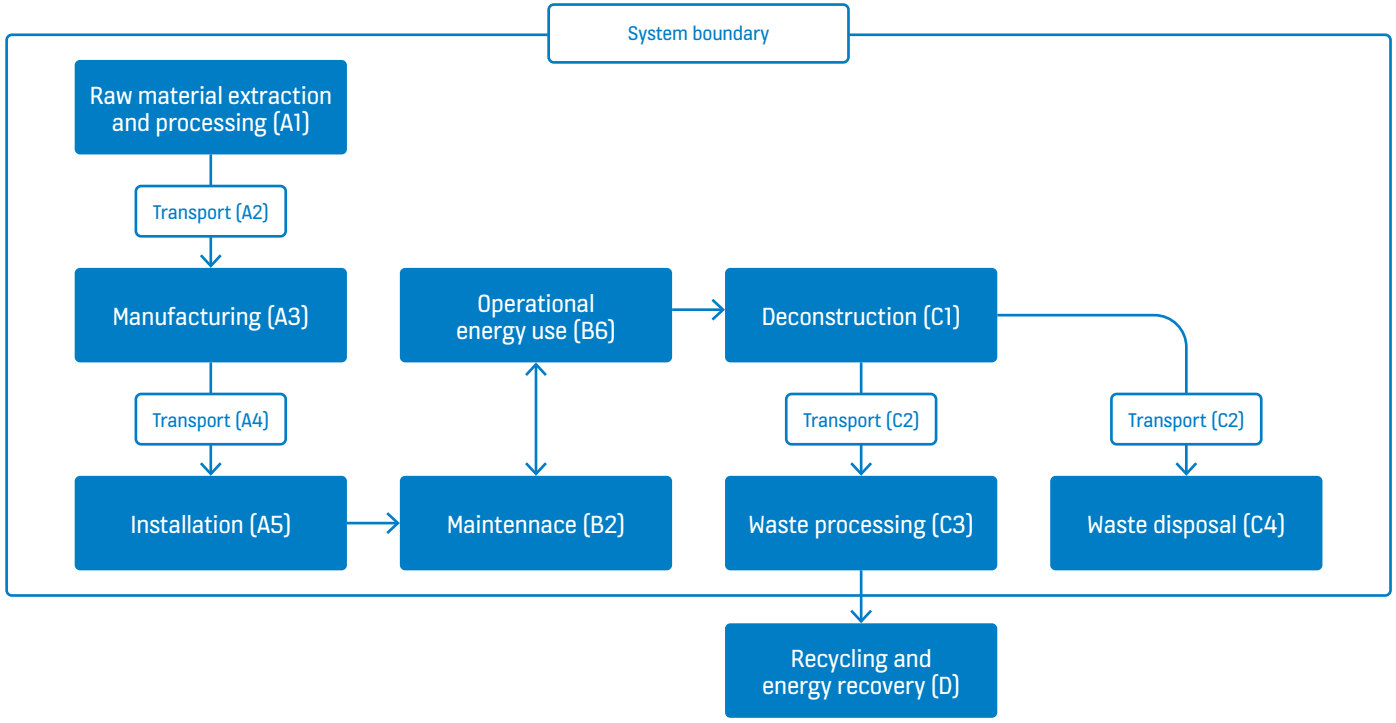
The end of life stage (C1-C4) includes dismantling, transportation of waste to processing sites, waste processing and disposal. Elevators once installed in the building, building owners are responsible for appropriate waste disposal. The impacts modeled for end of life in this LCA is based on most appropriate treatment scenarios for the materials. In addition, module D includes benefits and loads beyond the system boundary as a result of recycling and energy recovery through incineration.

FUNCTIONAL UNIT

Since the purpose of the elevator is to transport people and goods over multi-floor buildings, the functional unit (FU) for the study is defined as the transportation of the load over distance, expressed in tonne [t] over a kilometer [km], i.e. tonne-kilometer [tkm]. T he total amount of tkm (also called as Transportation performance (TP)) shall be calculated to obtain the results per FU. The TP for MiniSpace™ with Usage Category 4 in its lifetime 25 years was calculated to be 33726 tkm. The term “transportation performance (TP)” used to indicate the total amount of tkm is identical both in meaning and in calculation approach to the term “total number of FU” used in EPDs based on PCR 2015:05.

CUT-OFF CRITERIA

This study follows the cut-off criteria stated in the PCR and EN 15804 standard and does not exclude any modules or processes which are stated mandatory in the EN 15804 standard and in the PCR. For A1-A3, amount of material consumption, packaging, transportationand manufacturing data from the factory was received for each of the 11 modules. However, the material classification was not possible for 85.6 kg of the material used in the product. The missing material data represents only 0.20% of the total weight of the lift and their production is left out from the production analysis. Other materials with negligible quantities (kg) in the product that are excluded from the analysis are knots, bolts, screws, and labels and stickers. A4 transportation has been calculated but the return trip is not considered. Potential energy usage in distribution center per elevator delivered is negligible and are not included in the analysis. Similarly, the impacts of the auxiliary materials used for the installation and replacement in A5 and B2 (example; gloves, adhesive tapes and cleaning agents) is excluded from the analysis since both their usage quantity and impacts are considered negligible.



SCOPE OF THE LIFE CYCLE ASSESSMENT

		Module	Modules declared
Product stage	Raw material supply	A1	X
	Transport	A2	X
	Manufacturing	A3	X
Construction process stage	Transport	A4	X
	Construction installation	A5	X
Use stage	Use	B1	ND
	Maintenance	B2	X
	Repair	B3	ND
	Replacement	B4	ND
	Refurbishment	B5	ND
	Operational energy use	B6	X
	Operational water use	B7	ND
End of life stage	Deconstruction	C1	X
	Transport	C2	X
	Waste processing	C3	X
	Disposal	C4	X
Resource recovery stage	Reuse-Recovery-Recycling-potential	D	X

This declaration covers “cradle to grave”. All mandatory modules covered in the EPD are marked with “X”. For non-relevant fields, ND is marked in the table (module not related). >90% of data is specific i.e the share of GWP-GHG impacts are coming from specific data.

