

# Eco-efficient Building Transportation & Use of Life Cycle Assessments

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# Eco-efficient Building Transportation & Life Cycle Assessments



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Background on Eco-efficient Solutions

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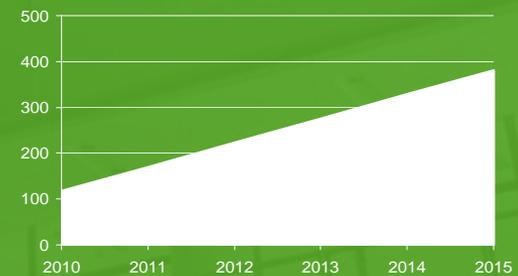
How KONE customers and other stakeholders use information

## Green building on the rise

- Buildings account for 40% of the world's energy consumption and elevators account for 2-10% of a building's energy consumption.
- Green building certifications like LEED and BREEAM are increasing the demand for eco-efficient elevators and escalators.

### Green construction market size

Billion €



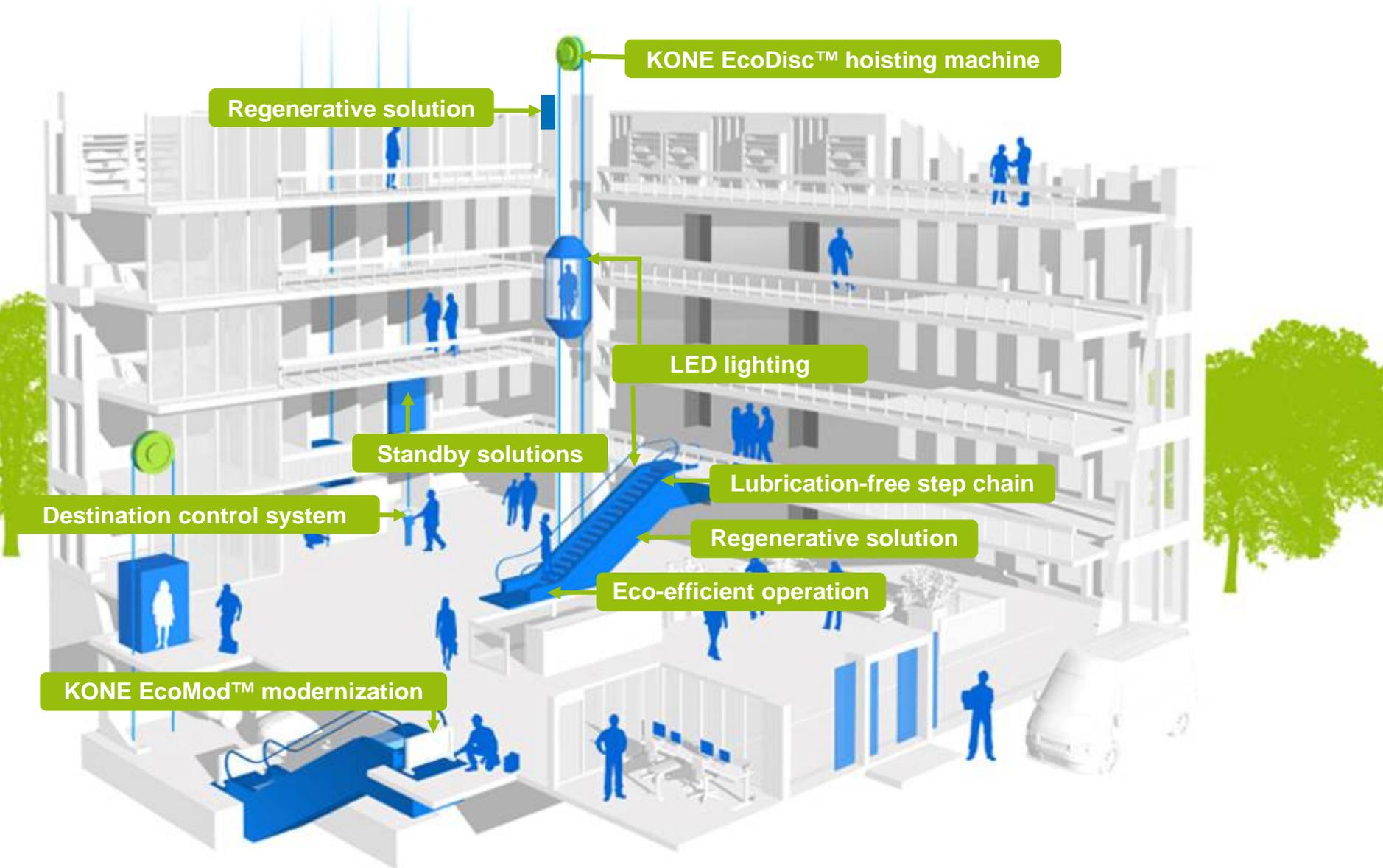
Source: U.S. Dept. of Commerce, U.S. Dept of Energy, various other sources. Calculated and estimated by SBI energy

