

FREQUENTLY ASKED QUESTIONS | ECO-EFFICIENCY

KONE Corporate Commitment to eco-efficiency

Q: What does Eco-efficient™ mean?

- The term eco-efficiency is based on the concept of creating more goods and services while using fewer resources and creating less waste and pollution.
- According to the World Business Council for Sustainable Development (WBCSD) definition, eco-efficiency is achieved through the delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing environmental impacts of goods and resource intensity throughout the entire life-cycle to a level at least in line with the Earth's estimated carrying capacity.

Q: How important are vertical transportation systems when considering the overall energy consumption of the building? Surely upgrading the lighting and environmental control systems is sufficient?

- Our cities are growing and so the choices we make now will impact far into the future. This trend to urbanization inevitably results in a greater number of higher buildings and so it is critical that all building systems become more energy-efficient if the necessary reductions in greenhouse emissions from buildings are to be achieved. Buildings account for a significant proportion – up to 40% – of the world's energy consumption.
- Lights and Heating / Air Conditioning systems are typically more high profile targets when considering reductions in building energy usage and indeed are a significant factor. However, the complex mechanical and electrical systems necessary to support the vertical transportation through a building are less obvious – old, energy-hungry elevator and escalator equipment negatively impact a building's sustainable footprint. Vertical transportation systems (elevators & escalators) can account for up to 10 percent of a building's energy use.

Q: Why does KONE call itself a “pioneer in eco-efficiency”?

- KONE was the first elevator company to bring the machine room-less elevator concept to the market in 1996. The innovation was driven by customer demand for energy-efficiency and space savings. We created a fully new segment, machine room-less elevators, and have been the innovation leader in this segment ever since.
- The cornerstone of the machine room-less concept's green credentials lies in the KONE EcoDisc® hoisting machine, which is a permanent magnet gearless motor. It consumes 70 percent less energy than a hydraulic drive and 50 percent less than a geared traction elevator drive, thus making it the most eco-efficient solution on the market today. In addition to the energy-efficiency advantages, EcoDisc's other features include the lack of oil as well as a compact and durable design based on recyclable materials.
- Since its commercial launch, the KONE machine room-less elevator family (EcoSpace & MonoSpace) has cumulatively saved the electricity production equivalent of a typical power plant. This figure represents avoiding the consumption of 2,000,000 barrels of oil, or the emissions of 100,000 cars driving the earth's circumference (40,074km).

Q: There is so much in the media about making buildings greener but why is this so important?

- One of the greatest mega-trends of our time is the concentration of people into ever-growing cities. In 2008, the world population reached a new milestone because for the first time in human history, an equal amount of people live in urban centers as do in rural communities. In fact, statistics from the United Nations show that about three billion of us live in urban areas and that by 2030; this number is expected to reach five billion.
- Urbanization offers new opportunities to manage the smooth movement of people, provided we develop some fresh ideas. Fundamentally, the densification of people into concentrated urban areas highlights the importance of the efficient movement of people. More people need to move in the same space, at the same time – and they will need to do so with the smallest use of our natural resources and with the lowest carbon footprint possible. The fact that buildings account for up to 40% of the world's energy consumption makes them impossible to ignore.

Q: What about KONE's present environmental excellence?

- Today, Eco-efficiency is an integral part of our R&D: it is a learning process, and we are building our pioneer-ship further every day.
- KONE's intent is to lead the industry in eco-efficiency. We supply the most Eco-efficient products and services, and minimize the carbon footprint of our own operations.
- The mega trend urbanization drives our innovations in energy-efficiency. Buildings consume 40% of the earth's energy. Elevators, in turn, consume some 2-10% of the total energy in a building.
- Recently, our focus has been on standby energy savings and regenerative systems, as well as energy-saving solutions like LED lights in elevator cars, and Destination Control Systems (DCS) for efficient elevator travel planning.
- In 2008 we set an ambitious target: 50% reduction in the electricity consumption of new elevators by the end of 2010 globally. Two major factors impacting on this reduction are car lighting and regenerative drives, in proportions: 20% out of 30% car lighting – 10% of 30% regenerative drive (new vector control drive).
- During 2009, we already achieved a 30% reduction and are on track to reach our 50% reduction target by the end of 2010.
- We have also set an annual 5% carbon footprint reduction target for our own operations globally. The most significant carbon dioxide impact of our operations relates to our car fleet, electricity consumption and logistics.
- In 2009, we achieved a 6% reduction in our operations carbon footprint.