ENVIRONMENTAL IMPACT

The results of a life cycle assessment are relative. They do not predict impact on category endpoints, exceeding of limit values, safety margins, or risks. The CML impact assessment method and its related characterization factors were employed at the midpoint level in this study. The global warming potential of modules A1-A3 is mainly caused by material manufacturing, with steel production activity having the highest share of 88% of the impacts. The elevator of this study is in use in Shanghai, China. The annual energy consumption of 19300 kWh* was calculated with ISO 25745-2 methodology. The impacts for operational energy usage (B6) were calculated using the energy production fuel mixes for China. The results of life cycle impact assessment are divided by life cycle stage per entire life cycle and per tkm. Carbon footprint for the entire life cycle of the product is 644 tons of CO2e. Detailed results for all the impact categories can be seen from the tables below. If the studied elevator is installed in Europe, the carbon footprint for the entire life cycle of the product will reduce by 45%.

Table 4. Potential environmental impacts per entire life cycle of KONE MiniSpace™ elevator

Section	Global Warming Potential total [kg CO2 eq.]	Global Warming Potential fossil total [kg CO2 eq.]	Global Warming Potential biogenic [kg CO2 eq.]	Global Warming Potential luluc [kg CO2 eq.]	Ozone depletion potential [kg CFC11 eq.]	Acidification potential [mol H+ eq.]	Eutrophication aquatic freshwater [kg P eq.]***	Eutrophication aquatic marine [kg N eq.]	Eutrophication terrestrial [mol N eq.]	Formation potential of tropospheric ozone [kg NMVOC eq.]	Abiotic depletion potential - elements [kg Sb eq.]**	Abiotic depletion potential - fossil [MJ]**	Water use [m3 depriv.]**	Global Warming Potential-GHG [kg CO2 eq.]
A1 Manufacturing - materials and components	1.04E+05	1.03E+05	8.16E+02	8.94E+01	6.10E-03	8.43E+02	8.35E+00	1.16E+02	1.31E+03	4.95E+02	4.25E+00	1.15E+06	5.23E+04	9.89E+04
A2 Transport to component manufacturer	1.73E+04	1.73E+04	-2.63E+00	1.05E+01	3.50E-03	5.13E+02	8.60E-02	1.28E+02	1.42E+03	3.68E+02	1.90E-01	2.24E+05	4.86E+02	1.72E+04
A3 Manufacturing - packaging and waste treatment	-1.62E+03	9.93E+03	-1.16E+04	4.65E+01	8.90E-04	7.10E+01	6.10E-01	1.94E+01	2.18E+02	5.96E+01	8.50E-02	1.36E+05	3.72E+03	9.93E+03
A4 Transport to building site	4.58E+03	4.57E+03	-2.30E-02	2.62E+00	9.60E-04	1.11E+02	2.50E-02	2.76E+01	3.07E+02	8.07E+01	4.70E-02	6.22E+04	1.64E+02	4.57E+03
A5 Installation into the building	1.20E+04	4.02E+02	1.16E+04	6.80E-02	2.20E-05	1.26E+00	3.20E-03	4.30E-01	4.63E+00	1.21E+00	4.90E-03	2.27E+03	-7.14E+00	4.02E+02
B2 Maintenance	1.41E+04	1.29E+04	1.12E+03	3.50E+01	6.10E-04	2.84E+02	2.33E+00	2.14E+01	2.73E+02	7.94E+01	1.46E+00	1.14E+05	7.34E+03	8.98E+03
B6 Operational energy usage	5.23E+05	5.27E+05	-4.70E+03	5.72E+01	3.30E-03	2.72E+03	1.14E+01	5.67E+02	6.23E+03	1.61E+03	6.80E-01	4.62E+06	5.52E+04	5.27E+05
C1 Deconstruction	6.50E+01	6.56E+01	-5.80E-01	7.10E-03	4.10E-07	3.40E-01	1.40E-03	7.00E-02	7.80E-01	2.00E-01	8.40E-05	5.75E+02	6.87E+00	6.56E+01
C2 Waste transportation	9.60E+02	9.59E+02	7.00E-01	2.90E-01	2.30E-04	4.03E+00	7.80E-03	1.21E+00	1.34E+01	4.31E+00	1.60E-02	1.49E+04	5.55E+01	9.59E+02
C3 Waste processing	2.45E+03	2.37E+03	7.75E+01	1.55E+00	1.40E-04	1.57E+01	1.70E-01	3.22E+00	3.77E+01	1.01E+01	7.90E-02	1.62E+04	3.67E+02	2.37E+03
C4 Waste disposal	3.13E+01	3.46E+01	-3.49E+00	1.10E-01	9.80E-06	2.70E-01	8.30E-04	8.40E-02	9.30E-01	2.90E-01	2.90E-04	7.57E+02	3.22E+01	3.46E+01
D Benefits	-3.20E+04	-3.21E+04	1.61E+02	4.87E+00	-1.01E-03	-1.86E+02	-2.24E+00	-3.03E+01	-3.68E+02	-1.75E+02	-3.07E-01	-2.63E+05	-1.87E+04	-3.21E+04

* The results of the energy calculation are based on the typical energy consumption of the selected reference.
The results are KONE's best estimates of the annual energy consumption but the real-life values may vary depending on the actual installation.

