



Driving positive change

Hägglands and sustainability

HÄGGLUNDS 

1

**Sustainability is
a common journey**

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**Häggglunds is on a path to become more sustainable.
We're not alone in making that claim.
Nor are we alone on the journey itself.**

We're working to improve our business and ourselves. It's a process that involves – and benefits – our customers and other stakeholders. But its effects are wider. Our products, solutions and actions contribute to sustainability in customer operations worldwide, which means our work carries forward in theirs.

Each positive change drives the next.

2

Why sustainability?

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Urgency demands responsibility

Sustainability isn't a vision.

It's a responsibility that needs to be taken now. From the people next to us to the world around us, sustainability is our responsibility to each other.

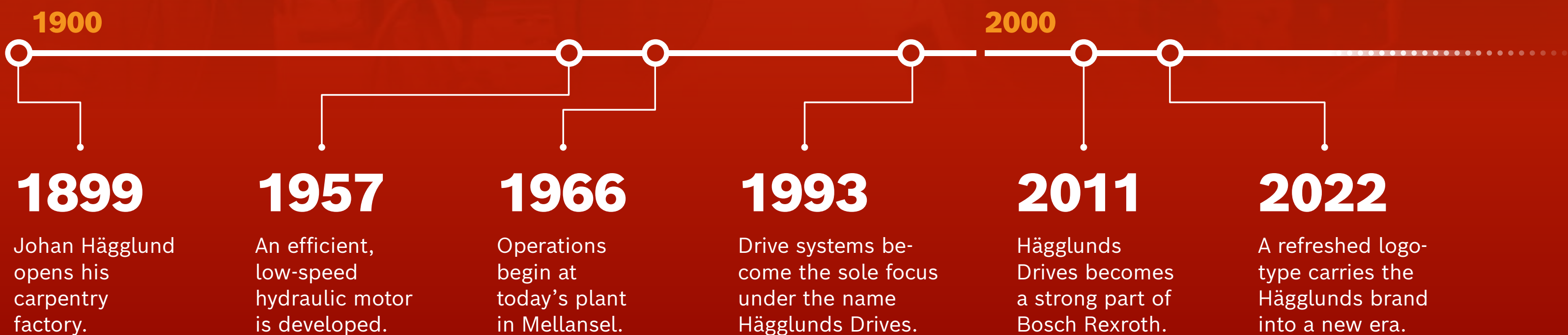
When it comes to the environment, the urgency is self-evident. Besides devastating climate change, there are wide-ranging threats to our air, water and soil. Our planet's future depends on what we do today.

Yet sustainability concerns people's futures as well. Health, well-being and economic prosperity are rights that everyone should have – but which many can't take for granted.



From one generation to the next

**At Häggglunds, responsibility has always been a strong element.
With this background, continuity and care for the future are part of our DNA.**



At Häggglunds, responsibility has always been a strong element. It comes in part from our long history, which stretches back to 1899, when Johan Häggglund founded the company.

What began as a family enterprise is now a part of Bosch Rexroth's global business. But our headquarters remain in Mellansel, Sweden, where we have deep roots and strong ties to the community.

Not only is there a sense of family, there are also families with multiple generations of Häggglunds employees who share their knowledge.

3

Our sustainability framework

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A picture with many aspects

Sustainability is a single concept that builds on multiple factors: social, economic and environmental. We strive for improvement in all areas where Häggglunds has an impact – but we are also part of something larger.



Working with sustainability means considering many things. Likewise, our work with sustainability at Häggglunds is one part of a wider picture.

Defining sustainability

Sustainability builds on multiple factors: social, economic and environmental. The factors are intertwined and can be broken down in many ways, but the United Nations has defined 17 Sustainable Development Goals (SDGs) that help to structure and assess sustainability work.

Sustainability at Häggglunds

Sustainability work at Häggglunds builds on many things as well. We strive for constant improvement in all areas where we have a specific impact. At the same time, as part of Bosch Rexroth's global business, our own work is part of a larger effort within the Bosch Group. The Bosch Group is a member of the United Nations Global Compact, committed to achieving the SDGs.

Bosch sustainability strategy

The Bosch Group sets the wider agenda, pursuing sustainability goals that also apply to Hägglunds.

