

The future is

ELECTRIC

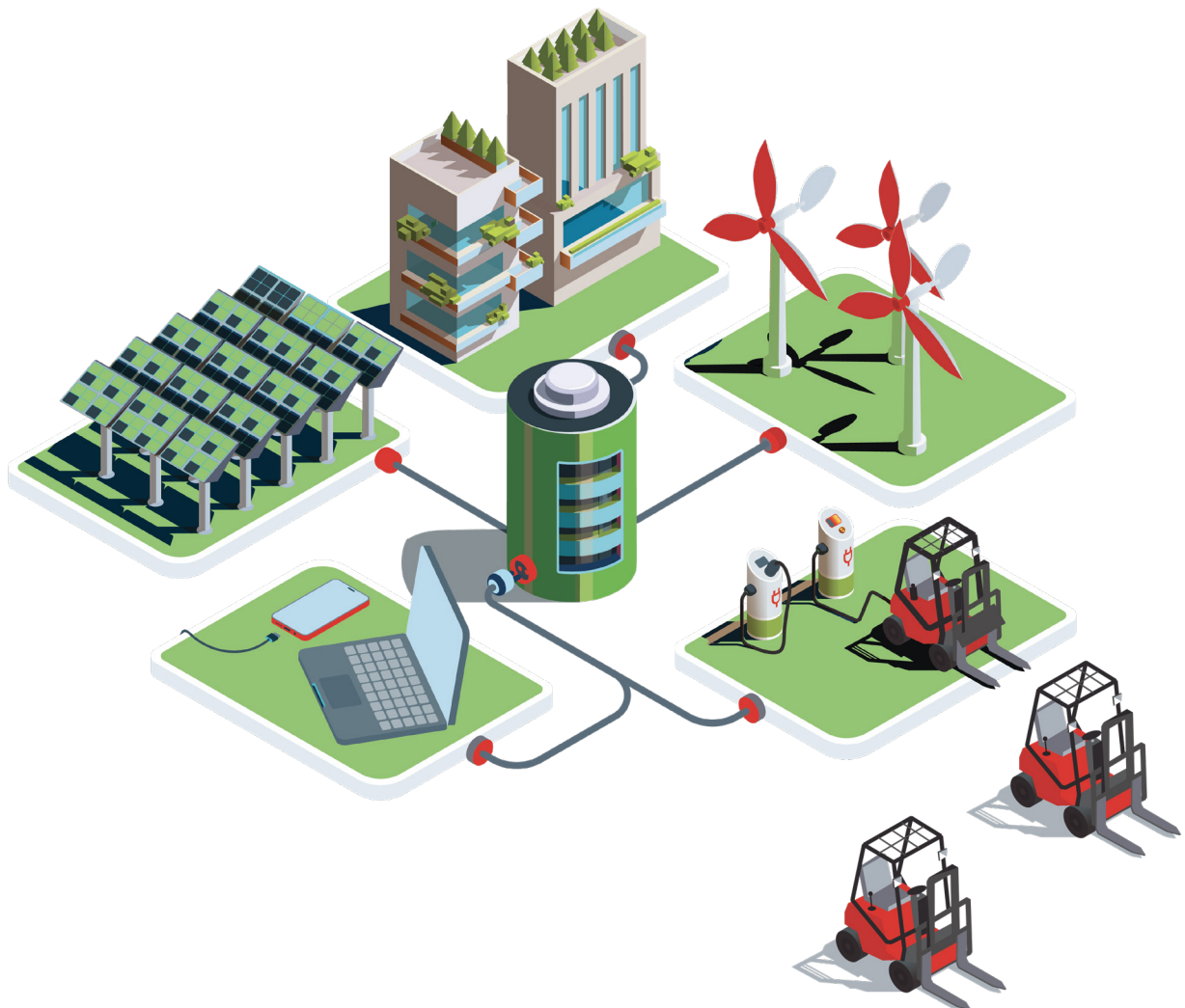
Electrification within heavy industrial vehicles.
Where are we today and what it means?

A whitepaper by Kalmar with voices from ABB, RISE,
Umeå Energy, InnoEnergy, and Electrification Hub



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Executive summary

The world is transforming, not just digitally; we are experiencing one of the greatest mechanical revolutions in modern times—with electric power at the forefront.

New technological advances, increased global environmental awareness, and stricter requirements for industrial emissions in the EU pave the way for an electric transformation where electric motors replace internal combustion engines.

Within the heavy industrial vehicles and equipment category, the number of battery/electric-powered vehicles is limited. As a result, the need for battery electric solutions exceeds today's market supply. Leading industrial companies have identified electrification of the fossil-fuelled vehicle fleet as an essential key to achieving internal environmental requirements and meeting stricter legislation.

In this article, we cover the challenges, opportunities, and future of heavier vehicles, along with what is required of companies and society in the transformation towards sustainable alternatives. Most studies, including this one, show that electrification of heavy machinery and equipment has environmental benefits as well as production technology and power benefits.

- Already today, there are substantial financial benefits for operators in terms of the total cost of ownership. After 2.5 years, electric trucks are more profitable than diesel. This is mainly due to the lower electricity cost, significantly higher energy efficiency, lower maintenance costs, and better measurability compared to diesel.
- Electrification of heavy industrial vehicles is a simple and cost-effective solution to meeting EU requirements and future goals. The EU has set a target of achieving net-zero CO₂ emissions within the industry by 2050—in line with the Paris Agreement. Several companies in Sweden which have already joined need to show significant results by 2030. Internal transports, in particular, have proven effective in achieving intermediate targets for 2024 and 2025.
- A big challenge lies ahead for businesses. Adaptations for electric power, planning, and training are required. In several cases, there are also internal cultural differences that slow down the transition. Clear and strong messaging across the entire organisation contribute to success in companies at the forefront.

This study illustrates the benefits mentioned above, the challenges, and the urgency of starting the transition today.

What is a heavy

electric truck?





What is a heavy electric truck?

This article covers the heavy truck segment, defined by trucks and vehicles that can lift over 9 tons.

Heavy trucks play a central role in internal logistics, especially in the steel, forest, mining, and port industries.