** 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 experienced with the indicator.

***The results in kg PO4 eq. can be obtained by multiplying the results in kg P eq. with a factor of 3.07.

Table 5. Potential environmental impacts per tkm of KONE MiniSpace™ elevator

Section	Global Warming Potential total [kg CO2 eq.]	Global Warming Potential fossil total [kg CO2 eq.]	Global Warming Potential biogenic [kg CO2 eq.]	Global Warming Potential luluc [kg CO2 eq.]	Ozone depletion potential [kg CFC11 eq.]	Acidification potential [mol H+ eq.]	Eutrophication aquatic freshwater [kg P eq.]***	Eutrophication aquatic marine [kg N eq.]	Eutrophication terrestrial [mol N eq.]	Formation potential of tropospheric ozone [kg NMVOC eq.]	Abiotic depletion potential - elements [kg Sb eq.]**	Abiotic depletion potential - fossil [MJ]**	Water use [m3 depriv.]**	Global Warming Potential-GHG [kg CO2 eq.]
A1 Manufacturing - materials and components	3.07E+00	3.05E+00	2.42E-02	2.65E-03	1.81E-07	2.50E-02	2.48E-04	3.45E-03	3.87E-02	1.47E-02	1.26E-04	3.42E+01	1.55E+00	2.93E+00
A2 Transport to component manufacturer	5.13E-01	5.13E-01	-7.80E-05	3.10E-04	1.04E-07	1.52E-02	2.55E-06	3.79E-03	4.22E-02	1.09E-02	5.63E-06	6.65E+00	1.44E-02	5.11E-01
A3 Manufacturing - packaging and waste treatment	-4.81E-02	2.94E-01	-3.44E-01	1.38E-03	2.64E-08	2.10E-03	1.81E-05	5.74E-04	6.46E-03	1.77E-03	2.52E-06	4.05E+00	1.10E-01	2.94E-01
A4 Transport to building site	1.36E-01	1.36E-01	-6.82E-07	7.77E-05	2.85E-08	3.30E-03	7.41E-07	8.19E-04	9.10E-03	2.39E-03	1.39E-06	1.84E+00	4.87E-03	1.36E-01
A5 Installation into the building	3.55E-01	1.19E-02	3.43E-01	2.02E-06	6.52E-10	3.74E-05	9.49E-08	1.27E-05	1.37E-04	3.59E-05	1.45E-07	6.73E-02	-2.12E-04	1.19E-02
B2 Maintenance	4.17E-01	3.83E-01	3.31E-02	1.04E-03	1.81E-08	8.44E-03	6.91E-05	6.34E-04	8.10E-03	2.35E-03	4.33E-05	3.39E+00	2.18E-01	2.66E-01
B6 Operational energy usage	1.55E+01	1.56E+01	-1.39E-01	1.70E-03	9.78E-08	8.07E-02	3.38E-04	1.68E-02	1.85E-01	4.78E-02	2.02E-05	1.37E+02	1.64E+00	1.56E+01
C1 Deconstruction	1.93E-03	1.94E-03	-1.72E-05	2.11E-07	1.22E-11	1.01E-05	4.15E-08	2.08E-06	2.31E-05	5.93E-06	2.49E-09	1.70E-02	2.04E-04	1.94E-03
C2 Waste transportation	2.85E-02	2.84E-02	2.08E-05	8.60E-06	6.82E-09	1.19E-04	2.31E-07	3.59E-05	3.98E-04	1.28E-04	4.74E-07	4.42E-01	1.65E-03	2.84E-02
C3 Waste processing	7.27E-02	7.04E-02	2.30E-03	4.60E-05	4.15E-09	4.66E-04	5.04E-06	9.55E-05	1.12E-03	2.98E-04	2.34E-06	4.82E-01	1.09E-02	7.04E-02
C4 Waste disposal	9.27E-04	1.03E-03	-1.03E-04	3.26E-06	2.91E-10	8.01E-06	2.46E-08	2.49E-06	2.76E-05	8.60E-06	8.60E-09	2.24E-02	9.55E-04	1.03E-03
D Benefits	-9.48E-01	-9.53E-01	4.78E-03	1.44E-04	-2.99E-08	-5.51E-03	-6.64E-05	-9.00E-04	-1.09E-02	-5.19E-03	-9.11E-06	-7.80E+00	-5.53E-01	-9.53E-01

* The results of the energy calculation are based on the typical energy consumption of the selected reference.
The results are KONE's best estimates of the annual energy consumption but the real-life values may vary depending on the actual installation.

** 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 experienced with the indicator.

***The results in kg PO4 eq. can be obtained by multiplying the results in kg P eq. with a factor of 3.07.

Table 6. The use of resources per entire life cycle of KONE MiniSpace™ elevator

Section	Use of renewable primary energy resources as energy [MJ]	Use of renewable primary energy resources as raw materials [MJ]	Total use of renewable primary energy [MJ]	Use of non renewable primary energy as energy [MJ]	Use of non renewable primary energy as raw materials [MJ]	Total use of non renewable primary energy [MJ]	Use of secondary materials [kg]	Use of renewable secondary fuels [MJ]	Use of non renewable secondary fuels [MJ]	Use of net fresh water [m3]
A1 Manufacturing - materials and components	1.05E+05	2.24E+02	1.05E+05	1.14E+06	1.42E+04	1.15E+06	2.26E+04	0.00E+00	0.00E+00	1.13E+03
A2 Transport to component manufacturer	1.78E+03	0.00E+00	1.78E+03	2.24E+05	0.00E+00	2.24E+05	0.00E+00	0.00E+00	0.00E+00	2.28E+01
A3 Manufacturing - packaging and waste treatment	9.30E+04	6.97E+04	1.63E+05	1.33E+05	4.02E+03	1.37E+05	1.57E+01	0.00E+00	0.00E+00	8.81E+01
A4 Transport to building site	5.39E+02	0.00E+00	5.39E+02	6.22E+04	0.00E+00	6.22E+04	0.00E+00	0.00E+00	0.00E+00	8.21E+00
A5 Installation into the building	8.16E+01	0.00E+00	8.16E+01	2.27E+03	0.00E+00	2.27E+03	0.00E+00	0.00E+00	0.00E+00	1.75E+00
B2 Maintenance	2.72E+04	1.63E+04	4.35E+04	1.08E+05	6.01E+03	1.14E+05	8.27E+02	0.00E+00	0.00E+00	1.58E+02
B6 Operational energy usage	4.08E+05	0.00E+00	4.08E+05	4.62E+06	0.00E+00	4.62E+06	0.00E+00	0.00E+00	0.00E+00	1.85E+03
C1 Deconstruction	5.08E+01	0.00E+00	5.08E+01	5.75E+02	0.00E+00	5.75E+02	0.00E+00	0.00E+00	0.00E+00	2.30E-01
C2 Waste transportation	1.88E+02	0.00E+00	1.88E+02	1.49E+04	0.00E+00	1.49E+04	0.00E+00	0.00E+00	0.00E+00	3.11E+00
C3 Waste processing	2.14E+03	0.00E+00	2.14E+03	1.62E+04	0.00E+00	1.62E+04	0.00E+00	0.00E+00	0.00E+00	1.07E+01
C4 Waste disposal	5.27E+01	0.00E+00	5.27E+01	7.57E+02	0.00E+00	7.57E+02	0.00E+00	0.00E+00	0.00E+00	7.60E-01
D Benefits	-2.59E+04	0.00E+00	-2.59E+04	-2.63E+05	0.00E+00	-2.63E+05	1.23E+04	0.00E+00	0.00E+00	-2.26E+02

