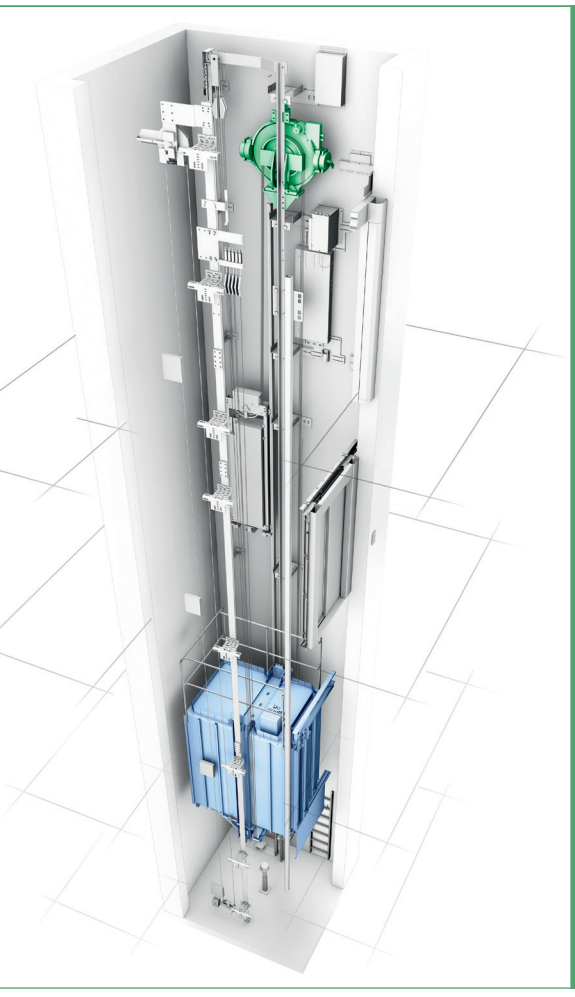
Dedicated to People Flow™

KONE



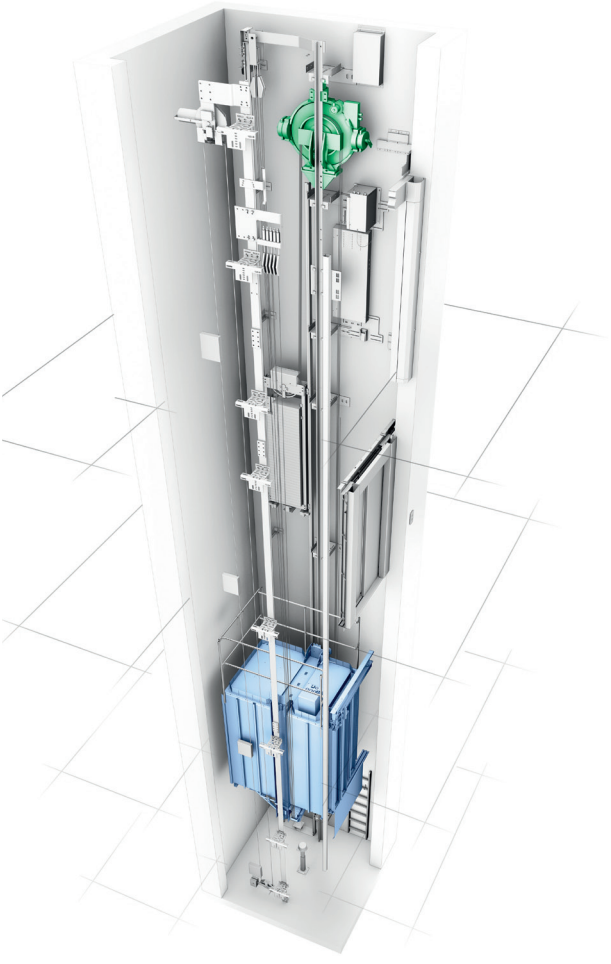
Environmental product declaration

KONE MonoSpace®

Environmental product declaration

General information

The Environmental Product Declaration (EPD) 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.com**.



Product description

- **Elevator solution for Residential Buildings**
- **KONE MonoSpace®**
- **Load range: 320 kg – 1000 kg**
- **Speed range: 0.63 m/s – 1 m/s – 1.6 m/s**
- **Travel range: up to 55 m**
- **Number of floors: up to 16**

The results of the Environmental Product Declaration are valid for typical elevator for a residential building based on KONE MonoSpace®.

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 KONE MonoSpace® 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-storey buildings. The functional unit is 1km distance travelled by the elevator. The LCA results for the whole life cycle are also represented in this EPD.

System Boundaries
TThe Life Cycle Assessment covers the important environmental aspects for raw material production, component manufacturing, transportation, installation, use, maintenance and end of life treatment i.e full chain assessment. 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 estimated lifetime of 25 years with frequency of starts 150 000 per year, installed in Brussels and with these elevator characteristics: Load: 630 kg Speed: 1 m/s Floors: 5. National mix of energy has been used for calculating emissions during component manufacturing and Belgium mix of energy has been used for calculating emissions caused by energy consumption during the use stage.