A young boy with dark hair and a wide smile is looking towards the camera. He is wearing a light-colored, vertically striped button-down shirt. His right hand is raised, with his index finger pressing one of the circular buttons on an elevator control panel. The panel is dark and has several buttons, some with numbers (1, 2, 3) and some with symbols. The background is slightly blurred, showing what appears to be the interior of an elevator or a similar public space.

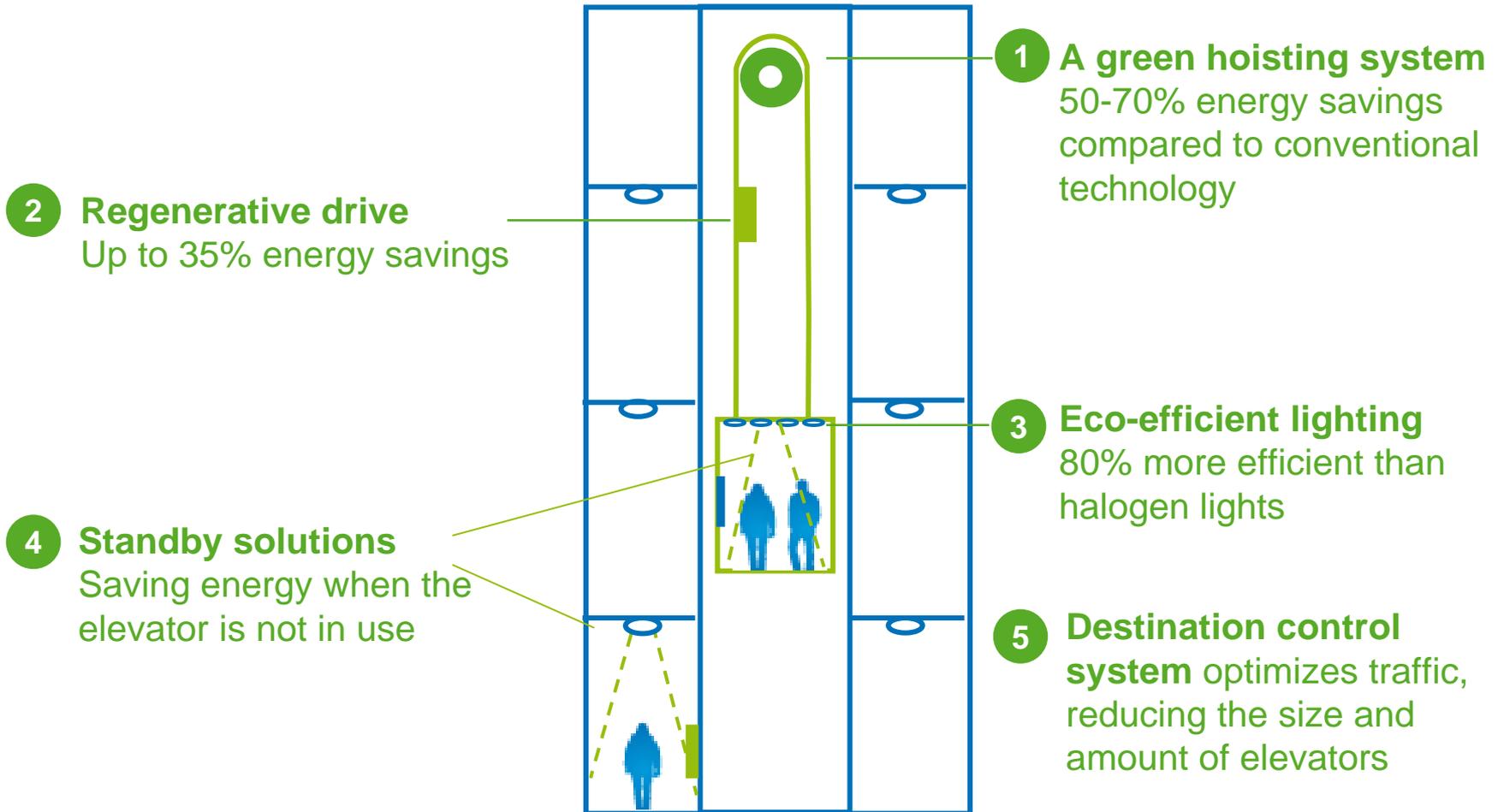
## Selecting an energy efficient elevator and escalator makes a difference

