



SUSTAINABILITY REPORT 2022



KNORR-BREMSE

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Foreword

Dear Reader,

The year 2022 was another one full of challenges: the ongoing impacts of the COVID-19 pandemic, soaring inflation, massive problems with the supply chains and exploding energy prices. And, above all, Russia's invasion of Ukraine, which has struck the local population heavily and caused immeasurable suffering. This war also has significant impacts on our business, not least due to the sanctions that have been imposed on Russia.

In this context, however, let us note that, even in challenging times, Knorr-Bremse possesses the strength of a future-shaping company. Our 31,600 employees helped us to stay on our successful path in 2022 and keep setting technological standards, with sustainability being an integral part of our business activities. This is because our system technology supports our customers in the rail and commercial vehicle industries with the transition to sustainable mobility, a transition that we are actively driving ourselves. By simultaneously fulfilling our responsibility to the environment, employees and society, we seek to contribute to a livable world.

As the Executive Board of Knorr-Bremse, we are united in our commitment to taking sustainable action. For us, corporate responsibility and sustainable business practices are a matter of course. In this report, we look back on fiscal year 2022, a period in which we raised our commitment to sustainability to a new level. By aligning our strategy and corresponding measures more closely with the three ESG dimensions (environment, social and governance), we are strengthening our commitment to sustainability in the present and focusing on the future. In doing so, we are ensuring comparability in our sustainability management and meeting the expectations of the financial market, the industry and many customers. In this regard, we once again initiated forward-looking projects in 2022:

We further strengthened our structures for responsible corporate governance strategically, organizationally and operationally. The integration of sustainability targets into the remuneration system for management levels 0-2 and the inclusion of ESG criteria in three financing instruments are just a few examples of this. We see compliance with responsible business practices and principles as part of our everyday work. One example of this is our ambition to make the supply chain sustainable. During the reporting period, we broadened our engagement for the respect of human rights in accordance with the requirements of the German Supply Chain Due Diligence Act.

We see climate change and the responsible use of environmental resources as key challenges. We counter them with our climate protection strategy and innovative product portfolio, which makes a contribution to sustainable mobility. Taking a leading role for environmental protection and further decarbonization is crucial for Knorr-Bremse's long-term strategy. We are fully on course to meet our target of reducing our production-related carbon emissions (Scope 1 and 2) by half by 2030, a target that we set back in 2019. In addition, we have decided to expand our climate targets and include upstream and downstream processes, too. By 2030, we want to reduce the main emissions associated with our business activities across the value chain (Scope 3) by 25%. To further emphasize this strong commitment, we have also submitted our targets to the Science Based Targets initiative (SBTi) for review.

The transformation in transportation and mobility is developing in a highly dynamic manner across the world, and Knorr-Bremse is a driving force of this progress. At the trade fairs held in 2022, customers clearly demonstrated demand and willingness for sustainable mobility solutions. As a systems supplier, we offer our customers these solutions.

The Rail Vehicle Systems (RVS) division could feel change in the air at InnoTrans 2022 in Berlin. Our Digital Automatic Coupler (DAC) was one of the contributing factors for this. As part of the Digital Freight Trains solution package, it will be an important lever for environmentally friendly, rail-based goods transportation. The development of digital services like these helps to improve train life cycle management, with smart maintenance, for example.

This was also reflected in the presence of our Commercial Vehicle Systems (CVS) division at the IAA Transportation 2022. Our eCUBATOR innovation unit develops system solutions for the zero-emission commercial vehicles of the future. Through our ongoing development of the commercial vehicle steering business, we offer electric power steering (EPS) – a key technology for automated driver assistance systems (ADAS), highly automated driving (HAD) and e-mobility.

As an attractive and responsible employer, we want to secure our technological leadership and counteract the shortage of skilled workers. For this reason, we take advantage of progressing digitalization to develop innovative products and optimize our internal processes. In terms of our human resources, our OneHR project – which has moved forward successfully – lays the foundation for globally standardized processes. Offering an efficient and attractive working environment will, among other things, also contribute to us achieving our newly defined quotas for the share of women in the workforce (25%) and in management (20%).

As you can see, we consistently continued to pursue and implement our clear approach toward sustainability in 2022. We are delighted that you would like to learn more about our strategy, targets and measures and hope you will enjoy reading our Sustainability Report, which, for the first time this year is an online report with an additional magazine section.

The Executive Board
Knorr-Bremse AG



Marc Llistosella
Chief Executive Officer



Frank Markus Weber
Chief Financial Officer



Dr. Claudia Mayfeld
Member of the Executive Board



Dr. Jürgen Wilder
Member of the Executive Board



Bernd Spies
Member of the Executive Board

Sustainable action in all areas of responsibility – this is what the Executive Board of Knorr-Bremse AG stands for



Marc Llistosella

Chief Executive Officer since 2023

Worldwide responsibility for Strategy, Communications, Brand Management, Digitalization, IT, Security and Internal Audit

“As a global market leader, Knorr-Bremse drives innovation for sustainable, safety-critical system solutions. Simultaneously, we also want to utilize our company’s enormous potential in the area of sustainability – for the benefit of society, of Knorr-Bremse and of all its customers. I believe we are on a good path for this. After all, the measures that we have already implemented for climate protection, a sustainable product portfolio and responsible corporate governance are a core element of our performance record.”



Frank Markus Weber

Chief Financial Officer since 2020

Worldwide responsibility for Finance, Accounting, Controlling, Taxes, Treasury, M&A, Sustainability and Investor Relations

“ESG-linked financing is going to have an increasingly important role in order to drive sustainability targets at all levels of the value chain. Right now, 70% of our long-term capital market financing instruments are already linked to sustainability-related criteria. Collecting the necessary data is challenging, but it is also an essential requirement for the improvements we want to make in our processes and in processes across the value chain.”



Dr. Claudia Mayfeld

Member of the Executive Board since 2021

Worldwide responsibility for Integrity, Legal and Human Resources

“For me, diversity means responding to individuality and differences with appreciation and respect. The differing achievements, experiences, personalities and ways of thinking among employees must be recognized so they can fully utilize their unique potential. This is because diverse teams are a game changer when building a sustainable company. An important matter for me is to increase the share of women in the workforce and in management. We have set specific targets for this ambition.”



Dr. Jürgen Wilder

Member of the Executive Board since 2018

Worldwide responsibility for the Rail Vehicle Systems division

“Rail has a key function in the transition toward sustainable mobility – for passenger transportation as well as freight transportation. We meet the high sustainability demands of our customers with a high level of responsibility in product technology and a high level of corporate responsibility. Our increasingly connected train systems contribute to the reduction of emissions and energy consumption in rail transportation. Furthermore, Knorr-Bremse’s products are designed to be compatible with the vision of a circular economy.”



Bernd Spies

Member of the Executive Board since 2022

Worldwide responsibility for the Commercial Vehicle Systems division

“We support our customers in the transformation of the commercial vehicle industry. The industry’s sustainable direction boosts our company’s future viability and offers major opportunities for our product strategy and for new business models. Examples I can mention in this context include innovative products for transportation safety, e-mobility and automated driving. The focus is on a circular economy, reducing emissions and lowering energy consumption.”

Focus on Sustainability: Intergenerational Dialog



When two different generations at Knorr-Bremse talk about sustainability ... it becomes clear that everyone is driven by the same vision: They want to contribute to a livable world with sustainable mobility at a responsible company. However, do different approaches, attitudes and paths lead there? Executive Board members and Katharina Serfas, a young sustainability professional, explore this in a conversation together.

Frank Markus Weber: It is my privilege to welcome no fewer than two new members to the Knorr-Bremse family. Ms. Serfas, you have been a sustainability professional at Knorr-Bremse since October 2022. Our new CEO Marc Llistosella, who has led the company since the beginning of 2023, is also here. As the Executive Board member responsible for sustainability, I would be interested in knowing if sustainability was an aspect that encouraged you to decide on Knorr-Bremse?

Marc Llistosella: 'I can really make changes there' is the main thing I thought when I decided on Knorr-Bremse's offer. As CEO, I want to set clear, long-term goals and achieve them with the Executive Board and all the employees, including sustainable corporate governance. Sustainability is a fundamental layer of our corporate strategy. On a side note, I have recently been involved in start-ups, some of them in the field of e-mobility. As a result, I feel right at home with solutions for sustainable mobility.

Frank Markus Weber: If you were involved in start-ups, you will definitely be familiar with intergenerational working environments and collaborating with younger generations in particular. Young coworkers are creating an atmosphere of change; what do you think about that, Marc?



“Millennials legitimately have high expectations and challenge us with disruptive ideas.”

Marc Llistosella, Chief Executive Officer

Marc Llistosella: Millennials legitimately have high expectations and challenge us established figures with disruptive ideas, digital know-how and rapid implementation. Companies that do not address these topics and do not offer any answers will not survive, and that is because the young generation represents our stakeholders, our employees and our investors of tomorrow – and today. Much like Ms. Serfas, whom I would like to welcome now.

Katharina Serfas: I do indeed have high expectations – of myself especially. After completing my master’s degree in global studies, specializing in business and the environment, I knew for certain that I wanted to work in sustainability management in the private sector. I want to do something with purpose and go home thinking, ‘Today I have contributed to increased sustainability.’ At Knorr-Bremse, I have seen possibilities to contribute to sustainable corporate development and ultimately to sustainable mobility. As a young professional, you approach things in a very expectant and idealistic way.

Dr. Claudia Mayfeld: As Chief Human Resources Officer, I am of course interested to know if you had a rather hard or soft landing in the reality of business? *(smiles)*



Each Executive Board member at Knorr-Bremse drives sustainability forward in his or her area of responsibility, including in the interests of future generations. CFO Frank Markus Weber is in charge of ESG implementation, while Dr. Claudia Mayfeld has recently expanded the compliance organization.

Katharina Serfas: I landed on both my feet, on solid ground. Knorr-Bremse has the structures in place for efficient sustainability management. Sustainability is in fact already integrated in many processes and decisions. I'm thinking of the Climate Strategy 2030, of course, but also of the supply chain, EcoDesign and Remanufacturing. There are clear processes, clear targets and a lot of support from the company's departments. It is what I had expected.

Claudia Mayfeld: Yet I can see a small "but" in your expression ...?

Katharina Serfas: There is still room for improvement in some of the objectives. By that I mean the depth of some of the key indicators or time frames, or just how binding an ambition is. However, there are two things that have already become very clear to me in this context. First, digital transformation and data collection in a global corporation is hard work. Second, I see that the necessary digital structures – if they do not already exist – are being installed step by step. This is an important motivation for me – I can feel that progress is being made and I can influence it.

Frank Markus Weber: Indeed. We are continuously working to further integrate sustainability consistently into the Group-wide process landscape. And we need to give sustainability even more attention. By the way, I'm counting heavily on you on this, because I also see you as a networking sustainability influencer within the company. Do you agree on that?

Katharina Serfas: I never really wanted to be an influencer but in this context I will happily take on the role (*laughs*). I have definitely met a number of colleagues, for example in purchasing, product development and compliance, who are passionate sustainability ambassadors, always incorporating sustainability aspects into their day-to-day work.



Frank Markus Weber: It is precisely this holistic approach that we want to reinforce. I can say on behalf of the entire Executive Board, with full conviction, that we are committed to sustainability. This can be seen in our ESG-linked remuneration system for the Executive Board and management, for instance. However, beyond remuneration, Knorr-Bremse also did much to develop its ESG focus in 2022. With three different sustainability-linked financing instruments alone, we have clearly demonstrated the importance that Knorr-Bremse assigns to sustainable business practices. The fact that we will broaden our climate targets to Scope 3 this year and have them validated by the SBTi is confirmation of this.

Claudia Mayfeld: In mentioning remuneration and the capital market, you have raised some key drivers for further enhancing the importance of sustainability within the company. The basis of success is always good, responsible corporate governance. Ensuring this is our top priority. It is essential for us as a listed company and for our stakeholders. In 2022, for example, we conducted a risk analysis of our suppliers and processes in relation to human rights due diligence. Doing this on a yearly basis in the future, we will be able to meet requirements such as those under the German Supply Chain Due Diligence Act. Aspiring for this level of integrity strengthens our market position in the long term. That extends through to recruitment, too, as the younger generation values having a responsible employer. Isn't that right, Ms. Serfas?

Katharina Serfas: Young people certainly check companies particularly thoroughly with regard to their sustainable behaviors. At the same time, we also look at things more critically. We believe that a high standard of living should no longer be at the expense of future generations. We have to leave the behavioral and economic patterns of unlimited resource consumption behind us. Unfortunately, however, only some parts of the economy, society and politics have understood that things cannot continue like this anymore. This is precisely why the critical and demanding view of the younger generation should be seen as a great opportunity and an important impetus for constructive discussions.

"At Knorr-Bremse, I have seen possibilities to contribute to sustainable corporate development and ultimately to sustainable mobility."

Katharina Serfas, Sustainability Professional



Marc Llistosella: Does it annoy you that the presentation of your generation is often reduced to climate protection and work-life balance?

Katharina Serfas: Training, work-life balance and flexible working hours are definitely important to me. Nonetheless, that doesn't go far enough: It's about purpose, products, environmental protection and social responsibility. Every generation has its idealists, realists and opportunists. Nonetheless, it was clear to me from the start that I would have to deal with the market, products and the commercial environment in order to discuss sustainable transportation strategically.

Marc Llistosella: During my first few months at Knorr-Bremse, I have also become very closely acquainted with our products – products that always seek to contribute to sustainable mobility – during numerous conversations and many site visits. These products consist of extraordinarily → [energy-efficient and safe system solutions for rail transportation](#). Or paving the way for intelligent freight trains with Digital Automatic Coupling. All of this is absolutely fascinating. When it comes to commercial vehicles, I have extensive expertise in technology and management based on my experience as a manager at Daimler Truck. The → [e-mobility solutions](#) that I have been able to see here at the eCUBATOR innovation center show me something: With our specialists, their knowledge, and the agile development processes, we can → [offer vehicle manufacturers innovative and suitable solutions](#) for the transformation in transportation and mobility.

Claudia Mayfeld: You just mentioned innovation, and that is closely connected to specialists. We need exactly these skilled workers to achieve our goals and for digital transformation. We also need to train our employees accordingly. We laid the foundation for a targeted, global recruitment process in 2022 as part of our OneHR project. Additionally, we want to support women's careers and generally increase their representation in the company. On the subject of equality, we have already set quite a lot in motion. This includes the introduction of gender quotas for the entire workforce and for management levels 1–4, an internal women's network and further enhanced development programs.

Katharina Serfas: I have already joined Knorr-Bremse's women's network in Munich. This community idea inspires me. A very experienced manager supervises me in the network's mentoring program and I can already see that this exchange is advancing my professional and social skills. Nevertheless, I still wonder if the share of women will increase, especially in technical fields? Group photos of Knorr-Bremse – as in politics or the economy – with 50 men and one or two women really should be history...



CEO Marc Llistosella assures colleagues at Knorr-Bremse and also business partners of his support in fulfilling their respective sustainability ambitions.

**"The basis for success is always good,
responsible corporate governance.
Practicing this type of corporate governance
is our top priority."**

Dr. Claudia Mayfeld, Executive Board member responsible
for Integrity, Legal and Human Resources



Claudia Mayfeld: Absolutely, the gender ratio is still far from balanced, even at Knorr-Bremse. Women who were not trained in technical professions 20 years ago are now missing as skilled workers. We need to change this or otherwise you, the millennial generation, will face the same dilemma in 10 or 20 years' time. That's why we are actively trying to get young women interested in technology and STEM professions at an early stage. It is also important to clarify that we have consistent framework conditions, such as equal wages, and view them as essential.

Katharina Serfas: Diversity of course involves more than just supporting women, and that applies to Knorr-Bremse, too. We must break down career barriers for all talented people. Younger people in particular have already strongly internalized this aspiration for diversity. As with all the new values, abilities and working methods, it demands further development of our corporate culture. So, what role do the younger employees have in this?

Frank Markus Weber: All employees across the world should always find themselves reflected in our corporate culture. There are currently department workshops taking place, developing on our most recent employee survey. Here, of course, I am also expecting strong impulses from the younger generation. The survey itself showed a high level of commitment to the Knorr-Bremse brand and the colleagues are proud of their work and the products.

Katharina Serfas: It also became clear where we can still improve ...



Sustainability is not a generational issue. It is an objective that connects people, and this is a view shared by young sustainability professional Katharina Serfas.

Claudia Mayfeld: Definitely. One of our main tasks is to transform hierarchical processes and mindsets into personal accountability and smooth information flows. We are working on further establishing the required speak-up culture in the company. This is a task for numerous traditional corporations, and one that we are determined to accomplish.

Katharina Serfas: Another observation about corporate culture that positively surprised me personally: I was previously not aware of the professional organization behind Knorr-Bremse's social commitment. At the Local Care initiative and in the Global Care association, I have seen some highly efficient structures. For example, the way that the Group practices solidarity in the Ukraine war, the willingness to help, the donations and the personal dedication of so many sites and people – all this impressed me.

Marc Llistosella: Teamwork makes us strong! 'My goal is a blind one-two pass with my Executive Board colleagues.' Those were my words on my first day as CEO at Knorr-Bremse. What is it that I want from you, Ms. Serfas, and from the young colleagues? To maintain that sports analogy, I want a smart game opening. Show me new ways and new options that take me to the goal of sustainability. Believe it or not, I am attentive and can still run with speed and endurance! *(laughs)*



Safe-Hub: Using the Power of Sport and Education to Support Young People

Young people love the EduFootball Programme at Safe-Hub: sports and education provided in a secure setting. Safe-Hub is creating a more equal world by improving young people's access to opportunity in structurally-disadvantaged communities. Developed by AMANDLA Social Enterprises, the Safe-Hub model and its proven impact convinced KBGC to partner with the organisation. Together they formed Safe-Hub Global GmbH with the aim of scaling the model worldwide. Thato, Phemelo and Anna of AMANDLA shared more about Safe-Hub with us. They all agreed: at Safe-Hub, everyone walks off the pitch a winner.