Everything that we do at Hägglunds is guided by the larger Bosch framework. For example, we uphold the Bosch Code of Conduct for Business Partners, which sets social and environmental standards for our sub-suppliers. Naturally, we also follow the group's sustainability monitoring program.



Bosch climate goals



With its more than 400 locations worldwide, the Bosch Group has been carbon neutral overall (scopes 1 & 2) since 2020. We achieved carbon neutrality by using four levers: increasing energy efficiency, generating our own energy from renew-

able sources (new clean power), purchasing electricity from renewable sources (green electricity), and – as a last resort – offsetting residual CO₂ emissions. In 2022, residual emissions of 0.7 million tons of CO₂ were offset through

carbon credits. Scopes 1, 2, 3 are used according to the *Greenhouse Gas Protocol Corporate Accounting and Reporting Standard*.

The Bosch Group has set ambitious goals for the year 2030. Bosch climate goals include:

- Scopes 1 and 2** (generated and purchased energy)
- Save 1.7 TWh by improving energy efficiency
 - Generate 0.4 TWh in-house at Bosch locations
 - Increase the share of green electricity to 100%
 - Offset at most 15% of carbon in relation to the 2018 baseline
- Scope 3** (upstream/downstream emissions)
- Reduce CO₂ emissions by 15% compared with 2018 baseline

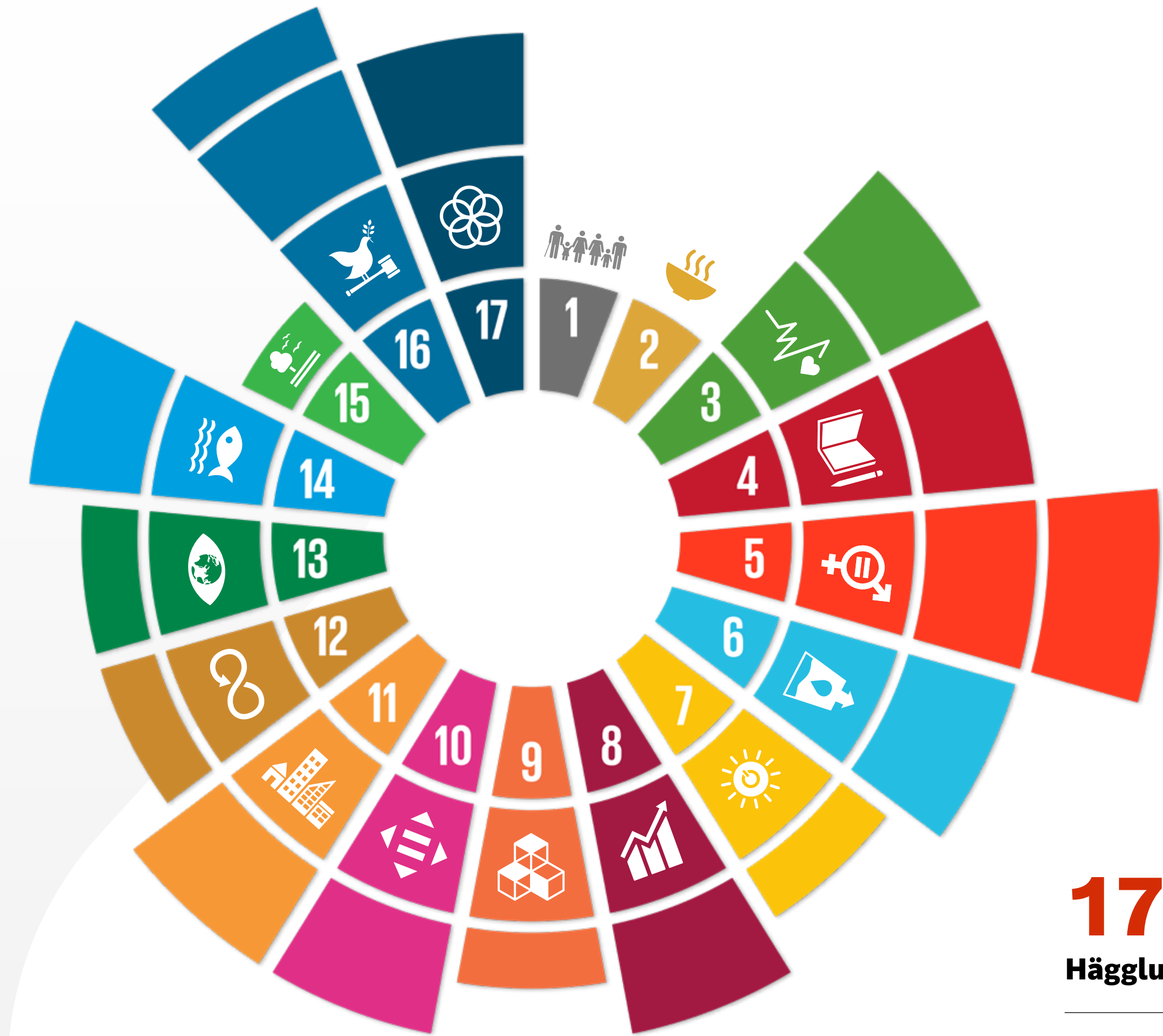
The climate goals apply to the whole Bosch Group, but contributions from Hägglunds will be necessary to achieve them.