Background

Although lighter truck segments offer mainly electric vehicles today, it is a relatively new occurrence within the heavy segment—but this is changing. We are on the verge of a significant shift linked to electrification. Over the last two years Kalmar has seen a sales increase of 58% and an increase of 570% since 2016.

Technological advancements have led to the benefits of electric vehicles outweighing the lower purchase price of diesel engines—especially when it comes to TCO. Today, the oldest electric trucks in the heavier segment have traveled 53 794 km (33,367 miles) and been in operation for around 10,000 hours, on par with many of the older electric cars on our streets. So even if the technology is new, there are well-documented statistics about usage and operation.

The technology is ready

The first heavy electric forklift truck from Kalmar has been used since 2014



53,794km
Distance travelled since 2014

9,468 h
of operation
since
2014

759,000
tons since 2014

Demand

Heavy industry and shipping account for 41% of the world's GDP. The production of steel, plastic, ammonia, and cement emits about 500 million tons of CO2 per year, accounting for 20% of the world's global emissions. These emissions have long been judged inaccessible, but companies and industries recognise the development of heavy electric vehicles as a key to meeting the EU's climate goals and future legislation.

500M

tons CO2/year
comes from heavy
industry

..That is

20%

of the world's total CO2
emissions

33%

of Sweden's CO2 emissions come
from heavy industry/logistics

At many large northern European industrial companies, the environmental issue has shifted from visions and CSR goals to more concrete KPIs with associated time frames for implementation. As part of this development, the need for fossil-free alternatives for internal transport, logistics chains, and workshop vehicles has increased exponentially.

Beyond the environmental necessity, there is great potential for companies at the forefront of the electric transition to reap benefits like increased productivity, measurability, economic savings, and safety.

Increase in orders

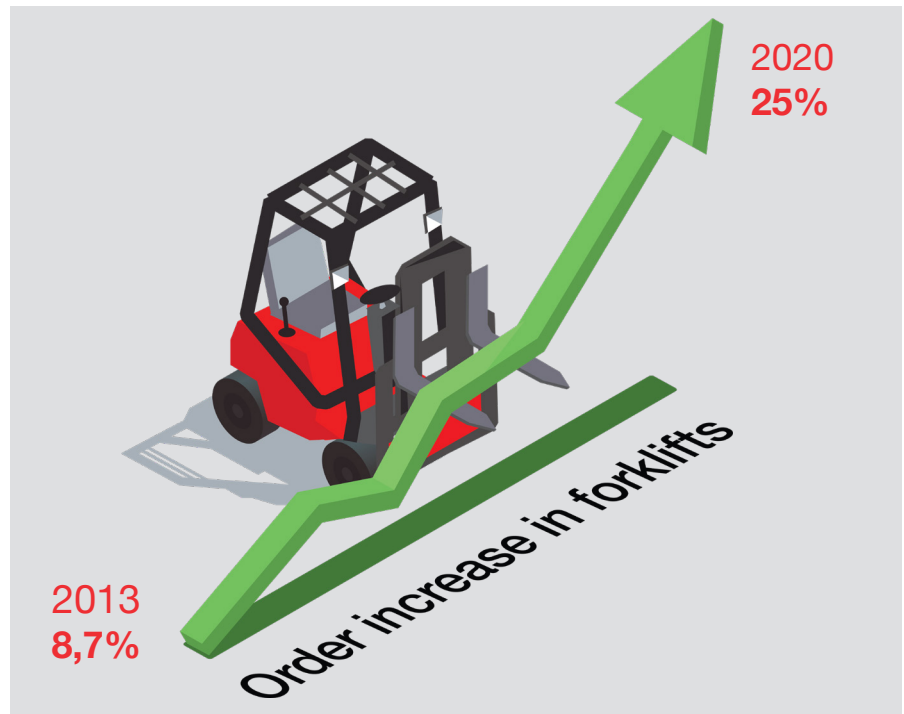
287%

2013 8.7% market share
2020 25% market share

Until the year 2022 an
increase in sales of

100%

is expected



Characteristics

In comparison with diesel-powered vehicles, electric vehicles have fewer components, meaning less maintenance. In terms of performance, there are no significant differences from diesel-powered trucks. However, there are several advantages to electric vehicles that we address in the next chapter.



Operational
benefits



Operational benefits

Swiftly and silently moving along in an exhaust-free environment is a superior experience compared to a noisy cabin, but what does going electric mean for productivity? According to Johan Granström (ABB), improved working environments (especially for indoor operations and the mining industry) will drive the development towards electricity in heavy industry.

” *In the cases we have looked at where a transition to electricity has taken place, CO2 has of course decreased, but productivity has increased so much that the competitive advantage cannot be overlooked. For instance, ABB participated in a pilot project in the Aitik mine on electrification of mining trucks. The results showed that Boliden reduced their emission with 80% on the distance covered, at the same time, the speed could be increased from 15 to 30 km/hr. This is proof that electrification not just a competitive advantage but a must.*

Johan Granström, Market Segment Lead Smart Cities, ABB



100ton

CO2/year can be saved with an electric reach stacker



2,5
year pay-off



Mythbuster #1 – Starting in low temperature

Did you know that electric trucks work perfectly in temperatures as low as -30C?

Energy usage is a bit higher, and indoor parking is essential to maintain the battery's lifespan, but other than that, cold temperatures will not affect operations.

With optimised use, switching to electricity means reduced costs and waste, increased competitiveness, and the ability to meet demands from customers with ambitious environmental goals. Visible machines in the workspace also send a strong message to the internal organisation, aligning with environmental goals and visions.

Proof of action can also be crucial in securing future investments. For example, the world's largest asset manager, BlackRock announced to its portfolio companies that they would vote against business leaders failing to invest in reducing CO2 emissions.

Traceability and measurability are crucial instruments to meeting legislation. They also provide evidence to investors demanding compliance with environmental goals.

We have compiled some direct benefits linked to operations:



62%

lower operational cost
per lift



50%

lower maintenance
costs

We have compiled some direct benefits linked to operations:

Safety

The combination of easy-to-maneuver operation, silence, and clear visibility mean a generally safer driving experience. Today's electric trucks also have other advantages such as adjustable brakes, safer driving modes with the potential to decrease energy usage, and automatic speed control with the help of geofencing.