“At Safe-Hub, the world we envision is one where all young people have access to equal opportunities, strive to realize their potential and dare to dream. This vision, and our dedication to realizing it, is a direct response to some of the most urgent challenges our world faces today, including inequality, poverty and unemployment.” This is how Florian Zech, the founder and Managing Director of AMANDLA, describes the driving forces behind the South African NGO. The first Safe-Hub project was set up in 2007 in South Africa. Nine other Safe-Hubs have been added there since then, to which about 30,000 young people have access every week.

What is a Safe-Hub? A Safe-Hub consists of an all-encompassing infrastructure. The infrastructure usually includes a sports field, a youth café, a training academy, a computer lab, cultural workshops, an exercise room, a psychosocial counseling center and office space for social entrepreneurs. Children and adolescents come here to decompress. The key to the program is its holistic focus: Safe-Hubs strive to reach young people, their families, and the local community in nearby townships. The concept has already demonstrated its impact in the areas of violence prevention, education and adolescent employment. Crime plummeted by 44% and high school graduation rates of program participants climbed by 49% in the area around the first Safe-Hub near Cape Town. One study found that the investments made by a single Safe-Hub generated a sixfold social return on investment (600%).

Figures

Safe-Hub programs have an impact on participants and nearby communities, here Khayelitsha near Cape Town

44%

less contact crime

90%

more young people in jobs, college or training programs

49%

higher high-school graduation rate



The Safe-Hub Diepsloot: Every day up to 200 children and young people find here a place for sports, education, to feel good.

Knorr-Bremse Global Care focuses on strategic partnerships

High impact, efficient use of funding and sustainability are the underlying reasons for the strategic partnerships initiated by Knorr-Bremse Global Care. Its partner organizations also benefit from the long-term collaboration by strengthening their institutional capacities, among other things. As part of the partnership with AMANDLA, which was initiated in 2014, Knorr-Bremse Global Care has been supporting the construction of the Safe-Hub in Gugulethu-Manenberg (Cape Town) and has been funding the accredited PlayMaker training program conducted by the Safe-Hub in Diepsloot, a township of Johannesburg. Julia Thiele-Schürhoff, Chairwoman of Knorr-Bremse Global Care, said: "We were impressed by the Safe-Hub concept from the very beginning. Children and young people from marginalized families with little access to education and support often find themselves in a vicious circle, with few opportunities for advancement. This strategic partnership enables us to tackle the root causes of structural problems and create better prospects for these people." As a way of formalizing the strategic partnership, Knorr-Bremse Global Care and AMANDLA set up Safe-Hub Global gGmbH (social enterprise) in July 2021. Julia Thiele-Schürhoff described the organization's clear goal this way: "Our aim is jointly scale and further develop one of the world's most impactful youth and community development projects."



Every Safe-Hub in South Africa directly reaches between 1,500 and 5,000 young people and between 7,500 and 25,000 people in the social environment.



Thato Molefe, Facility Manager Safe-Hub Diepsloot,
also organizes programs for preschoolers at the Safe-Hub in Diepsloot:

“The children’s worldview is limitless. They are carefree and happy. They enjoy learning through play. They are ambitious and love the Safe-Hub.”

Safe-Hub in Diepsloot: Children love the EduSport Program

The established Safe-Hub in Diepsloot can provide a large number of lessons and best practices for the scaling. Facility Manager Thato Molefe has become an experienced program implementation professional during his seven years on the job. Every day, he looks forward to working with between 120 and 200 participants. When he starts work at 9 a.m., the licensed and passionate soccer coach will be working with soccer teams made up of players from different age groups. Additionally, Thato will encourage young personalities to grow. The Safe-Hub is like an oasis in the middle of Diepsloot, a densely populated, multicultural township with a high crime rate. Thato views the opportunity to work in Diepsloot and help the neighborhood improve and grow as a blessing: “Seeing the positive impact we do on a daily basis energizes me to work even harder for our most important people, the participants.” Soccer is indeed a central activity in the Safe-Hub and is fully inclusive. “We accommodate all who join the Safe-Hub,” Thato says. “In addition to soccer, we offer programs like Girls Fun Tuesday and assist participants with homework assignments.” On Girls Fun Tuesday, girls only do activities they particularly enjoy. These usually include traditional games, water and board games, and social media activities.

The EduFootball Program

One central support program offered by all Safe-Hubs is the three-phase EduFootball Program – soccer as the gateway to education and an individual maturity process. The Safe-Hub also offers an early-childhood development opportunity called the GetInTheGame Program (U6, U8 and U10 players). The next phases for adolescents are GoForIt (life skills) and MakeYourPlay (employment, training education). “From age 17 and up, young people make plans for their future. The MakeYourPlay curriculum shares practical skills and helps young people become employable young adults who contribute positively to society,” Thato says. The MakeYourPlay phase includes the PlayMaker Program. This program includes a 12-month training course for 13 local coaches and prepares participants for work or an apprenticeship program.



The former playmaker **Phemelo Digopo** completed an administrative training program at the HR department of Knorr-Bremse South Africa:

“I get to help individuals better themselves, which for me is heartwarming.”

First PlayMaker, then Knorr-Bremse South Africa

Phemelo Digopo started off as a PlayMaker in Diepsloot at the beginning of 2021. He has really grown as a coach and moderator since then: “The team environment allowed me to learn how to balance different personalities and also identify my strengths. I have learned how to assert myself.” The PlayMakers receive important job-related know-how, for instance training courses on office data processing and in a job readiness program. Phemelo was one person who was ready for the job market – and this opportunity came to him in the form of the HR colleagues at Knorr-Bremse South Africa. The HR team visited Safe-Hub Diepsloot, got to know Phemelo and recruited him for a one-year training program at Knorr-Bremse in the business administration services unit.

“Phemelo was already a very thoughtful and determined personality when he joined us,” said Heidi Snyman, the Group Head of HR at Knorr-Bremse South Africa. “The PlayMaker Program had already given him the necessary job-related knowledge, including things like data processing and project management. As a former PlayMaker, Phemelo has tremendous soft skills – something that is really valuable for HR.” Phemelo wants to complement and further develop his HR qualifications. To do so, he will be studying HR at the South African College of Applied Psychology. Phemelo also set up his first small event company and is now working to expand this enterprise. He now possesses his own tool box to help underprivileged adolescents gain access to education, qualifications and jobs. “It is a vision I developed while at AMANDLA,” Phemelo said.



Program managers develop the programs of the Safe-Hubs, with the focuses being Health, Education and Employability.



The Safe-Hub Khayelitsha (Cape Town) is one of currently nine Safe-Hubs in South Africa. The first programs northern hemisphere were launched by Knorr-Bremse Global Care with AMANDLA in Berlin (Germany) and Philadelphia (USA).



At their local Safe-Hub, young people come together to play, learn, and work as a team.

Safe-Hub Global gGmbH: scaling Safe-Hubs globally



Thanks to the proven impact of the Safe-Hubs project, AMANDLA has been recognized as a best-practice model for youth development by the United Nations Office on Sport for Development and Peace.

Having achieved success in South Africa, the Safe-Hub concept is now going global with the help of Safe-Hub Global gGmbH. Julia Thiele-Schürhoff wants to promote through expertise of Knorr-Bremse Global Care and Knorr-Bremse: “We plan to not only support Safe-Hubs around the world, but also help shape their development. This will improve the long-term opportunities of young people around the world.” Safe-Hub projects are already implemented in Berlin (Germany) and Philadelphia (United States). Like South Africa, Knorr-Bremse sites are not far away from these two Safe-Hubs. Employees of Knorr-Bremse can engage and support when necessary.



The partnership agreement of Safe-Hub Global gGmbH was signed on July 27, 2021. From left: Julia Thiele-Schürhoff, Chairwoman of Knorr-Bremse Global Care, Jakob Schlichtig, Managing Director of AMANDLA and Mario Beinert, from Knorr-Bremse Global Care. They have lofty objectives: "The aim is to work together to scale up and further develop one of the world's most impactful youth and community development projects."



Anna Winkler,
project manager AMANDLA Berlin,
is in charge of the Girls Hub project in Berlin:

"The EduFootball program developed by AMANDLA teaches the participants not only football skills but also important social skills during training."

Florian Zech noted that Knorr-Bremse Global Care works with the South African organization as equal partners: "We are deliberately breaking with the old stigma of NGO on one side and donor on the other. We consult closely with Knorr-Bremse Global Care, which includes potential engagement among Knorr-Bremse employees and the sharing of joint expertise." The first Safe-Hub infrastructure in the northern hemisphere is scheduled to open in Berlin-Wedding in 2023.

Safe-Hub in Berlin about to kick off

The Berlin-based AMANDLA team has been offering programs and services to local young people for the last six years. Later this year, the Berlin-Wedding Safe-Hub infrastructure will be completed. These programs currently comprise train-the-trainer workshops, School-Hubs, Girls Hub and open soccer practices on local athletic fields. A career guidance program for adolescents is planned as well. AMANDLA is currently working with schools to carry out the EduFootball Program or uses public soccer fields. The organization's own sports field is scheduled to open in mid-2023. Girls and young women playing soccer are very present in the process, and the GIRLS HUB project makes sure of that. Anna Winkler is the passionate organizer of the program: "Using sports to promote equal opportunity for girls and young women is something that is very close to my heart." She sees it daily: "In Berlin, the EduFootball Program designed especially for girls helps create more stable, self-confident young personalities who are better able to deal with their emotions and handle setbacks. They bring team play and respectful interaction to life." Once soccer is over, these skills are not simply left in the dressing room to dry. Rather, they are also applied in the girls' daily lives and apprenticeships.

The development of many young female coaches, those individuals who serve as important role models for the young players, takes a similar path, Anna says: "Two of our trainers were uncertain about their future when they joined us about 18 months ago. They are now completing an apprenticeship as social pedagogical assistants. They also continue to help us out both on and off the pitch." This fact underscores the strong relationship that participants have with the project in Berlin. It is a positive sign for the future. After all, Safe-Hubs are scheduled to be set up around the world. And, just maybe, we might be able to have a Safe-Hub world soccer championship some day. Or a Safe-Hub mathematical Olympics. Both are possible.



As the German national player Lena Oberdorf says:
"Women's soccer, men's soccer. It is all soccer."
This way of thinking definitely applies to the GIRLS HUB project in Berlin.



The Road to Decarbonization

The Knorr-Bremse systems that help make reliable, high-performance e-trucks possible

The mobility and transportation industry is demanding that vehicle manufacturers and fleet operators develop new strategies, concepts and products for e-mobility. Knorr-Bremse supports its customers by acting as a system partner, offering safe and reliable systems with minimized emission of carbon dioxide, noise and brake dust. They align with the vehicle makers' electrification road maps. As a result, Knorr-Bremse helps its customers to reduce their environmental footprint.

To provide the right conditions for the very best development, Knorr-Bremse has focused its mindset, business processes and product portfolio on e-mobility. In the eCUBATOR innovation unit (→ [eCUBATOR](#)), for example, experts apply an overarching system-based approach to develop innovative and intelligent solutions for electric commercial vehicles. Sonja Wimmer, Chief Operations Owner E-Mobility, has the mission to shape the long-term future of e-mobility in the eCUBATOR: “In the eCUBATOR, we focus on innovative, efficient and scalable technologies that contribute to decarbonization in road freight and passenger transportation. We are not limiting ourselves to Knorr-Bremse’s current product portfolio, but are also looking at new growth areas.”

All Knorr-Bremse developments are based on the principle of the best fit: adaptable, modular and compact solutions that can be integrated into OEMs’ vehicle architectures flexibly and easily. With our “first-to-market” ambition, we already offer easily integrated, assembly-line-ready products for electric mobility. In this article, three experts from different Centers of Competence (CoCs) at Knorr-Bremse each discuss one of these Knorr-Bremse system solutions, which are sustainable and will be essential for the e-mobility transformation of commercial vehicles.

The eCUBATOR® Innovation Unit

In a reflection of Knorr-Bremse’s commitment to proactively shaping change, it has inaugurated the eCUBATOR®, an innovation unit for e-mobility. It sees up to 60 internal and external experts working at external sites in Munich and Budapest. Their mission is to use unconventional methods to identify innovative, intelligent solutions for electric commercial vehicles and develop them in close cooperation with customers, technology partners and start-ups.

→ [eCUBATOR](#)



Disk brakes from the modular SYNACT® family



**E-compressors
Electrical Vane Module (EVM)**



**Electric Power
Steering (EPS)**

The Modular SYNACT® Family: Lowers Emissions and Energy Consumption

Knorr-Bremse develops innovative system solutions for safety-critical products. These solutions have always stood out for their superior function, efficiency, reliability and sustainability and added value for customers. This also applies to automated driving and e-mobility.



SYNACT®

“The modular concept of our new SYNACT® brake family makes an important contribution to the commercial vehicle industry’s rapid and economic transformation to e-mobility.”

Niklas Beckwermert,
Product Manager
for Air Disk Brakes

SYNACT® Disk Brakes: Achieving e-Mobility Progress with Modularity

“The modular concept behind the easily integrated and robust SYNACT® brake family makes an important contribution to the commercial vehicle industry’s rapid and economical transformation to e-mobility,” says Niklas Beckwermert, Product Manager for Air Disk Brakes at Knorr-Bremse. With electric trucks, designers have to deal with a vehicle architecture that is different to those powered by internal combustion engines, the expert says. “The motor does not take the place that the old combustion engine used to be in. In an e-truck, the motor is located closer to a wheel end system made up of an actuator, brake caliper, brake lining and disk. The solutions currently applied by vehicle makers frequently use integrated e-axes, where the motors and gear stages are integrated into the axle. Consequently, e-truck designers have to deal with completely new architectural requirements.” Modular SYNACT® disk brakes can flexibly meet the architectural requirements of e-mobility. “They meet these challenges by using things such as a design that is more compact axially or a radial cylinder arrangement,” says Niklas Beckwermert. “Knorr-Bremse provides vehicle designers with the freedom they need to create innovative e-drive concepts.” Other aspects of the modular SYNACT® approach include future solutions to minimize the emission of brake dust and noise and to electrify the brake system.

Energy Efficiency Improves Range and the Environmental Footprint

“One key economic parameter in e-mobility is increasing a commercial vehicle’s range using the existing battery capacity,” Beckwermert says “SYNACT® helps add the necessary energy efficiency when driving by reducing energy consumption and vehicle weight.



How the Modular SYNACT® Family Contributes to Sustainable Mobility

- Improves energy efficiency: reduced weight and Active Caliper Release (ACR system)
- Lowers emissions: reduced Scope 3 carbon emissions as a result of resource conservation and energy savings; a toolbox for reducing noise emissions
- Realized with EcoDesign: reduced weight, robust, compatible with remanufacturing

These reductions also lead to lower Scope 3 carbon emissions.” Another high-efficiency feature is the Active Caliper Release (ACR) system to reduce brake drag – regardless of the drive technology involved. The ACR concept uses a spring system to release the brake pad from the disk and more rapidly recenter the caliper. The result is lower energy consumption and less wear and tear on the brake pads.

SYNACT®: Brimming with EcoDesign

SYNACT® axial weighs four kilograms less than its predecessor model and SYNACT® radial 10 kilograms less. This reduced weight conserves material in the production process in addition to reducing energy use during driving. We work closely with our suppliers and other business partners to raise awareness of this important subject. In the process, we draw on the expertise we have gained from many projects. Our EcoDesign philosophy is also reflected in the robustness of the brakes and their ability to be remanufactured, extending the SYNACT® brakes’ life cycle.



These three experts from various Centers of Competence at Knorr-Bremse have their sights firmly set on the e-mobility road map (left to right): Nils Bielefeld, Head of CoC EPS; Wolfgang Kiener, Product Manager: Compressors; Niklas Beckwermert, Product Manager: Air Disc Brakes.

E-compressors: Reduced Noise Emission Demanded and Delivered

Compressors produce compressed air, the main source of energy for all pneumatic brake systems, air suspensions and clutches used in commercial vehicles. The compressor technologies used with internal combustion engines and e-trucks differ significantly. Conventional piston compressors are powered by the internal combustion engine and the compressors of electric vehicles by the vehicle's own electric motor. Wolfgang Kiener, the Product Manager responsible for compressors at Knorr-Bremse and thus the manager overseeing the Electrical Vane Module (EVM) and Electric Screw Module (ESM), vividly describes the technical interrelationships in the following interview. Both modules possess two qualities required for e-trucks: energy efficiency and quiet-as-a-whisper operations.



Rotary Vane Compressor

Combustion Engine or E-truck: How Do the Compressors Differ?

Wolfgang Kiener: Firstly, there are compressors that are powered by the internal combustion engine. They are mechanically coupled directly to the gear train on the internal combustion engine and operate when the engine is running. One exception is the compressor with a clutch, which is decoupled when the engine is idling. Piston compressors are used for this purpose, which produce a typical pumping sound, but this is drowned out by the running diesel engine. The major technological difference is that the e-truck compressors need to have their own motor. The reason is simple: There is no internal combustion engine to power them. Another difference is noise emission, for which there are heavy demands that we must meet. These demands led to the development of rotary compressors that operate very quietly.

How does the drive system of an e-compressor work?

Wolfgang Kiener: In an e-truck, a highly efficient off-engine compressor switches on when compressed air is needed. This saves energy. Energy-efficient auxiliary consumers like our compressors are exactly what helps customers to increase their vehicle range, an area that is critically important to all electric vehicles.