- Life cycle analysis show that the largest part of an elevator's or escalator's carbon footprint is created when it is in use.
- KONE has reduced the energy consumption of its volume elevators over 70% from 2008 to 2012.
- The target is achieved through innovative eco-efficient solutions like efficient machinery, energy regeneration, lighting, and standby solutions.

# Eco-efficient solutions for elevators and escalators



# Five ways to make an elevator eco-efficient



# Four ways to make an escalator eco-efficient



- 1 The lubrication-free step chain** saves oil, reduces chain wear, and decreases fire risk
- 2 Regenerative solutions** recover energy created when the escalator is used saving up to 60% energy.
- 3 Eco-efficient operation** can save up to 50% energy by slowing down the escalator when it is not in use or increasing the efficiency of the motor when traffic is low.
- 4 LED lights** save 80% energy compared to conventional lighting technologies.



# Eco-efficient modernization solutions



- KONE's modernization solutions range from small upgrades to the full replacement of elevators and escalators
- KONE's modernization solutions improve the equipment's safety, accessibility, performance, aesthetic appeal and eco-efficiency
- KONE's elevator modernization can increase the eco-efficiency of an elevator by 70%

# Eco-efficiency in KONE maintenance



- **Regular professional maintenance** of elevators, escalators, and building doors prevents breakdowns and increases the lifetime of the equipment.
- **Route planning technology** used to optimize driving routes for our technicians in the field.
- **Wireless solutions** enables information to be sent between a KONE Customer Care Center™ and KONE technicians, ensuring that they have accurate information and the right tools for the job and allowing them to fix the problem in a single service visit.
- **Eco-safe driving principles** communicated to service technicians to promote environmentally efficient and safe driving habits.
- **Eco-efficient car fleet** - environmentally sustainable, safe, and cost effective.
- **Remote monitoring capabilities** enabling a faster response and accurate identification of faults, resulting in fewer call-outs and better-planned maintenance visits.
- **Spare parts stock in cars** reducing warehouse visits, decreasing gas consumption and emissions.



# Life Cycle Assessments and Environmental Product Declarations

# Why Environmental Product Declaration (EPD) and Life Cycle Assessment (LCA)?



## GOALS FOR DEVELOPING LCA AND EPD

- Meet KONE customer concerns / questions on environmental impacts of KONE products
- Provide basis for KONE environmental communication concerning ecological and carbon footprint of existing products
- Provide data on environmental impacts of existing products for R&D of new products through Life Cycle Assessment



# Contents in KONE EPDs



- EPD is a summary of energy and environmental performances of a product during its whole life cycle
  - Material usage
  - Energy consumption
  - Ecological footprint, including carbon footprint
  - Recycling description
  - Other environmental data and information.

Functional unit is the quantified performance of a product system for use as a reference unit: 1 km distance travelled by the elevator

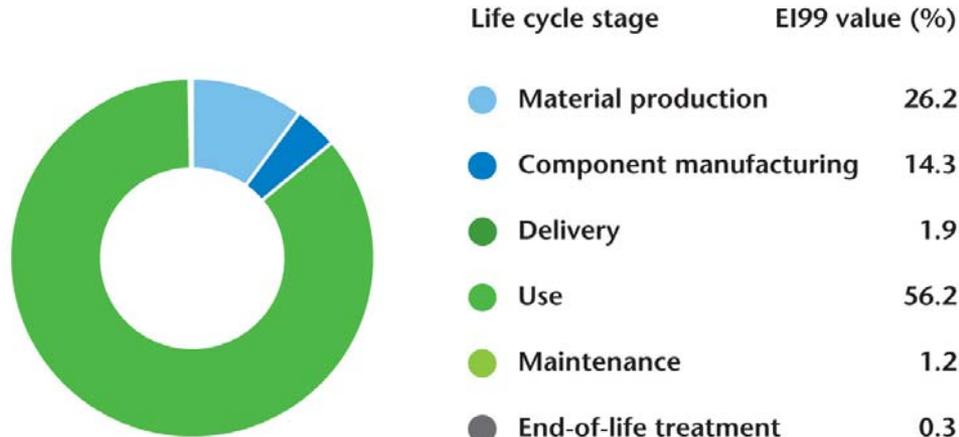
## Emissions expressed in terms of environmental impact – KONE MonoSpace

