KONECRANES®
Lifting Businesses™

C-series electric chain hoist

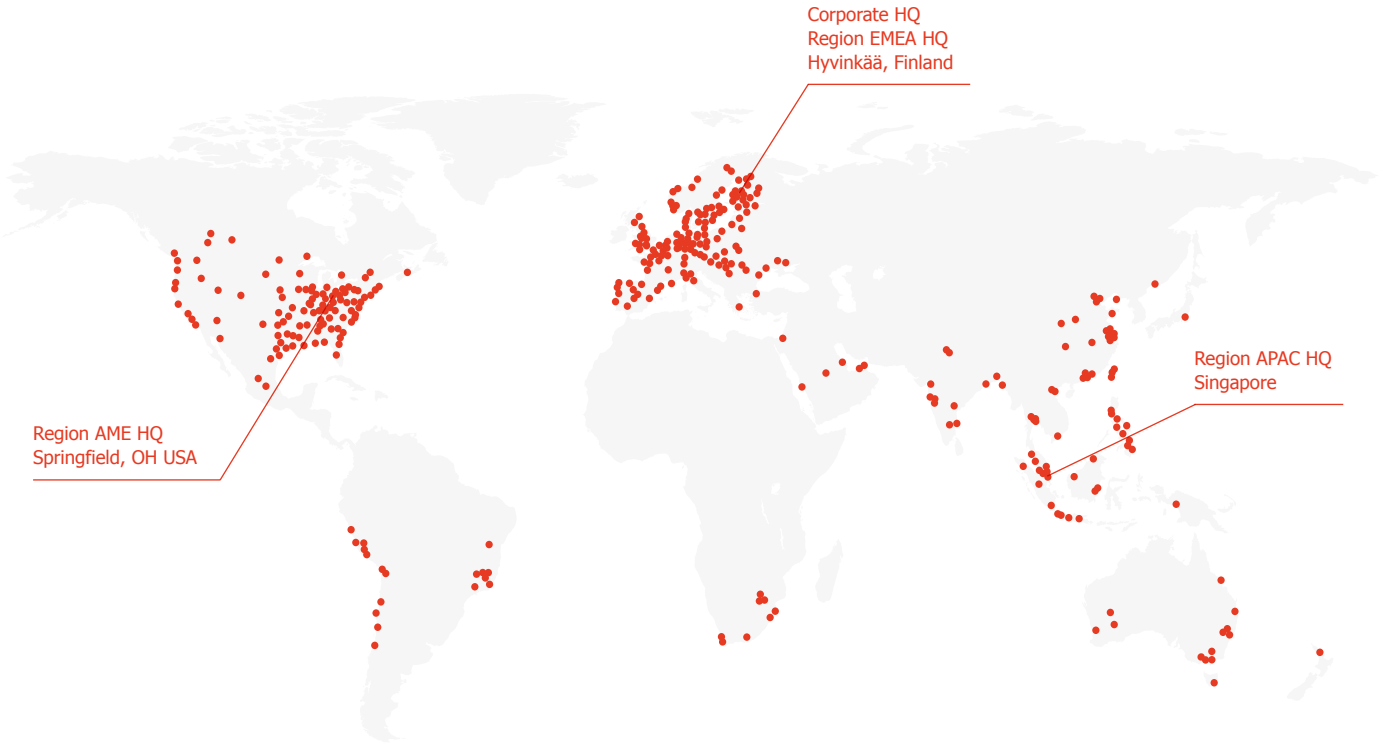
Environmental Product Declaration

General company information

Konecranes is a world-leading manufacturer of lifting equipment, offering a vast range of advanced lifting solutions and services to different industries worldwide. We work for a decarbonized and circular world together with our customers and partners, substituting existing technology with lower-emission alternatives.

In an interconnected world, material flows sustain the well-being of people, as well as the success of businesses and societal functions. Konecranes' knowledge and innovative technologies, solutions and services constitute a key link in these material flows. We maximize lifecycle value and eliminate waste of resources, energy and time throughout the whole value chain. Our culture is rooted in uncompromised safety, high ethics, and diversity and inclusion.

Our ambition is to provide our customers with sustainable solutions and services while preventing and minimizing emissions and waste. We design our products with their complete lifecycle in mind. Usability, eco-efficiency, and safety are our guiding principles in product design, along with lifecycle thinking. Our aim is to maximize the lifecycle value of our products. We do this through innovative product design and our full service offering.