Table 7. The use of resources per tkm of KONE MiniSpace™ elevator

Section	Use of renewable primary energy resources as energy [MJ]	Use of renewable primary energy resources as raw materials [MJ]	Total use of renewable primary energy [MJ]	Use of non renewable primary energy as energy [MJ]	Use of non renewable primary energy as raw materials [MJ]	Total use of non renewable primary energy [MJ]	Use of secondary materials [kg]	Use of renewable secondary fuels [MJ]	Use of non renewable secondary fuels [MJ]	Use of net fresh water [m3]
A1 Manufacturing - materials and components	3.12E+00	6.65E-03	3.12E+00	3.38E+01	4.22E-01	3.42E+01	6.71E-01	0.00E+00	0.00E+00	3.35E-02
A2 Transport to component manufacturer	5.28E-02	0.00E+00	5.28E-02	6.65E+00	0.00E+00	6.65E+00	0.00E+00	0.00E+00	0.00E+00	6.75E-04
A3 Manufacturing - packaging and waste treatment	2.76E+00	2.07E+00	4.82E+00	3.95E+00	1.19E-01	4.07E+00	4.66E-04	0.00E+00	0.00E+00	2.61E-03
A4 Transport to building site	1.60E-02	0.00E+00	1.60E-02	1.84E+00	0.00E+00	1.84E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-04
A5 Installation into the building	2.42E-03	0.00E+00	2.42E-03	6.73E-02	0.00E+00	6.73E-02	0.00E+00	0.00E+00	0.00E+00	5.19E-05
B2 Maintenance	8.07E-01	4.83E-01	1.29E+00	3.21E+00	1.78E-01	3.39E+00	2.45E-02	0.00E+00	0.00E+00	4.67E-03
B6 Operational energy usage	1.21E+01	0.00E+00	1.21E+01	1.37E+02	0.00E+00	1.37E+02	0.00E+00	0.00E+00	0.00E+00	5.49E-02
C1 Deconstruction	1.50E-03	0.00E+00	1.50E-03	1.70E-02	0.00E+00	1.70E-02	0.00E+00	0.00E+00	0.00E+00	6.82E-06
C2 Waste transportation	5.57E-03	0.00E+00	5.57E-03	4.42E-01	0.00E+00	4.42E-01	0.00E+00	0.00E+00	0.00E+00	9.22E-05
C3 Waste processing	6.33E-02	0.00E+00	6.33E-02	4.82E-01	0.00E+00	4.82E-01	0.00E+00	0.00E+00	0.00E+00	3.16E-04
C4 Waste disposal	1.56E-03	0.00E+00	1.56E-03	2.24E-02	0.00E+00	2.24E-02	0.00E+00	0.00E+00	0.00E+00	2.25E-05
D Benefits	-7.67E-01	0.00E+00	-7.67E-01	-7.80E+00	0.00E+00	-7.80E+00	3.64E-01	0.00E+00	0.00E+00	-6.70E-03

END OF LIFE - WASTE

In addition to the waste reported by the manufacturing units during the production process (specific data), the data on the amount of waste disposed reported in the table 8 and table 9 below also includes the waste data from the Ecoinvent database for all the life cycle stages. The amount of specific waste generated including the material losses during the production of elevator modules and packaging was collected from the module manufacturing unit.

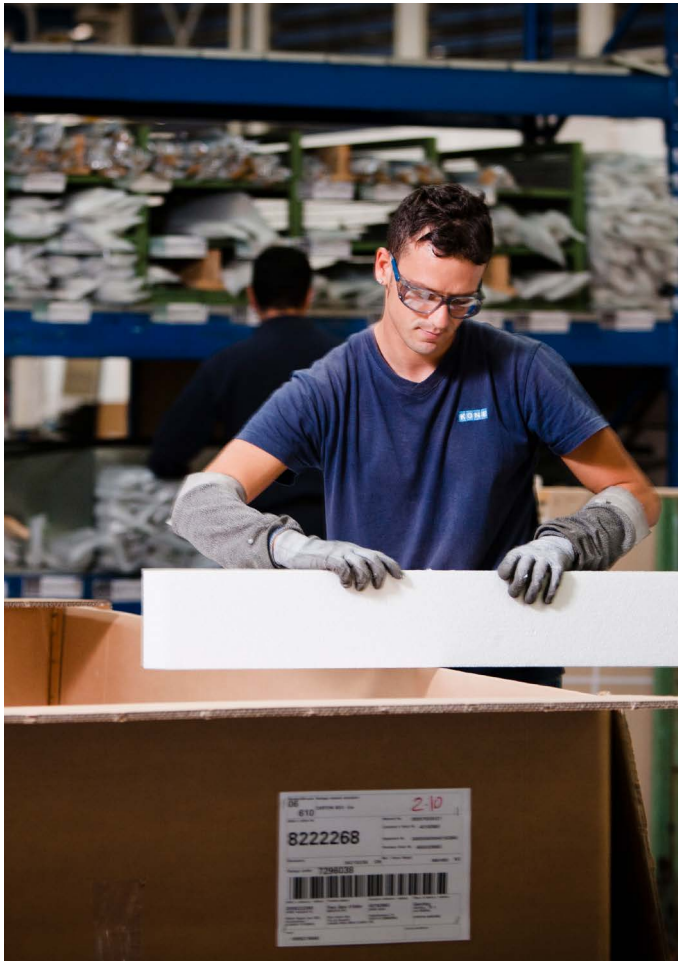


Table 8. Amount of waste disposed per entire lifecycle of KONE MiniSpace™ elevator