Assessing our impact at Häggglunds

Sweco has assessed our operations based on the United Nations Agenda 2030 and Sustainable Development Goals (SDGs).

To understand the effects of our own sustainability efforts and the challenges we ourselves need to address, Häggglunds has worked with Sweco, a well-established engineering consultancy firm in Sweden. Sweco has assessed our operations based on the United Nations Agenda 2030 and Sustainable Development Goals (SDGs). The assessment was carried out in January 2023.

Sweco’s assessment, which is the basis for this document, is summarized as a Sustainability Sun with 17 rays – one for each SDG. The length of each outward ray shows how much Häggglunds contributes toward the goal. There are no areas where we counteract the goals, which would result in an inward ray.



17 rays Häggglunds contribution to each SDG

SDG 1, No Poverty, was deemed not relevant to Häggglunds and is shown in gray in the Sustainability Sun.
SDG 2, Zero Hunger, was only deemed relevant for owned agricultural land next to our Mellansel plant.

4

**Sustainability
starts with people**

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Safety first

Though the environment is often in the spotlight, sustainability has many sides. For Häggglunds it begins with people, and it starts with keeping them safe.

For employees

We work with structured risk management and strive for an open, forgiving culture where incidents lead to improvement.



Safety for employees

Safety is our first consideration at Häggglunds, both in manufacturing and in the field. At our production site in Mellansel, our employees work daily with structured risk management, reporting all observations and observed events. We strive for an open and forgiving environment where employees can feel comfortable sharing mistakes, so that incidents lead to improvement. Our target is an injury rate of zero and at least one risk observation from each employee per year.

For customers

We build safety into our drive systems, and we work extensively with training to ensure their safe use by operators.



* Source: VQCC data sheet

Safety for customers

Our focus on safety extends to our customers, and we build it into our drive systems themselves. For example, Häggglunds drives offer a quick-stop function that aims to save lives and limbs by stopping mill rollers in 3–15° of rotation – a fraction of the market standard (source: VQCC data sheet). In all respects, we work to ensure the safe use of our equipment, which includes providing and assisting customers with operator safety training.

Fairness and opportunity

Safety is one key to human sustainability, but the social side is no less important at Häggglunds. In Sweco’s assessment and the Sustainability Sun, we make our strongest contributions toward SDG 5, Gender Equality, and SDG 16, Peace, Justice and Strong Institutions.

In the workplace

We value diversity, and work for equality, applying universal employment criteria and encouraging development for all.



In the workplace

Häggglunds has an international workforce with diverse ethnicities, and we work actively to improve gender distribution. At our head office in Mellansel, women make up 28% of Häggglunds employees and 40% of our management. We apply universal criteria for salary, promotion and other terms of employment, and all employees benefit from our strong focus on knowledge and competence development. In addition, we have a structured action plan against discrimination and harassment – including an active whistle-blower function.

In our business

We define our position on legal requirements and ethical issues in internal and external codes of conduct that apply globally.