Product description and application

Konecranes offers a wide range of industrial hoists for different applications. These hoists can be electrically powered, use compressed air as a power source, or be operated manually.

The Konecranes C-series hoist is meant for industrial use in various assembly and process applications, either as a primary production hoist or as a secondary maintenance hoist. The equipment is designed to perform lifting, lowering, and traveling operations, within the limits specified by its duty class. Due to the range in sizes, possible configurations and manufacturing locations, environmental impact might vary.

The C-series has all the latest technological innovations that an electric chain hoist can offer. Components such as the overload device, hoisting limits and brake are made to last. Together with Konecranes Smart Features like Extended Speed Range they advance our customer's productivity and overall safety. With long-lasting, durable components and carefully selected raw materials, customers get a hoist that has a long lifetime, helping them reduce the overall climate impact of their operations.

This Environmental Product Declaration (EPD) applies to the most typical configuration of the C-Series, the 500kg hoist (C05) utilizing a pole changing lifting motor and with a manually operated traveling trolley.

Environmental impact of the C-series hoist

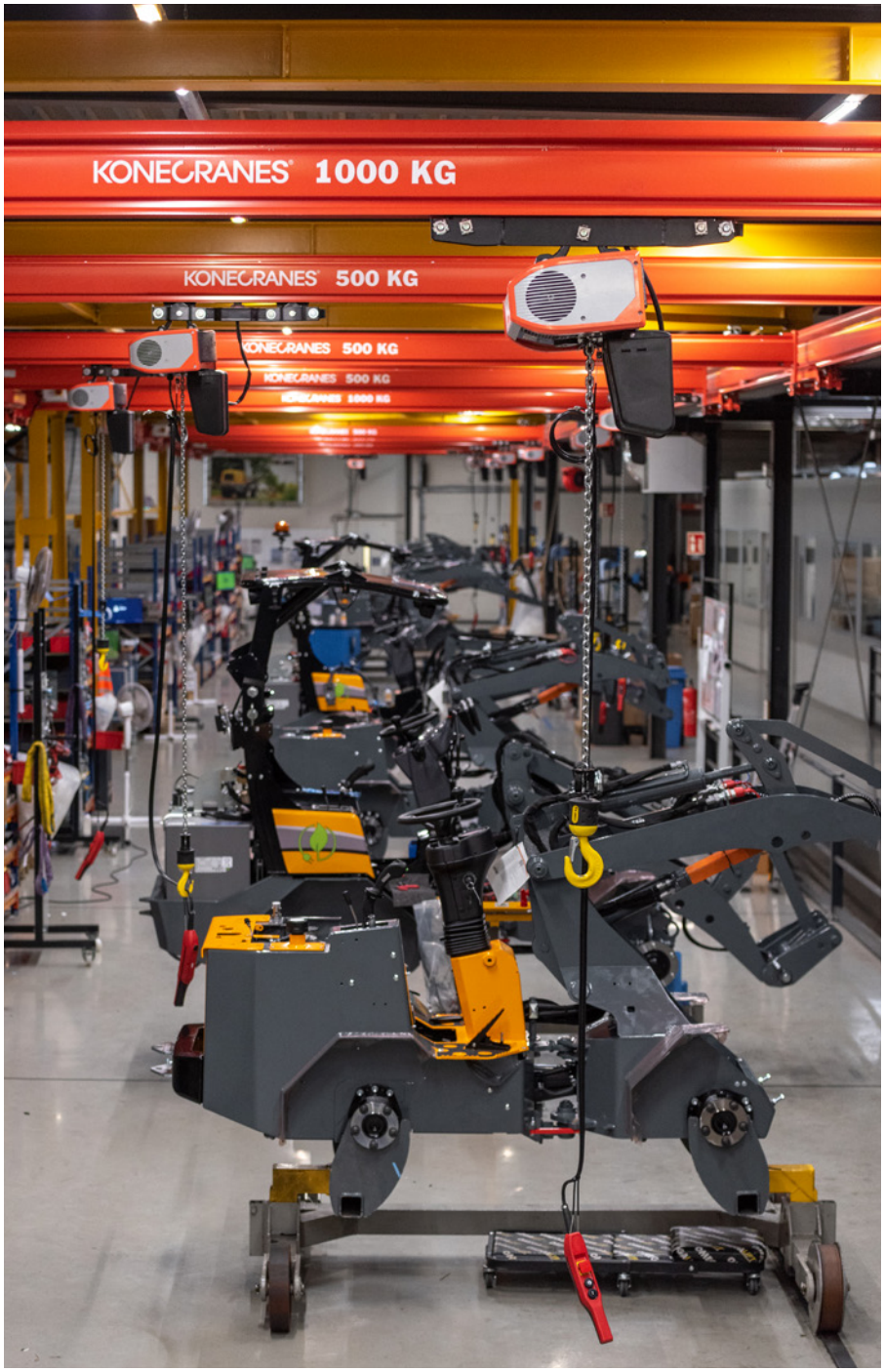
At Konecranes, we are committed to supporting our customers in reaching their low-carbon targets with our offering. Decisions made at the design phase critically determine a product's overall environmental impact. Therefore, we can significantly improve the environmental performance if we take the environmental impacts into consideration early in the product development process. Konecranes' Design for Environment (DfE) concept aims to reduce the environmental impact of the product's lifecycle. The concept focuses on repairability, durability, material selection and energy efficiency.