Screw Compressor

“Compressors would be one of the loudest components in an e-truck. However, the e-compressors made by Knorr-Bremse keep noise emissions at a minimum. The compressor noise has been harmoniously integrated into the overall symphony of sounds in the vehicle.”

Wolfgang Kiener,
Product Manager, EVM and ESM

Is the e-compressor quieter?

Wolfgang Kiener: E-trucks are much quieter than diesel vehicles. For this reason, the compressors used in electric commercial vehicles must be quiet as a whisper in operation. A classic piston compressor with those typical pumping sounds would be one of the loudest components in an e-vehicle, and it would be unacceptable. We have applied the rotary compressor principles to achieve the necessary reductions in compressor noise emissions. The sound emissions have been reduced to a minimum and the compressor noise has been harmoniously integrated into the overall symphony of sounds in the vehicle.

Technology Profile: E-compressors (EVM and ESM) Made by Knorr-Bremse

The Electrical Vane Module (EVM) is going into series production in 2023. Screw compressors have already proven to be very reliable components during their decade of usage.

- The **Electrical Vane Module** consists of a rotary vane compressor in conjunction with a compact e-motor. The vane compressor is designed to be an energy-efficient and quiet compressor for electric commercial vehicles that require a medium to low amount of air (air consumption 180 to 300 NL/min; 330 NL/min to 11 bar). The vane compressors are able to operate so quietly thanks to their low-pulse compressed-air production and low vibration. They are designed to be compact and robust for use in a wide range of temperatures (–40°C to 80°C). They can also operate highly efficiently throughout the entire rpm spectrum. Another feature that contributes to the high level of efficiency is a permanent-magnet motor with an integrated inverter.
- The **Electric Screw Module (ESM)** (a screw compressor in conjunction with an e-motor) is efficient and extremely reliable. It performs impressively thanks to its low-noise operation in commercial vehicles requiring a lot of air, such as e-buses. The air consumption is 230 to 475 NL/min. The product characteristics are similar to those of the vane compressor.

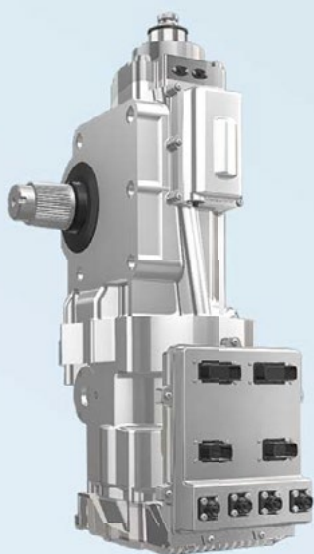


How E-compressors Made by Knorr-Bremse Contribute to Sustainable Mobility

- Improves energy efficiency: reduced energy consumption through needs-based production of compressed air
- Lowers noise: quiet-as-a-whisper operations using the rotary compressor principle

EPS – Safe, Energy-Saving Electric Power Steering for E-trucks

Knorr-Bremse's electric power steering (EPS) is a fully redundant, fail-safe steering system. EPS, which is scheduled to enter series production in 2025, is a key technology for advanced driver assistance systems (ADAS), highly automated driving (HAD) and e-mobility. Thanks to its modular, system-based approach, EPS enables applications in all commercial vehicle classes and requires little integration expense. Using the power-on-demand principle, EPS is energy efficient and naturally meets the demanding safety standards of Knorr-Bremse. The coordinated steer-by-brake system also contributes to this, creating additional safety redundancy. Moreover, EPS assists with critical steering maneuvers in traffic, including evasive and μ -split maneuvers.



EPS – Electric Power Steering

How does the steering system of a vehicle powered by an internal combustion engine and the one used in an e-truck differ? "The interplay of the steering system with an e-axle or with a conventional setup is quite similar. However, the technological functionality of electric power steering is completely different," says Nils Bielefeld, head of the EPS Center of Competence (CoC). "The pump for the steering system in an e-truck cannot be powered by an internal combustion engine. The power must be provided all electrically. During operation, this leads to greater energy supply for short periods." Doesn't greater energy usage reduce the vehicle's range? "No," Bielefeld says, "EPS is a power-on-demand system, and that means the system uses energy only when it is required." The expert also pointed to the changed balances of power for steering an e-truck: "The front-axle load increases significantly in all-electric vehicles due to the battery. For this reason, the steering system needs to expend more power to perform the steering maneuver." However, energy-efficient steering is ensured with EPS because it is a power-on-demand system – and lower carbon emissions are ensured as well.

Nils Bielefeld, the steering system specialist, explains why a power-on-demand system is the key to energy-efficient steering: "Power on demand means that EPS does not consume any power when the vehicle is driving straight ahead. This is called the 'idle mode' and it applies to a large amount of the routes to be driven, particularly for trips made by long-haul trucks." EPS therefore uses the most power when the steering wheel is turned and the vehicle is stopped or during maneuvers at low speed with high torque steer."

“Power on demand means that the EPS does not consume any power when a vehicle is driving straight ahead. This ‘idle mode’ applies to a large amount of the routes to be driven, particularly for trips made by long-haul trucks.”

Nils Bielefeld,
Head of the EPS Center of Competence

EcoDesign Keeps the Aftermarket in Mind

The EPS also incorporates EcoDesign and therefore the needs of the aftermarket. Subcomponents in handling and technology can be exchanged easier and potential premature scrapping of a component can be prevented. The process by its very nature requires components to be recyclable.



How Knorr-Bremse EPS Improves the Environmental Footprint

- Improves energy efficiency: greater range through a power-on-demand system
- Lowers emissions: lower carbon emissions through a power-on-demand system
- Recyclable: recyclability is incorporated into EcoDesign



Setting the Course for Sustainability

How Knorr-Bremse systems are driving forward
energy- and emission-reduced rail transportation

Intensive discussions in the rail industry reveal a clear trend: There is a spirit of optimism – and a genuine interest in sustainable solutions for rail transportation. What is required, is reduced energy consumption, even lower pollutant and noise emissions; and clean air for a high level of passenger health and comfort on board.

Knorr-Bremse supports customers with highly innovative solutions that make rail transportation more reliable and connected, safer and cleaner, more comfortable and more efficient. Technical experts from the company talk about three systems that make rail vehicle operation more sustainable:

AirSupply Smart

More noise protection and lower CO₂ emissions thanks to reduced weight

clean[air] and green[air]

Energy-saving air conditioning for clean air in trains

ECOSystem from Microelettrica

Optimized energy management based on data

AirSupply Smart

More Noise Protection and Lower CO₂ Emissions Thanks to Reduced Weight

AirSupply Smart creates the basic conditions for a new climate- and environment-friendly energy and noise emission management for rail vehicles. For decades, air supply systems on trains have only known two operating modes: on or off. AirSupply Smart, on the other hand, can provide compressed air as needed. The delivery volume is adjusted to the pressure level, which is influenced by the vehicle's load, speed and braking processes as well as the operating data and track topography. "At the heart of the solution is our new frequency converter. It acts as the air supply system's 'brain' and enables three different operating modes: Boost, Silent and Panto Modes," explains Justina Margeth, Product Manager AirSupply Smart.



"We are able to dispense with complex and heavy capsule solutions in Silent Mode. Boost and Panto Modes also contribute to a reduction of the weight of the overall system by around one third, which ultimately means reduced CO₂ emissions and lower material usage."

Justina Margeth
Product Manager AirSupply Smart

Optimized Noise Management

Silent Mode reduces the speed of the compressor so that it runs much more quietly. This is important, for example, for "upgraded" trains parked at night near residential areas or in train stations. This is because they remain in an often noisy state of operational readiness. Measurements show that Silent Mode can reduce sound power by up to 75 %. "This helps operators to comply with the increasingly stringent rules on noise protection. What I'm thinking of here are standards and voluntary specifications that we can fulfill with AirSupply Smart without needing high-cost encapsulation. One example is the European specification for reducing parking noise, called EuroSpec Parking Noise," Justina Margeth notes with satisfaction.

Improved energy management

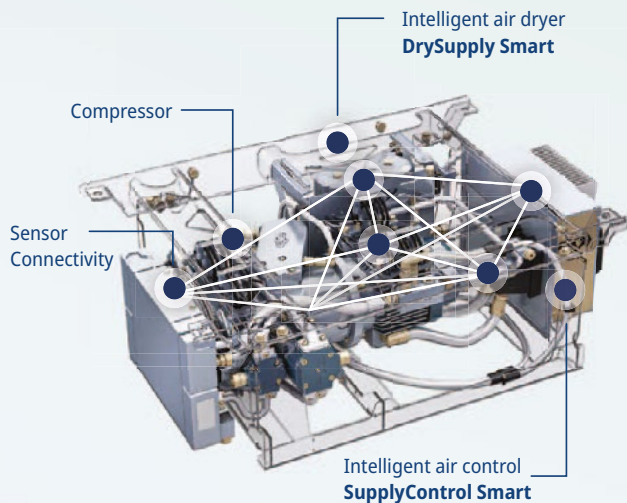
AirSupply Smart can switch from Silent Mode to **Boost Mode** when there is a particularly high demand for compressed air and the air suspension needs to be readjusted. This is the case, for example, if a large number of passengers disembark. Boost Mode can also be used to shorten the set-up times of parked vehicles and makes it possible to use a smaller, lighter compressor that still meets peak demand. In addition, the use of an inverter allows the compressor to be temporarily powered directly from the vehicle battery and used as an auxiliary air compressor at a reduced speed. This function is called Panto Mode (pantograph mode). A supplementary auxiliary air compressor is no longer necessary. The resulting advantages are weight reduction, reduced complexity, lower material usage and reduced life cycle costs.



AirSupply Smart Helps Reduce a Customer's Ecological Footprint Because It Is:

- Emission-reducing: reduced weight lowers CO₂ emissions
- Noise-reducing: compressor runs at adjusted speed in Silent Mode

All three functions, Silent, Boost and Panto Modes, pay off with an improved ecological footprint: "Vehicle manufacturers have high demands in relation to weight targets. We already take this into account in the ecological product design. In Silent Mode, for example, we were able to dispense with complex and heavy capsule solutions. Boost and Panto Mode also contribute to a reduction of the weight of the overall system, which ultimately means reduced CO₂ emissions and lower material usage." Margeth sees the sustainability-related aspects as the result of a holistic understanding of the system: "With AirSupply Smart, we are meeting customer requirements for intelligent solutions. With its extensive potential for adaptive control and integrated condition monitoring, our solution increases vehicle availability and results in less wear and tear and lower life cycle costs."



The AirSupply Smart intelligent air supply unit delivers compressed air as needed. As a fully integrated system, it combines intelligent control with monitoring of operating conditions.

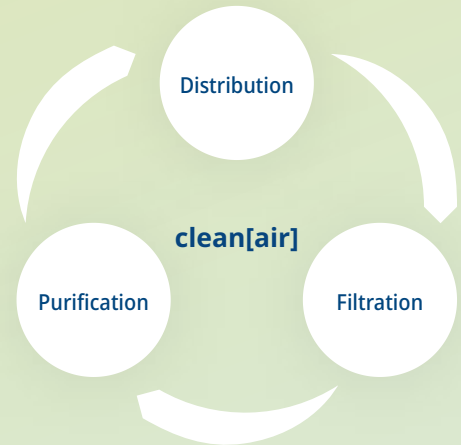


Knorr-Bremse helps customers to optimize their ecological footprint. The company presented solutions such as AirSupply Smart for reducing the emissions and energy consumption of rail vehicles and fleets at InnoTrans 2022 in Berlin.

clean[air] and green[air]

Energy-saving Air Conditioning for Clean Air in Trains

One approach for improving the environmental footprint of air conditioning technology is in upgradeable subsystems: clean[air] technology is designed for clean air in the passenger compartment and all-round comfort, while green[air] technology offers highly efficient solutions with GWP (Global Warming Potential)-reduced and natural refrigerants. “The pandemic in particular highlighted to customers and the public the need for secure and clean air quality on board trains, even outside of such extreme situations,” reports Dr. Giovanni Nurzia, Managing Director at Merak. At the same time, conventional air conditioning systems are among the most electricity-intensive consumers on a train. This makes solutions that combine optimized air purification and energy-efficient operation all the more important for operators.



The three dimensions of Merak's clean[air] concept: air distribution, filtration and purification.

In the **clean[air]** concept, Merak has optimally combined its technologies and developed an integrated concept made of three dimensions: Distribution, Filtration and Purification. In it, the air is cleverly distributed by means of intelligent ventilation and freed from potentially pathogenic germs and viruses as well as other contaminants using highly efficient filtration and purification solutions. Dr. Giovanni Nurzia sees important unique selling points: “clean[air] is the only multidimensional, configurable and scalable comprehensive air quality solution in rail transportation. Its added hygienic value is particularly impressive thanks to the effective removal of aerosol-bound viruses such as SARS-CoV-2 from the air. This of course aroused great interest during the Covid-19 pandemic – and to date we have been able to equip numerous fleets internationally with this solution, across all modes.” The innovative clean[air] technology also includes high-efficiency air filters (Merak Long Life Filter, MLLF). “The MLLF lasts up to four times longer than conventional filters, which also reduces waste and increases asset usage”, Dr. Nurzia said.

The **green[air]** concept uses refrigerants with reduced GWP (Global Warming Potential) and lowers energy consumption. One factor is ECOFans (eco-efficient fans), which can reduce energy consumption by 30 % compared to conventional systems. This can be complemented by the innovative LITE (Light Integrated Train Energy) auxiliary power supply, which also enables significant weight savings: “The weight reduction results from the use of distributed power supply systems. This avoids unnecessary duplication of intermediate power stages, which saves weight and increases efficiency. We can advise the vehicle manufacturer on the necessary adaptation of the vehicle architecture”, explains Dr. Giovanni Nurzia.

custom[air] Configurator Supports Sustainable HVAC Concepts

In 2022, after being presented at the international railway trade fair Innotrans, the new **custom[air] concept configurator** – which combines performance and TCO (total cost of ownership) assessment – reached the finals in the Research & Development category at the Berlin Sustainability Congress. Using a holistic approach, this configurator calculates CO₂ emissions, in-vehicle air quality and total cost of ownership of customized HVAC concepts. Various green[air] and clean[air] technologies are also included as well as a representative climate zone for the system’s place of use. The associated app can combine the data to meet customer requirements for sustainability and health protection as precisely as possible.



“With the clean[air] and green[air] technologies, we are able to make health and comfort sustainable in rail, combining increased air quality with reduced environmental impact.”

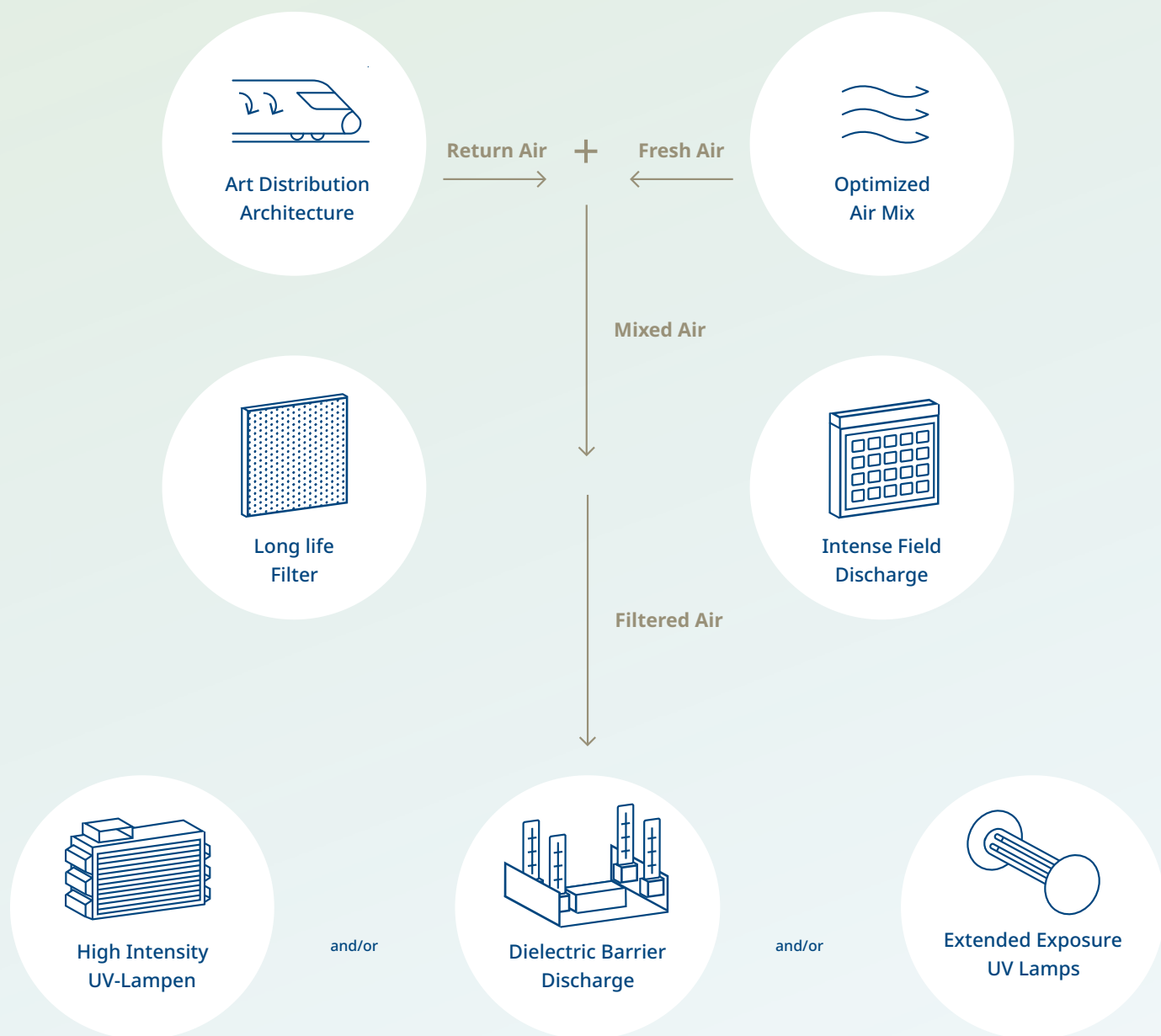
Dr. Giovanni Nurzia

Development Team Leader, Merak



Air Conditioning Technology from Knorr-Bremse Contributes to Sustainable Rail Vehicle Operation Because It Is:

- Air-cleaning: improved air quality in the passenger compartment with the integrated clean[air] concept
- Energy-efficient: refrigerants with reduced GWP (Global Warming Potential) in the green[air] concept and ECOFans



Health and Passenger Comfort when Traveling by Train: clean[air] Concept for Clean and Safe Air on Trains

The first dimension is intelligent vertical air circulation supplying a maximum volume of fresh air. This can be implemented through intelligent control of the HVAC systems. The second dimension consists of air filters to remove bacteria and dust particles. The third dimension consists of air purifiers based on UV-C irradiation and electric near-fields.



