KONE TRAVELMASTER™ 115

Environmental product declaration

KONE Environmental Product Declarations, or EPDs, provide independently verified information about the environmental performance of our products. EPDs are based on Life Cycle Assessment (LCA) data from studies carried out in conformance with the ISO 14040–44 standards.

This EPD lists all the components and environmental impacts of a representative sampling of our products throughout their life cycles, including energy and material consumption, waste generation, and emissions.

This EPD is a self-declaration developed in conformance with the ISO 14025 standard for Product Self-Declarations. The Life Cycle Assessment on which this EPD is based was jointly conducted by KONE and VTT Technical Research Centre of Finland.

The results of this Environmental Product Declaration are valid for the KONE TravelMaster 115, the reference inclined autowalk for the commercial segment.

Product reviewed in this document	
Autowalk type	KONE TravelMaster™ 115 inclined autowalk
Vertical rise	3.2 m
Inclination	11°
Pallet width	1000 mm
Speed	0.5 m/s
Gear	Worm gear
Running direction	50% upwards, 50% downwards
Operation	14 hours/day, 6 days/week, 52 weeks/year
Maximum capacity	6000 persons/hour (according to EN 115-1 for 0.5 m/s)
Weight of passenger	75 kg (average value)
Maximum pallet load	100 kg (related to maximum capacity)
Usage load profile	2.5 h–0%; 10 h–25%; 1 h–50%; 0.5 h–75%; 0 h–100%
Equivalent pallet load	24 kg
Manufacturer	KONE Corporation

Life Cycle Assessment

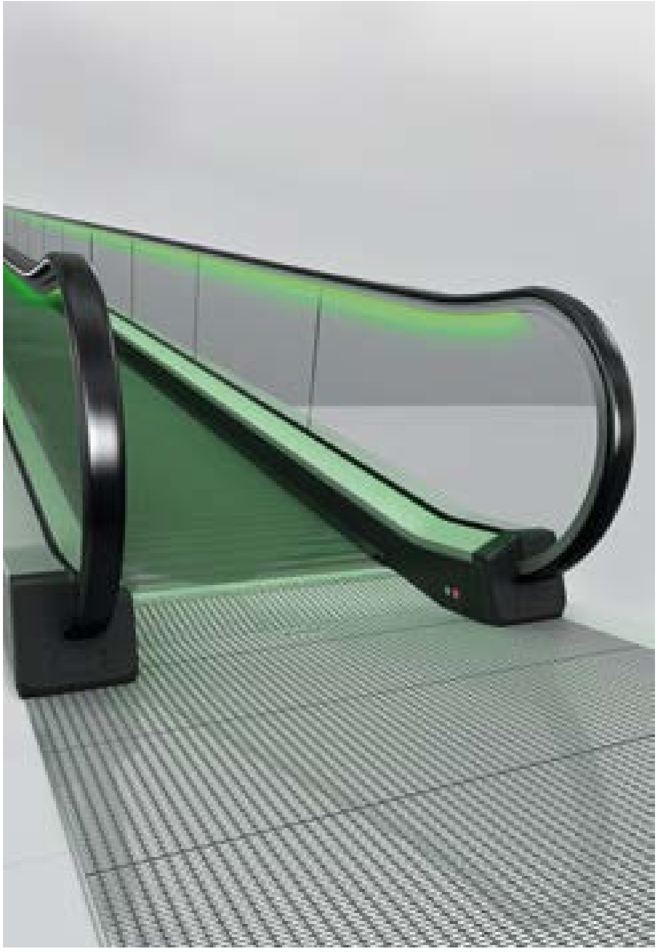
Life Cycle Assessment (LCA) is a methodology for assessing the environmental impacts associated with a product, process, or service throughout its life cycle. The LCA covers the most important environmental aspects related to raw material production, component manufacturing, transportation to usage place, installation, use, maintenance, and end-of-life treatment – i.e. full-chain assessment. Transportation is included in all stages of the life cycle. The LCA includes the consumption of raw materials and energy resources as well as emissions and waste generation.