To minimize the environmental impact of the C-series hoist:

- We applied our own Design for Environment concept to the product design process.
- We minimized substances of very high concern (SVHCs) in product design.
- We used components with high durability and a long lifetime to enable them to be reused and repaired.
- We changed the packaging design into renewable and recyclable packaging material.

We also assessed the product's carbon footprint and other relevant environmental impacts during its lifecycle with Life Cycle Assessment (LCA) calculations for the C05 hoist and traveling trolley.

By using fewer and lighter materials and components, adding special features (e.g., an option for a more durable chain) and improving the energy efficiency of the hoist, we reduce the greenhouse gas (GHG) emissions across the lifecycle of the hoist.



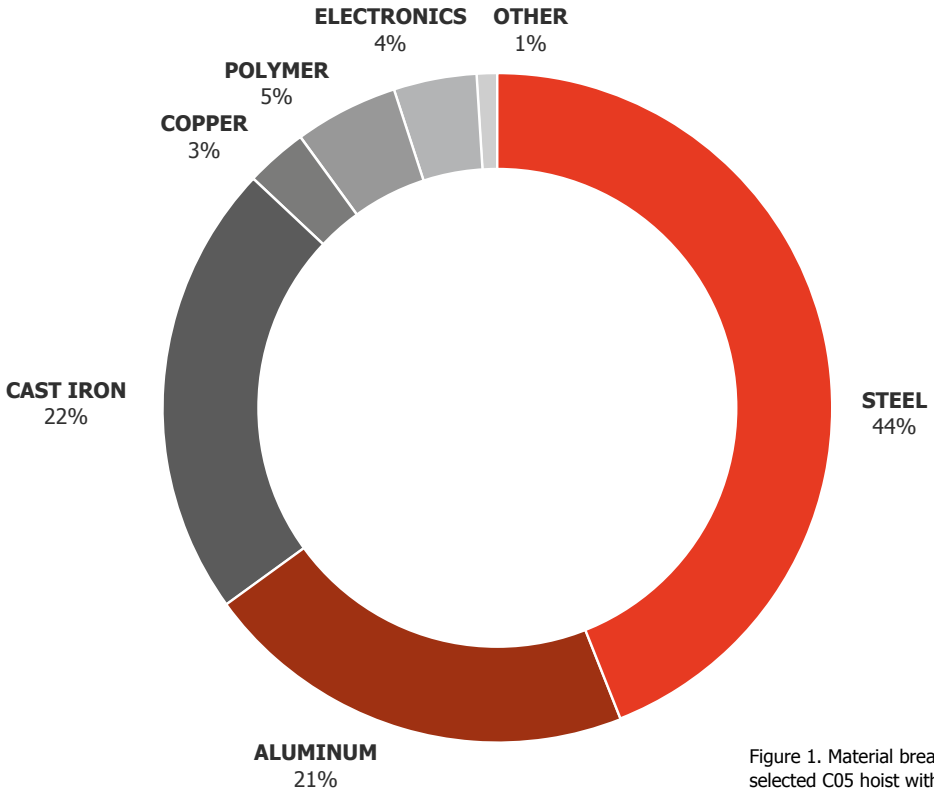


Figure 1. Material breakdown of selected C05 hoist without optional parts.

