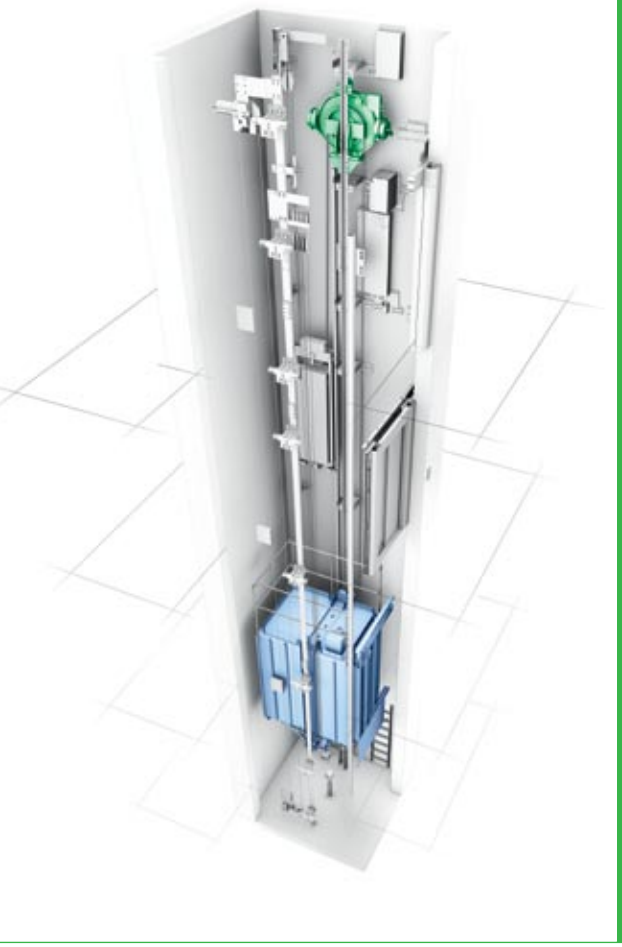
Dedicated to People Flow™



Environmental Product Declaration

KONE EcoSpace™

Environmental Product Declaration

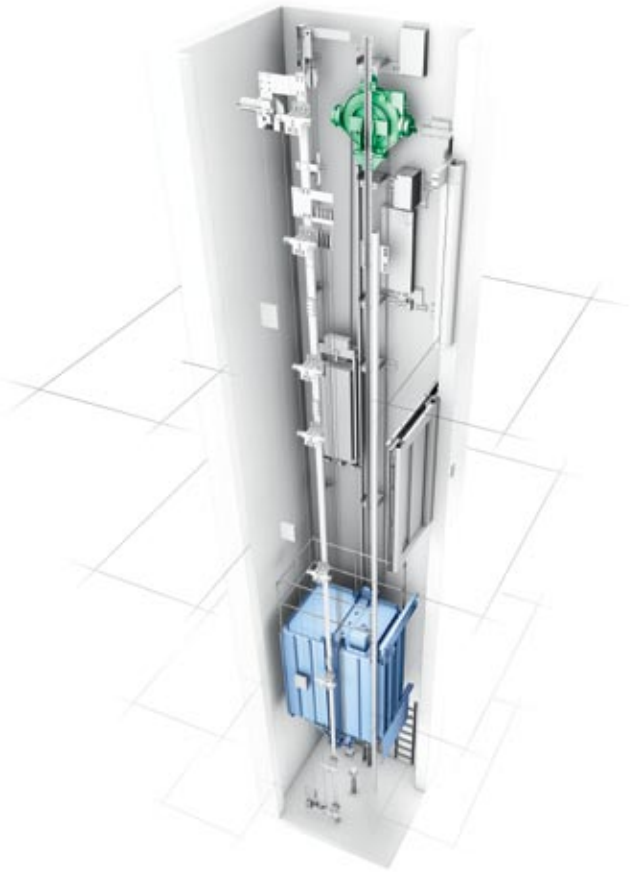
General information

The Environmental Product Declaration provides you, as a KONE customer, information on environmental performance of KONE products and services. The Environmental Product Declaration is carried out according to the ISO 14025 standard. In addition, the ISO 14001 Environmental Management System is implemented in several KONE units. For the latest, updated information on KONE Elevators & Escalators responsibility including Environmental Management, see www.kone.us.

Product description – KONE EcoSpace

- Elevator solution
- Load range: 2000 lb (907 kg) – 5000 lb (2268 kg)
- Rated Speed: 150 fpm (0.75 m/s)
- Travel range: up to 83'-0" ft (25 m)

The results of the Environmental Product Declaration are valid for typical low-rise (2-10 landing) elevators based on KONE EcoSpace platform.