Section	Hazardous waste disposed [kg]	Non hazardous waste disposed [kg]	Radioactive waste disposed [kg]
A1 Manufacturing - materials and components	2.84E+04	4.47E+05	2.53E+00
A2 Transport to component manufacturer	2.51E+02	4.43E+03	1.57E+00
A3 Manufacturing - packaging and waste treatment	9.91E+02	1.63E+04	6.60E-01
A4 Transport to building site	6.86E+01	2.83E+03	4.30E-01
A5 Installation into the building	3.13E+01	3.33E+03	9.10E-03
B2 Maintenance	1.88E+03	1.45E+05	3.10E-01
B6 Operational energy usage	6.60E+04	4.39E+05	2.16E+00
C1 Deconstruction	8.20E+00	5.46E+01	2.70E-04
C2 Waste transportation	1.45E+01	1.60E+03	1.00E-01
C3 Waste processing	0.00E+00	0.00E+00	0.00E+00
C4 Waste disposal	4.36E+01	4.23E+03	4.30E-03
D Benefits	-1.26E+04	-1.19E+05	-1.43E-01

Table 9. Amount of waste disposed per tkm of KONE MiniSpace™ elevator

Section	Hazardous waste disposed [kg]	Non hazardous waste disposed [kg]	Radioactive waste disposed [kg]
A1 Manufacturing - materials and components	8.42E-01	1.33E+01	7.50E-05
A2 Transport to component manufacturer	7.45E-03	1.31E-01	4.66E-05
A3 Manufacturing - packaging and waste treatment	2.94E-02	4.84E-01	1.96E-05
A4 Transport to building site	2.03E-03	8.41E-02	1.27E-05
A5 Installation into the building	9.28E-04	9.86E-02	2.70E-07
B2 Maintenance	5.59E-02	4.30E+00	9.19E-06
B6 Operational energy usage	1.96E+00	1.30E+01	6.40E-05
C1 Deconstruction	2.43E-04	1.62E-03	8.01E-09
C2 Waste transportation	4.30E-04	4.76E-02	2.97E-06
C3 Waste processing	0.00E+00	0.00E+00	0.00E+00
C4 Waste disposal	1.29E-03	1.25E-01	1.27E-07
D Benefits	-3.75E-01	-3.53E+00	-4.24E-06

END OF LIFE- OUTPUT FLOWS

The data for the output flows of the process is presented in table 10 and table 11 for the entire life cycle and per tkm respectively. The parameters in the tables are calculated on the gross amounts leaving the system boundary when they have reached the end-of-waste state. During manufacturing process, silica sand utilized as ancillary material can be reused, no other components are reused after the end of the waste state. Possible exported energy is not reported in the LCI datasets of Ecoinvent and there is no amount of exported energy from the manufacturing units.

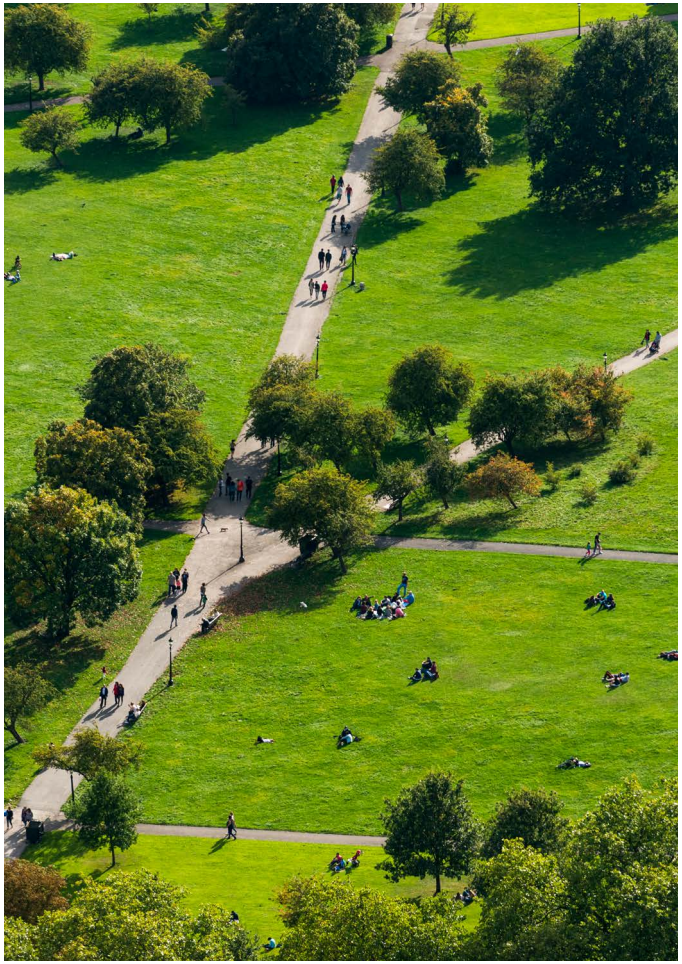


Table 10. Amount of materials leaving the system boundary per entire life cycle of KONE MiniSpace™ elevator