ECOSystem from Microelettrica

Optimized Energy Management Based on Data

Reducing and saving energy in train operation is a key challenge for rail operators. Fundamental to the energy-efficient operation of rail vehicles is the reliable recording of the underlying data. This is precisely what *ECOSystem* from Knorr-Bremse's Microelettrica Scientifica brand, does: The system captures data and measures and manages energy consumption. The data processed by an online data handling system (ECOM) and subsequently recorded (ECOLogic) becomes transparent for infrastructure and operators – and energy consumption can be analyzed. The result: Smart Billing Support adds value by enabling operators to calculate the amount of current consumed or fed back into the grid. And driver advisory systems such as LEADER can aggregate this energy data with train configuration, infrastructure and vehicle operating data to generate recommendations for situational, energy-efficient driving styles. LEADER is already achieving energy savings of at least 5 % in the rail freight sector.



“The *ECOSystem* family is a key data source for any further data mining and analysis activity. The modularization of the *ECOSystem* makes it particularly suitable for a large variety of applications.”

Valter Lovati
Metering Technical Group Leader
Microelettrica Scientifica

Three questions about the development and use of the modular *ECOSystem* for Valter Lovati, Metering Technical Group Leader at Microelettrica Scientifica.

Digitalization is driving sustainable solutions in rail transportation. What is your approach to development work here?

At Microelettrica Scientifica, we always see the “overall railway system,” which we know comprehensively and in depth. With this system knowledge, we set goals that are intended to add value for any stakeholder. In this context, and when considering how essential digitalization is, collaboration between experts in the respective sectors is crucial. This is because each organizational unit must identify and promote precisely the processes that contribute to maximizing their respective competencies. This is also the key to achieving set sustainability objectives.

How does a vehicle operator benefit from the data expertise of the *ECOSystem*?

The *ECOSystem* family is a key data source for any further data mining and analysis activity. The modularization of the *ECOSystem* makes it particularly suitable for a large variety of applications. They range from pure energy measurement for billing purposes to maintenance activities as well as complex efficiency algorithms that capture entire transportation systems. All these *ECOSystem* applications pay off in sustainable transport operations.

With rising energy prices, has customer interest in the *ECOSystem* increased and can it be retrofitted?

Yes, the increased interest also comes from infrastructure managers. They are pursuing a policy of fare differentiation and want certified energy management systems in the rail vehicle. Fleet operators also want to increasingly identify non-drive-related energy consumers in the vehicle for improved overall efficiency. In this respect, we offer *ECOSystem* for new and existing vehicles, which means it can be retrofitted. It is important that EU directives such as Implementing Regulation (EU) No. 402/2013 can always be fully adhered to. We keep this in mind with our experience.



ECOSystem Helps Reduce a Customer's Ecological Footprint by Supporting:

- Energy-efficient operation: energy consumption measurement and management through effective data collection and analysis



Valter Lovati (second from the left), Metering Technical Group Leader, at his favorite place to work: the metering lab at Microelettrica Scientifica. This is where important knowledge is gained for the development of energy consumption measurement and management systems.



Sustainability Management

Knorr-Bremse helps make mobility and transportation more reliable, safer and more efficient with innovative system solutions. Accordingly, sustainability is a core element of our corporate identity and a foundation of our business success. With our management of sustainability, we take responsibility for our employees, customers and business partners as well as the environment and society.

Sustainability Strategy and Materiality

Knorr-Bremse wants to live up to its environmental and social responsibilities. In line with this desire, we have committed to sustainable corporate governance and integrated sustainability into our organizational structures and business processes. We aim to strengthen this integration in the future because the company's sustainable direction contributes to its business success. The resulting sustainability strategy is impetus for adding value in a way that conserves resources and a key influence on our conduct as a fair business partner and employer.

Our management of sustainability is designed based on international standards and internal rules. They lay out our requirements for sustainable corporate governance and are a guide for our employees' and business partners' conduct. These internal guidelines include, for example, our Sustainability Guidelines and our Group-wide Code of Conduct (→ [Sustainability Guidelines](#)). Furthermore, we are guided by international guidelines and conventions such as the UN Global Compact, the UN Guiding Principles on Business and Human Rights, the conventions of the International Labour Organization (ILO) and the → [UN Sustainable Development Goals \(SDGs\)](#). Our sustainability ambitions are accomplished using the specific, established management systems and action programs.

Industry Guidelines

There are also industry guidelines that provide orientation for Knorr-Bremse in the design of its sustainability management. For example, we are cosignatories to the following guidelines:

- Sustainability Charter of the International Association of Public Transport (UITP)
- Code of Conduct of the Verband der Bahnindustrie in Deutschland e. V. (VDB, railway industry association)
- Dublin Declaration of the European Rail Supply Industry
- European Railway Safety Culture Declaration

The Knorr-Bremse Sustainability Guidelines

Sustainability Guidelines

Our sustainability guidelines set out the principles and strategic objectives for responsible corporate governance at Knorr-Bremse.

↓ [Sustainability Guidelines](#)

Code of Conduct

Our Code of Conduct defines our understanding of responsible behavior for all Knorr-Bremse employees globally.

↓ [Code of Conduct](#)

Procurement Guidelines

Our Supplier Code of Conduct demonstrates our obligation to fair and sustainable business practices within our supply chain.

The quality guidelines for our procurement spell out the requirements that we have of our suppliers with regard to sustainability.

The Conflict Minerals Policy governs the handling of conflict minerals and guides the Purchasing department at Knorr-Bremse as well as Knorr-Bremse's suppliers.

Internal guidelines specify the extent to which sustainability aspects are to be taken into account in purchasing decisions for various categories (e.g., energy, business travel or energy-efficient products).

↓ [Supplier Code of Conduct](#)

↓ [Conflict Minerals Policy](#)

Compliance Guidelines

There are six Group-wide compliance guidelines that specify principles for conduct. They cover dealing with gifts and invitations, donations and sponsoring, corruption prevention, conflicts of interest, screening of business partners and fair competition.

Human Rights Policy

The Human Rights Policy brings together all aspects relating to human rights that are currently spread across different Knorr-Bremse guidelines.

↓ [Human Rights Policy](#)

HSE Policy

With our Health, Safety and Environment (HSE) Policy, we commit to high performance standards.

↓ [HSE Policy](#)

Product and System Safety Guidelines

The Quality Policy defines our high quality requirements for the RVS division, while our Quality First Policy lays out our high quality requirements for CVS.

The Product Safety and Product Conformity Organizational Policy, issued in 2022, provides an organizational framework for fulfilling our product safety requirements.

Through our sustainability strategy, we have set the objective of constantly enhancing our sustainability performance in all areas of the value-adding process. We derive our strategic focus topics from our materiality analysis, international guidelines and external ratings and customer assessments. We also gain important input through dialogue with our stakeholders, such as customers, employees and investors. We have increasingly used the ESG approach to structure our overarching sustainability program, and the measures derived from it, since 2022. This means we are also following capital market requirements and future legislation more clearly.

The ESG Approach

ESG stands for environment, social and governance. It provides a structure for the areas of a company's sustainability management. The ESG approach is intended to be a tool to achieve sustainable business and company development and make a positive contribution to sustainable development in society as a whole. The term is used mostly in the capital market for the guiding principle of sustainability.

Our materiality analysis, which was updated in 2022, shows us the focus topics we need to prioritize in order to take responsibility for environmental and social challenges. The topics that are identified as material also determine the content of this report. During the analysis, we first evaluated the positive and negative impacts of our business activity on the environment and society from an inside-out perspective. Secondly, we analyzed the topics' business relevance and impact on Knorr-Bremse's future viability (outside-in perspective). This confirmed the following 13 focus topics from the previous materiality analysis:



G

Anti-corruption and Fair Competition

Responsible corporate governance is a prerequisite for gaining the trust of society, customers and employees. It is the basis for the company's growth and minimizes reputational and legal risks. We hold ourselves to our own high standard of constant compliance with laws, internal regulations and voluntary commitments. Combating corruption and bribery is therefore one of the key topics in compliance management at Knorr-Bremse.

The topic of anticorruption and fair competition is integrated into the "Integrity and Compliance" chapter.

→ [Integrity and Compliance](#)

Impacts on the Environment and Society: ■■■□

Business Relevance: ■■■□

E

Climate Protection

Climate change is a global challenge. As a manufacturing company, our business activity has direct and indirect impacts on the environment and climate. Moreover, we must develop strategies that prepare us for the risks associated with climate change. With our Climate Strategy 2030, we want to make our contribution to the target of the 2015 UN Paris Agreement to limit global warming to a maximum of 1.5 degrees.

→ [Climate Protection](#)

Impacts on the Environment and Society: ■■■□

Business Relevance: ■■■■

G

Data Protection and Information Security

Digitalization is important for our company's future direction as it supports efficient processes and new business models. We are always responsible in our handling of the data from various stakeholders that is used and acquired. We have developed and implemented legally compliant safeguards for this.

→ [Data Protection and Information Security](#)

Impacts on the Environment and Society: ■□□□

Business Relevance: ■■■□

S

Diversity and Equal Opportunities

Positive and fair employment conditions inherently involve equal treatment for all employees. Individual employees can harness their potential better when they are in an environment characterized by diversity. A diverse workforce is therefore a driver of creativity, innovation and cultural competence in business partnerships – and consequently a cornerstone of our commercial strength. To reinforce gender equality at Knorr-Bremse, we work on increasing female representation within the workforce and within management.

→ [Diversity and Equal Opportunities](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■□

S

Employment Conditions

As a responsible employer, we wish to offer good employment conditions. They are the foundation for satisfied employees as well as for gaining and obtaining the loyalty of the best skilled workers and managers. In addition to having an open and supportive corporate culture, there are many other factors that contribute to good employment conditions, from fair, competitive salaries to a reasonable work-life balance.

→ [Employment Conditions](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■□

E

Environmental Product Design

We can make a significant contribution to climate and environmental protection with environment-oriented product development. It also enables us to utilize market opportunities and counteract product-based risks proactively. Using our EcoDesign approach, we systematically integrate sustainability criteria, such as longevity, resource conservation and emission prevention, into our processes. In addition, we make sure we design our products in such a way that they are capable of industrial remanufacturing and overhaul; this is now a significant line of business at both Knorr-Bremse divisions that contributes to a circular economy.

→ [Environmental Product Design](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■■

S

Occupational Health and Safety

With high standards and targeted measures for occupational health and safety, we as a responsible employer meet our own requirements and the requirements of human rights more broadly. A healthy and safe working environment is essential in order for our employees to reach their full potential. Our corresponding programs at our sites across the world contribute to positive employment conditions and, by extension, employee satisfaction.

→ [Occupational Health and Safety](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■□

S

Personnel Development

Knorr-Bremse can only manifest its leading market position with well-qualified and motivated employees. Our strategic personnel development focuses on the recruitment of qualified people and the individual, further development of employees and managers.

→ [Personnel Development](#)

Impacts on the Environment and Society: ■■■□

Business Relevance: ■■■□

S

Product and System Safety

Knorr-Bremse's products for commercial and rail vehicles are highly relevant to transportation safety. Our customers rely on us fulfilling our distinct, self-imposed standards for technological excellence and high quality and safety. Simultaneously, we are a driver of innovation and are successful in constantly enhancing the safety of our products and boosting our commercial success.

→ [Product and System Safety](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■■

S

Social Commitment

Knorr-Bremse is a part of society through its business activity and as a driver of mobility. For this reason, the company and its employees contribute to society, especially at its sites. As an employer, as a purchaser of materials and services and through its products, Knorr-Bremse influences local communities and economies in a variety of ways. Thanks to our engagement in society, our employees' identification with Knorr-Bremse increases. Our employees feel motivated to play an active role in social projects themselves. In addition, having a greater reputation in society contributes to the company's employer branding.

→ [Social Commitment](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■■

G

Sustainability in the Supply Chain

Having a sustainable supply chain structure is a core element of our value-adding process and makes a decisive contribution to our company's success. We create the foundation for sustainable products with our selection of suppliers and materials. On top of that, our selection of suppliers has significant impacts on the environment and society in the countries the goods are produced in. That is why we demand adherence to our high sustainability standards. After all, violations of them can result in reputational or business risks.

→ [Sustainability in the Supply Chain](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■■

E

Waste

Waste management is an important aspect of a circular economy, as the valuable raw materials contained in waste can be returned to production. The disposal of waste can also create burdens on the environment. For this reason, we attach great importance to preventing waste or recycling it wherever possible.

→ [Conservation of Resources](#)

Impacts on the Environment and Society: ■■■■

Business Relevance: ■■■■

E

Water

Our water management is intended to promote sustainable and responsible use of this resource. The current and predicted water shortages in a number of regions around the world also result in increased entrepreneurial risk for us. We want to use water efficiently and reuse it multiple times through recirculation wherever possible so that water is consumed sustainably and conservatively.

→ [Conservation of Resources](#)

Impacts on the Environment and Society: ■□□

Business Relevance: ■□□

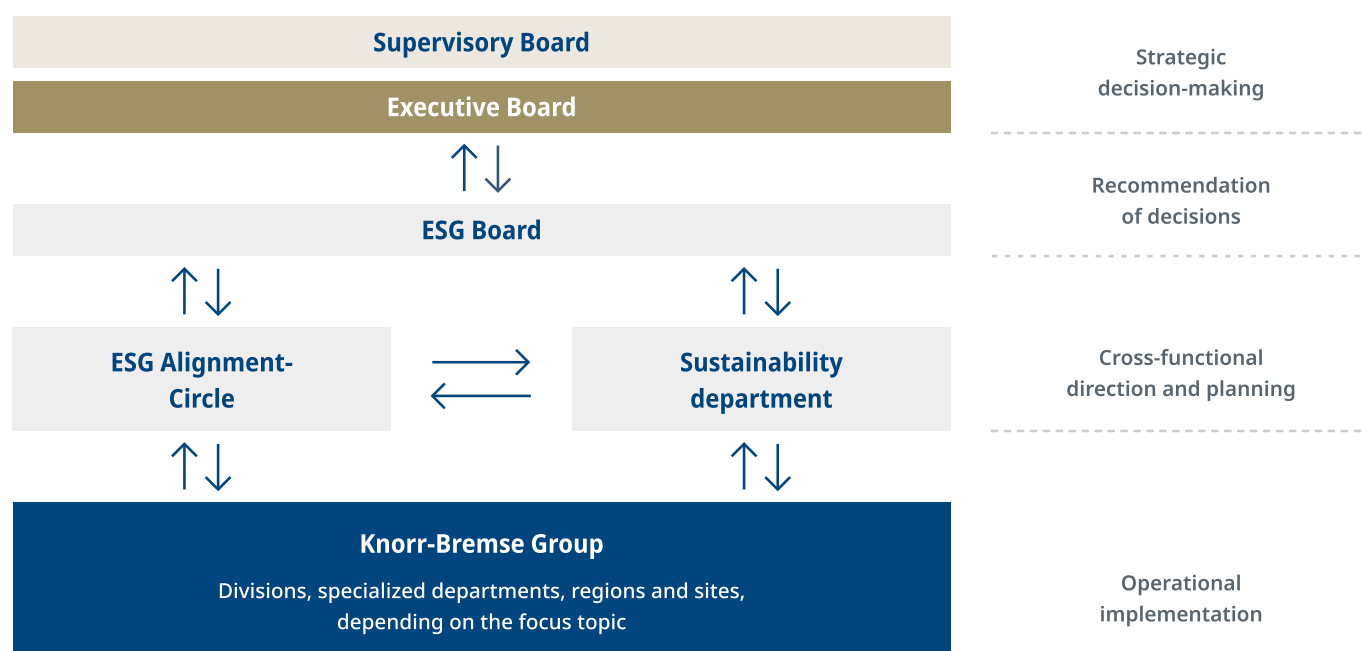
Organizational Structure for Sustainability

With a clear organizational structure, we ensure the analysis, structuring and implementation of the identified sustainability measures in the Group's highest decision-making bodies. The organizational structure, which was expanded in 2022, is intended to drive the growing work in sustainability management both strategically and in terms of implementation (→ [Organizational Structure for Sustainability](#)). The entire Executive Board is responsible for the business strategy's focus on sustainability. The Sustainability department coordinates the sustainability strategy and reports directly to the Chief Financial Officer. To address the topic of sustainability in an organizationally appropriate way and support the implementation of the defined measures, the company relies on the ESG Board (known as the "Corporate Responsibility Council" until 2022) as the central coordination body. The ESG Board, which meets at least four times a year, comprises two members of the Executive Board as well as a representative of senior management from each of the two divisions, the Chair of Knorr-Bremse Global Care e.V. and the Head of the Sustainability department. In 2022, the ESG Board was expanded to include a representative of the senior management of the Knorr-Bremse Americas region and a representative of the senior management of the Asia-Pacific region to embed the topic of sustainability more strongly in the regions both organizationally and operationally. The ESG Board advises on the development of the sustainability program by defining goals and measures for implementing the strategic topics.

