



Move more. Waste less.

Decarbonising warehouses:
innovative solutions and
key benefits at a glance.



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Businesses are under growing pressure: they must operate with ever-greater efficiency while also complying with increasingly stringent environmental regulations. Decarbonisation offers the potential to achieve both. Our white paper explores how to make your warehousing processes more sustainable. Featuring clear examples and practical steps, it provides a comprehensive guide to forward-thinking intralogistics.

01 Decarbonising material handling: why it's a priority now.

To address growing environmental and economic demands, businesses are increasingly required to reduce their emissions while improving efficiency and performance. Decarbonisation has become a key focus – and rightly so.

The Paris Agreement has set a clear objective: to limit global warming to a maximum of 1.5 °C. Central to this is decarbonisation – the reduction of CO₂ emissions and other greenhouse gases, collectively measured as CO₂ equivalents (CO₂e).^{1,2} The nations that signed the agreement are committed to achieving this target by implementing regulations, with particular emphasis on industry as one of the largest sources of emissions. For businesses, the task is clear but challenging: to comply with these requirements and achieve significant reductions in emissions across all processes.

Material handling plays a key role here.

In many areas, it's possible to achieve not only CO₂e reductions but also economic advantages simultaneously, regardless of the industry. For example, software solutions for route planning optimise resource use and minimise empty runs. Automation solutions further enhance efficiency by maximising storage space utilisation. Both measures save time and reduce costs, delivering tangible financial benefits.

The good news: decarbonisation offers benefits on many levels.

Adopting sustainable solutions not only improves environmental performance but also boosts efficiency. It also helps position your business as forward-thinking and responsible. When done right, decarbonisation can be a powerful driver of both sustainability and profitability.

At a glance: Scope 1, 2 and 3 emissions

Greenhouse gas emissions are divided into three categories, depending on the source and the party responsible.

- Scope 1** Direct emissions from sources owned or controlled by the company, such as heating boilers, furnaces or vehicle fleets.
- Scope 2** Indirect emissions from purchased energy that is generated externally but used by the company – for example, electricity or district heating.
- Scope 3** Indirect emissions across the entire value chain that are not directly controlled by the company. These include, for example, purchased goods and services.

¹ EHA. Decarbonisation: The Path to a Carbon-Free Economy. Available at: <https://www.eha.net/blog/details/dekarbonisierung-entkarbonisierung.html>

² The Greenhouse Gas Protocol. Available at: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

Source: The Greenhouse Gas Protocol. Available at: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

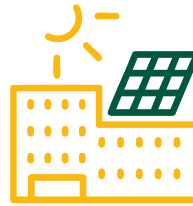
The three stages of decarbonisation.

A detailed analysis of energy consumption and emissions forms the foundation for the following three stages. Identifying key hot-spots is essential for companies to develop targeted measures and establish specific reduction goals – paving the way for sustainable decarbonisation.

1.

Prevention

Actions aimed at stopping emissions before they are produced.

**2.**

Reduction

Actions that decrease existing emissions by improving efficiency and leveraging technological innovation.