Q: What do you mean when you say that eco-efficiency is part of your corporate responsibility?

- KONE's corporate responsibility (sustainable business) approach covers economic, environmental and social responsibility towards our key stakeholders. Eco-efficient solutions and operations form the core of our responsible business operations.
- KONE is a financially sound company, and this provides us opportunities to develop our responsible business approach.
- We actively promote global and local initiatives in the area of social responsibility: employee and end-user safety programs, ethical business conduct, platforms for good employee relations, professional and people leadership training programs, which all ensure responsibility in our every day operations.
- We also set the same demand of environmental excellence and code of conduct to our suppliers.

Q: Are any of your facilities ISO 14001:2004 certified?

- Yes, two manufacturing facilities and one supply unit in North America.
- Coal Valley, Illinois; McKinney, Texas and Torreon, Mexico.

Q: Do you have an environmentally friendly fleet program in place?

- Globally, altogether 42% of KONE's operational greenhouse gases are emitted by the vehicle fleet used by maintenance and service personnel. In 2009, our maintenance fleet consisted of 13,300 (2008: 12,800) vehicles emitting 94K tCO₂e.

To reduce vehicle fleet greenhouse gas emissions, KONE initiated Project O₂xygen in 2008. The project continued as the Eco-Safe Driving program in 2009. The program has three different focus areas: a car policy requiring low emission cars as well as driver rights and duties, the harmonizing and optimizing of the global vehicle fleet, and promoting safe, efficient and economical driving as well as route optimization.

In 2009 KONE reduced its vehicle fleet's greenhouse gas emissions by one percent globally, five percent per car, or a six percent reduction of carbon intensity of the service car fleet. This was an excellent result as the number of cars and mile driven increased in 2009. We are targeting an ambitious five percent annual emission reduction per vehicle in 2010-2012.

In North America, over the next three years, they KONE's fleet will be more than two thirds (68 percent) SmartWay vehicles, resulting in a 3,000 ton (13 percent) reduction in yearly greenhouse gases in three years.

Q: What kinds of future technological improvements are you working on to further improve the energy efficiency of vertical transportation systems?

- KONE is not standing still to admire our already impressive list of energy-efficient technological achievements implemented. This is a fast-moving field; customer awareness and education on this issue are increasing rapidly, so it is a core business goal to constantly improve the efficiency of mechanical and electrical systems. Furthermore, we are striving to enable such systems to be the norm, rather than an expensive option. Some key areas for focus are:
 - Improving hoisting technology and power conversion efficiency
 - Recovering braking energy
 - Reduction in idle losses
 - Greater use of solar power

Q: What about completely new technologies, like using solar power in elevators?

- As an innovation leader, we constantly study new avenues like solar power.
- At this point, it only is a concept but it makes one good example of KONE's commitment to continuously develop innovative eco-efficient technologies and solutions.
- It anticipates a potential scenario of future developments in energy conserving in the elevator solutions, using solar power.
- However, solar power requires further developments e.g. in the storage systems to be a cost-competitive as well as a technically sound solution.

KONE's eco-efficient™ solutions

Q: How do KONE's eco-efficient™ elevators differ from standard elevators?

- There are a wide variety of features that make energy-efficient elevators different from standard elevators. In our case the most important thing is KONE EcoDisc®, a lightweight, highly efficient hoisting machine. KONE EcoDisc® consumes 70 percent less energy than a hydraulic drive and 50 percent less than a geared traction elevator drive.
- KONE has also been the pioneer in introducing inverter drives and regenerative systems for elevator use. These can recover up to 25 percent of the total energy consumed, which can be used as one source of energy to be used for example in lighting the building.
- Also, when the elevator is idle, it still consumes energy. The standby energy is mostly consumed by the car lights, control devices, car ventilators, elevator drives and control systems. This standby energy consumption can account for 25 to 80 percent of the total energy consumed by the elevator, depending on its design and usage. Less frequent usage, for example in a small apartment building, means that a higher percentage of the electricity can be saved by reducing standby energy consumption.