In our business

The same focus on fairness and opportunity applies to those we do business with. Throughout the Bosch Group, our position on legal requirements and ethical issues is defined in a globally applicable Code of Business Conduct. For our suppliers, we have formulated our requirements in a Code of Conduct for Business Partners. Where possible, we prioritize local buying, which benefits regional business development and job creation.

Häggglunds Spirit

Just as sustainability starts with people, so do our contributions to it. Everything Häggglunds does and achieves begins with the people in our team, who are guided by our Häggglunds Spirit.

The five aspects of our Häggglunds Spirit explain what customers can expect of us in solving their challenges, and the same powerful promise applies in our sustainability work.





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A sustainable drive solution

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Helping to drive sustainability

Häggglunds is a supplier of hydraulic direct drive systems, so the equipment we provide is central to our sustainability. Manufacturing and delivering Häggglunds products has an impact we need to reduce, but there are also positive contributions that we and our products make.



Through design

- Extending product lifetime
- Reducing energy loss
- Increasing power density

In operation

- Reliability
- Built-in shock load protection
- Process-adapted sizing/speed

Through service

- Expert support
- Drive connectivity
- Revitalizing/resizing



Sustainability through design

CONSTANT DEVELOPMENT AND IMPROVEMENT

- 1 Extending product lifetime**
Less wear and stress, easier service
- 2 Reducing energy loss**
Higher efficiency throughout
- 3 Increasing power density**
Less size, weight and hydraulic fluid

Developing our hydraulic direct drive systems includes not only creating new products but also improving our existing products. Sustainability is a strong element in Hägglunds design processes.

EALs (Environmentally Acceptable Lubricants)

Today's option,
tomorrow's
standard



1

Extending product lifetime

Less wear and stress, easier service

Throughout our development, we strive to lengthen the product life cycle through our material and design choices. High-durability material in our cam rings and specialized coatings on our pistons and bearings, for example, help to reduce component wear. So do refinements that alleviate internal stresses, such as design improvements to our pistons. We always design for ease of service, making it as simple as possible to exchange components when needed.

Two recent examples:

- The new design of the Häggglunds CBm seal retainer allows the seal to be exchanged without opening the motor.
- The Häggglunds Atom motor now has a replaceable shaft ring, allowing a tight seal to be restored without reworking the shaft.

2

Reducing energy loss

Higher efficiency throughout

Another focus of our development is maximizing efficiency. By that, we mean ensuring the most system output for the energy that customers put in. Over recent decades, we've steadily improved the design of individual components (e.g. piston assemblies and cylinder blocks), achieving both smaller clearances and decreased friction. Together, these factors improve motor efficiency while reducing internal wear. By working to lower the pressure drop and fine-tune the hydraulic channels within each new motor, we continue to reduce energy loss.

This has led to remarkable improvements in the Häggglunds Quantum Power, for example (*see slide 21*). And because our drive systems are modular, existing drives can be upgraded to improve their efficiency over the system lifetime.

3

Increasing power density

Less size, weight and hydraulic fluid

Perhaps the most visible aspect of our development is our focus on power density. Simply put, we try to get more power out of our systems with less size and weight. Shrinking our motors in relation to their output gives customers the power they need with less weight on the machine shaft, which can result in smaller and lighter machines as a whole. In a mobile machine, especially, it can save energy and fuel. Our Häggglunds Atom motor, which is both our smallest and most power dense, was designed with mobile applications in mind.

Other examples:

- Häggglunds MA/MB → Häggglunds CBm
- Häggglunds CBp → Häggglunds Quantum Power



Similar evolution in our Drive Units

A similar evolution can be seen in our drive units, where the amount of hydraulic fluid has decreased in relation to system power. In 2010, for example, we reduced the tank size by half when moving from the older PEC design to today's Häggglunds DUE and DUC drive units. Our integrated Häggglunds Fusion drive systems use even less fluid, having a tank that's around half the size of our smallest standard drive units.

(Source: Häggglunds PEC, DUE and DUC data sheets)

When it comes to the hydraulic fluid itself, we're increasing the focus on Environmentally Acceptable Lubricants (EALs) across our Häggglunds portfolio. Häggglunds drives comprise closed hydraulic systems, and all Häggglunds motors can be prepared for use with EALs. As we move forward, EAL compatibility will become standard for motors where it's currently an option. In addition, we're making it easier for customers to identify EALs with the correct properties for use in Häggglunds systems.