Section	Components for re-use [kg]	Materials for recycling [kg]	Materials for energy recovery [kg]	Exported Energy [MJ]
A1 Manufacturing - materials and components	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A2 Transport to component manufacturer	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A3 Manufacturing - packaging and waste treatment	4.98E+03	4.84E+03	0.00E+00	0.00E+00
A4 Transport to building site	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A5 Installation into the building	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2 Maintenance	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6 Operational energy usage	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1 Deconstruction	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2 Waste transportation	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C3 Waste processing	0.00E+00	3.74E+04	0.00E+00	0.00E+00
C4 Waste disposal	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D Benefits	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 11. Amount of materials leaving the system boundary per tkm of KONE MiniSpace™ elevator

Section	Components for re-use [kg]	Materials for recycling [kg]	Materials for energy recovery [kg]	Exported Energy [MJ]
A1 Manufacturing - materials and components	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A2 Transport to component manufacturer	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A3 Manufacturing - packaging and waste treatment	1.48E-01	1.44E-01	0.00E+00	0.00E+00
A4 Transport to building site	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A5 Installation into the building	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2 Maintenance	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6 Operational energy usage	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1 Deconstruction	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2 Waste transportation	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C3 Waste processing	0.00E+00	1.11E+00	0.00E+00	0.00E+00
C4 Waste disposal	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D Benefits	0.00E+00	0.00E+00	0.00E+00	0.00E+00

SCENARIOS

Scenarios support the application of product related data in the corresponding life cycle stage of the building assessment. Scenarios in this EPD are specified in the tables below for respective life cycle stages.

ELECTRICITY IN THE MANUFACTURING STAGE

KONE's suppliers and KONE factory for manufacturing the studied elevator and its components are located in China. The impacts of electricity have been calculated using the electricity fuel mixed for China, residual mixes for Germany, Estonia, Finland, Czech Republic, Italy, Lithuania and supplier-specific mixes for Austria (kg CO2e/KWh). The resulting carbon emission per kWh of electricity consumed for each manufacturing location is presented in the table below.

Country	kg CO2e/kWh
Austria	0.03
China	1.08
Germany	0.76
Estonia	0.80
Finland	0.46
Czech Republic	0.74
Italy	0.76
Lithuania	0.56

TRANSPORT FROM PRODUCTION PLACE TO USER

The table below shows the transportation scenario applied from KONE and supplier production location to KONE distribution center and from distribution center to building location in Shanghai.

Vehicle type	Distance	Capacity utilization*
Freight. lorry>32 ton. Euro 6	820 km	100 %
Sea freight	26103 km	100 %

* Lorry is assumed to be fully loaded. Return trip is not considered

INSTALLATION INTO THE BUILDING

Installing the product into the building consumes electricty, generates waste from packaging materials and requires negligible quantity of ancilliary materials.

Resource	Consumption value
Ancilliary materials - glues and disposable gloves	Negligible quantities - Excluded
Water use	0 m3
Electricity consumption	60 kWh

Waste generation	
Wood	2995.05 kg
Plastics	84.86 kg
Cardboard	109.78 kg
Metals	19.46 kg

MAINTENANCE

The reference conditions for achieving the declared service life is primarily influenced by maintenance frequency/replacement of components and usage conditions such as frequency of use of the elevator. While corrective replacement activities depend on the building application, user's behavior and installed environment and cannot be foreseen by manufacturer, the assessment takes into account predictive replacement of the necessary parts.

Scenarios	Value
Energy input	0 kWh
Transport	360 km

Materials	
Ferrous metal	1197.85 kg
Non-ferrous metal	1.13 kg
Polymers	184.25 kg
Carbon Fiber	107.51 kg
Electronics	644.98 kg
Lubricant	2.88 kg

END OF LIFE

The MiniSpace™ is mainly composed of ferrous metals. A realistic assumption is made that whole of the elevator and its parts are collected separately during the dismantling process. 10% of the elevator's material is assumed to be not recyclable with current technologies and therefore disposed. The disposal is also considered for a small portion of materials. Ferrous metals, nonferrous metals as well as electronic components used in the elevator can all be recycled after the end of life. Varnishes, adhesives, and lubricating oils used in the elevator are treated as hazardous waste and incineration is considered for small proportion of combustible materials (mainly plastics). Regarding waste treatment plants, the global average technologies are considered in this EPD.

Processes	Unit	Amount kg/kg
Collection process specified by type	kg collected separately	1
	kg collected with mixed construction waste	0
Recovery system by type	kg for re-use	0
	kg for recycling	0.89*
	kg for energy recovery	0.00*
Disposal by type	kg for final deposition	0.11*
Distance to treatment facilities	Lorry>32 ton	250 km

* Values are calculated based on the most common treatment scenarios currently in use for the materials

COMPARISON OF RESULT WITH USAGE CATEGORY 5

The energy consumption and carbon impact for the lifts depend on the number of starts the elevator makes annually.

The results in the EPD is calculated for usage category (UC) 4 - 273750 starts annually per ISO 25745.

The table below shows the comparison of the results with usage category (UC) 5 - 547500 starts annually as per ISO 25745.

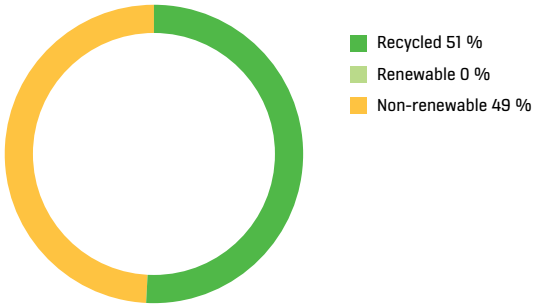
Number of starts/year	Energy use per year (kWh)	Energy use for lifecycle (kWh)	Carbon emission from energy use (kg CO2e)*	Lifecycle carbon (kg CO2e)*
273750 (UC4)	19300	482500	522630	644114
547500 (UC5)	29700	742500	804254	925738

* Global warming potential total, calculated in accordance with EN 15804:2012+A2:2019