The LCA results included in this EPD are shown both for the whole life cycle of the inclined autowalk and the functional unit (1 km of inclined autowalk pallet band travel). The LCA is based on an estimated lifetime of 15 years for the reference inclined autowalk, a KONE TravelMaster™ 115 operating 14 hours per day, 6 days per week, and 52 weeks per year.

Because the KONE TravelMaster 115 is primarily used in the Asian market, the Chinese mix of energy sources for electricity production has been used for calculating emissions during the product's life cycle.

The total global recycling rate for metals is assumed to be 95%. Metals are recovered as scrap from manufacturing processes and from end-of-life treatment.

The data used in the LCA is collected from the manufacturer and the suppliers as well as from LCA databases. If no suitable data was available, expert opinion or the best estimation was used.



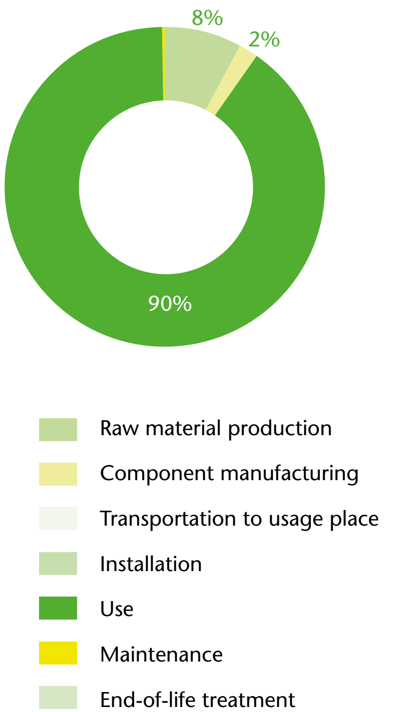
Total environmental impacts during the escalator's life cycle

The impact assessment part of the LCA evaluates the significance of potential environmental impacts throughout the life cycle of the product. The share of the total environmental impact of each life cycle stage has been calculated using the ReCiPe 1.07 impact assessment method.

The Life Cycle Assessment shows that the biggest environmental impact during the life cycle of the inclined autowalk is caused by the electricity required to operate it during the use stage. About 85% of the total primary energy is consumed during this stage. The most significant environmental impacts of the inclined autowalk result from the fossil fuels used to generate the electricity that powers the equipment, in particular hard coal and crude oil.

The most significant air emissions resulting from the use of these fossil fuels include nitrogen oxides, sulfur oxides, particulates, and carbon dioxide. The impact categories included are global warming potential, terrestrial acidification potential, fresh water eutrophication, marine water eutrophication, and photochemical ozone formation. About 89% of carbon dioxide (CO_2) emissions, 83% of nitrogen oxide (NO_X), and 94% of sulfur oxide (SO_X) emissions are generated during the use stage of the life cycle.

Carbon footprint (GWP) of KONE TravelMaster™ 115



Total primary energy and emissions to air		
	Values per inclined autowalk, with reference operation 1 km distance	Values per inclined autowalk for the whole life cycle
Total primary energy	19.11 MJ	2 254 059 MJ
Emissions to air		
CO_2	1.66 kg	196 247 kg
NO_X	6.65E-03 kg	784 kg
SO_X	0.01 kg	1 524 kg
Particulates	2.81E-03 kg	332 kg

Emissions expressed in terms of environmental impact categories*			
Category of impact	Equivalent unit	Values per inclined autowalk, with reference operation 1 km distance	Values per inclined autowalk for the whole life cycle
Global warming potential GWP	kg CO_2 eq.	1.95	229 762
Terrestrial acidification potential TAP	kg SO_2 eq.	0.02	1 967
Fresh water eutrophication potential FEP	kg P eq.	2.86E-04	33.7
Marine eutrophication potential MEP	kg N eq.	3.43E-04	40.4
Photochemical ozone formation potential POFP	kg NMVOC eq.	0.01	937

** Note that the impacts have different equivalent units. Values are calculated according to the factors of ReCiPe impact assessment method.*

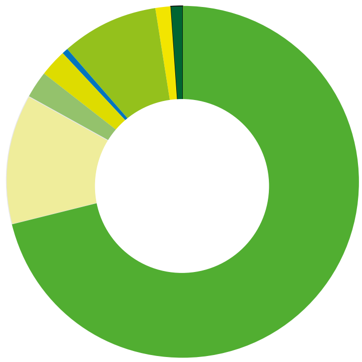
The energy consumption of the inclined autowalk is affected by the operating mode of the equipment and can be reduced when not in use (e.g. Stop & Go mode).

