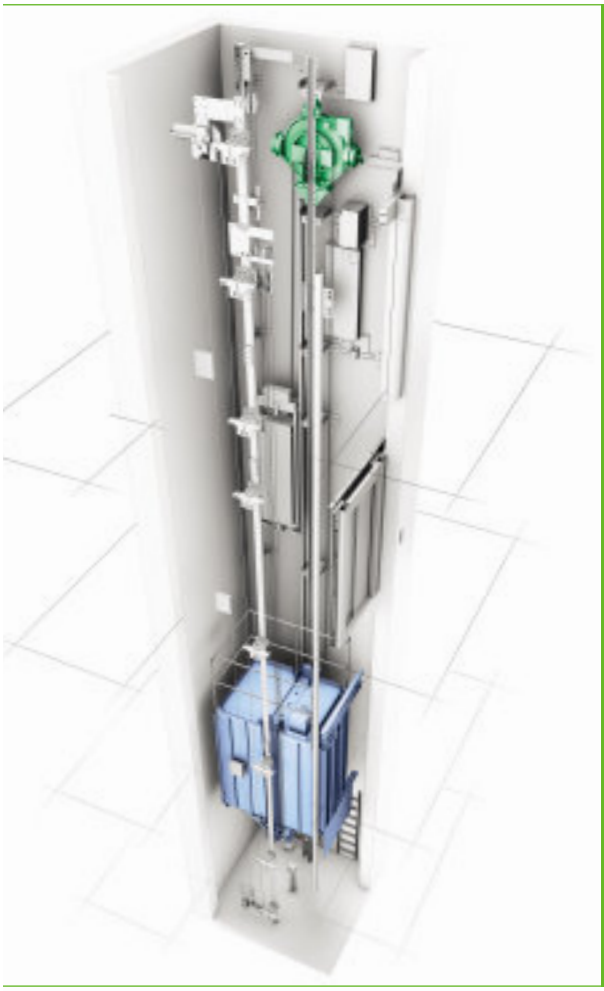
Dedicated to People Flow™



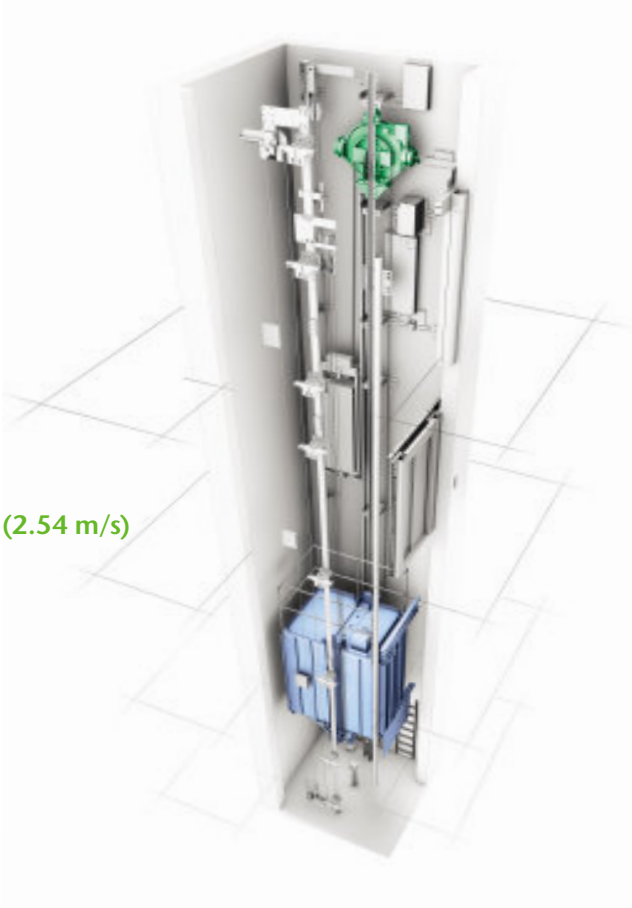
Environmental Product Declaration

KONE MonoSpace®

Environmental Product Declaration

General information

The Environmental Product Declaration provides you with information on the environmental performance of KONE products and services. The Environmental Product Declaration is made according to the ISO 14025 standard. In addition, the ISO 14001 Environmental Management System is implemented in several KONE units. For the latest information on KONE corporate responsibility, including Environmental Management, see **www.us.kone.com.**



Product description

- **Mid-rise elevator solution**
- **KONE MonoSpace**
- **Load range: 2000 lb (907 kg) – 5000 lb (2268 kg)**
- **Rated speed range: 200 fpm (1.00 m/s) – 500 fpm (2.54 m/s)**
- **Travel range: up to 230 ft (70.1 m)**

The results of the Environmental Product Declaration are valid for typical mid-rise elevator solutions based on the KONE MonoSpace platform.

Environmental performance

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 the 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-story buildings. The functional unit is a 0.62 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, in other words full-chain assessment. Transportation is also included in 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 200,000 starts per year and an average traveling height of 23 ft (7 m) in McKinney (Dallas). One typical MonoSpace elevator case was calculated as: 8 floors, 3500 lb (1588 kg), and 400 fpm (2 m/s). The US energy mix has been used as a basis for calculating the emissions caused by component manufacturing as well as by energy consumption during the usage of the elevator.