SUMMARY

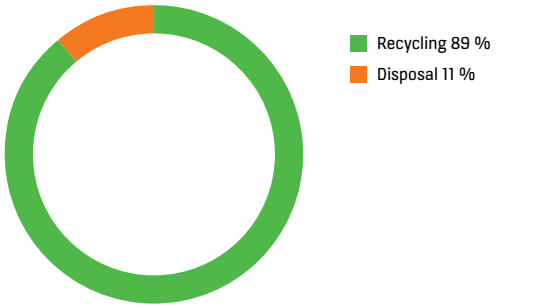
MATERIALS AND CIRCULARITY

Origin of materials



Materials	kg
Steel - all types	38251
Plastics	421
Aluminium	122
Copper	128
Electronics	1017
Others	2281

Materials utilization potential after elevator usage



CARBON EMISSION

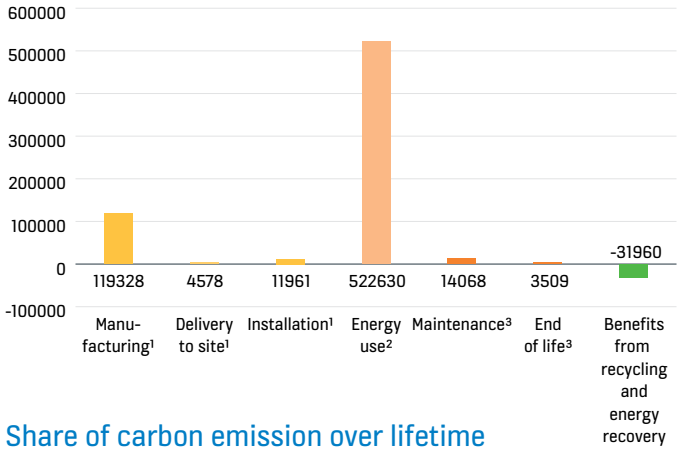
676,074 KG CO2E — CARBON EMISSION

-31,960 KG CO2E — CARBON SAVING

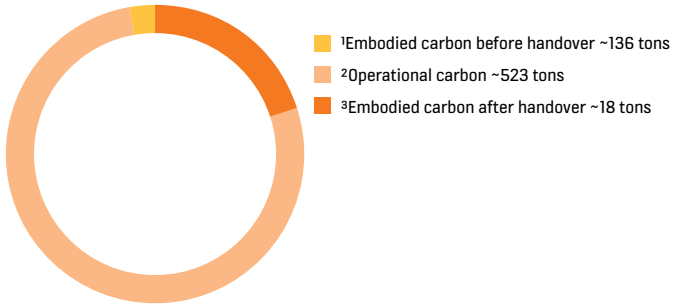
Carbon emission - GHG emission throughout lifecyle of product

Carbon saving - Recycling materials such as steel at the end of life avoids production of virgin materials ('negative emission').

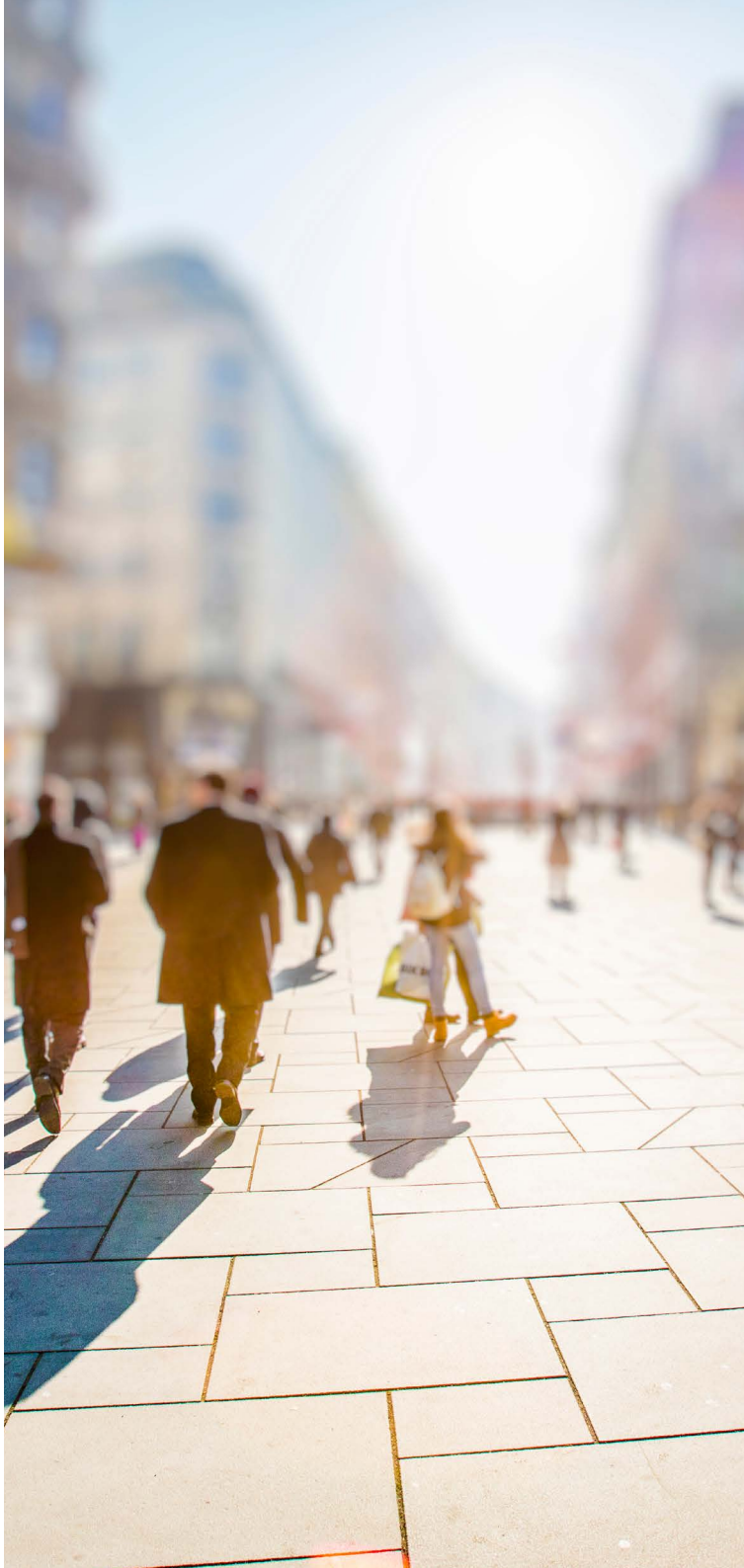
Carbon footprint distribution (kg CO2 eq.)