Q: How can elevators be made greener – surely they just transport passengers and goods up and down in the building?

- Certain parameters related to vertical transportation systems are fixed and cannot therefore be changed with technology alone:
 - Building height
 - Building population
 - Elevator speed
 - Elevator capacity
- However there are many other parameters which technology definitely can improve:
 - Hoisting motor efficiency
 - Mechanical efficiencies
 - Power conversion efficiency
 - Recovering of regenerated energy
 - Reduction in idle time losses

Therefore technology improvements can indeed improve energy efficiency and in fact, are absolutely critical to success.

Q: What have you done to improve the energy efficiency of vertical transportation systems?

KONE is one of the world's leading vertical transportation companies and has made great efforts to reduce the energy use and environmental impact of its systems. Energy efficiency has been a core value of our company for years, setting us apart from other companies in the industry and we have many successful innovations to be proud of.

- In November 2007, KONE became the first elevator/escalator company to stop manufacturing hydraulic elevator systems. Hydraulic elevator technology basically dates from the 19th Century and is fundamentally blighted by several environmentally unsound factors
 - Inefficient technology
 - High energy consumption
 - Potential for soil contamination from hundreds of gallons of oil required by the system
 - Higher levels of noise

- Unpleasant oil aroma, especially during periods when the elevator is busy
- Poor speed control efficiency, resulting in longer floor-to-floor drive times – and a lower level of passenger ride comfort
- KONE introduced its groundbreaking Machine Room-Less (MRL) elevator platform in 1996. KONE EcoSpace and KONE MonoSpace are MRL systems among the most environmentally sound elevator concepts in the industry
 - Developed using KONE's EcoDisc technology, an MRL elevator consumes an astounding 70 percent less energy than traditional hydraulic elevators, making it the most eco-efficient elevator on the market today
 - Primarily of greater benefit in larger elevator applications, KONE also has a regenerative drive system, which takes excess energy from elevator braking and converts it for use throughout the building – essentially making the system a mini-generator
- While the mechanics are what makes a system run “behind the scenes”, KONE has also gone to great lengths to “green” the internal environment of elevators, with the introduction of LED Lighting, destination controls that manage the flow of people and standby options which reduce the “idle time” energy demand so that, for instance, cab lights and interior ventilation are not on while the elevator is not in use for extended periods
- KONE has all of this in place to make sure that energy is never being wasted – and all of it goes on without riders ever experiencing anything other than the safe, efficient, smooth ride they expect to their destination

Q: What uses the most energy in an elevator?

- The most energy use of an elevator is made up of the number of motor starts and the standby energy used by the elevator including lights, fans and any air-conditioning units installed on the elevator.
- A bit of explanation on the energy consumption of an elevator is needed since there are essential differences in its energy consumption depending on the speed, load and travel distance of the elevator in the building.
 - First, according to life-cycle assessments, **in a high-rise building**, the most significant environmental impact of an elevator is generated by its use, i.e. when used to transport people up and down. Therefore, in high-rise buildings, KONE has focused on developing innovative energy recovery systems, which can recover at least 25 but often between 35 and 60 percent of the total energy consumed by the elevator depending on the number of floors and the elevators used. The energy recovered can then be converted and used as one source for a building's energy needs such as lighting.
 - However, an elevator still consumes energy when it is idle. This standby energy is mostly needed for car lighting, car fan equipment, doors, machine fans and brakes as well as signalization equipment and other elevator related monitoring and screen equipment.
 - Different from a high-rise building, **in a low-rise building**, standby energy is responsible for the majority of the elevator's total energy use: at low speed and small loads this can mount to about 70-80% of the total energy consumed with the most efficient hoisting equipment. Therefore, at low speed–lower–rise elevators, it is essentially more important to pay a lot of attention to reduction of standby energy with innovative solutions for example for car lighting, doors, fans and signalization than for regenerative solutions, which in turn are important for higher-rise buildings.
- Examples of various ways to save standby energy developed by KONE:
 - After the last car call, the car lights and the car fan are switched off automatically; they come on again the next time the car is called.
 - The usage of LED lights reduces the energy consumed in car lighting by up to 80 percent and they last up to 10 times longer than halogen lights.