Example of sustainability in development

The new Häggglunds Quantum Power motor (QMp)

Always striving for better

The new Häggglunds Quantum Power motor is a perfect example of our R&D efforts. The Quantum Power is the successor to the Häggglunds CBp motor. It provides performance comparable to that of the CBp, yet it contributes to sustainability in multiple ways. The first key way is related to its production.

Compared to the CBp, the Quantum Power is smaller and lighter for a given output, meaning that less material goes into its manufacture. Depending on the motor size, weight is reduced by 17–28%. Nearly all that weight comes from cast iron components that are smaller in the Quantum Power than they are in the CBp. With less cast iron going in, the CO₂ footprint related to material is reduced.



17–28%
Weight savings
depending on motor size

Successor to the Häggglunds CBp motor

- Equivalent performance scope
- Reduced size and weight
- Less material and related CO₂
- EAL compatibility as standard

HÄGGLUNDS QUANTUM POWER

Energy savings in an expanded range of applications

In operation, the Häggglunds Quantum Power improves sustainability in a different way.

The Quantum Power is equivalent in performance scope to the Häggglunds CBp, so it applies in all existing CBp applications. But because it's also smaller and lighter, it can even cover certain applications where customers have been using the Häggglunds CB to achieve high shaft power. When supplying the same combination of torque and speed, the Quantum Power's internal design reduces pressure losses compared to the CB. This reduces power losses in turn, which leads to energy savings in operation.

The difference is clear on chemical mixers and belt conveyors, for example. At high shaft power in these applications, the Quantum Power has substantially lower power losses compared to the CB. Over one year of continuous operation, calculated as 8000 hours (accounting for planned maintenance), this saves a significant amount of energy.

Besides saving energy, the internal design of the Quantum Power has a further advantage:

As the pressure on the internal components is reduced, the lifetime of the motor is increased.



Häggglunds Quantum Power

ENERGY SAVINGS

Power loss reduction^{*}
Energy reduction^{*}, 1 year (= CO₂^{**})
Equivalent energy consumption,
e-cars, 1 year (12,000 km)

^{*} Compared to the Häggglunds CB motor in continuous operation at high shaft power.
^{**} Calculated at a world average grid carbon intensity of 442 g CO₂e per MWh
^{***} Source: ember-climate.org (Calculated at a world average grid carbon intensity of 442 g CO₂e per MWh)
^{****} Source: bmu.de/en/

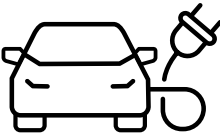


CHEMICAL MIXER

CB 280 → QMp 280

18 kW

144 MWh (= 64 t)

58 

On a chemical mixer, switching to the Quantum Power saves around 144 MWh, which is the equivalent of 64 metric tons of CO₂^{***} – or the energy usage of 58 electric cars with an annual mileage of 12,000 km.^{****} To look at it another way, the input energy saved is equivalent to 6% of the 2264 MWh of shaft output in the same time frame. Calculated for QMp 280 vs CB 280 at 283 kW: **T = 52 kNm, n = 52 rpm**



BELT CONVEYOR

CB 400 → QMp 400

39 kW

312 MWh (= 138 t)

127 

On a belt conveyor, switching to the Quantum Power saves around 312 MWh, which is the equivalent of 138 metric tons of CO₂^{***} – or the energy usage of 127 electric cars with an annual mileage of 12,000 km.^{****} The input energy saved is equivalent to 7% of the 4 084 MWh of shaft output in same time frame. Calculated for QMp 400 vs CB 400 at 510 kW: **T = 75 kNm, n = 65 rpm**



Sustainability in operation

LOWER IMPACT IN CUSTOMER PROCESSES

- 1 Reliability**
Reduced process waste
- 2 Built-in shock load protection**
Reduced machine wear and breakage
- 3 Process-adapted sizing**
Increased process efficiency

Looking at customer operations overall, there are numerous ways that Hägglunds drive systems can contribute to sustainability over time.