Environmental performance

The Life Cycle Assessment (LCA) is a tool for assessing the environmental impacts associated with a product, process or service throughout its life cycle. The LCA of a KONE EcoSpace elevator was applied in compliance with the requirements of the ISO 14040 and ISO 14044 standards.

Functional Unit

The function of an elevator is to give people access to multi-story buildings. The functional unit is 0.6 mi (1 km) distance traveled by the elevator. The LCA results for the whole life cycle are also represented in this Environmental Product Declaration.

System Boundaries

The Life Cycle Assessment covers the important environmental aspects for raw material production, component manufacturing, installation, use, maintenance and end-of-life treatment i.e. full-chain assessment. Transportation is included to the stages of the life cycle. The Life Cycle Assessment includes consumption of raw materials and energy resources as well as emissions and waste generation.

The Life Cycle Assessment is based on an estimated lifetime of 25 years with a frequency of starts at 100,000 per year and average traveling height 18 ft (5.5 m) in Dallas. One typical EcoSpace elevator case was calculated: 5 floors, 8 persons 1,389 lb (630 kg), 197 fpm (1.0 m/s). National mix of energy has been used for calculating emissions during component manufacturing and USA mix of energy has been used for calculating emissions caused by energy consumption during the use stage.

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

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

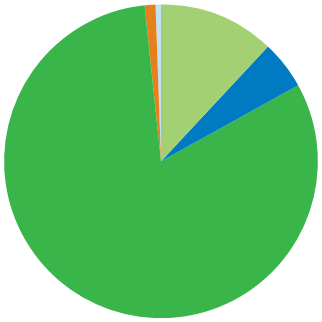
Most significant environmental impacts

About 87% of carbon dioxide (CO_2) emissions, 69% of nitrogen oxide (NO_x) emissions and 88% of sulphur oxide (SO_x) emissions are generated during the use stage. By comparison, during material production, carbon dioxide emissions are 9%, and during component manufacturing 3% of the total carbon dioxide emissions. About 90% of the total primary energy is consumed during the use stage.

Total primary energy and emissions to air		
	Values are calculated per escalator, with reference operation 0.6 mile (1 km)	Values are calculated per escalator for the whole life cycle
Total primary energy	83.4 MJ	1,147,150 MJ
Emissions to air		
CO_2	8.93 lbs. (4.50 kg)	112,858.6 lbs. (55,727.7 kg)
NO_x	0.020 lbs. (0.009 kg)	280.9 lbs. (127.4 kg)
SO_x	0.049 lbs. (0.022 kg)	675.1 lbs. (306.2 kg)
Particulates	0.002 lbs. (0.0009 kg)	27.3 lbs. (12.4 kg)

The Impact Assessment phase of LCA evaluates the significance of potential environmental impacts throughout the product life cycle. The shares of the total environmental impacts of the life cycle stages have been calculated using Eco-Indicator 99 (H,A) method and the factors of CML-Impact Assessment method. The absolute values of the eco-indicators are not highly relevant because the main purpose is to compare relative differences between products or processes.

The shares of the total environmental impacts of the life-cycle stages using Eco-Indicator 99 method



The stage of the life cycle	EI99 value-%
Raw material production	12.2
Component manufacturing	4.9
Use	81.4
Maintenance	1.2
End-of-life treatment	0.3

The most significant environmental aspects of the elevator are fossil fuels particularly natural gas, hard coal and crude oil; and air emissions particularly carbon dioxide, nitrogen oxides, sulphur oxides and particulates according to CML-Impact Assessment (impact categories included are global warming, eutrophication, photochemical oxidants and acidification) and Eco-Indicator 99 methods.

Emissions expressed in terms of environmental impact categories			
Category of impact	Equivalent unit	Values are calculated per functional unit, 0.6 mi (1 km) distance travelled by the elevator	Values are calculated per the whole lifetime of the elevator
Global warming (GWP100)	kg CO_2 eq.	4.3	58896
Ozone layer depletion (ODP)	kg CFC-11 eq.	6.8E-08	9.3E-04
Eutrophication	kg PO4 – eq.	1.3E-03	18.5
Photochemical oxidants	kg ethylene	1.2E-03	16.6
Acidification	kg SO2 eq.	3.0E-02	408

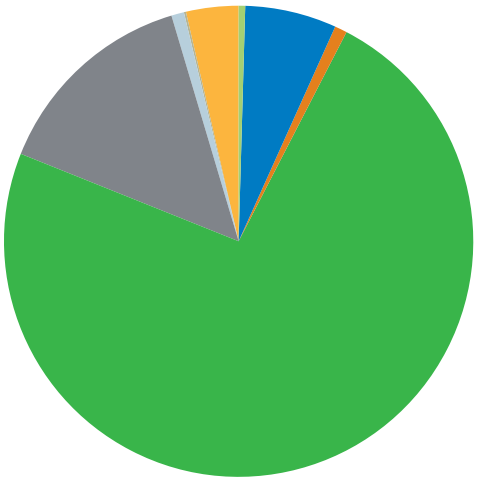
* Values are calculated according to the factors of CML-Impact Assessment method.