The ESG Board and the Sustainability department are therefore centrally responsible for the development, management, implementation and monitoring of sustainability projects. The operational implementation of projects takes place in different areas of activity and divisions.

The ESG Alignment Circle is a body that was installed in 2022 and precedes the ESG Board. It has the task of coordinating the implementation of the individual sustainability activities across departments and divisions and ensuring systematic process integration. It comprises leading representatives of nearly all functional units of the Knorr-Bremse Group. In addition, issue-specific committees and the departments supplement the implementation and development of the sustainability program. Established bodies – e.g., for the topic of human rights or sustainable purchasing – communicate on individual specialist topics and monitor operational implementation. The Executive Board and the Supervisory Board are informed regularly about sustainability topics and make important decisions.

The Organizational Structure for Sustainability at Knorr-Bremse



Stakeholder Management

Trusting collaboration and open exchange with stakeholders is the basis for sustainable business success. We seek to understand the perspectives and demands of our stakeholder groups. This is essential in order to identify future trends, global developments and market requirements at an early stage and thus meet our stakeholders' expectations. Particularly important stakeholder groups for us include employees, young professionals, customers and suppliers, shareholders and investors, business partners, authorities, unions, associations, the media, politics, non-government organizations (NGOs), local residents near our sites and representatives of local initiatives. We maintain a dialog with them all, often within fixed communication and event formats. They include direct conversations with customers, global trade fairs, active work in associations, investor meetings, the Annual General Meeting and communication with employees.

Founding Member of Europe's Rail Joint Undertaking

Knorr-Bremse is one of the 25 founding members of Europe's Rail Joint Undertaking (ERJU), a technology initiative launched in 2021. ERJU continues the rail transportation research program that was previously known as Shift2Rail. Knorr-Bremse is active in five of its eight "Flagship Areas" with a total of nine technology projects. By working collectively, the intention is to lay the foundations for pioneering, future-oriented technologies for the rail sector. Knorr-Bremse will be the driving force for three topics in the "Sustainable and Green Rail Systems" area: the use of halogen-free and low-GWP refrigerants, technology for improved air quality in trains and the trialing of an electromechanical brake.

Stakeholder Inclusion

| Customers | |
|-----------------------------|---|
| Format and Examples in 2022 | <p>Exchange from customer conversations and visits as well as customer satisfaction surveys</p> <p>Trade fairs and conventions as important dialog formats:</p> <ul style="list-style-type: none"> ■ InnoTrans (RVS), Berlin ■ European Mobility Expo (RVS), Paris ■ AusRail PLUS (RVS), Sydney ■ MassTRANS (RVS), Osaka ■ IAA Transportation (CVS), Hannover ■ Automechanika (CVS), Frankfurt <p>Events for business partners organized by Knorr-Bremse:</p> <ul style="list-style-type: none"> ■ Tag der Schiene ("day of the rails," RVS), Knorr-Bremse Forum Munich ■ Workshops held for the EU Rail Initiative (RVS), including Munich Flagship Area 5, Munich ■ Braking technology road show (CVS) at customer and service partner locations, Germany ■ Live virtual product demonstrations for trucks and school buses (CVS), Bendix <p>Customer events in which Knorr-Bremse took part:</p> <ul style="list-style-type: none"> ■ Hitachi: supplier conference at COP26 (RVS) ■ DAF Trucks: Business Review 2021 (CVS) ■ Daimler: Executive meeting and Daimler Supplier Dialogue (CVS) ■ MAN: Grand Supplier Opening and MAN Expert Day about the future of wheel ends ■ PACCAR: meeting of technical experts (CVS) ■ E-Mobility Exchange between Mitsubishi Fuso and Knorr-Bremse eCubator (CVS) <p>Awards presented to Knorr-Bremse by customers and the industry:</p> <ul style="list-style-type: none"> ■ Knorr-Bremse Thailand (CVS) received the Best Supplier Award 2022 from HINO Motors Manufacturing (Thailand) Ltd. (HMMT) ■ Knorr-Bremse Truck Services was named the best supplier for commercial vehicles by the dealer network Temot International ■ Knorr-Bremse won the Innovation Award from the world-leading trade fair Automechanika for its brake drag reduction system |
| Important Topics | <ul style="list-style-type: none"> ■ Product safety ■ Transportation safety ■ Supplier safety ■ Quality, prices ■ Mobility transition, energy efficiency ■ Governance and compliance ■ Sustainability |

| Employees | |
|------------------------------------|---|
| Format and Examples in 2022 | Employee communications in a broad range of formats and initiatives: <ul style="list-style-type: none"> ■ 2022 global employee survey ■ Employee events such as town hall meetings ■ Feedback conversations with supervisors ■ Intranet, employee magazine ■ Group-wide campaigns such as the multiday Digi News event and the internal diversity campaign ■ Local campaigns such as the Zero Waste Challenge in 2021/2022; Bendix ■ Audience-specific formats like the international HSE meeting in 2022 (Best Practice Award) ■ Volunteering → Employment Conditions |
| Important Topics | <ul style="list-style-type: none"> ■ Wages and salaries ■ Occupational health and safety ■ Working conditions ■ Current business development ■ New products ■ Customer projects |

| Suppliers and business partners | |
|------------------------------------|--|
| Format and Examples in 2022 | Direct exchange with our suppliers and business partners: <ul style="list-style-type: none"> ■ Various Knorr-Bremse policies for business partners, e.g., Code of Conduct for Suppliers ■ Discussions with suppliers ■ Supplier evaluations and on-site audits; discussions for following up on audits; and comparisons of planned corrective measures ■ Training courses and provision of training material, e.g., on conflict minerals Dialog at technical conferences and trade fairs: <ul style="list-style-type: none"> ■ CVS Supplier Summit ■ Railsponsible Supplier Award at InnoTrans 2022 → Sustainability in the Supply Chain |
| Important Topics | <ul style="list-style-type: none"> ■ Price, quality ■ Governance and compliance ■ Safety ■ Climate protection ■ Human rights due diligence ■ Circularity |

| Financial market stakeholders (shareholders, investors, lenders) | |
|--|--|
| Format and Examples in 2022 | Regular dialog and information formats for the financial market: <ul style="list-style-type: none"> ■ Annual General Meeting ■ Financial information and reports such as the Annual Report 2022 ■ (Virtual) road shows and conferences ■ (Individual) conversations with investors and lenders ■ ESG ratings → Knorr-Bremse Investor Relations |
| Important Topics | <ul style="list-style-type: none"> ■ Dividend ■ Business development and guidance ■ Sustainability/ESG |

| Politics/government authorities/local initiatives | |
|---|--|
| Format and Examples in 2022 | Local and professional lobbying organizations offer a good platform for conversations with stakeholders: <ul style="list-style-type: none"> ■ Automotive industry dialog on the National Action Plan of the German Federal Ministry of Labour and Social Affairs ■ US Environmental Protection Agency (EPA): Green Power Partnership (Bendix, CVS) ■ US Department of Energy (DOE): Better Buildings Initiative (Bendix, CVS) ■ Working groups and interest groups in Europe's Rail Joint Undertaking (ERJU) ■ Participation in local business initiatives such as Klimapakt2 ("climate pact 2") organized by the Munich business community, and the environment and energy committee of the Munich-Upper Bavaria Chamber of Industry and Commerce Information formats for national and local officials at sites globally: <ul style="list-style-type: none"> ■ Receptions, meetings and dialog with politicians and diplomats |
| Important Topics | <ul style="list-style-type: none"> ■ Safety ■ Climate protection ■ Governance ■ Compliance |

| Local residents in site regions | |
|---------------------------------|--|
| Format and Examples in 2022 | <p>Knorr-Bremse promotes social stakeholding at its sites through activities such as:</p> <ul style="list-style-type: none"> ■ Local Care initiatives ■ Personal contact, e.g., site tours for visitor groups <p>→ Social Commitment</p> |
| Wichtige Themen | <ul style="list-style-type: none"> ■ Safety ■ Attractive employer ■ Local engagement ■ Operational changes |

| Industries/trade associations/unions | |
|--------------------------------------|--|
| Format and Examples in 2022 | <p>Memberships in trade associations:</p> <ul style="list-style-type: none"> ■ Rail and Commercial Vehicles: American Public Transportation Association (APTA), United States ■ Rail: Association of American Railroads (AAR), United States; Union des Industries Ferroviaires Européennes (UNIFE), Belgium ■ Commercial Vehicles: Motor & Equipment Manufacturers Association (MEMA), United States <p>Knorr-Bremse conducts active project work, including at:</p> <ul style="list-style-type: none"> ■ Europe's Rail Joint Undertaking (ERJU) ■ Railsponsible: head of a working group on "responsible purchasing" ■ UNIFE: working group on sustainability/environment, Knorr-Bremse represented on steering committee ■ German Association of the Automotive Industry (VDA): meeting of working groups on "environment and product" and "sustainability in the supply chain" <p>Knorr-Bremse experts gave talks at industry events including:</p> <ul style="list-style-type: none"> ■ Euro Brake, Essex, England ■ Conference of Rolling Stock, Graz, Austria ■ Siegburger Erfahrungsaustausch ("Siegburg experience exchange"), Germany ■ PM Forum Digital 2022, Germany <p>Industry honors for Knorr-Bremse:</p> <ul style="list-style-type: none"> ■ Knorr-Bremse honored as top supplier by the railroad association Bahnverband e.V. at InnoTrans 2022 ■ custom[air] configuration tool from Merak in the final of the Sustainability Award (RVS) at the Sustainability Kongress 2022 in Berlin |
| Important Topics | <ul style="list-style-type: none"> ■ Lobby work for the industry ■ Transportation safety ■ Mobility transition ■ Climate protection ■ Innovative products |

| Young professionals | |
|------------------------------------|---|
| Format and Examples in 2022 | <p>Partnerships and projects with schools and educational institutions:</p> <ul style="list-style-type: none"> ■ Technical University of Munich, RWTH Aachen University, Budapest University of Technology and Economics, among others ■ Chamber of Industry and Commerce training scout and education partnerships <p>Presence at university trade fairs and events to speak to and recruit young talent:</p> <ul style="list-style-type: none"> ■ Career information evenings and applicant training at schools ■ Wissenschaftstage 2022 ("science days 2022"), Munich ■ University fairs at the Munich University of Applied Sciences and the Technical University of Munich; "bonding" university fair in Aachen (RWTH Aachen University and Aachen University of Applied Sciences) ■ Presentations at universities such as a webinar for students at Pimpri Chinchwad College of Engineering, Pune ■ Scholarship program in mechanical engineering, Budapest <p>Promotion of women (particularly in STEM jobs):</p> <ul style="list-style-type: none"> ■ Mentoring programs: mentorING women's support program at the Technical University of Munich; Bayernmentoring ("Bavaria Mentorship") at the Munich University of Applied Sciences; Cross Mentoring Munich ■ Her Career training fair, Munich ■ Mädchen für Technik-Camp ("girls for technology camp"), Munich; Girls Day <p>→ Personnel Development</p> |
| Important Topics | <ul style="list-style-type: none"> ■ Working conditions ■ Development opportunities ■ Work-life balance ■ Company values ■ Current business development ■ New products ■ Diversity |

| Media | |
|------------------------------------|--|
| Format and Examples in 2022 | <p>Networking and exchange of information with the media around the world:</p> <ul style="list-style-type: none"> ■ Financial Statements Press Conference 2022 ■ Site tours ■ Interviews ■ Financial, technical and corporate press releases <p>→ Knorr-Bremse Press Area</p> |
| Important Topics | <ul style="list-style-type: none"> ■ Innovative products ■ Strategy and business development |

| NGOs | |
|-----------------------------|---|
| Format and Examples in 2022 | <p>Projects conducted by Local Care and Global Care at our sites are usually carried out in conjunction with local NGOs or other aid initiatives.</p> <p>Projects by Knorr-Bremse Local Care, organized by the relevant site:</p> <ul style="list-style-type: none"> ■ Kociánka social center, IFE-CR ■ Rheumalis (organization assisting children suffering from rheumatism), Knorr-Bremse GmbH, Mödling ■ Treedom organization (tree planting), Florence, Knorr-Bremse Rail Systems Italia <p>Strategic partnerships of Knorr-Bremse Global Care with long-term project outlook:</p> <ul style="list-style-type: none"> ■ atmosfair, Berlin: drinking water projects in countries such as Kenya ■ AMANDLA, Cape Town: Safe-Hub Global GmbH founded for global Safe-Hub projects <p>→ Social Commitment</p> <p>➤ Knorr-Bremse Global Care</p> |
| Important Topics | <ul style="list-style-type: none"> ■ Education ■ Social cohesion ■ Health ■ Water, sanitation and hygiene ■ Environment |

Sustainable Development Goals (SDGs)

The United Nations' 17 Sustainable Development Goals, which came into effect in 2015, provide guidance for companies to align their business activities with sustainable development across the entire value chain. Based on these Sustainable Development Goals (SDGs), the industry can use its economic power and strong innovation in a more targeted way to face the economic, social and environmental challenges. In this context, Knorr-Bremse wants to address the challenges through its business model and activities, and contribute to the achievement of the SDGs. Our sustainability strategy focuses on the five SDGs that we can have the greatest influence over through our business. Furthermore, Knorr-Bremse contributes to SDG 4 (Quality Education) and SDG 6 (Clean Water and Sanitation) through the activities of Knorr-Bremse Global Care e. V. (→ [Social Commitment](#)).

We focus on the following SDGs:



SDG 5: Gender Equality

Knorr-Bremse believes that a diverse workforce is a critical factor in business success. We are committed to gender equality and to supporting women in the entire workforce, in management and in STEM professions. We support our employees with various offerings that help to achieve a work-life balance.

Examples of activities in 2022:

- Development of a global diversity network
- Definition of a target for increasing female representation
- Establishment of women's networks

→ [Diversity and Equal Opportunities](#)



SDG 8: Decent Work and Economic Growth

Knorr-Bremse strives to add value sustainably and wants to offer good working conditions and fair social standards to its current and future employees around the world. We continuously work on making our global supply chain more sustainable. We seek to respect and uphold human rights with our processes for human rights due diligence for our employees and suppliers.

Examples of activities in 2022:

- Performance of an analysis of human rights risks among suppliers and in our own business
- Expansion of processes for human rights due diligence in accordance with the German Supply Chain Due Diligence Act
- Improvement of key occupational health and safety figures

→ [Employment Conditions](#)

→ [Due Diligence Processes for Human Rights](#)

→ [Sustainability in the Supply Chain](#)



SDG 9: Industry, Innovation and Infrastructure

Knorr-Bremse finds solutions for the mobility of tomorrow and invests in a sustainable future through its research and development activities. We can actively drive the transition to sustainable mobility with our innovative solutions. Thanks to our EcoDesign approach, we are already integrating aspects of sustainability into the development and innovation process.

Examples of activities in 2022:

- eCUBATOR, an ideas factory for electric mobility
- Partner of the TechFounders accelerator program in Munich
- Consistent incorporation of EcoDesign criteria in product development

→ [Environmental Product Design](#)



SDG 12: Responsible Consumption and Production

Knorr-Bremse is committed to integrated and preventive environmental protection in its production processes, which it practices by preventing waste and using natural resources efficiently. In our product development, too, we take care to use materials in a way that conserves resources and to recycle with the help of our EcoDesign approach. We extend the product service life through our remanufacturing (CVS) and overhaul (RVS) activities and improve our customers' environmental and commercial sustainability.

Examples of activities in 2022:

- Increase of revenues from remanufactured/overhauled products to 10.3%
- Carrying out of recyclability analyses for 21 projects in the RVS division
- Performance of life cycle analyses (LCAs) in the RVS division

→ [Environmental Management](#)

→ [Conservation of Resources](#)

→ [Environmental Product Design](#)

→ [Climate Protection](#)

→ [Eco-friendly Logistics](#)



SDG 13: Climate Action

Knorr-Bremse aligns its climate protection objectives with the 1.5 degree target of the UN Paris Agreement. We want to minimize the carbon emissions from our business activity through production processes with reduced energy and emissions levels and through innovative products and solutions.

Examples of activities in 2022:

- Achievement of the climate protection target for Scope 1 and 2 emissions
- Accounting of material Scope 3 emissions
- Setting of a Scope 3 target of -25%

→ [Climate Protection](#)

Sustainability Ratings and Rankings

Knorr-Bremse's commitment to sustainability is evaluated regularly and recognized as part of external ratings and rankings. They are important to us as they confirm our direction and alert us to potential improvements. Using sustainability ratings and rankings, we analyze and evaluate the external perception of our sustainability performance. The comparison with our peers and early detection of trends gives us findings that we use to develop our sustainability management further.

ESG Ratings and Rankings

DAX® 50 ESG

DAX®50 ESG

Knorr-Bremse has been listed in this index since it started. It presents the top 50 companies in Germany based on their ESG performance, market capitalization and revenue.

➤ [DAX®50 ESG](#)

S&P Global

S&P Global Corporate Sustainability Assessment

Knorr-Bremse scored 50 out of 100 points (2021: 52, 2020: 50), putting it in the top 24% of the comparison group.