1

Reliability

Reduced process waste

Perhaps the strongest contribution our solutions make is through their reliability, because unplanned stops in customer processes can lead to material or energy waste. Examples:

- Cut sugar cane degrades quickly and must be processed within a narrow time frame.
- A stop in a chemical agitator or reactor can lead to an unwanted or escalated chemical reaction (e.g. thermal runaway), resulting in material waste and perhaps equipment failure.

Häggglunds systems are fully enclosed, and the sealed motor housing protects against damage in dirty, humid or otherwise extreme environments. Internally, our design progress in reducing friction, stress and other wear factors contributes to process uptime as well as product lifetime. And by steadily implementing drive connectivity, we're giving customers new tools for monitoring system condition, so that issues can be detected before they become problems.

2

Built-in shock load protection

Reduced machine wear and breakage

Just as we work to protect Häggglunds systems against wear, Häggglunds systems can help to protect the machines they serve. In addition to having a low moment of inertia, our drives have a built-in pressure limiting function that automatically mitigates sudden torque peaks. Such "shock loads" can occur when a heavy mass is dumped onto a feeder, for example, or when an unexpectedly hard object comes between a shredder's jaws. The low moment of inertia avoids amplifying the additional torque stress, while the immediate pressure relief keeps it from being transferred to wear-prone machine components like teeth and knives.

3

Process-adapted sizing

Increased process efficiency

Features like shock load protection mean that Häggglunds drives can be sized exactly for the applications they serve, without additional margins to prevent breakage. When there's no overdimensioning, there are no resulting efficiency losses – which means less energy used in operation. Overall, our drives' modularity allows a precise match for the power and speed needed in a process. Using our Häggglunds Configurator, we can not only select the correct motor but also adapt its internal configuration or the size and number of pumps and other components used with it. Since the speed is fully variable within the system's range, it can then be fine-tuned from moment to moment – whether to prevent wear through soft starts, to save energy by running only as fast as needed, or to achieve the exact process conditions for a better end product.



Sustainability through service

OPTIMIZATION AND PROLONGED OPERATION

- 1 Expert support**
Maintenance, parts and more
- 2 Drive connectivity**
Insights and preventive care
- 3 Revitalizing/resizing**
Adaptation to new needs

How well and how long a Häggglunds system operates are among the major factors that determine its sustainability. Here, service aspects play a key role.





1

Expert support

Maintenance, parts and more

Häggglunds drive systems are engineered for long and problem-free operation, even in harsh environments. But attention throughout the life cycle remains important. Our global service team helps customers keep their drive systems in optimal condition, not only through spare parts and maintenance but also through knowledge support and more advanced services.

2

Drive connectivity

Insights and preventive care

A good example of an advanced service is Häggglunds CMp, which is based on drive connectivity. Using sensors installed within the drive system, Häggglunds CMp provides condition monitoring possibilities and deep insights for improving drive use. As a basis for preventive maintenance and optimization, it can increase drive reliability and potentially reduce factors like wear or energy consumption.