Category of impact	Equivalent Unit	Per functional unit	Per the whole lifetime
Global warming	kg CO2	0.38	12 936
Eutrophication	kg PO4 eq.	1.75E-04	5.9
Photochemical oxidants	kg ethylene eq.	7.70E-05	2.6
Acidification	kg SO2	1.61E-03	54.5

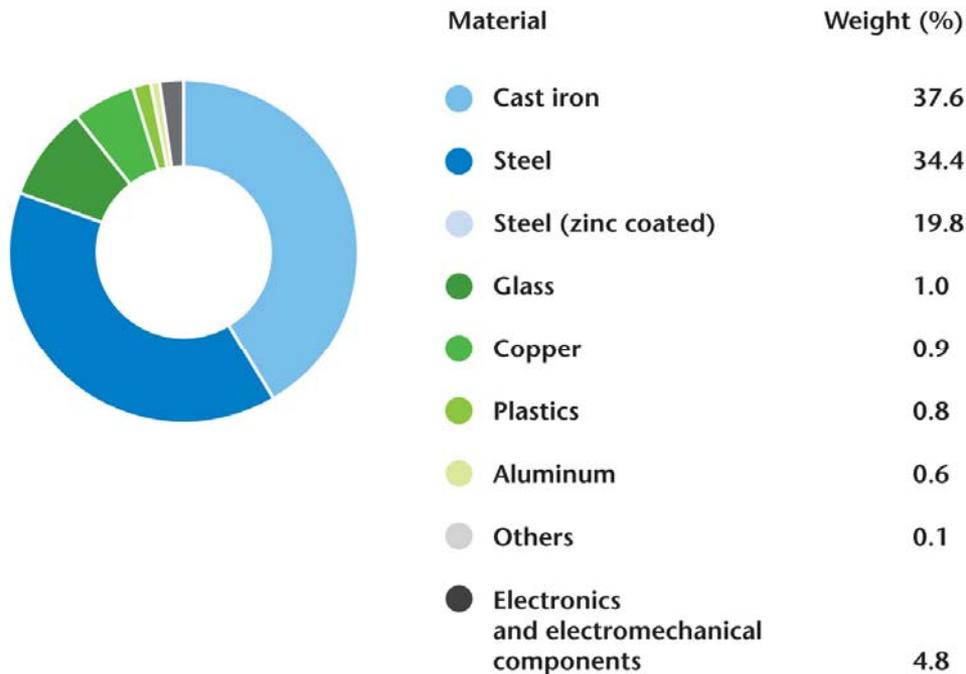
# Life Cycle Assessments of KONE Elevators



## Elevator life cycle analysis (% of CO2 emissions)\*



## Elevator material (% of weight)\*

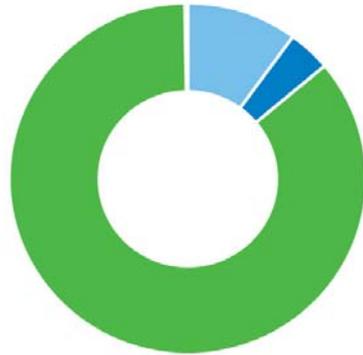


*\*The analysis is based on a KONE MonoSpace elevator with a load of 630 kg, 150,000 starts per year, a travel height of 5 floors, and an estimated lifetime of 25 years.*

# Life Cycle Assessments of KONE Escalators



## Escalator life cycle analysis (% of CO2 emissions)\*



Life cycle stage	EI99 value (%)
Material production	10.0
Component manufacturing	3.9
Delivery	0.005
Installation	0.02
Use	85.8
Maintenance	0.09
End-of-life treatment	0.2