The S&P Global Corporate Sustainability Assessment takes into account economic criteria as well as environmental and social criteria based on the best-in-class principle. The most sustainable companies in an industry are added to the index.

➤ [S&P Global Corporate Sustainability Assessment](#)



MSCI

Knorr-Bremse received an improved rating of "AA" in 2022 (2021: A, 2020: A), the second-best of seven categories.

MSCI ESG ratings score companies on a scale from "AAA" to "CCC" with regard to their industry-specific ESG risks and their risk management.

➤ [MSCI](#)

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ISS ESG

ISS once again gave Knorr-Bremse the prime status of "C+" (2021: C+, 2020: C+), thus putting Knorr-Bremse among the best 10% in the industry comparison.

ISS ESG assesses a company's sustainability performance on a scale from "A+" to "D-".

➤ [ISS ESG](#)



Morningstar Sustainalytics

In April 2022 Knorr-Bremse scored 19.5 out of a total of 100 risk points and was therefore classified as low risk.

Sustainalytics categorizes ESG risks across five risk levels (negligible, low, medium, high and severe).

➤ [Sustainalytics](#)

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CDP

CDP rates Knorr-Bremse "C" for transparency and performance on climate protection (2021: B, 2020: A-). This puts Knorr-Bremse in the top 53% of the comparison group. The measures that we adopted in 2022, such as the Scope 3 reduction target, will contribute to the rising requirements for corporate climate protection initiatives only at a future point in time. For this reason, we are confident that we will be able to reverse our year-over-year fall in this rating.

CDP rates companies on climate protection according to a scale from "A" to "D-," with "A" being the highest.

➤ [CDP](#)



EcoVadis

Knorr-Bremse received Silver status for 2022 (2021: Gold status, 2020: Silver status). This puts us in the top 9% of companies in the comparison group.

EcoVadis rates suppliers from 150 countries in the categories of Environment, Labor & Human Rights, Ethics and Sustainable Procurement, awarding a status of Platinum, Gold, Silver or Bronze.

➤ [EcoVadis](#)



SAQ – Sustainability Self-Assessment Questionnaire by Drive Sustainability

Eighteen Knorr-Bremse sites are rated within a range from 81% to 93% (2021: 17 sites within a range from 80% to 93%, 2020: 13 sites within a range from 80% to 89%).

The Self-Assessment Questionnaire (SAQ) is a survey for suppliers in the automotive industry. It rates the sustainability management of a company's individual sites on a scale from 0% to 100%.

➤ [Drive Sustainability](#)

Transparency in Sustainability Reporting

Our goal of transparent reporting also includes the transparent presentation expected by investors of our corporate climate risks and opportunities. We publish these in this Sustainability Report in accordance with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) (→ [TCFD Reference Table](#)).

In addition, we constantly work on meeting the statutory reporting obligations, such as the EU Taxonomy (→ [Management Report](#)) and on preparing for further developments in legislation on non-financial reporting (Corporate Sustainability Reporting Directive, CSRD).



Environment

Resource consumption and climate change are major challenges for business and society. Our Climate Strategy 2030 is designed to significantly reduce energy consumption and carbon emissions at our own production sites. The Knorr-Bremse EcoDesign approach helps us to ensure that material sustainability aspects of our products can be taken into account across the entire life cycle. In use, our products facilitate the safe, efficient and sustainable mobility of rail and commercial vehicles.

Environmental Management

By practicing holistic environmental management, we seek to continuously reduce the environmental impact of our business activities. Clear processes and local measures promote the conservation of resources as well as the reduction of emissions and waste at Knorr-Bremse.

The company's [↓ Health, Safety and Environment \(HSE\) Policy](#), defines the principles of environmental and climate protection and energy management in the Knorr-Bremse Group. We want to prevent or minimize potential impacts that our processes, services or products could possibly have on people and the environment. To implement these measures, we have introduced divisional HSE management systems using standardized processes at our sites around the world. The HSE management systems are an integral part of our company management systems (Rail Excellence [REX] at RVS and Truck Excellence [TEX] at CVS). They are based on legal regulations, customer requirements, internal policies and process instructions. In addition, our processes are guided by national and international standards such as ISO 9001, ISO/TS 22163, IATF 16949 (quality management), ISO 14001 (environmental management), ISO 45001 (occupational safety) and ISO 50001 (energy management). Knorr-Bremse conducts regular internal and external audits to monitor its environmental management, auditing compliance with specified standards and the implementation of defined improvement measures.

We require selected locations to be certified in accordance with the environmental management standard ISO 14001. When implementing energy management, we follow the European Energy Efficiency Directive and have had all our European production sites certified in accordance with ISO 50001 or had energy audits conducted in accordance with EN 16247. In addition, largely energy-intensive sites in Brazil, India and the United States are also certified.

Number of audited/certified business units with environmental management systems




| | 2022 | 2021 | 2020 |
|--|------|------|------|
| Based on environmental management standard ISO 14001 | 71 | 70 | 67 |
| Based on energy management standard ISO 50001/EN 16247 | 37 | 38 | 36 |

The central HSE departments of the RVS and CVS divisions are responsible for managing and implementing environmental management. They develop strategic guidelines and bring together all cross-site management and coordination duties. Knorr-Bremse's senior management is involved in strategic and operational environmental management through regular meetings, ad hoc reporting or via the ESG Board. HSE managers implement the strategic requirements, goals and programs at the Knorr-Bremse sites with the local managers. Local environmental protection and energy officers, regional coordinators and experts from the departments involved provide support. We strive to have largely uniform HSE management across both divisions. There is a regular exchange of expertise both within and between the divisions to this end. This addresses aspects relevant to HSE, best practices, legal requirements and the associated reporting.

Climate Protection

Knorr-Bremse has set itself the objective of making mobility more sustainable. Climate protection and reductions of carbon emissions are two key goals in this effort. With our Climate Strategy 2030, we want to make our contribution to the goals of the 2015 UN Paris Agreement to limit global warming to a maximum of 1.5 degrees.

In a first step, we are focusing on reducing emissions that arise as a result of energy use by Knorr-Bremse’s production sites and vehicle fleet (Scope 1 and market-based indirect Scope 2 emissions). In 2019, the company set a goal of reducing production-related carbon emissions by at least 50.4% by 2030. This equates to an average CO₂ reduction of 4.2% annually compared to 2018. This is to be achieved through the following levers:

|  Increasing CO ₂ and Energy Efficiency |  Self-Generation of Renewable Energy |  Purchase of Renewable Energy |
|--|---|--|
| Energy efficiency measures and the use of low-carbon fuels in heating systems and the company’s vehicle fleet. | Investments in measures to increase the share of self-generated renewable energy at Knorr-Bremse sites. | Increased use of renewable energy purchased by the company through long-term power purchase agreements, green-power products and certificates. Most of Knorr-Bremse’s environmental investments are planned for energy efficiency and self-generation of renewable energy. |

In a second step, we extended Knorr-Bremse’s climate goals to the value chain at the beginning of 2023 and set an ambitious reduction target: We intend to reduce emissions of the upstream and downstream value chain (Scope 3) that are related to our business activities by 25% by 2030 compared to the base year 2021. We focus in particular on emissions from the Scope 3 categories 3.1 Purchased Good and Services, 3.4 Upstream Transportation and Distribution and 3.11 Use of Sold Products.

We conducted a detailed analysis of these three emission categories to identify the steps of the value chain that cause the largest amount of carbon emissions. As a result of this analysis, we were able to determine the biggest emission drivers during the reporting period and identify clear areas of action based on these findings. Increased transparency is essential for us to make our targeted improvements. With this thought in mind, we continuously work on refining our data collection methodology.

As another contribution to climate protection, Knorr-Bremse has committed itself to carbon neutrality at its sites from 2021. To this end, we offset Scope 1 and Scope 2 emissions still remaining after our own measures by investing in selected climate protection projects during the last reporting period (2021). Due to changed framework conditions for emission offsetting¹, the emission reductions achieved in climate protection projects are currently counted toward the country-specific climate goals of the project host countries. Accordingly, we will make a contribution to the reduction targets of the respective project countries in the future². This is because our commitment to climate protection remains unchanged. We will continue to finance selected climate protection projects to prevent global emissions at least by the amount of our remaining Scope 1 and Scope 2 emissions of approximately 50,000 metric tons of CO₂ in the

-25%

We want to reduce key Scope 3 emissions by 25% by 2030.

year under review. To this end, we finance two atmosfair gGmbH climate protection projects certified in accordance with the Gold Standard: the project for clean drinking water in Kenya and the project for efficient wood gasifier ovens in India.

¹With the implementation of COP 26, Article 6.4 of the Paris Agreement, reduction measures are automatically counted toward the project host countries unless contracts provide otherwise.

²To avoid counting achieved reductions twice, Knorr-Bremse will not claim as offsets the carbon emission reductions resulting from climate protection projects.

Financial Support for Climate Protection Projects in Kenya and India

As another contribution to climate protection, Knorr-Bremse acts jointly with atmosfair gGmbH, Berlin, to fund climate protection projects that are at least equal to the amount of Scope 1 and Scope 2 emissions remaining during the reporting period. To this end, we finance two atmosfair gGmbH climate protection projects certified in accordance with the Gold Standard: the project for clean drinking water in Kenya and the project for efficient wood gasifier ovens in India. These projects were selected together with Knorr-Bremse Global Care e.V.

In 2022, global emissions were lowered by about 50,000 metric tons with the help of a project called “Efficient Wood Gasifier Ovens” in India. With the assistance of the local project partner Sapient, based in Kolkata, low-income households in rural parts of West Bengal are given efficient wood gasifier ovens that use 50% to 60% less firewood. The ovens enable smoke-free cooking, while the gasification process also produces charcoal that can be sold. The reduced use of wood also protects the mangrove forests in West Bengal. A total of 30,000 new ovens subsidized by Knorr-Bremse are planned to be distributed by 2030.

The project “Clean Drinking Water” run by the local project partners Boreal Light GmbH and Waterkiosk Ltd. helps to provide access to clean drinking water for rural households in Kenya. This improvement will help prevent water-borne illnesses. Up to 20,000 liters of water are desalinated and cleaned by the first solar-powered water treatment plant in Burani, Kenya. The result is clean drinking water for 6,000 people, and the unit also produces process water. The certification of the project was completed in late 2022. There are now 31 units in operation. Alongside the monitoring of the carbon emissions prevented by the project, a study is being conducted in collaboration with Knorr-Bremse Global Care e.V. to identify the positive health effects enjoyed by the local population.



Climate Risks

The impact of climate change and global decarbonization efforts to limit climate change pose potential risks for Knorr-Bremse as a company. These include, for example, extreme weather events and regulatory requirements entailing costs. For this reason, we analyze our corporate climate risks and opportunities as part of Group-wide risk management. To evaluate our commercial climate risks and opportunities, we have started to implement the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). With the help of qualitative scenario analysis, we have identified potential risks in our production operations, the supply chain and markets.

→ [TCFD Reference Table](#)

Climate Strategy 2030 Interim Targets Achieved

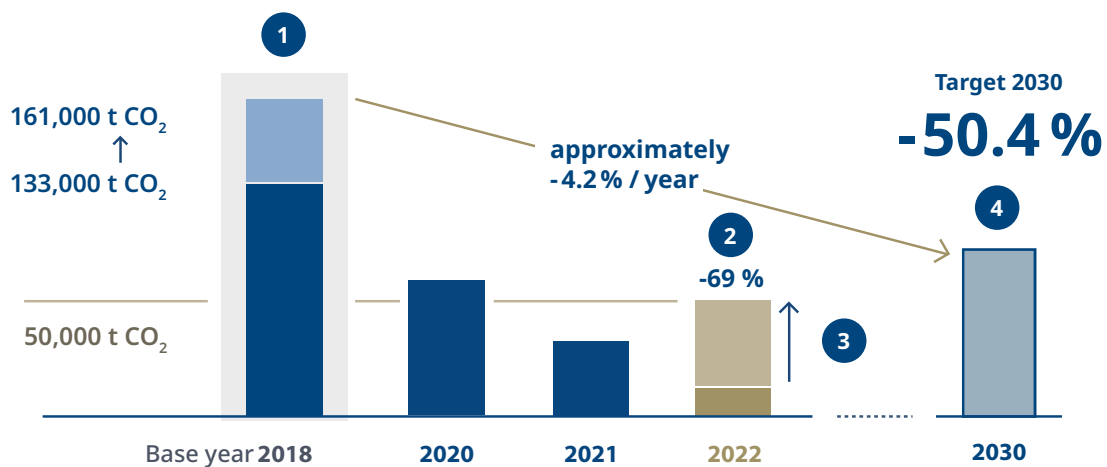
We achieved our climate protection targets in the reporting period: We reduced our Scope 1 and market-based Scope 2 emissions by 69% in 2022 compared to the base year 2018¹. In doing so, we again exceeded our goal of lowering our carbon emissions each year by an average of 4.2%. Our increased purchase of green power has been our most important lever and contribution thus far. At the same time, we are strengthening our measures in the areas of energy efficiency and self-generation of renewable energies.

69%

By 2022, we were able to reduce 69% of our carbon emissions compared with the base year 2018.

¹ Due to acquisitions and divestitures, the carbon emissions for the base year 2018 have been adjusted.

Knorr-Bremse Climate Strategy 2030



1 Recalculation of the base year 2018

The values for the base year 2018 were recalculated on the basis of our restatement policy. Our mergers and acquisitions (United States, Japan, Germany) and divestments (Russia) had a significant impact on our CO₂ emissions. In addition, the emission factors for electricity were shifted from the standard of the German Association of the Automotive Industry to IEA data (link to appendix). The newly calculated base year now has 161,000 t of CO₂ as the new reference level for 2018 (market based) (compared to 133,000 t of CO₂ as the baseline in the → [2021 Sustainability Report](#)).

2 69% Reduction of CO₂ Emission

In 2022, Knorr-Bremse reduced its carbon emissions by 69% compared to 2018, an amount that exceeds our minimum emission reduction target of 50.4% by 2030. To support the 1.5°C path, we intend to reduce our carbon emissions to the greatest degree and at the earliest time possible. We intend to maintain this commitment continuously.

3 Residual Emissions 2022

With the reduction of our carbon emissions by 69% in 2022 compared to 2018, residual emissions of approximately 50 t of CO₂ remain. The rise of these residual emissions compared with the previous year's level resulted in part from the effects of mergers and acquisitions (United States, Japan, Germany) and from greenfield development (Mexico, United States, Thailand).

4 Climate Protection Target 2030

Based on the findings of climate science, our support for the 1.5°C pathway requires annual emission reductions of at least 4.2%. This would result in emission reductions of at least 50.4% by 2030 compared to the base year 2018.

Energy and Carbon Footprint at Knorr-Bremse

Knorr-Bremse recorded total energy consumption of 524 GWh in 2022. This is equivalent to an approximately 22% increase compared to the previous year. This increase resulted largely from the consolidation of the past M&A activities relating to our subsidiaries R.H. Sheppard in the United States, Knorr-Bremse Steering Systems in Japan and EVAC in Germany. If the system parameters of previous reporting periods were applied, a decline in total energy consumption would have been recorded. About 64% of total energy usage was attributed to electricity and 26% to natural gas in 2022. The share of power generated by renewable energy sources totaled 94% in 2022 (2021: 98%), with 0.7% of this being self-generated (2021: 0.6%).

Energy Consumption¹

| | | 2022 | 2021 | 2020 | 2018 ⁵ |
|--|---------------------------------|------|------|------|-------------------|
| Primary energy consumption | GWh | 180 | 131 | 119 | 159 |
| Natural gas | GWh | 138 | 99 | 91 | 126 |
| Fuels | GWh | 39 | 31 | 26 | 33 |
| Self-generated renewable energy ² | GWh | 2 | 1 | 1 | 0 |
| Secondary energy consumption | GWh | 344 | 301 | 287 | 349 |
| Purchased electricity ² | GWh | 336 | 287 | 273 | 338 |
| Of which renewable energy ³ | % | 94 | 98 | 86 | 12 |
| District heating | GWh | 8 | 14 | 13 | 11 |
| Total energy consumption⁴ | Gwh | 524 | 431 | 406 | 508 |
| Energy efficiency | MWh/€ millions of revenue | 73.3 | 64.3 | 65.9 | 76.9 |

¹ The figure for 2022 relates to all sites under operating control, excluding sites with fewer than 50 employees other than production sites or service workshops. This covers around 97% of Knorr-Bremse's workforce.

² Figures for 2021 adjusted: 0.7 GWh was generated by an on-site PPA and corresponding credits were sold by the operator to the electricity market.

³ The reduction of the figure is due to the higher electricity consumption from our M&A activities in Japan, for which no green power is currently being purchased.

⁴ The increase in energy consumption is due to new sites included in the reporting Scope as a result of M&A activities and new buildings. Around 21% of the total energy consumption is attributable to these sites. The figures from 2021 and 2020 have not been retroactively adjusted.

⁵ Data from the 2018 base year were recalculated in accordance with our Restatement Policy.

In line with our increased energy consumption, our absolute Scope 1 and market-based Scope 2 emissions in 2022 increased by approximately 15,000 metric tons of CO₂ compared to 2021. The intensity of carbon emissions (Scopes 1 and 2) totaled 7.0 metric tons of CO₂ emissions per million euros of revenue in the year under review (2021: 5.2 metric tons). The use of natural gas by Knorr-Bremse was the primary source of 38,000 metric tons of Scope 1 emissions that were produced in 2022 (2021: 28,000 metric tons). Indirect carbon emissions (Scope 2, location based) totaled 122,000 metric tons of CO₂ (2021: 152,000 metric tons). These emissions are largely composed of purchased electricity in particular.