3

Revitalizing/resizing

Adaptation to new needs

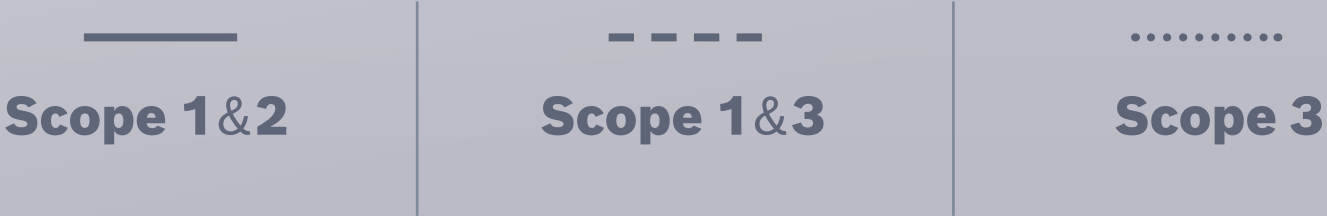
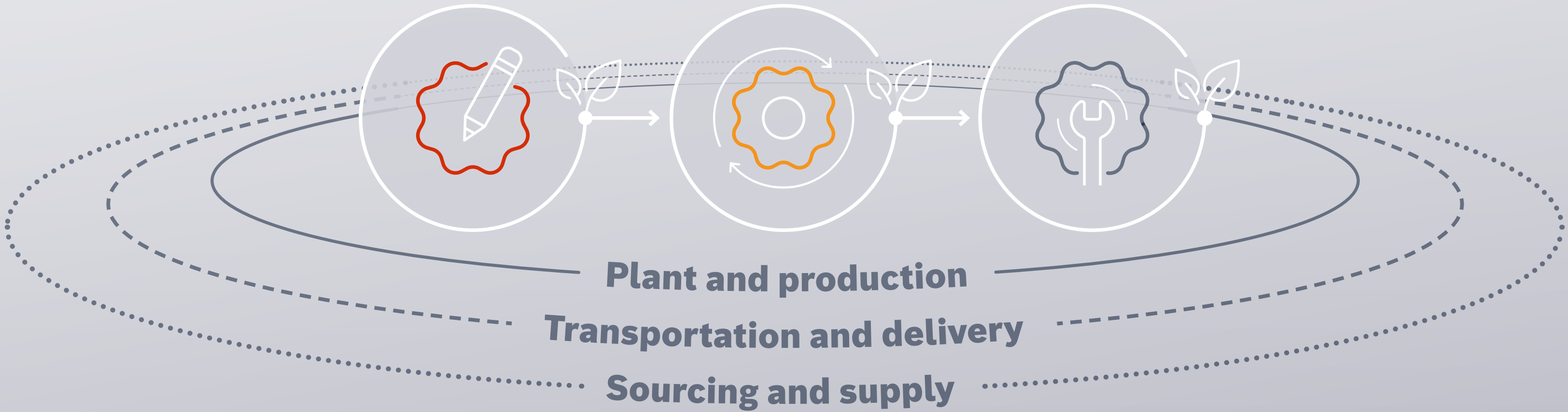
Because Häggglunds systems are modular, their lifetime can easily be prolonged. Older components can be replaced with new and more efficient ones, and our service team can rescale an entire drive system if needs change compared to the original dimensioning. This ensures the longest possible system life while keeping utilization high. When the end of life is reached, modularity and a mostly steel motor construction facilitate disassembly and recycling. Today this process is largely handled by customers, but product return programs and other incentives are being explored.

6

Sustainability around the solution

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Around the solution



Sourcing and supply

Sustainability in what we deliver begins with those who deliver to us. Working closely with suppliers, Häggglunds is constantly looking to reduce impact upstream (part of Scope 3).



Supplier accountability

- Enforced Code of Conduct (social/environmental)
- CSR quick scans on supplier visits

Concrete action if deficiencies identified

In addition to social standards, our Bosch Code of Conduct for Business Partners contains environmental standards that suppliers must adhere to, for example regarding substances of concern. Our purchasers perform a Corporate Social Responsibility (CSR) quick scan on each new visit to a supplier, and concrete actions are taken if deficiencies are identified.



Supply chain waste

- Targeting internal causes of rework/scrapping
- Targeting supply chain errors (e.g. material defects)

Steps taken to avoid repeated deviations

We seek to reduce the amount of raw material going into our products, which involves targeting internal errors that lead to reworking or scrapping. Those include errors in our supply chain, such as material defects. Whenever defects are identified, we report them to our suppliers and take relevant steps to avoid repeated deviations.

Plant and production

Our Häggglunds plant in Mellansel is where we have most control over our environmental impact, either directly (Scope 1) or indirectly through our sourcing of energy and other resources (Scope 2).

Our plant works according to the Bosch Production System (BPS), a model that includes 5S methodology and aims to reduce all forms of waste.



Bosch Production System (BPS)

- Model including 5S methodology
- Aims to reduce all forms of waste

Constant improvement of production/material flow

Project Layout 2021, a layout change to improve production and material flow at our Mellansel plant, is a concrete example of how our BPS model leads to improvement. Since its implementation, forklift transport in the workshop has decreased by 1200 hours per year – equivalent to an annual energy savings of roughly 5 MWh.