## Escalator material (% of weight)\*

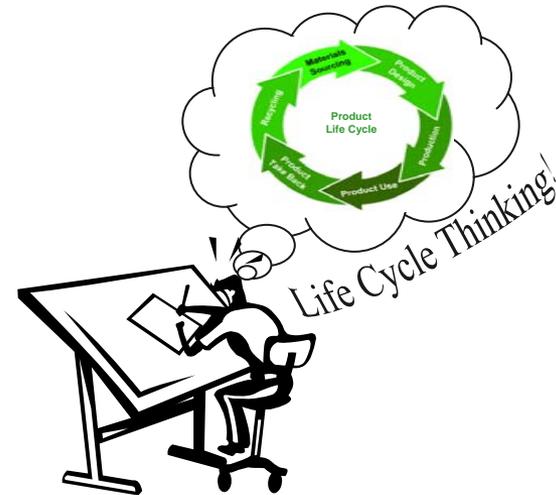


Material	Weight (%)
Steel	41.5
Steel (zinc coated)	39.2
Aluminum	8.8
Raw glass	5.7
Other metals	1.7
Plastics	1.0
Others	2.0

\*The analysis is based on an estimated lifetime of 15 years for a KONE TravelMaster™ 110 escalator operating 14 hours per day, 6 days per week, and 52 weeks per year with an equivalent step load of 25 kg.

# How LCA information is used internally

- Design for environment
- Plan next generation products together with design team
- Used for innovation purposes
- Ensure that we meet customer requirements and regulatory requirements



# Design for Environment in KONE's solution creation process



- Eco-efficiency is one of the key drivers of our solution creation process and is at the heart of the entire KONE offering.
- When developing new solutions, the focus is on minimizing the environmental impact throughout the lifespan of the equipment.

We aim to:

- reduce energy consumption
- reduce material use  
(including packaging and waste)
- avoid the use of hazardous substances
- optimize material durability and recycled content
- maximize recyclability
- ensure that our products meet voluntary green building certification requirements
- minimize water consumption



# How LCA Information is used externally



- As a tool with our suppliers
- In different customer tenders
- During conferences at a general level
- Used in corporate responsibility reports



# Supporting green building design



- **Environmental product declarations** providing information about e.g. the CO2 emissions of and materials used in KONE elevators and escalators
- **Energy calculation tools** to estimate the energy consumption of customer specific solutions
- **An expert team** performing regular measurements of KONE equipment energy consumption
- **Participation in the development of energy measurement standards** such as ISO/DIS 25745, Energy Performance of Lifts and Escalators, defining globally agreed criteria for measurement and comparison between different technologies and products.
- **Cooperation with green building associations** in different locations around the world.

# Supporting Green Marketing Claims



Dedicated to People Flow™ **KONE**

## KONE Eco-efficient™ solutions

KONE MonoSpace® Elevators

KONE is the pioneer of eco-efficiency in the elevator industry. For several decades, KONE has led the way in creating innovative solutions that help to significantly cut the energy consumption of buildings.

Lifecycle assessments of KONE elevators show that the greatest environmental impact of an elevator stems from the electricity used in the operation of the equipment. Therefore, the key focus area for KONE is to systematically reduce the energy consumption of its elevators with each new product release.

Elevators consist mostly of metals and over 90% of this material can be recycled.

Supporting green building through energy measurements and calculations KONE elevators have achieved excellent B-class energy efficiency ratings in measurements performed by independent third parties.

KONE has developed tools to estimate the energy consumption of customer-specific solutions in the design phase of each project. These tools are especially helpful for customers working on green building certified (e.g. LEED, BREEAM) projects.

KONE follows the latest green building trends through its involvement in green building associations around the world.

KONE MonoSpace elevators have achieved excellent energy efficiency ratings\*

	KONE MonoSpace®	
Load (kg)	432	1000
Speed (m/s)	1	1
Floors	14	7
Travel (m)	29	18.53
Start/year	110,000	70,000
Usage category	2	2
Travel	A	A
Standby	B	B
Energy efficiency class	A	A

\*Energy classification according to the ISO Energy Efficiency Guide V10 4157

### KONE eco-efficiency milestones

- 1987: KONE introduces the V3F frequency converter, improving the energy efficiency of its hoisting machines.
- 1991: KONE is the first elevator company to utilize regenerative drives in its elevators.
- 1996: KONE invents and launches the first machine-room-less elevator, KONE MonoSpace®, providing up to 70% energy savings compared to conventional technology.
- 2005: KONE MonoSpace is the first elevator to include LED lighting as a standard feature.
- 2006: KONE unveils the concept of solar powered elevators.
- 2009: KONE launches high-performance regenerative drives for a full range of applications.