Work environment

Silent machines with less vibration affect well-being and motivation to the extent that several studies credit increased productivity to this factor. For companies operating in densely populated areas, the quiet machines can handle more shifts as engine sounds and noise are less disturbing. Also, for businesses with sensitive goods, this advantage is significant.

Economy

The lower price of electricity and higher energy efficiency, and decreasing battery prices contribute to economic benefits. Fewer components mean less maintenance, parts needing replacement, and reduced storage requirement during the machine's lifetime.

Eliminating the need for changing the starter motor, turbo, or fuel filter means service and maintenance savings of up to 50%. Furthermore, the energy consumption in operation can be controlled more precisely, leading to further savings. (Read more under Productivity)



When we started developing our electric portfolio, we looked primarily at customer value from a holistic perspective where we focused on increasing productivity and optimising the life cycle costs. The combination of improved technology, the increased interest in reducing CO2 emissions, and the potential to be able to quickly and drastically reduce CO2 emissions is now driving the transition to electric trucks forward at an ever faster pace.

Alf Gunnar Karlgren, Vice President, Counterbalanced Container Handler Division, Kalmar



We are approaching the point where transitioning will be based on finances. When it comes to passenger cars, the breaking point is very close to the total cost. Driving an electric vehicle is already cheaper than diesel if you drive a lot. The same applies to heavy machinery. Regardless of culture, finance, and to some extent, the work environment will be deciding factors.

Björn Nilsson, Electrical Engineer, Umeå Energi.

Measurability

Today's electric trucks offer an opportunity to measure individual machines as well as the entire fleet's performance. Several studies show that this will become increasingly significant on several levels but primarily, investing in digitalisation means ensuring the suitable machine for the need. This means extracting statistics, measuring efficiency linked to energy consumption, and strategically meeting power peaks in production.



Digitalisation is an important asset that we have invested in previous years. It gives us a good understanding of how different machines work and how they are used in terms of performance, fuel consumption, etc. We can use that information to calculate the best-case scenario for our customers. For example—how to charge in the best way, which machines to start with when switching to electricity, etc. Data is essential to design the right solution for the customer, especially in this transformation.

Alf Gunnar Karlgren, Vice President, Counterbalanced Container Handler Division, Kalmar

Productivity

Easier handling and fast acceleration mean shorter operating cycles that can provide time savings and increased productivity. With longer service cycles and improved diagnostic systems, the machine's availability will also increase compared to diesel.

Delivery

Lead times on new machines have decreased thanks to new manufacturing technology. The newer machines' modularity, optimisation, standardisation, and fewer components have reduced electric trucks' complexity. There are both operational and financial advantages to ordering machines as close to the start of work as possible, including greater freedom to configure as needed, leading to more efficient use and better logistics.



We have focused on improving sustainability, increasing safety for both clients and our staff, while at the same time improving our customers' productivity. Three areas that have previously been in opposition.

Martin Hall, Country Director, Sweden, Kalmar



Batteries

and battery technology



Batteries

and battery technology

Today's market

Batteries are necessary to balance the power flow of electricity in the coming years. As the proportion of variable energy sources such as wind and solar increases, so does the need for storage. Batteries are estimated to account for about half of electric energy storage as early as 2030. During the pandemic, the production of electric vehicles has put pressure on critical minerals, raising the prices of lithium and copper. Complimentary technologies are in development to address that and other challenges related to production and working conditions.

As battery prices fall, availability also increases, intensifying the general pace of electrification.

Below is an overall summary of current technologies:

Lead-acid

Lead-based batteries have long been standard in rechargeable batteries as Lithium-ion batteries did not make their way onto the market until 2019.

Although the power relative to weight and size is slighter, there is an existing infrastructure with recycling options. About 90% of the lead-acid batteries in Europe today are recycled.

Sodium-ion

Several companies are now exploring sodium-ion technology. Based on iron instead of rarer metals, the price is up to 30x lower than lithium-ion. The batteries can handle a wide temperature range, withstand more charging/discharging before their capacity deteriorates, and charge faster than lithium-ion. The disadvantage today is the energy density, which is better than lead-acid but worse than lithium-ion.

Commercialisation is expected in 2023, with batteries charging to 80% capacity in 15 minutes.

Solid state

Batteries with solid instead of liquid electrolytes are expected to provide new possibilities in terms of charging and range. Their high energy density makes the batteries smaller and lighter, and the lack of fire- and environmentally hazardous electrolytes makes them safer. In the passenger car sector, Toyota, Nissan, Hyundai, Honda, Volkswagen, BMW Group, Ford, etc., are investing in the technology with small scale examples expected in the next few years. Temperature fluctuations, power, and price are some of the biggest challenges for this technology. Today, a cell costs thousands of euros, with applications (exclusively light passenger cars) requiring 800-1,000 cells per car.



Li-ion batteries

Demand for Li-ion batteries has increased sharply in recent years. While lead-based batteries are suitable for starter batteries in vehicles, lithium-ion has dominated the portable electronics and smaller electric vehicle markets. Today, up to 80% of the battery can be recycled, but recycling systems have not yet been commercialised. As the first li-ion-powered electric cars are approaching the end of their service life, the pressure for recycling solutions increases. In operations, there are several advantages to Li-ion batteries in comparison with lead-acid batteries:

- Faster charging times.
- The ability for the same battery to work all day through interval charging.
- Less maintenance and infrastructure.

Flow batteries

Flow batteries are stationary batteries with energy stored inside the electrolyte, outside the cell itself—like a fuel cell. This makes them optimal for storing excess energy from sources like solar and wind. The electrolyte where energy is stored can be water-based, making the batteries safe while lowering the energy density. Today, they are more expensive than lithium but have a longer lifespan, and prices are expected to drop as technology improves.

Flow batteries are a complex technology with the disadvantage that some types contain vanadium's rare and expensive metal. The charging time is longer with a low density, meaning today's batteries are stationary and unsuitable for vehicles.

Hydrogen

Hydrogen technology produces electricity in a fuel cell with a supply of hydrogen. The advantage is that it does not load the electricity grid and uses a similar infrastructure for refuelling as cars use with petrol today.

The first vehicles are already rolling, and the technology is considered a necessary complement to other solutions in the transition to a society with more renewable energy. Hydrogen is seen as a solution primarily for heavy trucks and transport vessels.