Material breakdown

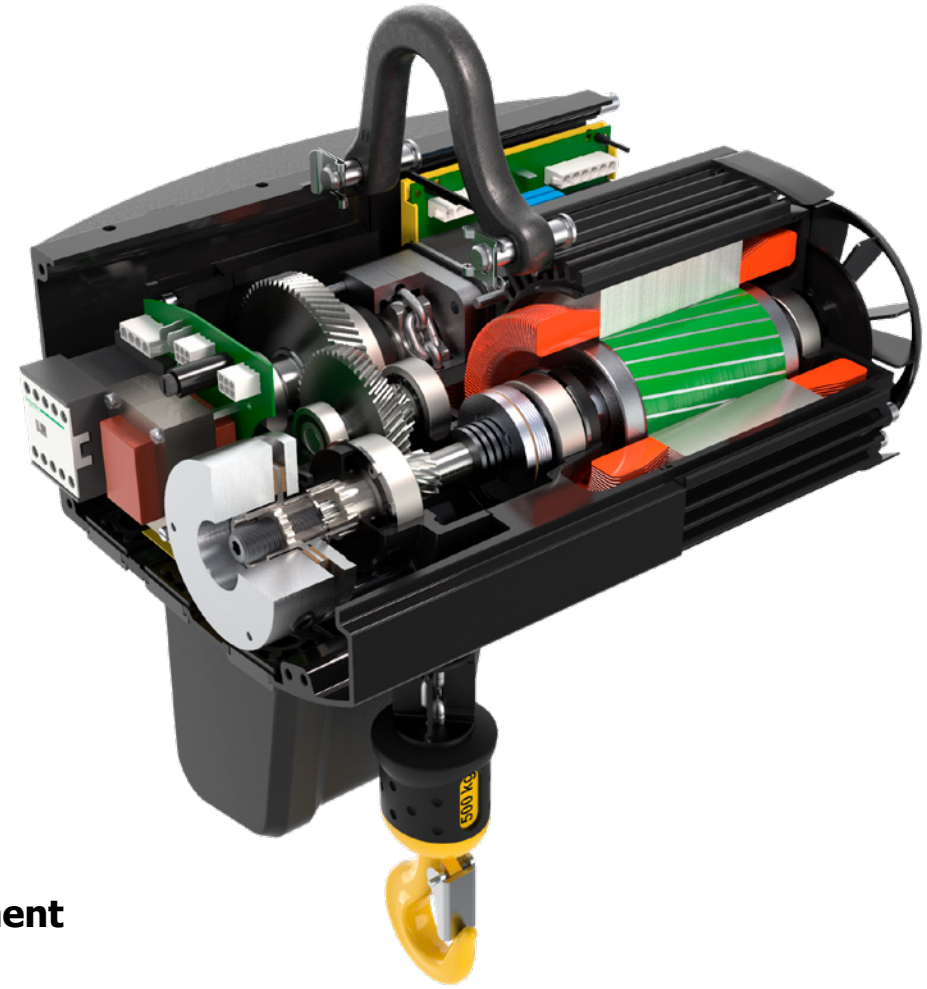
The material breakdown relates to the total weight of the 500 kg rated capacity C-series hoist with a maximum lifting height of 5 meters and 2 speed drive hoisting. The weight can vary slightly, depending on which C-series features are selected for the hoist.

The total weight of the hoist is 52 kg including a 13 kg push trolley (not motorized trolley) and a 39 kg hoist.

In this particular C-series hoist, 91% of the hoist materials are metals including steel, steel alloy, cast iron, aluminum alloys and copper, which are fully recyclable at the end of hoist's life span.

The C-series hoist does not contain asbestos, ozone-depleting substances, or PCBs. Any factory-installed lubricants in the product are industrial hydrocarbons. Coatings are applied on-site or the work is outsourced to a subcontractor*. Coatings that are used on the C-series are mostly powder coatings, KTL (cathodic dip coating), solvent-borne epoxy binder paints and zinc electrocoatings. Paints are pigmented with iron oxides and electrocoatings have a clear trivalent chromate.