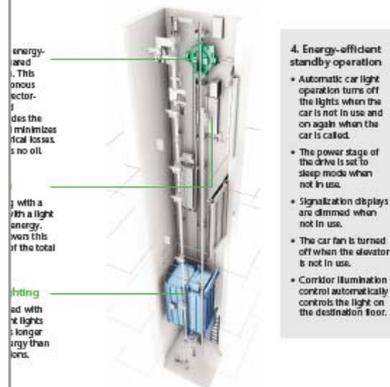
### Environmental Impacts during the lifecycle stages of a typical KONE elevator\*



\*The analysis is based on a KONE MonoSpace elevator with a load range of 220-200 kg, 150,000 starts per year, a travel height of 5 floors and an estimated lifetime of 25 years.

### Reduce elevator energy consumption

Energy consumption of an elevator can be reduced by utilizing energy-efficient technologies and by a more efficient way.

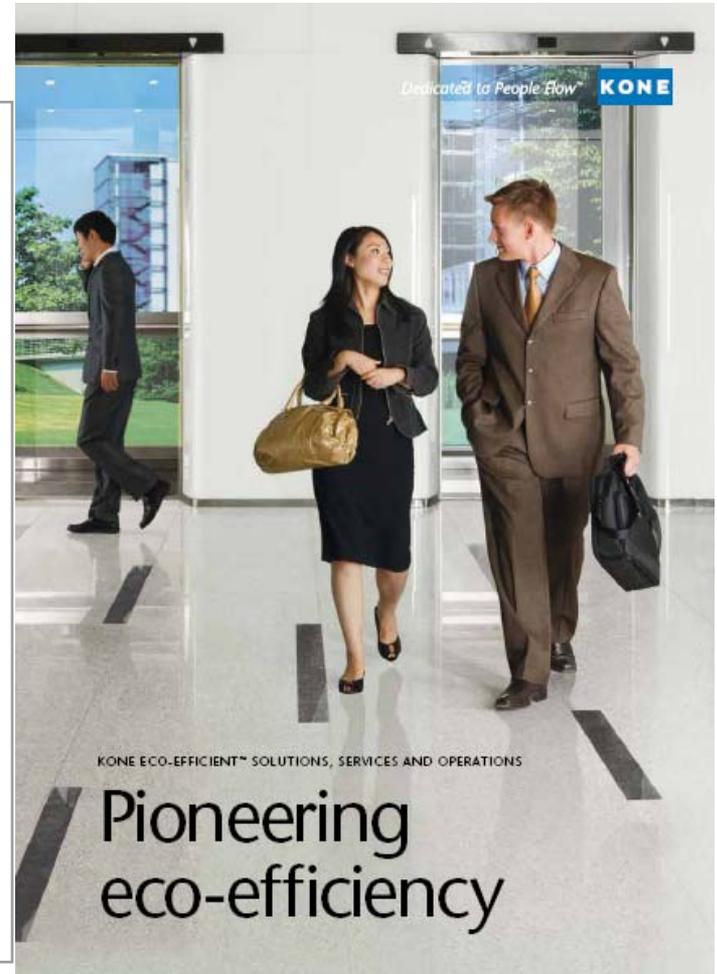


### On track record of reducing elevator energy consumption



For more information go to [KONE.com](http://KONE.com)

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KONE ECO-EFFICIENT™ SOLUTIONS, SERVICES AND OPERATIONS

# Pioneering eco-efficiency

# Supporting Company Transparency



12:45 P.M.  
OFFICE BUILDING, SHANGHAI

Providing a safe ride for Li Li and millions of other commuters, every day.

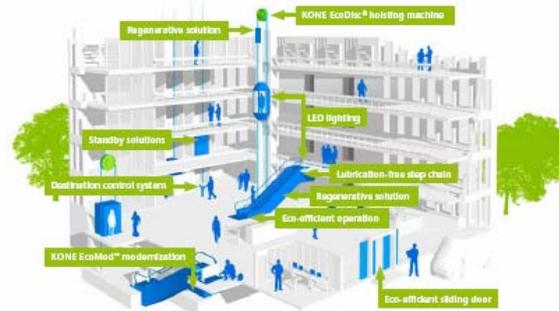
KONE moves millions of people with elevators and escalators every day. Over 12,000 service technicians around the world ensure that the equipment under KONE's maintenance functions properly. KONE's preventive maintenance helps to minimize equipment downtime and ensures a smooth and safe experience for all users.