- A few minutes after the last car call, the signalization automatically switches to standby mode. This can reduce up to 80 percent of the energy consumed by signalization.
- When the car reaches the floor, corridor illumination control automatically illuminates the floor, thus reducing overall electricity consumption for the building.

Q: What is the energy use of an EcoSpace elevator while it sits idle?

- If 480 VAC 3-phase Mains Supply, 205 watts
- If 220 VAC 3-phase Mains Supply, 265 watts

Q: How do regenerative systems in elevators work?

- Our drive unit with Modulated Line Bridge (MLB) regenerates power back to owner's supply network for use in lighting of the building and reduces the net electricity consumption.
- Modulated Line Bridge guaranties clean power factor & reduces harmonics content in the building network meaning less disturbances for user of electricity. As mentioned, these can recover up to 25 percent of the total energy consumed.

Q: Can you explain how destination based systems work? How does it make elevators eco-efficient?

- With a destination control system, the passenger will enter their intended destination floor into a keypad situated in the elevator lobby. The control system then selects the optimal elevator to serve the passenger and indicates this immediately to the passenger.
- This innovative system increases the vertical people-handling capacity of a building, significantly improving the efficient use of time and energy. The considerable improvement in people flow results in a reduction in the total journey time for elevator passengers, with a decrease in the number of elevator trips required.

Q: How important is life-cycle thinking at KONE? Do you also study materials used in elevators, how much energy it requires to make elevator parts etc?

- KONE continues to dedicate resources to researching the impact and performance of our solutions so that we can provide factual information to our customers.
- We believe in being transparent and providing proof to our "sustainable" claims.
- We strive for continuous improvement together with our customers and suppliers to save energy and to minimize business operation related emissions and waste. In practice this means that we work to minimize carbon footprint and maximize eco-efficiency in all of our operations.
- The carbon footprint can be seen as the total amount of carbon dioxide (CO₂) and other greenhouse gases emitted over the full life cycle of a product or service, measured in units of carbon dioxide. KONE wants to be amongst those companies actively contributing to solving the climate crisis, and had therefore assessed the carbon footprint of its global operations. The assessment confirms the actions underway are correct and helps to plan KONE's future priorities.

- To study elevators' energy use, KONE analyzed the carbon footprint of selected volume products using life cycle assessments.
- According to life-cycle assessments, the most significant part of KONE products' life-cycle impact on the environment takes place when the products are used, not during their manufacture. KONE is best able to influence the environmental impact of the way its products are used by taking steps during the product development phase to lower energy and fuel consumption, cut back on oil requirements, reduce noise levels, etc.
- In addition, the amount of carbon dioxide emitted by an elevator varies a great deal, depending on its size and usage. For example, during its 25 years life cycle the standard elevator in a five-story residential building generates almost six times less carbon dioxide than a bigger and more often used elevator in a 16-story office building.

Q: What about recyclability of your products; how much of KONE elevators can be recycled?

- Short answer is: our products are about 95% recyclable.
- More background to recycling of an elevator at the end of its life in our [Environmental Product Declarations](#) which are based on the LCAs of KONE's EcoSpace and MonoSpace Machine Room-Less elevator solutions (LCA's for EcoSystem MR available in Q3 2011):

Metals make up 93-95% of the elevator material weight, and they are all recyclable.