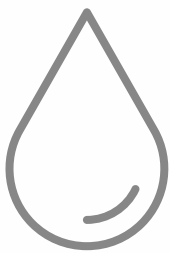
Energy

- Continuous efficiency work (utilization, optimization, upgrades)
- District cooling via closed-system cooling plant

Regular reporting on energy measures

We work continuously with utilization, optimization and upgrades to improve energy efficiency at our Mellansel plant. As part of the Bosch Group’s wider sustainability work, we report the status of our energy reduction measures on a regular basis. The plant has been running on fossil-free electricity since 2020. To further reduce our dependency on fossil energy, we intend to have a fully electric vehicle fleet during 2024.

Plant and production



Water

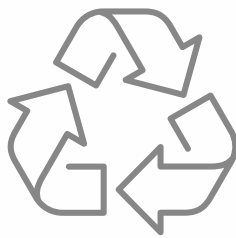
- No negative impact on water sources used for district cooling
- Reclamation of water from cutting/ washing fluids

Cleaned water returned to municipal network

Our use of water in Mellansel is closely tied to energy, thanks to the district cooling for our manufacturing and offices that was installed in 2008. The closed-system cooling plant, which reduces our use of refrigerants and cuts electricity use by 700 MWh per year, has been shown to have no negative impact* on the natural water bodies that support it (Anundsjön Lake and the Moälven River). The cooling project was highlighted as a good example by the Swedish Environmental Protection Agency in 2011.

Overall, we strive to shrink our water footprint in Mellansel. For example, spent cutting and washing fluids from our production are treated in an evaporator, which separates harmful waste from the water component. The reclaimed water is clean enough that it can be returned to the municipal stormwater network.

**An environmental assessment was carried out 2018*



Waste

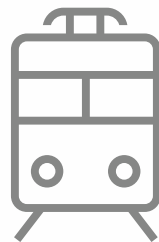
- 99 percent of plant waste can be recycled
- All waste streams sorted and continuously monitored

What cannot be recycled is minimized

Almost 99 percent of the waste from our Mellansel plant is recyclable, and all waste streams are sorted before dispatch to appropriate facilities. What we can't recycle we seek to minimize, and the evaporator, that separates harmful waste from the water component, is a good example. We monitor our resource and waste flows continuously, using the statistics to aid our sustainability work. Over the last two years, we've unfortunately seen an increase in the amount of waste per unit. However, we believe this is a short-term setback due to painting process changes, renovation projects and raw material issues.

Transportation

Hägglands is a global operation with customers worldwide. This puts focus on travel and shipping, which are significant to our wider environmental footprint.



Employee journeys (SCOPE 3)

- Sustainable travel options (e.g. train) encouraged for both commuting and business travel

Our own choices as individuals have a significant impact. Throughout our operations, we encourage employees to choose trains and other sustainable options for commuting and business travel.

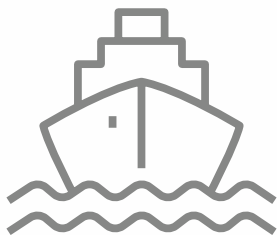


Vehicle fleet (SCOPE 1)

- Fully electric vehicle fleet in Mellansel planned for 2024

Electric charging stations in Mellansel to double from 20 to 40

As we work to phase out fossil fuels, we're transforming our own fleet of vehicles. During 2024, the plan is for all forklift trucks and other company-owned vehicles at our head office in Mellansel to run on electricity. The number of charging stations in Mellansel will double from 20 to 40, which will also help to electrify commuter journeys.



Shipments (SCOPE 3)

- Central arrangement by Bosch Rexroth
- Adherence to European Mobility Package
- Road emission data available from primary provider

Transport arrangements for Hägglands products are managed centrally by Bosch Rexroth. Bosch Rexroth adheres to the requirements set out in the European Union Mobility Package, which aims to safeguard the health and safety of transport suppliers. Emission data is available from our primary road transport provider.



7

The work goes on

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Together for the future

As our work with sustainability at Häggglunds continues, it will both go deeper and become more transparent. This presentation is a first step in making our efforts more visible to customers, partners and other stakeholders. Many more will follow.

Through openness, commitment and – above all – close cooperation, we can meet the challenge of contributing to a better world for coming generations.

**Sustainability
isn't a vision. It's
a responsibility that
needs to be taken now.**

From the people next to us
to the world around us,
sustainability is our
responsibility to
each other.