Corporate  
Responsibility Report  
KONE 2011

Dedicated to People Flow™ KONE

## Eco-efficiency in our solutions

We offer industry-leading solutions that help our customers save energy and costs, while at the same time create buildings in which people can move around smoothly, safely, and comfortably. KONE has set itself the target to cut the energy consumption of its volume products by 50% between 2006 and 2010.



### Eco-efficient solutions for elevators

- Elevators equipped with the energy-efficient KONE EcoDisc® hoisting machine are 50-70% more efficient than elevators that use conventional traction 2-speed or hydraulic technology. Unlike hydraulic elevators, the KONE EcoDisc requires no oil or hole drilling.
- KONE's regenerative solutions can provide 20-35% energy savings by recovering the energy created when the elevator is used.
- LED and eco-efficient fluorescent lighting can reduce energy consumption by up to 80% compared to halogen lights.
- Standby solutions power down the equipment when it is not in use, providing substantial energy savings, especially in buildings with periods of low elevator usage.
- The KONE Polaris™ destination control system optimizes elevator traffic, making it possible to reduce the size and number of elevators needed in the building.

### Eco-efficient solutions for escalators

- The lubrication-free stop chain saves oil, reduces chain wear, and decreases the risk.
- Eco-efficient operation can save up to 50% energy by slowing down or stopping the escalator when it is not in use or increasing the efficiency of the motor when traffic is low.
- Regenerative solutions reduce energy requirements by up to 60% by recovering the energy created when the escalator is used.
- LED lighting consumes up to 90% less energy compared to conventional lighting technologies.
- The KONE EcoMod™ solution enables escalator modernization without removing the truss, saving construction time and materials.

**Eco-efficient solutions for building doors:**  
KONE's eco-efficient sliding door solution regulates the door's opening width and opening time based on the outside temperature, providing savings of up to 4000 kWh per year in building heating and cooling costs.



The energy-efficient KONE EcoDisc hoisting machine.

### The environmental impact and recycling of KONE products

Lifecycle assessments of KONE elevators and escalators have shown that the greatest environmental impact of an elevator or escalator stems from the electricity used to operate it. Therefore, KONE is focusing on systematically reducing the energy consumption of its solutions with each new product release.

Elevators and escalators consist mostly of metals, meaning that approximately 90% of elevator and 80% of escalator material can be recycled.

### Elevator lifecycle analysis\*



\*The analysis is based on a KONE MonoSpace elevator with a load range of 220-1000 kg, 110,000 steps per year, a travel height of 5 floors and an average lifetime of 25 years.

### Escalator lifecycle analysis\*\*



\*\*The analysis is based on an external lifetime of 15 months at KONE ToyokoMotel™ #110 escalator operating 14 hours per day, 360 days per year and 25 steps per minute with an equivalent step load of 25 kg.

### Pioneering innovations – key milestones:

- KONE has a long track record of creating innovative and eco-efficient solutions – we have been leading the way in this field for over 20 years.
- 1987: V3F frequency converter launched, improving energy efficiency of KONE hoisting machines.
- 1991: KONE becomes the first company to utilize regenerative drives in its elevators.
- 1993: The energy-efficient planetary gear for escalators is introduced.
- 1996: The first machine-room-less elevator, KONE MonoSpace®, is launched, providing up to 70% energy savings compared to conventional technology.
- 2004: KONE EcoMod™ solution is launched, enabling modernization of escalators without removing the truss, saving construction time and materials.
- 2005: KONE MonoSpace is the first elevator to include LED lighting as a standard feature.
- 2006: KONE unveils the solar-powered elevator concept.
- 2007: KONE InnoTrack™ autowalk is launched – the first autowalk to feature an energy-efficient gearless drive.
- 2009: High-performance regenerative drives for the full range of KONE elevators launched.
- 2009: New efficient gear outside step band drive launched for KONE escalators and autowalks.
- 2009: KONE MiniSpace™ elevator awarded A-class energy classification (VDI standard 4707).
- 2010: Eco-efficient sliding door solution launched.
- 2010: The KONE MonoSpace elevator receives an A-class energy classification based on the VDI guideline. Its measurements performed under optimized conditions in KONE facilities.



**Check out video –**

**BBC’s “Going Down? The Lift-Testing Facility 350m Below Ground”**

**[www.bbc.co.uk/news](http://www.bbc.co.uk/news)**

*Dedicated to People Flow™*