At the end of the life of the elevator, the equipment is dismantled and depending on the elevator, **36-60% of the material weight (steel and cast iron components) can be sorted and directly reused even without pre-processing.**

Any possible **hazardous materials** (may contain lead battery and, depending on selection of lighting, standard fluorescent lamps that contain mercury) are dismantled and handled **according to hazardous waste management procedure**. And as we all know, the KONE EcoDisc hoisting machine contains no oil. All 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 are used for energy recovery or disposed in landfills.

Q: How much energy do elevators use in terms of the overall energy use in a building?

- Buildings make up about 40% of the global energy consumption today. Of this amount, elevators only consume a few percentages (2-10% depending on the type of use of the building).

Q. Can existing elevators be made “green”? If so, how?

- KONE ReSolve™ with Unity Drive is a complete elevator drive and electrification solution for modernization. KONE ReSolve™ with Unity Drive reduces energy consumption by 40% compared with Motor Generator (MG) sets and by 25% compared with DC-SCR (SCD -type) drives. The regenerative feature saves considerable energy (up to 50%), substantially cutting the building owner's operating costs and reducing the environmental footprint.

- KONE EcoSpace EB is a full replacement solution for existing hydraulic elevators. This turnkey solution delivers innovative Machine Room-Less technology with up to 70% energy savings over a traditional hydraulic elevator.

Q: How much of a role does implementing energy-efficient lighting make?

- The usage of LED lights reduces the energy consumed in car lighting by up to 80 percent.
- LED lights also lasts up to 10 times longer than halogen lights.

Q: What are the most important eco-efficient aspects relating to escalators? What should I think about if aiming at having an eco-efficient escalator solution in my building?

- Main drivers regarding escalator eco-efficiency are:
 - Efficient motor
 - Efficient gear
 - Friction in the system (material selection / adjustments = good maintenance)

Q: Do your escalators use oil?

- Escalators generally need oil for lubrication of the gear box and the drive chain (connection between gear box and main sprocket wheel / when motor and gear are installed outside the step band). KONE also offers and recommends the lubrication free step band chain, which requires no oil. Typical escalator step chains require continuous and regular oil lubrication.

Q: How do you recycle used parts in escalator modernizations?

- At the moment, this is a very local issue: waste is collected and recycled according to local regulation in each location. We have initiated a study about the opportunity for systematic recycling and globally aligned practices as part of eco-efficiency for the entire modernization business. Currently we do not yet have KONE wide information available.

Q: What is EcoDrive? How does it compare to traditional gears? Is it compatible with all escalators?

- EcoDrive is based on a highly efficient planetary gear with extended oil change intervals of up to 30,000 hours and gear efficiency of 96% (conventional worm gear 87%). Background: EcoDrive (former: TransVarioDrive) was invented by O&K for a new escalator product, serving the tradition in the company of installing the motor and gear within the step band (reduction of the overall dimensions of the truss / Industrial standard is the installation of motor and gear in the upper head section).

Q: What is an EcoStart Package?

- EcoStart is KONE's power efficiency device for escalators that continuously adjusts the motor terminal voltage to an appropriate level required for passenger loading conditions. EcoStart also includes a soft start feature that reduces wear on the motor at escalator start-up. The advantage of this device is an energy savings of up to 40%.

Clarification of LEED Contribution

Q. Can KONE elevators earn LEED points for my project?

- No because products in general do not earn LEED points, **projects** do. Products can only contribute to a project earning LEED points – and elevators can contribute to a few areas (see next question).

Q. What areas of LEED can KONE elevators contribute to earning points?

- LEED-NC 2009: SS, WE, and the majority of the credits in MR & IEQ categories do not currently apply to Elevator Escalator CSI Section 14.

1. Energy and Atmosphere (EA Credits)

Possible,
only EAc1

2. Innovation and Design Process (ID Credits)

Possible

- LEED-EB: O&M 2009: SS, WE, MR and the majority of the credits in IEQ categories do not currently apply to Elevator Escalator CSI Section 14.

3. Energy and Atmosphere (EA Credits)

Possible

5. Indoor Environmental Quality (IEQ Credits)

Possible,
only IEQc2.1

6. Innovation in Operations Process (IO Credits)

Possible

For more reference, please see our [LEED Fact Sheet](#).

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