Operating mode*	Operational hours/year [h]*	Energy consumption/year [kWh]
Continuously running	4368	9200
Stop & Go	3588	8300

** Continuously running: 14 h/day operation, 6 days/week, 52 weeks/year*
Stop & Go: 11.5 h/day operation, 2.5 h/day no operation, 6 days/week, 52 weeks/year

Product material content

The KONE TravelMaster 115™ is mainly composed of steel and aluminum. The product does not contain asbestos, paints containing lead or cadmium pigments, capacitors containing PCBs or PCTs, ozone layer-depleting chemicals such as CFCs, or chlorinated solvents. Mercury is not used in applications other than lighting. Cadmium stabilizers are not used in plastics.



Material	Weight (%)
Steel	71.1
Aluminum	11.9
Cast iron	2.6
Stainless steel	2.5
Copper	0.5
Glass	8.9
Plastics	1.3
Others	1.1

Product recycling description

The end-of-life treatment of the escalator consists of multi-metal scrap recycling. The metals represent about 89% of the escalator material weight, and are recyclable. Recycling metals clearly reduces the environmental impacts, primarily because recycling lowers the demand for primary metals as raw materials.

Packaging includes wood (13%), plywood (58%), and plastics and other materials (11%). Wood and plywood can be recycled or used for energy recovery. Plastics can also be used for energy recovery, or disposed of in landfills.

Glossary

Fresh water eutrophication potential (FEP) expressed in kg phosphorus (P) eq.
Aquatic eutrophication 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. Fresh waters are typically limited by phosphorus (P). The ReCiPe 1.07 impact assessment method takes into account phosphorus and phosphate (PO_4) emissions to water.

Exponential notation (E)
A way of writing numbers that accommodates values too large or too small to be conveniently written in standard decimal notation – e.g. 7.21E-04 kg is equal to 0.000721 kg.

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

Global warming potential (GWP) expressed in kg carbon dioxide (CO_2) eq.
The index used to translate the level of emissions of various gases into a common measurement to compare their contributions to the absorption by the atmosphere of infrared radiation. Greenhouse gases are converted to CO_2 equivalents with GWP factors, using factors for a 100-year interval (GWP100).

Marine eutrophication potential (MEP) expressed in kg nitrogen (N) eq.
Marine waters are usually limited by nitrogen. The ReCiPe 1.07 impact assessment method takes into account ammonia (NH_3), nitrate (NO_3), and nitrogen oxide (NO_X) emissions to air and N, ammonium (NH_4), and CN emissions to water.

Photochemical ozone formation potential (POFP) expressed in kg NMVOC (non-methane volatile organic carbons) eq.
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 ReCiPe 1.07 impact assessment method takes into account certain emissions to air – for example, carbon monoxide (CO), ethyne (C_2H_2), and formaldehyde (CH_2O).

Recycling rate
Metals recovered as scrap from manufacturing processes and scrap from end-of-life treatment.

Terrestrial acidification potential (TAP) expressed in kg sulfur dioxide (SO_2) eq.
Expresses ground-based acidification potential that originates from emissions of sulfur dioxide and oxides of nitrogen. In the atmosphere these oxides react and form acids, which subsequently fall to earth as rain or snow, or as dry depositions. Inorganic substances such as sulfates, nitrates, and phosphates change soil acidity. The primary acidifying substances are nitrogen oxides (NO_x), ammonia (NH_3), and sulfate (SO_4).