**3.**

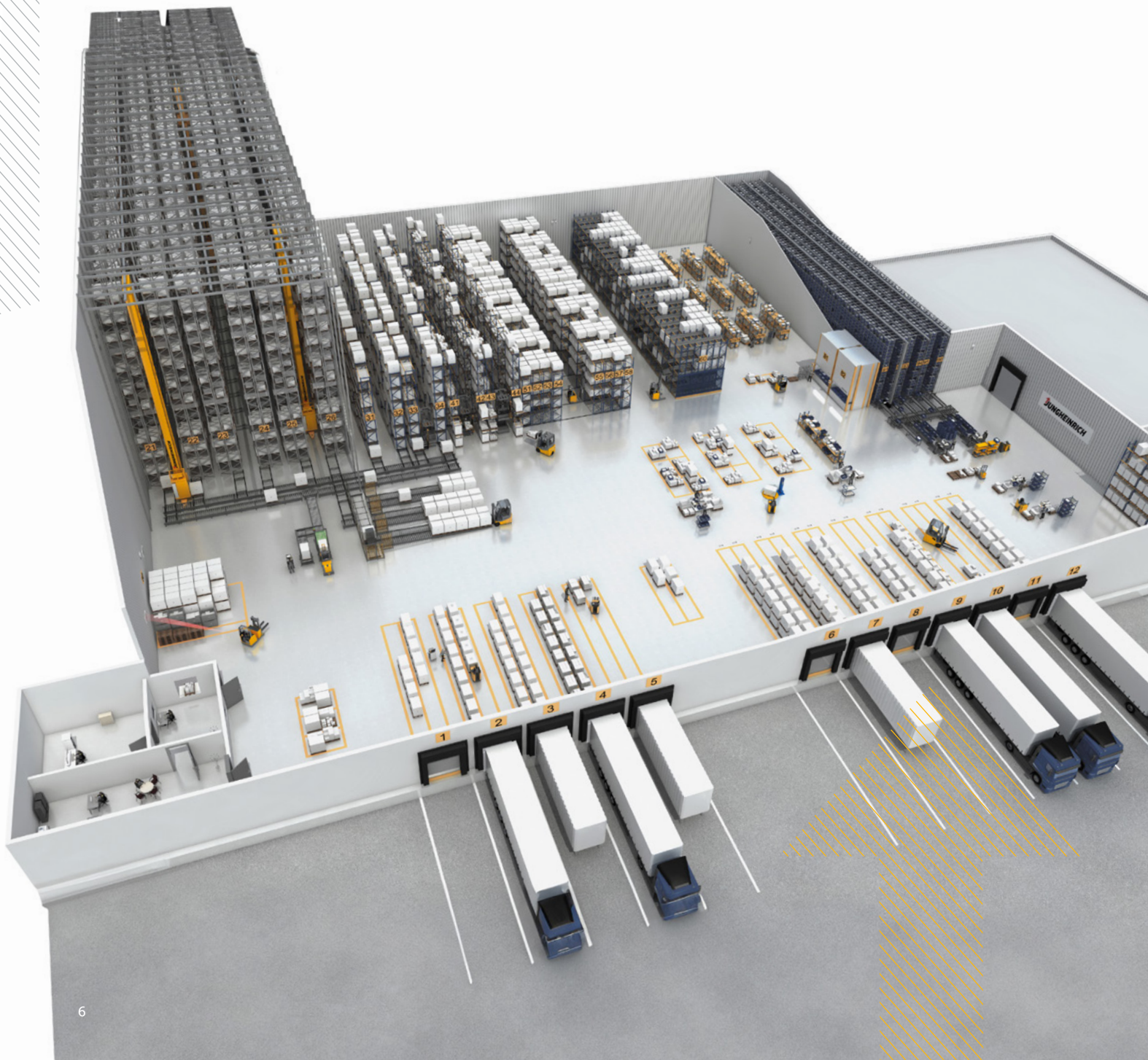
Neutralisation

Actions that balance unavoidable residual emissions, such as through CO₂e offsetting.



Decarbonisation as a competitive edge.

Companies that cut their greenhouse gas emissions play a vital role in tackling climate change. Best of all, it's not only beneficial for the environment – it also provides businesses with the chance to secure significant economic advantages.



How decarbonisation can benefit you.



Reduce costs

By adopting energy-efficient operations and processes, businesses can lower their operating expenses.



Strengthen resilience

By producing their own energy, for example with photo-voltaic systems, businesses can cover part of their energy needs themselves, increasing sustainability and reducing dependency on external suppliers.



Improve air quality

Electric industrial trucks generate no direct emissions during operation. This enhances air quality and hygiene in warehouses while also reducing direct CO₂e emissions.



Increase efficiency

Automation solutions not only cut CO₂e emissions but also offer the opportunity to significantly reduce operating costs and improve process reliability. They support more compact storage layouts, enabling greater storage capacity within the same space.