*Konecranes has clear processes in place to mitigate sustainability-related risks both in the supplier selection phase and during the business relationship. The Konecranes Supplier Code of Conduct includes the minimum requirements for suppliers on topics such as human rights, health and safety, environmental management, anti-corruption and compliance with laws and regulations. Konecranes Restricted Substances List describes our key requirements for the use of harmful substances.



C05 lifecycle assessment

We analyzed the environmental impact of the C05 hoist with the Life Cycle Assessment (LCA) method and standards ISO 14040 – ISO 14044. The lifecycle of a C05 hoist was divided into the following stages: raw materials, component production and final assembly, packaging, delivery to customer, usage at customer site, maintenance at customer site and dismantling and preparing for recycling. The logistics required during or between each stage to move the hoist from one place to another were included. Only the components specifically relevant to the C05 hoist and trolley were under examination, excluding all the other parts of the crane.

The functional unit for the LCA study was the entire lifecycle of a hoist across 10 years (approximately 40,000 duty cycles that corresponds to 11 cycles per day which is considered light use). The LCA study was critically reviewed by VTT Technical Research Centre of Finland Ltd. The C05 hoist under examination has a maximum lifting height of five meters and uses a 2-speed hoisting motor. The use profile was based on typical usage data representing an average customer in a workshop application with one shift per day in the European Union area (EU28) and application-specific lifting height of 1.25 meters.

The impact focus was set on climate impact (global warming potential) and the calculations based on emission factors from The Intergovernmental Panel on Climate Change (IPCC) dating back to 2013 using a 100-year time horizon and excluding biogenic carbon. At the time of the study, there was no product-specific LCA guideline (product category rules) available for electric chain hoists.

We used both average and specific data for the LCA. The ecoinvent version 3.8 life cycle inventory database (cut-off system model) was the average data source for our LCA calculations and analyses. Additionally, we collected and used specific data on our products. Specific data was collected on the product structure and materials of the C05 hoist, in-house production processes, selected first-tier suppliers (i.e., suppliers with which we have a direct business relationship) and its use phase. This data was especially crucial for the use phase because usage levels can vary significantly between individual hoists depending on customer needs.

We analyzed usage data from customer equipment for calculating typical hoisting runtimes and together with internal experts' knowledge we modelled typical usage in the customer environment considering the running times, typical loads, hoisting distances and speeds. Power measurements were carried out in a laboratory environment on physical hoists considering various operation phases. These gave a representative figure for typical use profile and typical electricity consumption.

C05 climate impact results

C05 hoist total climate impact result was up to 643 CO_2 eq. kg considering all the lifecycle phases and use for 10 years.

The most significant part of the climate impact in the lifecycle of an C05 hoist comes from the processing of raw materials which is done for the manufacturing of the hoist components. The raw material phase excludes the burden of recycled materials. Steel and aluminum production causes a high amount of value chain emissions.

The second largest amount of climate impact of the hoist lifecycle is created when the hoist is in actual operation (typical use), mostly due to the GHG emissions related to electricity production used for powering the hoist. Maintenance, including service technicians' visits to customers and spare parts production, is the third most significant source of emissions. The climate impact of the dismantling and preparing for recycling includes the transportation of the discarded product to a recycling facility and its processing, but excludes material recycling credits.

Konecranes offers general overhaul, retrofitting and modernization services that can extend the life of the hoist and thus reduce its environmental impact. These, however, were excluded from the LCA analysis, as we focused on the basic product configuration. Customers can also lower their operational climate impact further by using electricity from renewable sources on their site.

We analyzed C05 lifecycle environmental impact from various viewpoints such as climate impact, fossil depletion and mineral depletion. In this EPD, we focus on the climate impact results. Other environmental impact results can be shared on demand.