Direct and Indirect Carbon Emissions¹

| | | 2022 | 2021 | 2020 | 2018 ² |
|--|---|------------|------------|------------|-------------------|
| Scope 1 direct carbon emissions | Thousands metric tons of CO ₂ | 38 | 28 | 26 | 34 |
| Scope 2 indirect market-based carbon emissions | Thousands metric tons of CO ₂ | 12 | 7 | 27 | 127 |
| Scope 2 indirect location-based carbon emissions | Thousands metric tons of CO ₂ | 122 | 152 | 147 | 151 |
| Total market-based carbon emissions | Thousands metric tons of CO ₂ | 50 | 35 | 53 | 161 |
| Total location-based carbon emissions | Thousands metric tons of CO ₂ | 160 | 180 | 173 | 186 |
| Carbon intensity | Metric tons of CO ₂ /€ million | 7.0 | 5.2 | 8.6 | 24.4 |

¹ The recording of carbon emissions is based on the recognized requirements of the Corporate Accounting and Reporting Standard (Scopes 1 and 2) of the Greenhouse Gas Protocol. The increase in carbon emissions is due to new sites included in the reporting Scope. Around 33% of the market-based carbon emissions were attributable to these sites in 2022. The figures from 2021 and 2020 have not been retroactively adjusted.

² The levels from the base year 2018 were recalculated in accordance with our restatement policy. Our mergers and acquisitions (United States, Japan, Germany) and divestments (Russia) had a significant impact on our CO₂ emissions. In addition, our emission factors for electricity were shifted from the standard of the German Association of the Automotive Industry to IEA data (→ [Carbon Calculation Method](#)). The newly calculated base year now has 161,000 t of CO₂ as the new reference level for 2018 (market based) (compared to 133,000 t of CO₂ as the baseline in the → [2021 Sustainability Report](#)).

In the year under review, Knorr-Bremse moved forward with its work to expand its monitoring of upstream and downstream emissions (Scope 3). The focus of this effort was placed on those emission categories that are relevant to Knorr-Bremse: Scope 3.4 (Upstream transport and distribution), 3.9 (Downstream transportation and distribution) and Scope 3.11 (Use of sold products). The emission categories Scope 3.1 (Purchased Good and Services), Scope 3.3 (Fuel- and Energy-Related Activities), Scope 3.6 (Business Travel) and Scope 3.7 (Employee Commuting) were calculated during the reporting period.

Carbon Emissions in the Value Chain (Scope 3)¹

Thousands metric tons of CO₂e

| | 2022 ² | 2021 |
|---|-------------------|--------------------|
| 3.1 Purchased goods and services | ✓ 1,802 | 1,855 ⁴ |
| 3.3 Fuel- and energy-related activities | 45 | 53 ⁵ |
| 3.4 Upstream transportation and distribution ³ | ✓ 184 | 191 |
| 3.6 Business travel | 6 | 4 |
| 3.7 Employee commuting | 25 | 26 ⁶ |
| 3.9 Downstream transportation and distribution ³ | ✓ 47 | 50 |
| 3.11 Use of sold products ³ | ✓ 26,301 | 27,736 |

¹ A detailed description of the calculation methodology can be found here (→ [Carbon Calculation Method](#)).

² The most material Scope 3 indicators with a ✓ have been reviewed with limited assurance by KPMG Wirtschaftsprüfungsgesellschaft (→ [Assurance Statement](#)). Scope 3.1, 3.4, 3.9 and 3.11 are estimated to account for more than 95% of Knorr-Bremse total Scope 3 emissions. Further key figures, including ones on energy consumption and Scope 1 and 2 emissions, were also reviewed as part of the limited assurance engagement for the separate non-financial statement in the Group Management Report (→ [Annual Report 2022](#)).

³ The carbon emissions in the Scope 3 categories 3.4, 3.9 and 3.11 have been calculated for the first time for reporting years 2021 and 2022 in the reporting period 2022.




⁴ Restatement of 2021 figure due to a change of the data model.

⁵ Restatement of 2021 figure due to a change of the emission factor set in order to be consistent with the Scope 1 and 2 calculation, using IEA emission factors as well as DEFRA methodology for electricity.

⁶ Restatement of the 2021 figure due to switch to well-to-wheel emission factors (from tank-to-wheel emission factors).

Climate Protection Measures at Sites

The Knorr-Bremse Climate Strategy 2030 is implemented with the divisional HSE managers and with representatives of the Americas and Asia regions, the Sustainability department and Energy Purchasing. Local environmental and energy management has the task of evaluating and improving processes in the Group on an ongoing basis with respect to energy requirements. For example, consumption data can be monitored at sites, savings potential can be found and the efficiency of any measures implemented can be audited. You can find out here how we achieved our climate targets for 2022 with the help of three levers:

|  Energy and CO₂ Efficiency |  Self-Generation of Renewable Energy |  Purchase of Renewable Energy |
|---|---|---|
| <p>To increase carbon efficiency and energy efficiency, we identify potential and, as a result, projects for saving energy using internal and external analyses. These are realized within the framework of a climate strategy budget set by the Executive Board. During the reporting period, the heating, ventilation and air conditioning were modernized at the Acuña site in Mexico, and a heat pump was installed as a replacement for gas burners at the Budapest site in Hungary. With the measures realized through the climate budget since 2019, we expect energy savings of around 8,750 MWh/year. In 2022, new energy saving projects with potential savings of approximately 7,200 MWh/year were also approved.</p> | <p>We are improving our carbon footprint by generating our own electricity from renewable energy at sites including Suzhou (RVS division), China; Faridabad (RVS division), India; Huntington (CVS division), USA; and Munich (headquarters), Germany. In 2022, we generated approximately 1,400 MWh/year more renewable energy ourselves compared to 2021. In 2022, we put photovoltaic installations into service in Getafe, Spain; Florence, Italy; Acuña, Mexico; and Darra and Granville, both in Australia. The plan is that these should increase our capacity to generate our own renewable energy by approximately 3,600 MWh/year. In addition, photovoltaic installations in Dalian, China; Melksham, UK; Buccinasco, Italy; and Budapest, Hungary, have already been approved. They will generate around 4,100 MWh/year in the future.</p> | <p>The proportion of purchased renewable energy in total energy consumption remains at a high level. In 2022, about 94% (2021: 98%) of the electricity supplied to Knorr-Bremse came from renewable energy sources or was obtained via green power contracts or green power certificates. Renewable electricity is purchased via a green power contract for our sites in Austria, Sweden and France and via a power purchase agreement (PPA) in Brazil. We obtain green power certificates for other Knorr-Bremse sites around the world. In Europe, these are European proofs of origin, except for specific local proofs of origin in Poland and the United Kingdom. Renewable Energy Certificates (RECs) are used in the USA and Canada, and International Renewable Energy Certificates (I-RECs) are used in China, India, Thailand, Mexico, South Africa and Turkey.</p> |

New Photovoltaic Systems Produce Electricity for Production Sites

Bendix, Huntington

Award-Winning Solar Project

The 1,168 megawatt solar project at Bendix in Huntington, USA, received the prestigious Governor's Award for Environmental Excellence from the state of Indiana in 2022. Connected to the grid in 2021, the PV system significantly reduces Bendix's environmental footprint while saving costs.

| Electricity production per year | Coverage of internal demand | CO ₂ emissions reduction per year |
|---------------------------------|-----------------------------|--|
| 1,500 MWh | approx. 10% | 530 tons |



Bendix, Acuna

PV Systems for Two Plants

PV systems at two plants have been supplying self-generated electricity to the plants in Acuna, Mexico, since December 2022. The future total annual output is expected to be approximately 2,000 MWh. For this purpose, 1,296 solar panels were installed on each factory roof.

| Electricity production per year | Coverage of internal demand | CO ₂ emissions reduction per year |
|---------------------------------|-----------------------------|--|
| 2,089 MWh | approx. 9 % | 835 tons |



Knorr-Bremse Rail Systems Italia, Florence

"Florence Sunlight" Project

The new PV system at Knorr-Bremse Rail Systems Italia, Florence, generates approximately 350 MWh of energy annually with 900 photovoltaic modules and a peak output of 320 kWp. This covers up to 80 % of the site's electricity requirements and can reduce carbon emissions by well over 100 tons per year.

| Electricity production per year | Coverage of internal demand | CO ₂ emissions reduction per year |
|---------------------------------|-----------------------------|--|
| 350 MWh | up to 80 % | 100 tons |



Knorr-Bremse Spain, Getafe

PV System for Energy Self-Sufficiency

In Getafe, a photovoltaic system installed on the factory roof entered operation in 2022. With annual production of 569 MWh of electricity, it will provide for roughly 30 % of the site's electricity consumption. In addition to considerable financial savings, carbon emissions are expected to decline by 97 tons per year.

Electricity
production per year

569 MWh

Coverage of
internal demand

approx. 30 %

CO₂ emissions
reduction per year

87 tons



Knorr-Bremse Australia

Four New PV Systems

In Australia, new PV systems have been supplying self-generated green power at four sites since 2022. Major systems have been installed, including 728 solar panels (300 kWp) in Granville and 242 in Darra (100 kWp). The systems are expected to reduce carbon emissions by almost 360 tons per year.

Electricity
production per year

530 MWh

Coverage of
internal demand

29 %

CO₂ emissions
reduction per year

360 tons



Flight Compensation Paid into Climate Protection Projects

As another climate protection measure, Knorr-Bremse implemented an automated compensation process for delayed flights. Flightright GmbH is the company's partner for this. In a process that applied initially to the company's locations in Germany, employees could surrender their entitlements to compensation payments for delayed, overbooked or canceled flights. An automated claim submission process was introduced for this purpose and affected individuals can have their compensation payments made out to Knorr-Bremse instead. The money from the compensation payments is put toward two different climate protection projects. The first project involves the production of synthetic fuels for business flights. The goal is to have up to 1% of flights taken by Knorr-Bremse employees be powered by synthetic fuels. In doing so, Knorr-Bremse is supporting the world's first production plant for jet fuel made from CO₂ electrolysis. Overseen by Knorr-Bremse's partner atmosfair gGmbH, the facility went into operation in 2021 in Werlte, Germany. Secondly, financial support is being given to a carbon offset project called → [Efficient Wood Gasifier Ovens](#) in India. Knorr-Bremse is also carrying out this project in partnership with atmosfair. By mid-2022, total donations of €10,000 were collected from sites in Germany. These employee donations supported the production of 400 liters of synthetic jet fuel and reduced carbon emissions by 345 metric tons. The project was expanded to the company's European sites in the second half of 2022.

Conservation of Resources

Knorr-Bremse wants to reduce the use of raw materials, consumables and supplies and, as far as possible, recycle them. This concept of reducing use and the circular economy applies to all waste as well as water. In principle, our waste management practices are designed to avoid waste – be it raw materials generated during production, packaging or other waste on-site. At the same time, we strive toward the sustainable use of water and, in doing so, account for the different requirements and needs of our locations around the world.

Global Waste Management

For its waste management, Knorr-Bremse is guided by the principle of a sustainable circular economy. Waste prevention is the top priority. If waste cannot be avoided, we strive to recycle it in an environmentally friendly manner. In essence, Knorr-Bremse's global waste management is based on three principles:

- Avoiding waste through the systematic and optimized use of resources
- Substituting materials with more environmentally friendly substances, for example avoiding the use of single-use plastics
- Promoting a circular economy based on environmentally friendly recycling and reusing materials

Waste at Knorr-Bremse primarily consists of scrap metal, paper and residual waste. As a manufacturing company, Knorr-Bremse generates waste containing steel and iron materials, lightweight metal, polymers, supplies and packaging. In addition, the surface treatment of metallic materials produces galvanic sludge.

The Knorr-Bremse Production System (KPS) helps the company to reduce the amount of waste generated in production. Value stream mapping is used to uncover and eliminate various types of waste, such as overproduction or substandard products. Knorr-Bremse itself tries to avoid or reduce packaging to the greatest extent possible and to use recyclable materials and containers. Our quality guidelines urge our suppliers to use the same practices.

Making Packaging Resource-Efficient

Using packaging in a smart way has the potential to save tremendous amounts of resources and lower costs. These benefits can be achieved by reusing materials or using a new packaging solution. The two projects below have received the Knorr-Bremse HSE Award:

In the field of waste, the “Kartofix” project conducted by **IFE in Brunn, Czech Republic**, made a lasting impression, giving a second life to cardboard packaging. The packaging is shredded and then used as cushioning in other packages. The result: 55% less cardboard waste. The investment made in the machinery pays off quickly thanks to the use of cost-saving cushioning material produced in-house. The principle of the circular economy is practiced effectively.

In the past, **Knorr-Bremse in Daxing, China**, delivered brake calipers to its customers in wooden crates. While these crates were secure, they consumed a lot of resources and had to be dismantled and disposed of following delivery. New packing crates for the brake calipers were designed in consultation with the customer and are now made of reusable material. After Knorr-Bremse delivers the components, the used packaging is taken back to Knorr-Bremse Daxing for recycling. The process reduces wood consumption and waste, which are two reasons why the project won the HSE Award in the environment category.

Global Water Management

We aspire to use water as efficiently as possible and to reuse it as many times as possible in a recirculation system. In particular, Knorr-Bremse uses water for the surface treatment and cleaning of its products, for test applications as well as for drinking and sanitary purposes. The usage of water varies strongly by location. We obtain our water from public utilities. As a way of conserving drinking water, some of our business locations use rainwater for cleaning purposes, sanitary facilities and green space irrigation. We dispose of wastewater via public wastewater systems.

Water Consumption¹

In thousands of cubic meters



¹ The figure for 2022 covers more than 80% of Knorr-Bremse’s employees.

² The increase from the previous year is due to new production processes and the inclusion of new locations in the reporting.

Knorr-Bremse Brazil: Sustainable Water Management Pays Off

Sustainable water management results in improved costs and environmental benefits for the company and the environment. For this reason, Knorr-Bremse Brazil, based in Itupeva, uses its own wastewater treatment plant (WWTP) for oily and galvanic industrial wastewater. Since 2020, the plant has treated 100% of all oily and galvanic industrial wastewater. The process is made possible by a management and quality control plan. The final disposal costs have plummeted as a result of the improved wastewater quality. The new system has also enabled the company to eliminate 673 transportation movements to a wastewater treatment facility, a step that saved 4,000 liters of diesel fuel and 13 metric tons of carbon emissions. Moreover, Knorr-Bremse applies the principle of a circular economy, with a third-party company using the treated sewage sludge (2022: 32 metric tons) to make fertilizer.

To conserve resources, the intake of well water was reduced by 33,500 m³ between 2020 and 2022 thanks to the wastewater treatment plant. This is equivalent to three days’ total consumption of water by residents in the Itupeva area (about 64,000 people). The 50 m³ currently being taken from the well each day is well below the level licensed for Knorr-Bremse Brazil by the Department for Water and Electrical Energy (DAEE). Another step taken for conscious water usage in 2022 included the recycling of water in all toilet cisterns and in selected industrial processes. Water intake was reduced by 50% as a result.

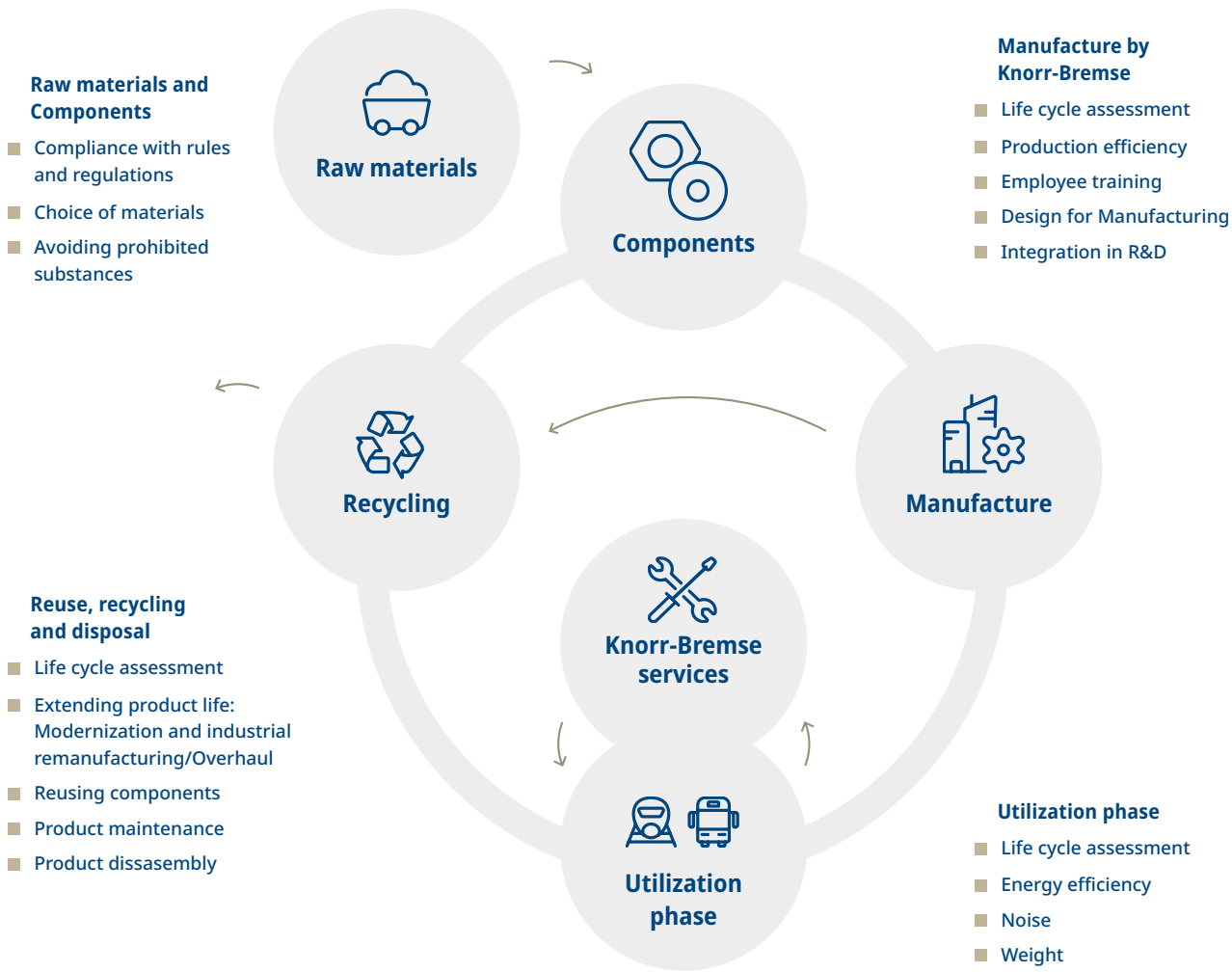
Environmental Product Design

Knorr-Bremse can make a contribution to climate and environmental protection with systematically environmentally oriented product development, while also achieving a medium- and long-term competitive edge. Knorr-Bremse EcoDesign – environmental product design – enables us to develop products, processes and services with an improved environmental impact across the complete product life cycle. In this way, we want to ensure a future-proof product portfolio and, at the same time, pursue our corporate vision and HSE Policy. With the EcoDesign approach, in addition to various internal requirements, the requirements of regulatory stipulations, standards and customer expectations also influence product development. The focus here is on sustainability aspects such as long service life, resource conservation and avoiding emissions.