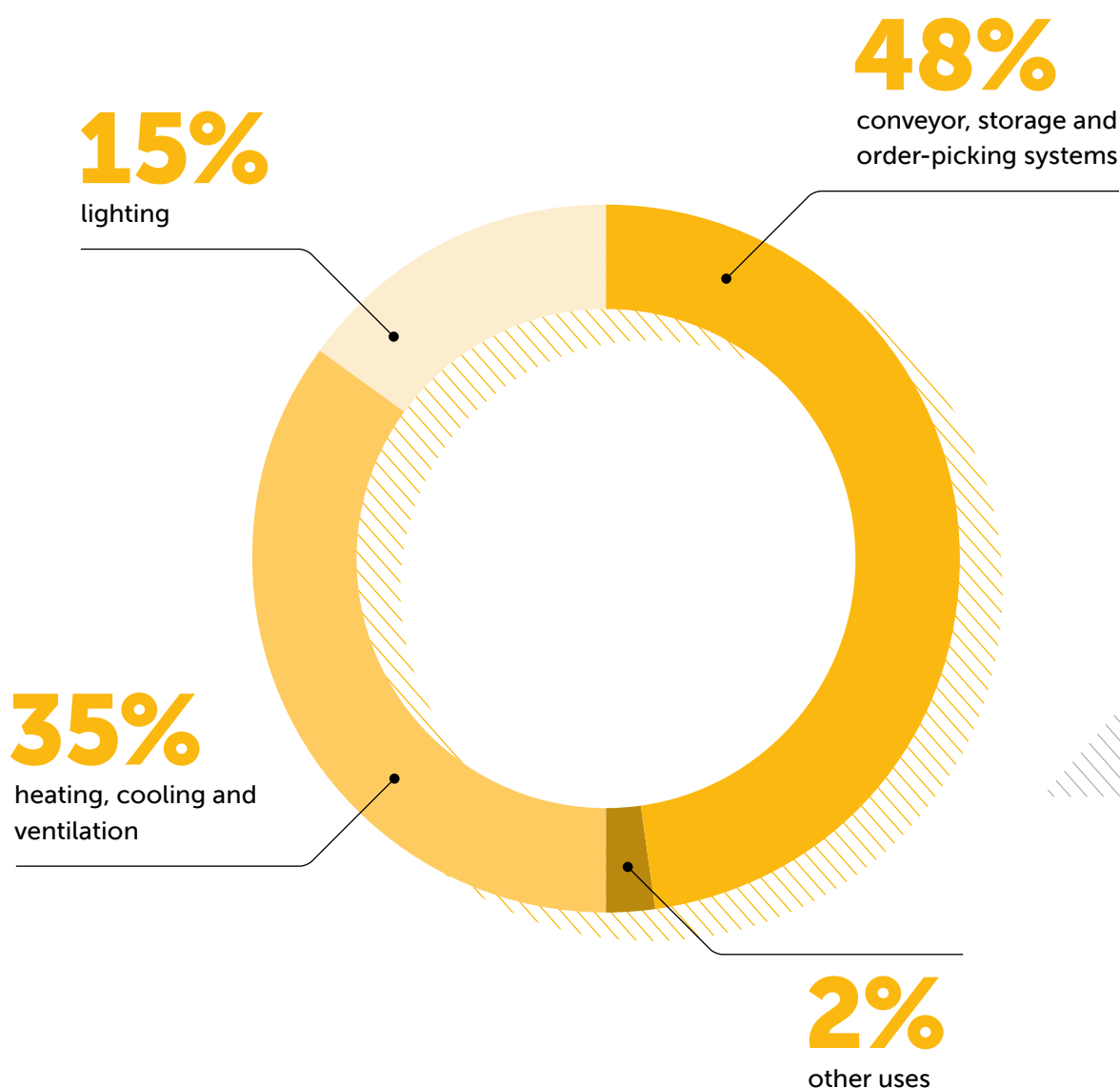
Boost productivity

Advanced software solutions for load optimisation, route planning and fleet management enable more efficient use of resources, reduce fuel consumption and enhance operational performance. These tools help streamline processes and maximise throughput.

05 How can businesses cut emissions in the warehouse?

Businesses have significant potential for cost savings through various adjustment mechanisms. This potential can be unlocked through targeted measures – ranging from energy-efficient lighting to automated transport systems. The greatest opportunities, however, lie in conveyor, storage and order-picking technologies, which are key for improving efficiency in warehouse operations.

Warehouse energy consumption



Five steps to improve your warehouse

Drive electrification forward

Electric industrial vehicles eliminate direct greenhouse gas emissions in warehouses. When powered by renewable electricity, emissions can be reduced even further. Strategically placed charging stations also enable more efficient route planning. Moreover, lithium-ion batteries offer distinct advantages: they are more efficient and have a longer lifespan than traditional lead-acid batteries.