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.

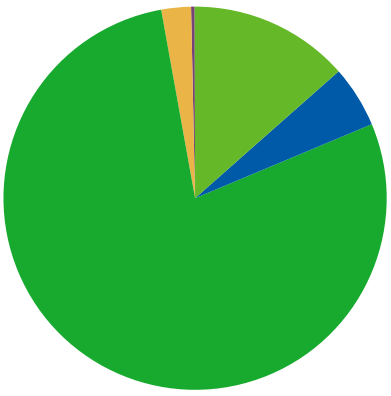
The data used in the Life Cycle Assessment is collected from the manufacturer and the suppliers as well as LCA databases. If no suitable data was available, an expert opinion or the best estimation was used.

The most significant environmental impacts

About 85% of carbon dioxide (CO_2) emissions, 72% of nitrogen oxide (NO_x) emissions and 89% of sulfur oxide (SO_x) emissions are generated during the use stage. By comparison, during material production carbon dioxide emissions are 10%, and during component manufacturing 2% of the total carbon dioxide emissions. About 86% of the total primary energy is consumed during the use stage.

Total primary energy and emissions to air		
	Values are calculated per functional unit, 0.62 mi (1 km) distance traveled by the elevator	Values are calculated per the whole lifetime of the elevator
Total primary energy	70.4 MJ	2 464 930 MJ
Emissions to air		
CO_2	7.42 lb (3.37 kg)	259,307.52 lb (117,760 kg)
NO_x	17.50E-03 lb (7.94E-03 kg)	612.15 lb (278 kg)
SO_x	3.92E-02 lb (1.78E-02 kg)	1,369.64 lb (622 kg)
Particulates	15.88 E-04 lb (7.21E-04 kg)	55.49 lb (25.2 kg)

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



The stage of the life cycle	EI99 value-%
Raw material production	13.5
Component manufacturing	5.2
Use	78.4
Maintenance	2.5
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, sulfur oxides and particulates) according to the CML-Impact Assessment and Eco-Indicator 99 methods. Impact categories included are global warming, ozone layer depletion, eutrophication, photochemical oxidation and acidification.

Emissions expressed in terms of environmental impact categories			
Category of impact	Equivalent unit	Values are calculated per functional unit, 0.62 mi (1 km) distance traveled by the elevator	Values are calculated per the whole lifetime of the elevator
Global warming (GWP100)	lb (kg) CO_2 eq.	7.61 lb (3.46 kg)	266,759 (121,144)
Ozone layer depletion (ODP)	lb (kg) CFC-11 eq.	12E-08 (5.45E-08)	4.2E-03 (1.91E-03)
Eutrophication	lb (kg) PO4 eq.	2.53E-03 (1.15E-03)	88.96 (40.4)
Photochemical oxidants	lb (kg) ethylene	20.3E-04 (9.22E-04)	71.12 (32.3)
Acidification	lb (kg) SO_2 eq.	5.22E-02 (2.37E-02)	17,241.66 (830)

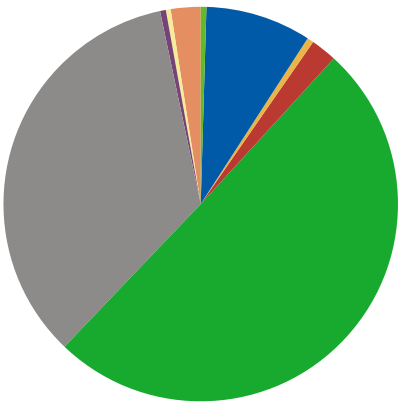
* Values are calculated according to the factors of CML-Impact Assessment method.

The Life Cycle Assessment shows that most of the environmental impacts of an elevator's 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]
200,000	5050

Additional environmental information

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



Material weight %	
Aluminum	0.5
Cast iron	8.7
Copper	0.5
Stainless steel	2.1
Steel	50.3
Steel (zinc coated)	34.6
Plastics	0.5
Others	0.4
Electronics and electromechanical components	2.4

The product does not contain asbestos, paints containing lead or cadmium pigments, condensers 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.

Recycling description

The end-of-life treatment of the elevator is multi-metal scrap recycling. The metals, which are about 97% 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 disposed of in landfills.

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

Packaging includes wood (84%), cardboard and paper (13%), plywood (2%) and plastics and others (1%). Wood, cardboard, paper and plywood can be recycled or used for energy recovery. Plastics can be used for energy recovery or disposed of in landfills.

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)
Damage factors in the hierarchic perspective. 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
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
A way of writing numbers that accommodates values too large or small to be conveniently written in standard decimal notation, for example 7.21E-04 kg equals 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 atmosphere's absorption of infrared radiation. Greenhouse gases are converted to CO_2 equivalents with GWP factors, using factors for a 100-year 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 the emission of 2.2 lbs (1 kg) of CFC-11 (a freon).

Photochemical oxidation
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 the emission of 2.2 lbs (1 kg) of ethylene.

Recycling rate
The percentage of metals recovered as scrap from manufacturing processes and 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 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.

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