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

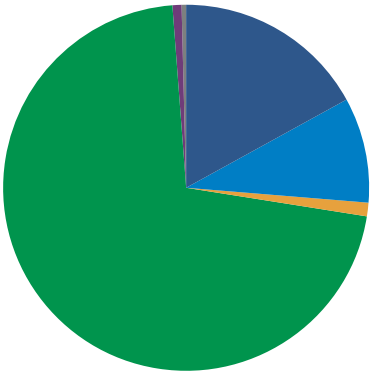
The most significant environmental impacts

About 75% of carbon dioxide (CO2) emissions, 51% of nitrogen oxide (NOX) emissions and 57% of sulphur oxide (SOX) emissions are generated during the use stage. By comparison, during material production carbon dioxide emissions are 14%, and during component manufacturing 6% 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 functional unit	Values are calculated per the whole life time of the elevator
Total primary energy	19,5 MJ	657 790 MJ
Emissions to air		
CO_2	0,61 kg	20 506,2 kg
NO_x	1, 65E-03 kg	55,7 kg
SOX	1,91E-03 kg	64,4 kg
Particulates	1,49E-04 kg	5,0 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 Swedish system for environmental product declarations. 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	17.0
Component manufacturing	9.3
Transportation to usage place	1.2
Use	71.3
Maintenance	0.8
End of life treatment	0.4

The most significant environmental aspects of the elevator are fossil fuels particularly natural gas and crude oil, and air emissions particularly carbon dioxide, nitrogen oxides, sulphur oxides and particulates according to Eco-Indicator 99 method. Eco-Indicator 99 method is one commonly used application for the environmental impact assessment.

Emissions expressed in terms of environmental impact			
Category of impact	Equivalent unit	Values are calculated per functional unit	Values are calculated per the whole life time of the elevator
Global warming (GWP)	kg CO2	0,63	21 380
Ozone depletion (ODP)	kg CFC-11	1,04E-08	3,51E-04
Eutrophication	kg O2	0,011	377,8
Photochemical oxidants (POCP)	kg ethylene	6,54E-05	2,2
Acidification (AP)	kmol H+	9,79E-05	3,3

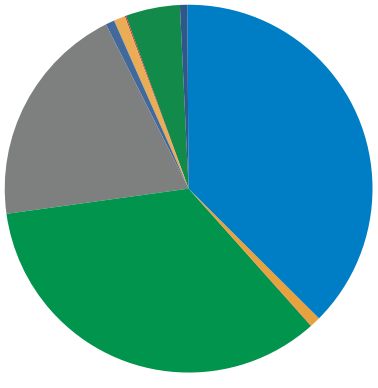
* Values are calculated according to the factors of Swedish system for environmental product declarations.

The Life Cycle Assessment shows that the 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)
150 000	1 680

Additional environmental information

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



Material weight %

Aluminum	0.6
Cast iron	37.6
Copper	0.9
Stainless steel	0.0
Steel	34.4
Steel (zinc coated)	19.8
Plastics	0.8
Rubber	0.0
Glass	1.0
Others	0.1
Electronics and electromechanical components	4.8

The product does not contain asbestos, lead and cadmium pigments in paints, condensators containing PCB´s or PCT´s, ozone layer depleting chemicals such as CFC´s and chlorinated solvents, mercury in other applications than lightning and batteries, and cadmium stabilizers in plastics.

Recycling description

At the end of life the elevator is dismantled and about 55% of the material weight (some steel and cast iron components) can be sorted and reused without pre-processing. The additional end of life treatment of the elevator is multimetal scrap recycling. The metals, that are about 93% 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 are 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 (77%), cardboard and paper (11%), plywood (9%) and plastics (3%). Wood, cardboard, paper and plywood can be recycled or used for energy recovery. Plastics are used for energy recovery or landfilled.

Glossary

Acidification potential (AP)
Chemical alternation 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.

Eco-Indicator 99 (EI99)
Pollutants are allocated to impact categories and are normalized by means of division through 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 (EP)
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.

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

Global warming potential (GWP)
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. GWPs are calculated as the absorption that would result from the emission of 1 kg of a gas to that from emission of 1 kg of carbon dioxide over 100 years.

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

Photochemical ozone creation potential (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 1 kg of a gas to that from emission of 1 kg of ethene.

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 2700 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.

References

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

ISO 14044. Environmental management. Life cycle assessment. Requirements and guidelines. 2006-12-18.

Vatanen, Saija and Tonteri, Hannele. The Life Cycle Assessment of KONE MonoSpace® Elevator. Research report No VTT-R-11221-07. VTT. Espoo, Finland 2008.

KONE provides innovative and eco-efficient solutions for elevators, escalators and automatic building doors. 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®, KONE MaxiSpace™, and KONE InnoTrack™. You can experience these innovations in architectural landmarks such as the Trump Tower in Chicago, the 30 St Mary Axe building in London, the Schiphol Airport in Amsterdam and the Beijing National Grand Theatre in China.

KONE employs over 32,000 dedicated experts to serve you globally and locally in over 50 countries.

KONE Corporation
www.kone.com