Use renewable energy

Installing photovoltaic systems on warehouse roofs allows businesses to generate their own electricity, increasing independence from energy price fluctuations and reducing exposure to external market volatility. Surplus energy can be stored, used on-site or fed into the public grid. Smart peak load management further helps to smooth out consumption spikes and cut costs.

Optimise the building envelope

Improved thermal insulation can cut energy consumption in industrial buildings by up to 35%.¹ Modern heat recovery systems further reduce the energy required to heat warehouses. Additional measures such as insulated windows and doors, dock shelters, air curtains and automated doors can significantly minimise heat loss.

Promote digitalisation and automation

Adopting warehouse management systems can streamline logistics processes and lower energy consumption. Smart systems for controlling goods movement also enhance operational efficiency.

Increase energy efficiency

Energy-efficient LED lighting, combined with motion detectors and timers, can cut lighting-related energy costs by up to 95%.² Efficient heating and cooling systems can reduce overall energy use and associated costs by up to one third.³

¹ Baulinks. Study: Energy Efficiency in Industrial Buildings Delivers More Than Just a Green Corporate Image. Available at: <https://www.baulinks.de/webplugin/2013/2223.php4>

² Luxiona. Modernisation of Lighting: Sustainability and Savings Through Lighting Replacement. Available at: <https://luxiona.com/de/wissen/modernisierung-der-beleuchtung-nachhaltigkeit-und-einsparungen-durch-den-austausch-der-beleuchtung>

³ Ökofen. Heat Pump and Solar Thermal: Maximising Efficiency with Hybrid Heating Systems. Available at: <https://www.oekoefen.com/de-de/hybrid-waermepumpe-solar/>

More capacity, fewer emissions: Bohus's automated warehouse.

Decarbonisation is not just a buzzword. For businesses striving to adopt more sustainable practices, it often requires sweeping transformations – bringing with them significant opportunities. A compelling example of this is the central warehouse of Bohus, Norway's largest furniture retailer, located in Lillestrøm. In partnership with Jungheinrich, Bohus has introduced an innovative, automated warehousing solution.

The challenge

Bohus aimed to address growing customer expectations for product availability and delivery efficiency by overhauling its warehouse operations. However, the company's ambitions extended further: it sought to increase storage capacity, streamline processes, lower energy consumption and, as a result, reduce its emissions.



The solution

A state-of-the-art high-bay warehouse with 32,000 storage spaces automates the handling of containers, standard pallets and bespoke pallets. The Jungheinrich Warehouse Control System (WCS) in conjunction with the existing ERP system offers greater transparency of the product range, helping to reduce excess inventory. By deploying vehicles powered by lithium-ion batteries and a storage-and-retrieval system that uses energy recovery technology, Bohus has achieved a 17% reduction in both operating costs and energy consumption.

This fully automated warehouse solution exemplifies how sustainability and efficiency can work in harmony. For Bohus, it has resulted in not only more streamlined storage but also shorter internal transport routes and improved delivery capabilities – key milestones on the journey towards becoming a more environmentally friendly business.

For more information: <https://www.jungheinrich.de/ihre-loesungen/kundenbeispiele/bohus-1310696>



Outcomes & customer benefits



Long-lasting and efficient technology



Better inventory oversight and delivery reliability



Increased safety and fewer errors



Faster workflows and greater throughput



17% reduction in energy consumption

Jungheinrich solutions for sustainable warehouse logistics.

Jungheinrich is a leading provider in intralogistics, driving the sustainable transformation of warehouse environments. With energy-efficient products and smart solutions, we support businesses on their path towards achieving greenhouse gas neutrality.

New equipment with lower consumption

From the very start of development, we prioritise energy efficiency and material utilisation. By 2025, we aim to equip 50% of our delivered industrial trucks with lithium-ion batteries.

These batteries produce approximately 21% fewer CO₂e emissions over their entire lifecycle and consume up to 20% less energy in daily use compared to lead-acid batteries.

Adaptive energy management

We take a holistic approach to energy solutions, tailoring all aspects of energy supply and usage to individual requirements.

Our experts design customised, efficient energy and charging concepts, offering comprehensive advice to help our customers minimise energy costs and emissions.