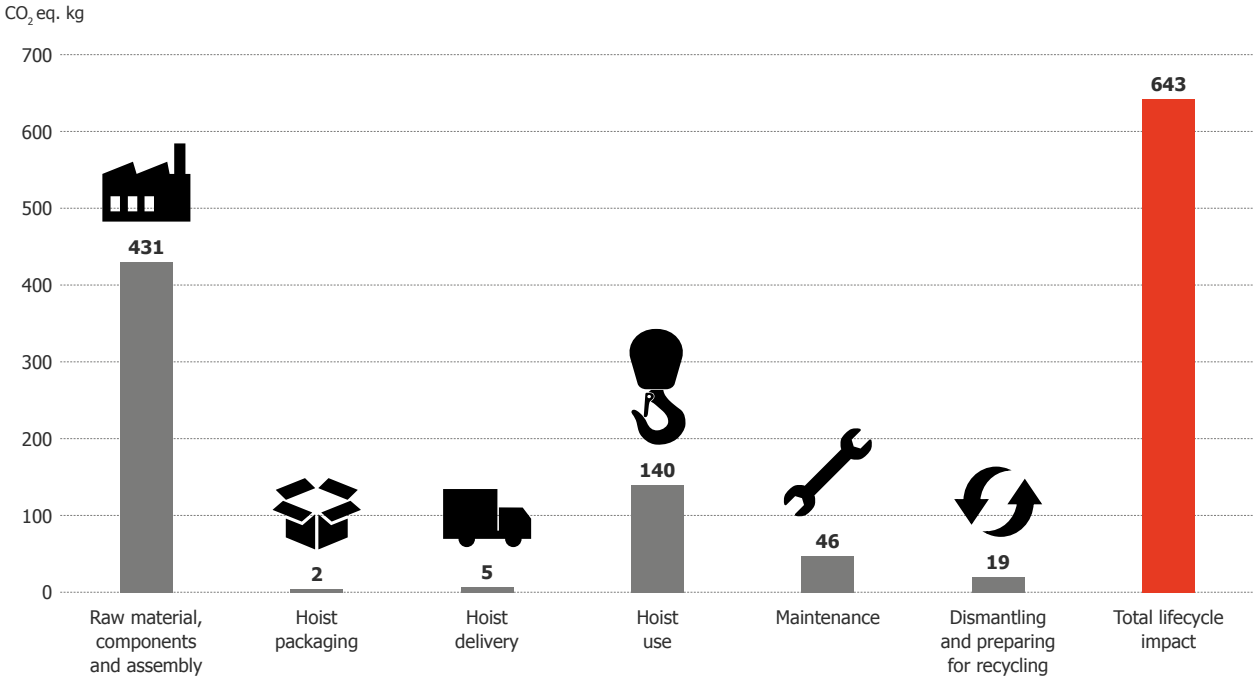


Figure 2. C05 lifecycle climate impact results in kg CO_2 eq.,* representing 10 years of use in a workshop application, use in Europe

* Impact assessment methods: CML2001, update 2016. The term "Global Warming Potential (GWP 100a)" is used instead of climate impact in CML methodology.

Use phase energy consumption and climate impact

Hoists are electrically powered, mostly by supply from a main outlet. We analyzed the power consumption and climate impact on a C05 chain hoist in its typical use, using a typical cycle as the basis of the calculations.

The typical cycle used in C05 LCA was defined by Konecranes' internal experts and consists of following stages:

1. 1.25 m of load lifting
2. 1.25 m of load lowering
3. 1/3 lifting and lowering time with low speed
4. 2/3 lifting and lowering time with fast speed

Fifty percent of the cycles were hoisted with a typical load of 150 kg and 50% of the cycles with an empty hook. The number of yearly cycles is 4,000 (2,000 with the typical load + 2,000 with an empty hook). A C05 hoist used in a workshop application for one working shift per day uses about 361 kWh of electricity in 10 years. The way customers use the hoist can change the energy usage and climate impact results significantly. When we only look at the hoist usage, using the C05 hoist at the maximum capacity consumes more energy and the climate impact of its use phase is three times more compared to typical customers of this line of product.