Today's hydrogen means a more complex system with a higher investment cost than pure battery solutions. Also, to be completely climate neutral, hydrogen gas needs to be manufactured without carbon dioxide.



Mythbuster #2 – Risk of explosion

Did you know that industrial batteries are constructed in a way that makes explosions extremely unlikely?

With safe handling according to guidelines and standards they are practically impossible.

Batteries

and battery technology

Which technology wins?

There is plenty of development in the field of battery technology, and most experts agree it is a non-issue that any particular technology would come to dominate in the future.

The most common battery technologies for heavy machinery have different properties adapted to use, and we will continue to see this in the future. With the right battery solution for the purpose, the electric vehicle is optimised for its use.

“Our electric reach stackers are designed to be equivalent to or better than diesel machines. We offer our customers the opportunity to choose from batteries of different sizes to optimise the machine for their exact need, which can differ greatly between a customer who drives three shifts and a customer who drives one shift or for a few hours a day. Through data, analysis, and simulations, and working with the customer, we find the perfect solution in terms of battery size and charging equipment.”

Alf Gunnar Karlgren, Vice President, Counterbalanced Container Handler Division, Kalmar

The development of battery technology will play a vital role in electric transformation. Optimised production, transport, and capacity are crucial for a future society with net-zero CO2 emissions. Vehicle manufacturers need to be responsive to the development and prepare by creating modular solutions, providing room for future changes.

“Through a modular solution, we prepare our machines for adaptation to future technology.”

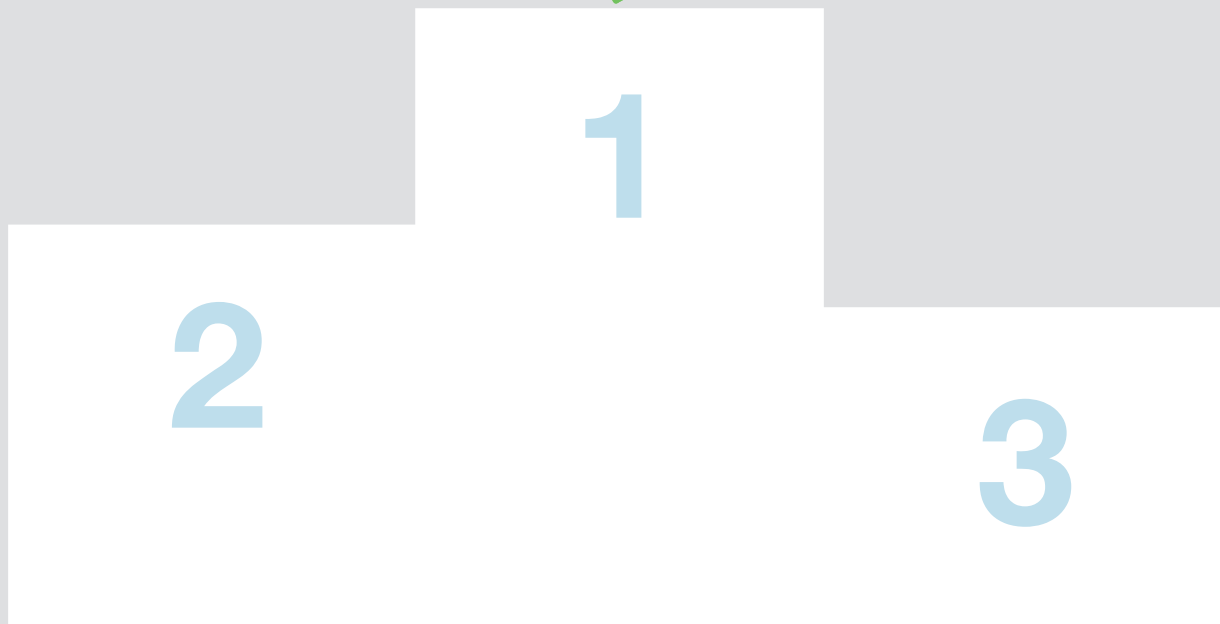
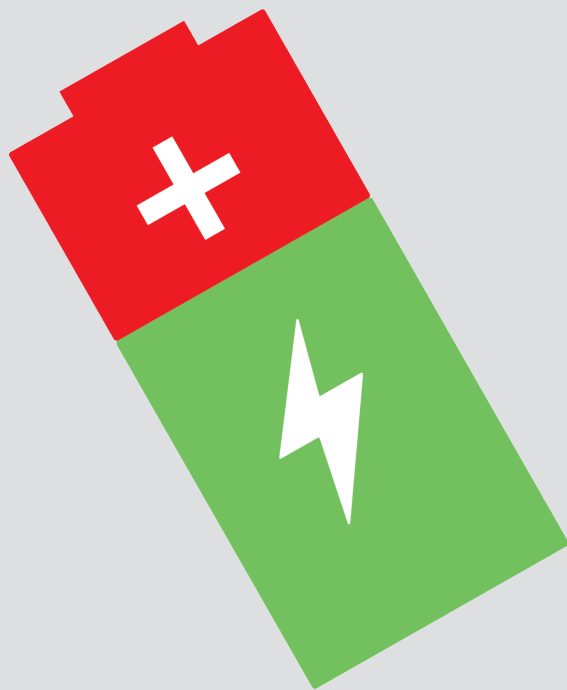
Stefan Hultqvist, Vice President FLT, Kalmar

We know for sure that diesel will not be an option in the future. With the rapid development in battery technology, the transformation is predicted to speed up in the next few years, and we will see more players in the market space.