Refurbished models that strengthen the circular economy

Our refurbished industrial trucks generate up to 80% less CO₂e compared to new production vehicles and cost approximately 40% less. They actively support the circular economy by extending product lifespans and reducing the need for new vehicles.

For over 15 years, we have championed the circular economy, achieving a reuse and recycling rate of 99% per vehicle today: 93% reuse and 6% recycling.

Rental vehicles that offer double the benefit

Circumstances can change quickly: our short- and long-term rental options provide customers with the flexibility they need.

What's more, rental vehicles are a cornerstone of the circular economy, with 90% of refurbished vehicles originating from our rental fleet.

Automated and digital solutions driving efficiency

Our automated systems and mobile robots improve warehouse safety and efficiency, enabling energy savings of up to 17% during operations.

Digital solutions, such as the Jungheinrich Warehouse Control System, streamline goods flow, enhancing both efficiency and safety while optimising the use of available warehouse space.



Material flow consulting that delivers clarity

Sustainable investment decisions demand clarity, especially when it comes to energy consumption. By providing a comprehensive overview, we support our clients in systematically reducing energy use and emissions.

Whether the goal is to enhance operational capacity, improve resource efficiency, or maximise warehouse utilisation, we offer integrated, all-in-one consulting. We help ensure that existing infrastructure is used effectively and sustainably.

Value-preserving service

Our after-sales service ensures that the maintenance and servicing of industrial trucks at our customers' premises are conducted both effectively and efficiently.

Using dynamic route planning and targeted fuel-saving training, we achieve fuel and energy savings of up to 15%. Together with the electrification of the fleet, we are actively contributing to the reduction of direct greenhouse gas emissions.

Insights into Jungheinrich's sustainable transformation.

1. Fully electric product range since 2023

All our new industrial trucks are entirely electric, helping to cut emissions and support energy-efficient solutions.

2. Commitment to renewable energy

We prioritise renewable energy at our production and office sites to reduce our CO₂e footprint.

3. Transitioning the company fleet

We are expanding our electric company fleet, including in customer service, to reduce CO₂e emissions and support the shift towards sustainable transport solutions.

4. Sustainable value chain

By adopting circular economy principles and resource-efficient production, we are enhancing sustainability throughout the entire value chain.

5. Transparent supply chains

We are committed to improving transparency across our supply chains and fostering close collaboration with our suppliers.

6. Global human rights code

We actively promote fair working conditions across all aspects of our global operations.

For the latest updates on our progress, please visit our website: <https://www.jungheinrich.com/en/sustainability>



The journey to sustainability: start today.

Decarbonisation represents a genuine opportunity for businesses. In material handling especially, it is clear how companies can implement the right measures not only to lower their CO₂e emissions but also to enhance efficiency and strengthen their position in an increasingly environmentally conscious market.

Key drivers of this transformation include energy-efficient technologies, the adoption of renewable energy, and the shift towards a circular economy. This is no longer simply about meeting legal requirements – it's about proactively

shaping the future. Businesses that invest now and adapt their processes can reduce costs, can bolster their reputation as sustainable organisations and gain distinct competitive advantages.

Material handling holds a pivotal role as a direct lever for achieving climate goals and securing a sustainable future. When is the right time to act? Now. Speak to us today and embark on your sustainable transformation journey with Jungheinrich.



Leading in material handling: supporting you globally.



● Direct sales subsidiaries
in 42 countries.

○ Partner companies in more
than 80 additional countries.

Over 20,000 employees
worldwide.

More than 6,100 customer
service engineers globally.

Jungheinrich, founded in 1953, is one of the world's leading providers of material handling solutions. With an extensive range of industrial trucks, automated systems, warehouse equipment and services, we deliver bespoke solutions to ensure you can focus fully on your core business. If you are looking to decarbonise your material handling operations, we are ready to support you with our expertise – efficient, innovative and sustainable. Thanks to our exceptional direct sales and service network, you can count on having a reliable partner by your side, no matter where you are in the world.

Move more. Waste less.

Jungheinrich products and services – driving efficient and sustainable material handling.

Tel. 801 300 801
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ISO 9001 The German production
ISO 14001 facilities in Norderstedt, Moosburg
and Landsberg are certified.

CE Jungheinrich industrial trucks
comply with European
safety standards.

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