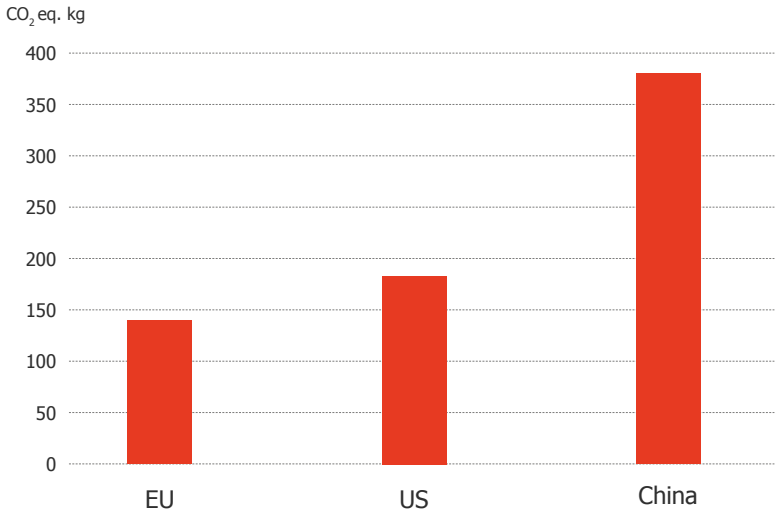


Figure 3. The operational climate impact of the C05 hoist in three different geographical regions over 10 years of use in a typical workshop application. Operational electricity demand is the same in all three regions.

Figure 3 shows how the climate impact of the use phase changes in different (geographical) regions by using different ways to produce energy (e.g., hydro, nuclear and fossil fuels). The demand for electricity stays the same in every case.

Manufacturing and logistics

Konecranes is committed to science-based targets (validated by the Science Based Targets initiative) for reducing emissions by 50% by 2030. These targets are aligned with the ambition of the Paris Climate Agreement of limiting global warming to 1.5°C. We work to decarbonize our own operations by continuously improving the energy efficiency of our manufacturing operations while maximizing the share of renewable energy sources. We're also improving the fuel efficiency of our service vehicle fleet.

We follow our internal guiding principles for chemical handling, energy and emission management, and waste and resource management globally, setting the company standard for environmental management. The majority of our factories have an ISO 14001:2015 Environmental Management System in place, requiring continuous development, solid risk management and annual targets. In all our factories, including the factory in Wetter, Germany, we use 100% renewable electricity to produce the C-series and other products.

We expect high ethical standards of ourselves and our business partners. And as we work with companies around the world who provide materials and components for Konecranes we expect all of our suppliers and subcontractors to commit to the same ethical, environmental and labor-related principles that we ourselves apply. To help mitigate risk in our supply chains we ask our suppliers to follow our Supplier Code of Conduct which describes the standards we expect from our business partners.

In addition, we pay attention to efficiency in logistics and packaging. The C-series logistics chain is optimized to minimize cost and decrease emissions. The old chain hoist package used in the central factory was redesigned and replaced with a new package made from fully recyclable materials. The new package was tested rigorously internally and externally to ensure the same quality of packaging. The climate impact of the new package is 59% of the previous package, it is fully reusable and 100% recyclable.

The emission reductions gained through choosing fewer and lighter materials and components multiply during delivery as there is less physical mass to transport.