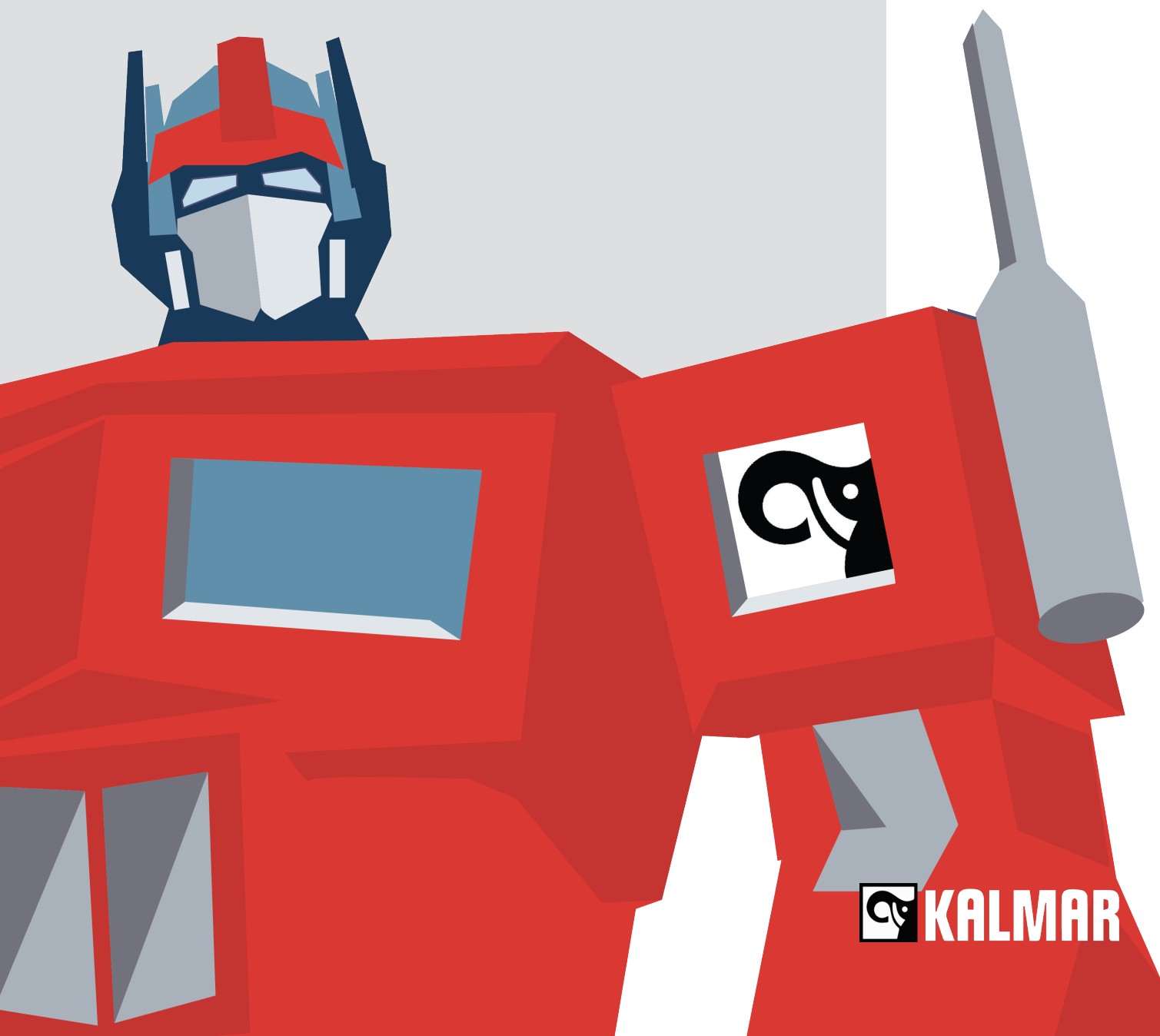
All technologies are needed. In vehicles, we see companies choosing slightly different paths; the only thing we know for sure is that fossil fuel will be phased out.

Elin Svanström, Process Leader, Electrification Hub



What does the

transformation
mean?



 **KALMAR**

What does the transformation mean?

It starts today

Though there are challenges and barriers, the transformation is happening, which means we are now facing considerable changes. How will businesses be affected by a transition to electricity? What does it mean for infrastructure, operations, electricity prices, work structures, and the market in general?

Sweden's Minister of Energy Anders Ygeman has started work on the national electrification strategy, which will be in place by the end of 2021.

"We are facing the next generation of electrification. With our electrification strategy, we are taking a holistic approach to a fast, smart, and socio-economically efficient electrification."

Anders Ygeman, Sweden's Minister of Energy, 2021

In step with falling battery prices and optimised operations, we are witnessing a transformation towards electric vehicles. While electrification within the passenger car market is taking place before our eyes, the transformation in the heavy industry is less clear—but we know it is happening.

” *It is about seeing the business as a whole and reducing resources. The goal is to switch to electricity and ensure our products use as little energy as possible. We are responsible for our products, but we also need to facilitate and influence customers and the society we live in.*

Claudio Strobl, Senior Vice President Operations, Kalmar

Electricity supply

The energy sector has seen rapid development in the last 5 to 10 years in renewable energy. This progress means that the new technologies will be cheaper to develop than coal and gas. Offshore wind power is a rapidly growing technology that will soon compete with solar and land-based wind turbines in terms of price. Green hydrogen has also reached large-scale production, and in the long run, can also compete in terms of price with traditionally produced gas. Also, some studies predict renewable energy will increase from today's 25% to about 40% of all globally produced electricity in 2030. An important insight is that outside Sweden, energy consumption is still dependent on coal and gas, so the global benefits of electric vehicles will increase even more with the development of green electricity.



Mythbuster #3 – Not enough energy

Did you know there is enough power for all? During the transformation, we need to provide the infrastructure. There is enough power, but we need to be agile and plan sustainably to grow with demand.

Opinion and legislation

Internal culture and communication in companies and organisations are both fundamental to increasing sustainability. Companies see the importance of motivating staff, retaining customers, and attracting new skills through transparent sustainability work. Public opinion is driving legislation towards stricter requirements, accelerating electrification. Tax breaks for those companies that comply and harsher penalties for those who do not, such as government-enforced shutdowns, will be decisive factors for a company's future success and survival. Environmental commitments and initiatives stemming from increased information and education are also generating societal pressure on companies.

Holistic perspective

How will electrification affect the industry in general? In the long run, it is a matter of restructuring the vehicle fleet and optimising the type and number of vehicles for the required tasks to reduce electricity use. Whether brown or green energy, it is a limited resource that we need to use wisely

” *We know our machines best of all, and that is a service we can offer our customers. With knowledge and insight into how the machines work, we can teach better handling and service to maximise the benefits with fewer vehicles.*

Claudio Strobl, Senior Vice President, Operations, Kalmar

Reducing production to fewer parts weighing less obviously means reduced CO2 emissions and can also mean economic savings. Shorter delivery times in production also provide better-optimised machines based on purpose, leading to less energy waste.