Share of carbon emission over lifetime



Product-specific (pre-consumer and post-consumer) recycled content is unknown. Global average of recycled content in metals is considered in calculations.



GLOSSARY

ADP, Abiotic depletion potential, expressed in kg Antimony (Sb) equivalent. for non-fossil resources and in MJ for fossil resources. In the CML method the non-fossil resources include e.g. silver, gold, copper, lead, zinc and aluminium.

AP, acidification potential, expressed in kg sulphuric dioxide (SO_2) equivalent. The indicator expresses acidification potential which originates from the emissions of sulphur dioxide and oxides of nitrogen. In the atmosphere, these oxides react and form acids which subsequently fall down to the earth in the form of rain or snow, or as dry depositions. Inorganic substances such as sulphates, nitrates, and phosphates change soil acidity. Major acidifying substances are nitrogen oxides (NOx), ammonia (NH_3) and sulphate (SO_4).

CML, a methodology for life cycle impact assessment created by University of Leiden in the Netherlands in 2001. It is publicly available and contains more than 1700 different flows. It includes impact categories of acidification, climate change, depletion of abiotic resources, ecotoxicity, eutrophication, human toxicity, ozone layer depletion and photochemical oxidation.

EPD, environmental product declaration, provides numeric information about product's environmental performance and facilitates comparison between different products with the same function. EPDs for KONE are based on life cycle assessment.

EP, eutrophication potential, expressed in kg phosphate (PO43-) equivalent. Eutrophication describes emissions of substances to water that contribute to oxygen depletion. It means nutrient enrichment of an aquatic environment. Biomass growth in aquatic ecosystems may be limited by various nutrients. Most of the time, aquatic ecosystems are saturated with either nitrogen or phosphorus, and only the limiting factor can cause eutrophication. The CML method takes into account nitrogen and phosphorus related emissions.

Functional unit, The quantified performance of a product system for use as a reference unit.

GWP, global warming potential, expressed in kg carbon dioxide (CO_2) equivalent. The indicator expresses global warming potential and refers to carbon footprint. It considers gaseous substances such as carbon dioxide (CO_2), methane (CH_4), laughing gas (N_2O) over 100 years. These substances have an ability to absorb infrared radiation in the earth's atmosphere. They let sunlight reach the earth's surface and trap some of the infrared radiation emitted back into space causing an increase in the earth's surface temperature.

LCA, life cycle assessment, is a method which quantifies the total environment impact of products or activities over their entire life cycle and life cycle thinking. Life cycle assessment is based on ISO 14040 and ISO 14044 standards and comprises four phases: goal and scope definition, inventory data collection and analysis, environmental impact assessment and interpretation of results. The results of LCA are used in communication and product development purposes, for example.

ODP, Ozone depletion potential, expressed in kg trichlorofluoromethane (CFC-11) equivalent. Ozone-depleting gases cause damage to stratospheric ozone or the "ozone layer". Chlorofluorocarbons (CFCs), halons and hydrochlorofluorocarbon (HCFCs) are the potent destroyer of ozone, which protects life on earth from harmful UV radiation. Damage to the ozone layer reduces its ability to prevent ultraviolet (UV) light entering the earth's atmosphere, increasing the amount of carcinogenic UVB light reaching the earth's surface. The CML impact calculation method takes into account all different forms of CFC, HCFC and halons related emissions.

Product Category rules (PCR) define the rules and requirements for EPDs of a certain product category. They are a key part of ISO 14025 as they enable transparency and comparability between EPDs

POCP, photochemical ozone creation potential, expressed in kg NMVOC equivalent. Photochemical ozone or ground level ozone is formed by the reaction of volatile organic compounds and nitrogen oxides in the presence of heat and sunlight. Ground-level ozone forms readily in the atmosphere, usually during hot summer weather. Photochemical oxidant formation is harmful to both humans and plants. The CML method takes into account certain emissions to air, for example, carbon monoxide (CO), ethyne (C_2H_2) and formaldehyde (CH_2O).

ADDITIONAL TECHNICAL INFORMATION

www.kone.com
Contact your local KONE sales organization to learn more about the technical details of the products available in your region.

ADDITIONAL INFORMATION

All the impacts specified by EN 15804 have been studied for all the information modules.

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

PCR 2019:14 Version 1.11 for Construction products.

EN-ISO 25745-2 Energy performance of lifts, escalators and moving walks - Part 2: Energy calculation and classification for lifts (elevators).

Ecoinvent database v3.6.

Life Cycle Assessment report of KONE MiniSpace™ as per EN 15804+A2:2019 and ISO 14025.

DIFFERENCES VERSUS PREVIOUS VERSIONS

The carbon emission factors in the scenarios and in the comparison tables have been revised to be in accordance with EN 15804:2012+A2:2019.

There is no change regarding environmental impacts in results between the released and the revised EPD versions.

Dedicated to People Flow™

KONE provides innovative and eco-efficient solutions for elevators, escalators, automatic building doors and the systems that integrate them with today's intelligent buildings.

We support our customers every step of the way; from design, manufacturing and installation to maintenance and modernization. KONE is a global leader in helping our customers manage the smooth flow of people and goods throughout their buildings.

Our commitment to customers is present in all KONE solutions. This makes us a reliable partner throughout the life cycle of the building. We challenge the conventional wisdom of the industry. We are fast, flexible, and we have a well-deserved reputation as a technology leader, with such innovations as KONE MonoSpace® DX, KONE NanoSpace™ and KONE UltraRope®.

KONE employs close to 57,000 dedicated experts to serve you globally and locally.

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