The Life Cycle Assessment shows that most of the environmental impacts of an elevator life cycle are due to the electricity used for operating the elevator during the use stage. Electricity is consumed in moving passengers and goods, illumination and control of the equipment.

Elevator electricity consumption during the use stage	
The frequency of starts/year	The energy consumption/year [kWh]
100,000	2455

Additional environmental information

Product material content
KONE EcoSpace is mainly composed of steel and cast iron.



Material	Weight (%)
Aluminum	0.5
Cast iron	6.3
Copper	0.9
Stainless Steel	0.0
Steel	73.4
Steel (zinc coated)	14.2
Plastics	0.9
Other	0.1
Electronics and electromechnical components	3.6

The product does not contain asbestos, paints containing lead or cadmium pigments, condensators containing PCBs or PCTs, ozone layer depleting chemicals such as CFCs, or chlorinated solvents.

Mercury is not used in applications other than lighting and batteries. Cadmium stabilizers are not used in plastics.

Recycling description

End-of-life treatment of the elevator is multi-metal scrap recycling. The metals, that are about 95% of the elevator material weight, are recyclable. When metals are recycled there is a clear reduction in environmental impacts, primarily because recycling of metals lowers the demand for primary metals as raw materials. Plastics can be used for energy recovery or landfilled.

An elevator includes a lead battery and, depending on selection of lighting, may include standard fluorescent lamps that contain mercury. Both require dismantling and hazardous waste management procedure to be followed when disposed. The KONE EcoDisc® elevator hoisting machine contains no oil. Electronics and electromechanical components waste is collected and treated separately.

Packaging includes wood (69%), cardboard and paper (18%), plywood (12%) and plastics (1%). Wood, cardboard, paper and plywood can be recycled or used for energy recovery. Plastics can be used for energy recovery or landfilled.

Glossary

Acidification potential
Chemical alteration of the environment, resulting in hydrogen ions being produced more rapidly than they are dispersed or neutralized. Occurs mainly through fallout of sulfur and nitrogen compounds from combustion processes. Acidification can be harmful to terrestrial and aquatic life.

CML-impact assessment method
CML methodology is based on midpoint modelling (problem oriented method). Pollutants are allocated to impact categories.

Eco-Indicator 99 (H,A) (EI99)
Damage factors in the hierarchism perspective. Pollutants are allocated to impact categories and are normalized by dividing the national total impact potentials. The environmental effects are then assigned to 'damage categories' which include the effects on human health, the quality of an ecosystem, and the fossil and mineral resources.

Eutrophication potential
Enrichment of bodies of water by nitrates and phosphates from organic material or the surface runoff. This increases the growth of aquatic plants and can produce algal blooms that deoxygenate water and smother other aquatic life.

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

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

Global warming potential (GWP100)
The index used to translate the level of emissions of various gases into a common measure 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 100 years' time interval (GWP100).

Ozone depletion potential (ODP)
The index used to translate the level of emissions of various substances into a common measure to compare their contribution to the breakdown of the ozone layer. ODPs are calculated as the change that would result from the emission of 2.2 lbs (1 kg) of a substance to that from emission of 2.2 lbs (1 kg) of CFC-11 (a freon).

Photochemical oxidants (POCP)
The index used to translate the level of emissions of various gases into a common measure to compare their contributions to the change of ground-level ozone concentration. POCPs are calculated as the change that would result from the emission of 2.2 lbs (1 kg) of a gas to that from emission of 2.2 lbs (1 kg) of ethylene.

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

This document has been developed in collaboration with VTT, Technical Research Centre of Finland. VTT is a contract research organization involved in many international assignments. With its more than 2,700 employees, VTT provides a wide range of technology and applied research services for its clients, private companies, institutions and the public sector. VTT is striving to improve the well-being of society and to enhance the technical and economic performance of its clients.

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ISO 14040. Environmental management. Life-cycle assessment. Principles and framework. 2006-12-18.

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Tonteri, Hannele, Anttila, Anna & Kujanpää Marjukka. The Life Cycle Assessment of KONE EcoSpace Elevator. Research report No VTT-R-06118-09. VTT. Espoo, Finland 2009.

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