Skills of the future

The transformation along with digitalisation means significant changes in required tasks and skills. As functions are increasingly automated, time for repetitive manual work is expected to decrease from 48% in 2019 to 35% in 2030.

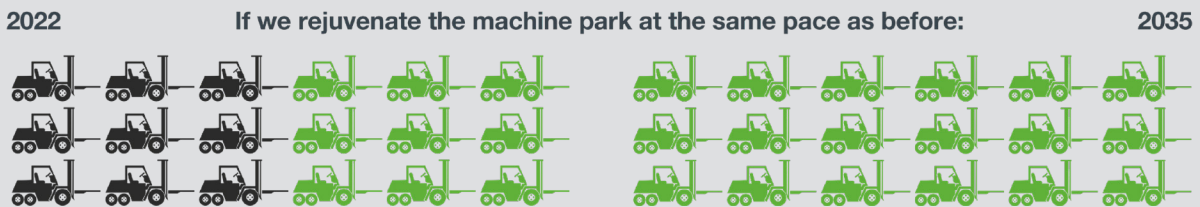
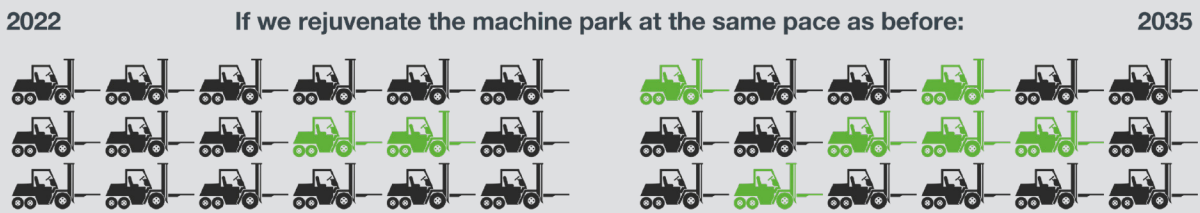
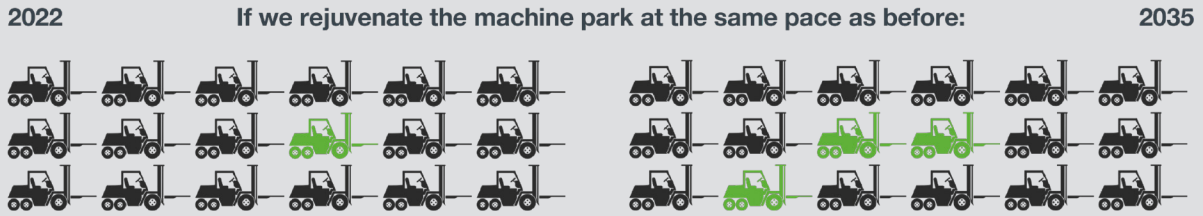
According to one study, 50% of suppliers surveyed by Deloitte and the Manufacturing Institute state that they have started automation projects. Skills such as programming, data synthesis, critical thinking, and digital excellence are expected to be high in demand.

” *A fast-moving development and an important factor for companies preparing for change is staff training company wide. Retraining is needed for staff to install electric power lines in all their equipment. Also, it is vital to ensure the entire organisation understands the change happening. An estimated 800,000 people will need to be re-educated in Europe over the next four years.*

Johan Söderbom, Thematic Leader Smart grid & Storage, InnoEnergy

Current trends such as the decline in battery prices, product development in the electricity sector, and economic and production incentives indicate an acceleration of this transformation. In this report, all interviewees have stressed the importance of preparing for a technology shift. The cost of not doing so will most likely be steep, and companies could risk their entire future. There is still time, but initiating the transition to electricity should take place today to avoid significant challenges in the future. The next chapter features data that shed light on the phenomenon and indicate where we are heading.

The transformation in numbers



...For top management

50%

of CEOs expect low carbon production by 2028

78%

already see opportunities to contribute to the Sustainable Development Goals (SDG) through their core business.

87%

of CEOs believe that SDGs provide an opportunity to rethink approaches to sustainable value creation.



We set the target of an all-electric portfolio a couple years ago. At the time, the response was mediocre but over the past year we have seen a major attitude shift within companies and organisations. Today, companies as well as legislators are on board, developing environmental programs and regulations for CO2 emissions. This has meant not only increased interest in our electric products, but also in our other ECO diesel products. It is very gratifying to see an entire industry gather strength to reduce its climate impact, and also great that we as a company can be a part of, and contribute to progress in this journey.

Alf Gunnar Karlgren, Vice President, Counterbalanced Container Handler Division, Kalmar

... For skills development



We have invested in comprehensive training programs for our service technicians in, for example, high voltage, in order to upscale our own capabilities. We see a lack of safety standards for high voltage solutions today and therefore set our own standards to be able to support customers.

Lasse Eriksson, Vice President Technology, Kalmar

85%

of the jobs that will exist in 2030 haven't been invented yet

500 million

SEK in government aid will be invested towards filling the skills gap in Sweden

47%

increase in time spent on advanced technological skills in Europe by 2030

...For the infrastructure



Renewable energy will increase from the current **25%** to about **40%** by 2030



Infrastructure can sometimes be a concern, but it has never been a significant obstacle in the electric car sector. There are many indications that the transition for the industry will not be significantly different. If you compare the energy consumption of heavy machinery for driving, it does not differ significantly from passenger cars.*

Lasse Eriksson, Vice President Technology, Kalmar

**In Sweden, electricity and hybrid solutions accounted for 50% of new car sales in September 2021.*

Ireland, Norway, India and the Netherlands are a few of the countries

banning

the sale of new gas-and diesel-powered cars by 2030.

The Swedish government granted funds of

4md SEK

in the past year in support of the transformation and more funding is yet to be granted.