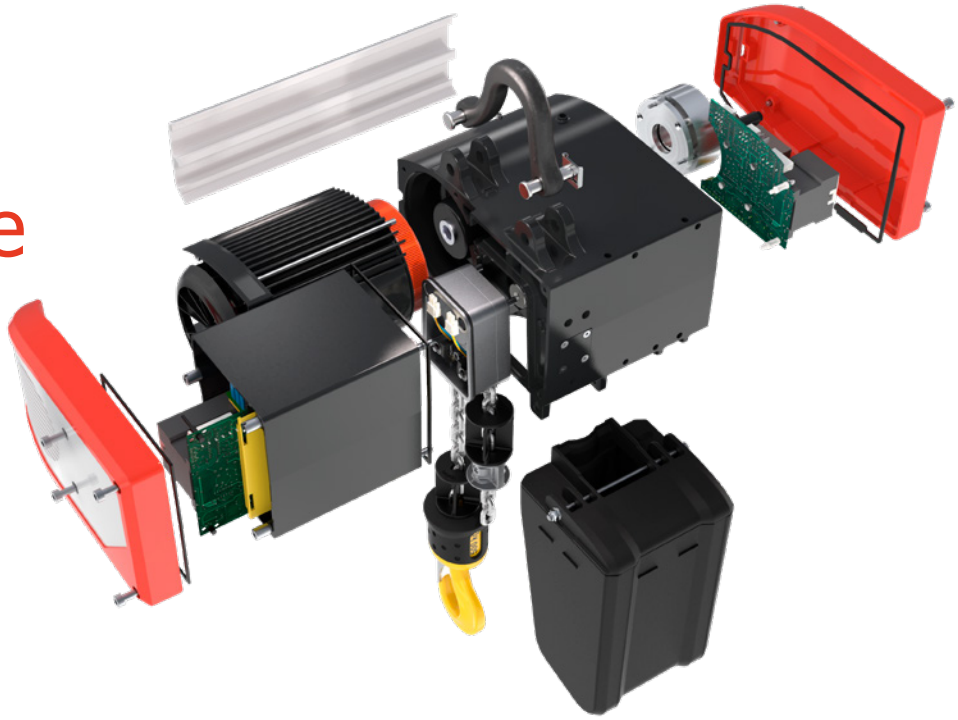
Maintenance

The lifecycle of our products can last for decades—so by investing in smart, resource- and energy-efficient products our customers can significantly reduce their environmental impact. A hoist that runs smoothly means less maintenance, spare parts and electricity.

Timely repairs and proper maintenance support the safety and performance of the C-series hoist. We offer regular maintenance to keep a high level of performance and avoid unplanned downtime or early wear and tear of components. Konecranes' service operations help extend the life of customers' equipment through maintenance and repairs, remanufacturing of parts, retrofitting and modernization. We provide service and spare parts in nearly 50 countries worldwide.

An active service program is vital to maintaining the safety and productivity of lifting equipment. Regular inspections and preventive maintenance activities help identify risks and opportunities for improvement. In this way sudden service visits to customers' sites can be minimized and maintenance can be planned in an optimal way helping to reduce emissions. Careful planning and management of service activities helps minimize the climate impact in the maintenance phase of the equipment's lifecycle. Konecranes' technicians service, on average, four assets per one customer visit.

Dismantling and end-of-life



The C-series hoist is compact and lightweight so it can be easily relocated and reused if a customer's production set-up changes. This reduces the need for scrapping existing lifting equipment and producing new equipment, thus lowering the environmental impact through less raw material acquisition, component production, transportation and waste handling. The standard suspension bracket of the C-series fits into a majority of trolleys available in the lifting market, so it can be re-located effortlessly.

The C-series hoist can be recycled to a high extent as more than 90% of the hoist materials are recyclable metals. The customer is responsible for taking care of the equipment when it reaches the end of its life span. When that happens, the hoist materials can be utilized for a new purpose or they can be recycled based on available infrastructure.

Waste material from installation, maintenance or dismantling should be taken care of by the customer according to local regulations. Dismantling should always be planned and executed by licensed professionals. Regulations and methods vary regionally, but we expect that our customers always use licensed waste-handling companies for industrial waste disposal and/or recycling of the recyclable materials.

Proposed waste handling methods*

MATERIAL	HANDLING METHOD
METALS	Materials recycling, multi-metal scrap recycling
PLASTICS	Recycling, if applicable or incineration as energy
ELASTOMER PARTS	Recycling
ELECTRICAL AND ELECTROMECHANICAL COMPONENTS	Recycling, e-waste management
LUBRICANTS (GEAR OIL, BEARING GREASE)	Oils should be removed from the hoist before end-of-life recycling. Oil can be regenerated or treated as hazardous waste.

*We encourage waste handling to be based on the EU Waste Framework Directive 2008/98/EC

Product description of C-series hoist used in this EPD

C05 P 08 1 050 5	
LOAD	500 kg
REEVING	1/1
HOL (HEIGHT OF LIFT)	5 m
DUTY CLASS	M5
HOISTING SPEED (HIGH/LOW) 50HZ NETWORK	8/2 m/min
HOIST WEIGHT WITH PUSH TROLLEY	52 kg

To ensure the validity of this Environmental Product Declaration (EPD), an independent third party, VTT Technical Research Center of Finland Ltd. has critically reviewed the Life Cycle Assessment (LCA) calculations used as basis for this EPD. "Critical review" refers to a process in which VTT has provided feedback and advice on the LCA calculations used for this EPD composed by Konecranes. VTT is one of the leading R&D organizations in Europe. This EPD is available in several language versions. The critical assessment applies to the original English version of this EPD.

Konecranes is a world-leading group of Lifting Businesses, serving a broad range of customers, including manufacturing and process industries, shipyards, ports and terminals. Konecranes provides productivity enhancing lifting solutions as well as services for lifting equipment of all makes. In 2022, Group sales totaled EUR 3.4 billion. The Group has approximately 16,500 employees in around 50 countries. Konecranes shares are listed on the Nasdaq Helsinki (symbol: KCR).

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