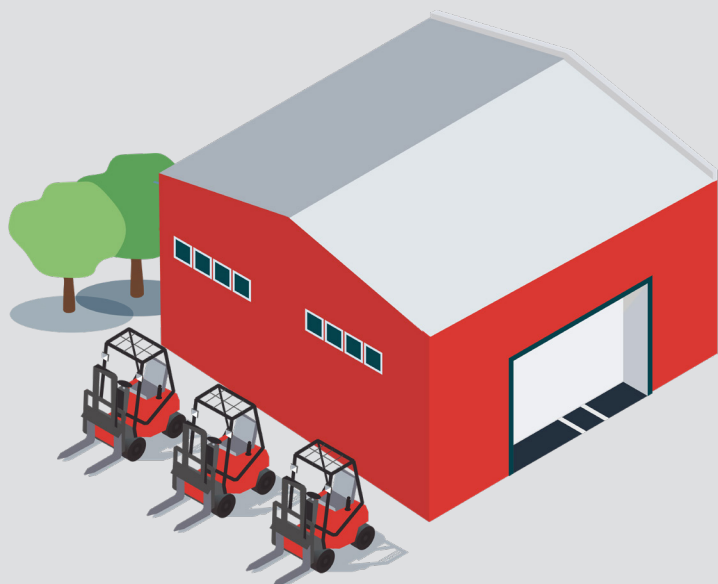
....For industry

20

There are initiatives within the European Green Deal that will significantly change buying criteria for heavy machinery.

5%

of the global economy could be the price of CO₂. Economic models show that a price for CO₂ could be about 100 dollars per ton.



Electrification is logical in many ways, and heavy machinery is particularly suitable. They operate in a limited area and never need to be far from a charging station. In terms of energy, there are opportunities in terms of reuse. Looking at automation, it is often easier to automate an electric vehicle than a diesel-powered one.

Christer Karlsson, Research & Business Developer, RISE

How companies

need to adapt





How companies need to adapt

Companies today are experiencing one of the most significant changes in modern history. What began with digitalisation has progressed into electrification, followed by automation. In addition to financial incentives sustainability is a driving force.

It is not just about environmental responsibility but also a competitive edge in technology that gives us connected and fossil-free vehicle fleets, increased measurability, and efficiency. Being compliant becomes not just a recipe for success but a matter of survival.

Staying ahead of legislation and foreseeing opportunities are essential factors to ensure long-term survival and profitability. Several studies indicate there is still time, but the time frame is narrow, and companies need to act now to secure their position in the future. Internal transports can be a good starting point on the road to net-zero emissions as they have a significant effect.

Future legislation, shareholders, and investors are driving the demand for accountability in terms of environmental impact. Being able to measure progress and follow up is paramount. For several companies, a change means increased opportunities to take investments from companies that today require reporting in line with evidence-based goals.

"We will solve this. We have no alternative. It is a matter of rolling up your sleeves and doing it. The pressure from investors and institutions will not subside. Everyone needs to change and secure their business for the future to survive."

Elin Svanström, Process Leader, Electrification Hub

The main challenge is equipping your business for the transition, through clear vision, purpose, and goals. It is about proactively reviewing infrastructures for electricity, meeting stricter legislation and higher demands from stakeholders, customers, shareholders, and responding to public opinion.

” *Rising electricity prices might make it unsustainable to charge 50 vehicles at the same time without spreading the charges strategically, developing solutions to reduce power peaks through storage, building microgrids between vehicles and other electric installations with storage capacity. It will be an advantage for both energy companies, whose networks will be relieved, and for customers saving on costs during energy peaks.*

Christian Skanderby, Project Manager Strategy & Development, Umeå Energi AB

Culture shift within organisations

Several studies indicate a discrepancy between management decisions and what happens on the floor.

We see the importance of communicating clear sustainability goals internally and externally, aligned with other business goals, as a crucial element of driving horizontal change within organisations.

” *When it comes to sustainability issues, we need to address both the heart and brain. Usually, you have an intro through the heart. The company's core values and the feeling of contributing to a higher purpose should not be underestimated.*

Claudio Strobl, Senior Vice President Operations, Kalmar

Departments such as production, logistics, HR, and development need to set intermediate goals together and make decisions linked to the sustainability goals. Everyone needs to understand the purpose and importance of their role to achieve results.

Adaptation for change

A collaborative culture is a concept we hear often. It means an interaction between internal departments, suppliers, and customers to establish needs and create long-term solutions. Collaboration becomes a natural part of work, and the methodology makes it easy for employees to contribute, act and work towards common goals.

” *The electric transition is an investment for the future, and it needs to be part of the long-term plan. We have a responsibility to help our customers find the right solution through digitalisation so that the investment pays off.*

Lasse Eriksson, Vice President Technology, Kalmar

At an operational level, drivers need training in handling vehicles to optimise efficiency, minimise electricity consumption, adapt charges according to shifts and variable electricity prices. For buyers and department heads at companies, there is a need to plan for adapting infrastructure, organisation, and production. On the company management's table, collaboration with suppliers and customers is essential to drive development forward.

” *... This issue often lies alongside the core business. In those cases, the potential future effect has not fully been recognised – thinking hasn't gone far enough. But we see a shift in sustainability issues. Previously, the sustainability manager pulled the strings; the issue has now moved to operations managers and management.*

Christian Skanderby, Project Manager Strategy & Development, Umeå Energi AB



Mythbuster #4 – The operators don't understand

Did you know that drivers frequently prefer electric machines? In many cases, the environmental aspect will activate and engage employees within operations where an improved work environment is a driving force for going electric.



How companies need to adapt

Taking responsibility beyond your operations

As previously mentioned, there is a need to review value chains and work for transparency from a communication perspective and as an economic necessity. It will be necessary to understand, for example, how a lack of resources may affect the business, both externally and internally.

Steel accounts for the majority of Cargotec's CO2 footprint – about 1/3 of the total emissions. Therefore, Cargotec has started a collaboration with SSAB, in producing fossil-free steel, which will have a significant effect on CO2 emissions and the road to a neutral value chain – meaning a long-term plan to meet future increases in steel demand.

” *Understanding and taking responsibility as a company means working on both a large and small scale. In Poland we work with alternative green energy sources in our factory, and we have trained and collaborated with municipalities and authorities to implement our vision. Sometimes companies need to go ahead and lead the way. By the time the others understand, it might be too late.*

Claudio Strobl, Kalmar Global AB

Elin Svanström at Electrification Hub sees collaboration within the value chain as a recent positive trend within companies that drives and accelerates electrification in general.

” *Companies sometimes need to step outside their core business and collaborate with their competitors to overcome barriers. It's nice to see real collaboration within the value chain.*

Elin Svanström, Process Leader, Electrification Hub

Daimler and Volvo have a collaboration called cell-centric to reduce carbon dioxide emissions from heavy transport. The plan is to have a full-scale production of fuel cells running by 2025, and together they will put pressure on the EU to establish more hydrogen stations in Europe.

Scania and VW have invested several million in collaboration with Northvolt to promote the development of battery cells optimised for heavy vehicles.

Calle Lagercrantz, the founder of H2Steel and Northvolt, explains the importance of long-term and collaborative thinking in Ny Teknik's podcast. Reindustrialization requires large-scale investments to be able to finance and find the right products that customers want.

” *I strongly believe in value chain transparency: to openly disclose and enable customers to feel secure with the value chains that are put together. In all dimensions, CO2, but also costs. Customers are interested in being involved in developing value chains—with long-term agreements. Then they can, in turn, build and optimize value chains for their products.*
Carl-Erik Lagerkrantz, Chairman of the Board, Northvolt, Polarium, H2 Greensteel

While the future may feel uncertain, it also means opportunities for companies that prepare, adjust in time, and work proactively. We also see internal culture work and building strong core values within organisations as a pivotal cornerstone. Looking ahead and understanding where the world is heading and how it affects one's core business is driving more companies to work more proactively to influence infrastructure, resource availability, and workforce.

” *We notice that customers many times need a validation process - a customer who requests solutions to invest. But sometimes you need to take risks and dare to be brave to show the end customer where you are going.*
Andrew Machirant, Business Development Officer, InnoEnergy



What does the future hold?

Vision 2030



What does the future hold?

Vision 2030

Sharing is caring

As earlier mentioned, energy storage will play a major role in meeting the increased electricity demands of the future. Our energy network needs to expand at a higher rate as electrification takes off. Ports, large industrial facilities, and workplaces may have an increasingly vital societal function as energy hubs, with storage that supplies society with electricity. Battery depots, both stationary and in vehicles, can flatten the usage curve, meaning companies can mitigate energy peaks – keeping electricity costs down.

Focus on Ports

Special hubs such as ports can become strategic, central places in taking care of local needs. When companies begin reviewing their value chain and the footprint from their deliveries and exports, these focal points are at the center.

"The first step for companies is to review their emissions; the next step will be to look at the entire value chain, where, for example, the logistics chain must be included. Of course, the port plays an important role as a logistics hub, but also has the potential to play a new role in the development of society, as well as finding new revenue streams, by also becoming energy hubs."

Johan Granström, Market Segment Lead Smart Cities, ABB



Lead times for new technology

We are moving towards shorter order times, which will revolutionise the industry in several ways.

We see the importance of shorter delivery times in production, which provides better-optimised machines based on purpose. The closer the delivery takes place to the work that needs to be done, the faster the customer can begin adjustments and meet immediate needs and specific purposes. This also allows new technology to be implemented faster.

Agile Technology

The future is modular: Regarding energy and storage technologies, several alternatives are in different development and launch phases. We see a consolidation of technology where products adapt for future technology and solutions. Most likely, the future will not be dominated by a particular technology, but we will see parallel initiatives started and phased out at a higher rate than before.

"Software plays an increasingly important role in all new solutions. Connectivity allows for improving and upgrading the functionality of solutions effectively. This is one of the benefits of new technologies and crucial for products with a relatively long lifetime."

Lasse Eriksson, Vice President Technology, Kalmar



Automation

What do automation and robotics mean for the future of heavy machinery? From manufacturing 4.0 * to self-driving vehicles - automation is happening today. The transformation from manned diesel machines to automated electric solutions means many benefits, such as development in safety, sustainability, and productivity.

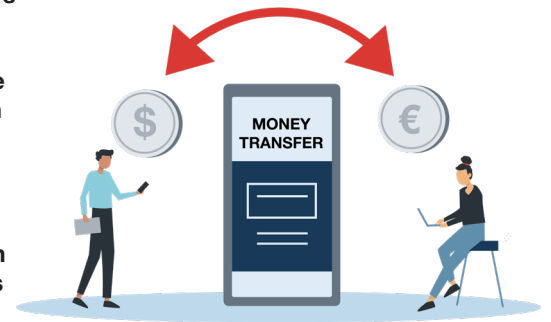
Customers' and authorities' demand for transparency within the value chain creates an additional role for digitalisation and automation. We will see a need for transparency and traceability in energy systems, where blockchain technology can identify the origin, use, and transaction. When it comes to skills, increased automation means that the need for fundamental cognitive, physical, and manual skills will decrease while the demand for cutting-edge digital and social skills will increase.

* a collective term for a myriad of technologies and concepts within automation, process industrial IT, and manufacturing technologies.

Disruptive payment models

Payment models will be different in the future. Soon we will see suppliers creating incentives to optimise energy use by, for example, charging for the purpose, per lift, or mileage. Directing the use of the machines towards their specific goal makes it easier to calculate and optimise the workplace economically. It will also allow companies to plan production more precisely to meet market needs and reduce financial risk.

Disruptive payment models in combination with circular solutions will be a prerequisite for achieving sustainability goals. We will not see one standard but several rental and leasing models, taking up more space in the future. Thus, the market becomes more democratic as more players gain access to the latest technology and avoid interim debts and write-offs over time.



From Products to Services

We see a shift from product to service economics around the world. Outside the realm of production-related challenges, the service-driven sector sees sustainability as a hygiene factor and places inexorable demands on transparency and results.

"A trend we see in our industry is an increase in leasing models that can mean longer periods compared to today. In the last ten years, leasing has increased from a small part of our sales to 15%. The benefits become clear when you look at the total cost of ownership."

Alf Gunnar Karlgren, Vice President, Counterbalanced Container Handler Division, Kalmar

What will the future bring? We don't know – but we have a good idea.

This article has highlighted the importance of companies beginning the transformation towards electricity. We know for sure that the world will soon look very different. To combat GHG emissions and counteract climate change, we need brave companies and leaders pioneering the development towards sustainable production. Substantial changes in work culture and operations are required to meet future needs. The time is now. The investments made today will be decisive over the next ten years.

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