EcoDesign Integrated into the Organization

EcoDesign is organizationally incorporated into both divisions in such a way that it supports strategic R&D planning and creates synergies and standardized processes between the Group divisions. The EcoDesign experts of the RVS and CVS divisions have one central function here. They are integrated into the development processes and help, for example, with the assessment of product development. They are supported in this work by divisional analysis teams that analyze Knorr-Bremse products and components with regard to compliance with internal, legal and customer requirements on contents. The EcoDesign experts also form the cross-divisional EcoDesign working group with representatives of the Sustainability department and, where required, the Remanufacturing department. In regular dialog, they develop, among other things, standards for product development and processes for the product life cycle. In the year under review, the focus was mainly on recording the Scope 3 emissions in product use and identifying reduction potential.

Intensive training of engineers and developers in the past few years has given them a shared understanding of EcoDesign standards for evaluating product development. We continue to offer this training on an ongoing basis. In 2022, we focused on specialized departmental training. As part of this program, the new EcoDesign analytics team in the RVS division was trained on the self-developed EcoApp. The app can be used to transfer analytical results on the contents of components into an internal database and customer formats using a digital workflow.



EcoDesign in Development Processes

Knorr-Bremse wants to proactively integrate EcoDesign aspects into product development and is working on systematically integrating sustainability criteria into the processes – from strategic planning through innovation to product development:



Strategic Planning

In strategic planning, the business units determine their goals on a product and system level for the next five years. In addition to many other aspects, product sustainability is an integral part of this process. As such, EcoDesign criteria such as selection of materials, energy efficiency, reduction of emissions and life cycle are taken into consideration.



Innovation

In our innovation process, we assess the potential for refining and realizing projects and product ideas, including on the basis of their alignment with strategically relevant megatrends. In the RVS division's innovation projects, EcoDesign is one of five different assessment criteria in the planning process. In the reporting period, around 80 projects were classified based on EcoDesign criteria. All innovation projects are assessed using a criteria catalog that includes the topic of sustainability. The resulting priority list for the projects is discussed and adjusted at the management level. A higher priority generally means a higher probability of project implementation. The size of a project budget is based on the responsible department's coordinated project and budget planning.



Product Development

When developing new products and solutions, we want to incorporate and minimize their environmental impact from the start. This is why we assess them across the product life cycle in accordance with EcoDesign criteria and derive improvements from this. Both divisions have introduced a binding process that takes the following EcoDesign criteria into account:

Material extraction and production phase:

- hazardous substances
- weight (CVS division)
- choice of materials (incl. proportion of secondary material)
- the origin of materials (conflict minerals)

Usage phase:

- weight (RVS division)
- energy efficiency
- longevity
- direct emissions

End of product life:

- recyclability

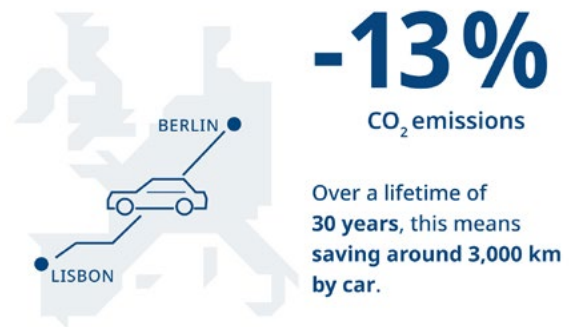
Product Development: Analysis and tools for minimized environmental impact

In the RVS division, the EcoDesign assessment form is provided to the development teams for the mandatory assessment of innovation projects and complex customer projects. It defines the requirements for product design and makes assessment tools available, such as supporting standards and methods for evaluating environmental impacts. For example, the recyclability analysis of the materials used helps us to identify and reduce their potential environmental impact. In 2022, a total of 21 projects in the RVS division were reviewed on the basis of a recyclability analysis in accordance with ISO 22628 and/or ISO 21106. Here, the result of the rail vehicle business area's products is in average more than 90% recyclability for Knorr-Bremse products. RVS also conducted four life cycle assessments (LCAs) of new developments compared to their reference system in 2022. These assess the environmental impact of Knorr-Bremse products and systems, and in this context on climate change in particular. The analyses deliver valuable insights on the use of materials and energy in production and impacts in the product usage phase through to disposal. The LCAs were conducted in accordance with standards such as ISO 14040 and the UNIFE Product Category Rules, and their findings were presented to the leading trade fair InnoTrans in 2022.

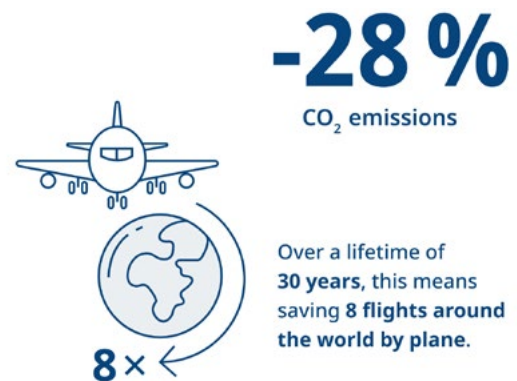
The CVS division has defined concrete EcoDesign requirements and targets in the product development and commercialization (PDC) process for new products and products with significant changes. These requirements and targets – for example, a minimum reduction in weight – need to be implemented in the phases of project planning through to the product and process development. In this process, specific guidelines and concrete tools and methods provide support. These include the IMDS system for identifying hazardous materials and materials requiring declaration, comparative analyses of material-specific environmental impacts and the EcoDesign assessment form.

Life cycle analyses: environmental impacts of selected Knorr-Bremse products (RVS)

LIFEDrive is an innovative sliding door system which for the first time has a linear motor drive that controls the two door leaves of an entry system independently of each other. If one door leaf is blocked, passengers can continue to enter and exit through the other door leaf. This helps with passenger flows on platforms, especially in metro transportation, and therefore contributes to timetable stability. There is a further benefit, too: The reduced weight of LIFEDrive emits less CO₂ than conventional sliding door systems over the product's life cycle, as it prevents unnecessary energy consumption during operation.

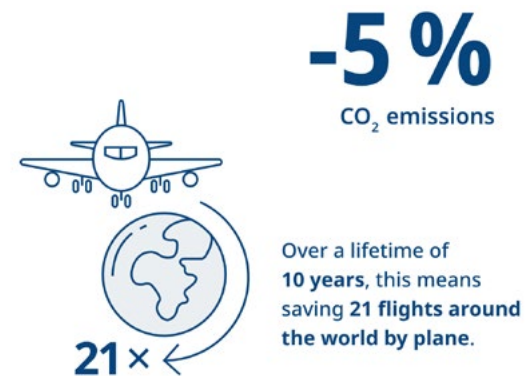


Air-conditioning systems for trains from Knorr-Bremse's brand Merak use efficient technologies, such as heat pumps and natural refrigerants (with a GWP value ≤ 1), to boost energy efficiency and environmental protection, reducing CO₂ emissions over the lifetime compared to conventional air-conditioning systems.



LEADER is a driver assistance system for rail freight transportation. It can provide smart recommendations for an efficient driving style and thus help reduce carbon emissions.*

* Installed on several hundred freight locomotives in Europe, LEADER contributes to a more than 5% reduction of energy consumption in operation. The potential is even greater: Knorr-Bremse is consistently driving technology and connected solutions for infrastructure and fleet forward.



Conservation of Resources through Industrial Remanufacturing

Our RailServices and TruckServices business is another driver of sustainable product design. This activity focuses on, among other tasks, remanufacturing in the CVS division and overhaul in the RVS division, which are significant lines of business. In this work, Knorr-Bremse industrially remanufactures products so that they can perform an identical function in the transportation industry once again. The longer product life cycle also reduces the amount of material used and saves energy, two improvements that have a positive impact on our life cycle assessment and the life cycle assessment of our customers.

We are able to extend the useful lives of our products by incorporating remanufacturing and overhaul into the development and construction process. Rail vehicle customers who turn to one of Knorr-Bremse's

50 service centers around the world can have these vehicles overhauled and repaired. Components can be regularly reconditioned here and used once again in a particular fleet or vehicle following a successful test. The goal is to maintain a component's functionality until the end of a particular train's service life. One example is compressors that are reconditioned after they have been used for defined periods of time or operating hours. The replacement of a component or the installation of an additional function can also be done as part of a complete upgrade or modernization project. This complete overhaul can extend the useful life of an entire train.

In 2022, Knorr-Bremse's service center in Berlin remanufactured about 63,600 products used for the widest range of jobs. In China, the brake systems for more than 4,400 cars for high-speed trains, 1,900 locomotives and nearly 3,200 product units for metro trains were remanufactured in 2022. In addition, about 3,200 entrance systems and 1,100 air-conditioning units for high-speed and metro trains were remanufactured.

The portfolio of the CVS division in the region Africa/Europe comprises remanufactured products with about 1,000 product numbers. The portfolio is available under the brand name EconX®. In the year under review, 2,045 tons of CO₂, 736 tons of material and 8,750 MWh of energy were saved as a result of industrial remanufacturing.

Share of revenue from remanufactured products in Group revenue

in %



Eco-Friendly Logistics

Knorr-Bremse strives for eco-friendly logistics throughout its entire value chain. We continuously optimize our operational transport management, including with the support of external service providers. These contractors assume responsibility for the planning, consolidation and operational execution of deliveries from external suppliers to Knorr-Bremse, goods transportation between Knorr-Bremse sites and deliveries to our customers.

We strive to minimize both costs and the environmental impact of product transportation. We also continuously optimize our coordinated usage of rail, road and shipping connections. We achieve this through the use of standardized processes and methods, which, at the same time, increase our service quality across all distribution channels with regard to delivery reliability, delivery quality and delivery deadlines. In 2022, we continued to primarily use ships for most of our intercontinental product transportation. Our target utilization rate of at least 85% for sea freight containers (CVS) supports efficient goods transportation. Rail transportation to China, an option that was increasingly used during the regional Covid-19 restrictions imposed in the country, had to be temporarily halted as a result of the war in Ukraine. They were partially resumed toward the end of 2022. We avoid air freight transport whenever possible.

Smart Logistics in Munich

In Munich, Knorr-Bremse works with a strategic logistics partner, which benefits the efficiency of processes and communications. One specific example of this is the new e-truck that has been helping internal logistics operations in Munich since 2022. It travels between the company's warehouse in Garching and Knorr-Bremse's sites in Munich. On an annualized basis, the e-truck covers a distance equivalent to a mini-world tour – a journey that is now carbon neutral.

We are also working to reduce the carbon footprint of our global transportation network. As part of our efforts, we measured the carbon footprint of this global network for the first time (→ [Climate Protection](#)). Both divisions will increasingly consider the carbon emissions from transportation as a decision-making criterion for optimizing logistics. The Commercial Vehicle Systems (CVS) division plans to introduce a transport management system (TMS) to evaluate and monitor the impact of carbon reduction measures. CVS is already quantifying and evaluating the transport-related carbon emissions when there are new sourcing activities. A further monetary evaluation will serve as a financial incentive to reduce carbon emissions, in addition to the transparency that is created.

Knorr-Bremse continuously monitors and analyzes transportation flows in conjunction with its logistics contractors. This work enables shipments to be consolidated and carbon emissions to be reduced. It has also resulted in the creation of local projects like the restructuring of internal goods transportation in the Munich region.

Another emission-lowering measure completed during the reporting period was a project called the NextGen European Distribution Network. The revised European distribution structure near our sites in Spain, Hungary and Germany will improve the efficiency of transportation flows and lower their emissions. This successfully implemented project received the Supply Chain Management Award 2022 in Germany.

The CVS division is reducing its carrier portfolio in the Europe/Africa region by increasingly focusing on strategic partnerships. Another step being taken to enable more efficient carbon emissions management involves reducing the number of interfaces with freight-forwarding companies. We will work on similar steps in the Asia/Pacific region and South America in the future.

The CVS division has introduced a central tracking process for the Europe/Africa region to optimize the logistics of special freight shipments around the world. Completed and scheduled special freight shipments are analyzed in a regional process for sales inventory operations planning (SIOP). The results will be used to define countermeasures such as increases in inventories on a cyclical basis.

Reducing Carbon Emissions in Logistics: Successful Transformation Project

The NextGen European Distribution Network is a transformation project in the Rail Vehicle Systems (RVS) division. It stands for increased efficiency, lower costs and reduced carbon emissions in logistics throughout the supply chain. The purpose of this project was to refocus the company's logistics and supply chain network in Europe and it was implemented so successfully that it won the Supply Chain Management Award 2022 in Germany.

The project is aimed at optimizing economic as well as environmental factors. Eleven criteria were applied in this process, including targets for logistics quality. The result: a 15% decrease in logistics costs, significant carbon emission reductions due to a 20% decline in ton-kilometers driven and increased logistics speed and flexibility for customers.

How was this achieved? By using a "digital twin," among other things. This digital twin was a virtual, data-based model of Knorr-Bremse's logistics footprint in Europe. By taking this approach, Knorr-Bremse significantly boosted transparency in its network, which is used to transport shipments worth more than € 1 billion annually. It is a model that can be used in other regions, too.



Social

We want to live up to our responsibility toward all stakeholders and contribute to social and societal improvements. In the process, we apply our due diligence for human rights. We practice our social commitment to an exceptional degree at our sites while simultaneously providing our customers and the general public around the world with reliable products – all for the purpose of sustainable and safe mobility. We also seek to create an attractive working environment for our employees. To this end, we pursue a clear human resources strategy with goals including attractive working conditions, a commitment to diverse opportunities and holistic personnel development.

Product and System Safety

Knorr-Bremse makes a significant contribution to safe, efficient and connected transportation based on rail and commercial vehicles. In our Rail Vehicle Systems (RVS) division, this applies to braking systems in particular as well as intelligent entrance systems, HVAC systems, energy supply systems, control components and driver assistance systems. Our Commercial Vehicle Systems (CVS) division offers not only braking and steering systems for safe transportation, but also products such as driver assistance systems, air treatment and systems for the powertrain; and digital and data-driven aftermarket solutions.

Our products and systems are subject to high safety requirements arising from customer specifications, legal requirements and standards, and we carefully monitor compliance with these. To this end, Knorr-Bremse makes use of extensive quality planning, quality assurance and testing procedures.

Knorr-Bremse commits itself to product safety and quality in its vision, corporate values and Code of Conduct. Moreover, there are separate safety and quality policies for the two divisions that the sites must introduce. The permanent improvement of our product and system quality is a core topic here, along with the safe production and work processes that must be implemented by employees. Our zero-defect philosophy and our product safety management system are intended to help us achieve our objectives with all our products and services: increasing efficiency, maximum flexibility and productivity throughout every stage from the vehicle's manufacture to when it is in service, maximum delivery reliability, accident prevention and better utilization of infrastructure.

Overall responsibility for compliance with product safety and product conformity lies with the Executive Board of Knorr-Bremse AG, which has transferred this responsibility to the companies of the RVS and CVS divisions through the Product Safety and Product Conformity Organizational Policy. The organizational policy documents the responsibilities and duties within the two divisions. Each Product Safety Committee must ensure that product safety and product conformity are implemented. For reportable processes, the Group Clearing committee assumes the investigation and technical clarification of the facts.

Integrated Management Systems Ensure Highest Standards

Both divisions implement integrated management systems. Their processes satisfy internally defined requirements, and are also designed to fulfill regulatory or customer requirements regarding quality assurance and environmental and health protection.

We specify and manage the product and system safety management processes using the management systems Rail Excellence (REX) and Truck Excellence (TEX). The process manuals and work instructions set out all the basic rules for the processes. We seek to ensure quality and safety at every stage of the value chain that we are in a position to influence by taking various measures. These cover the development process, product validation, careful selection of suppliers, the Knorr-Bremse production process and the delivery of our products. The instruments used include, first of all, failure mode and effects analyses (FMEA) as well as production safety audits and product safety reviews. Furthermore, we practice supplier monitoring, separate auditing of production lines, product safety training for employees, product and field testing and close monitoring of the relevant markets. Regular internal audits and assessments serve to verify and optimize the implementation of our process management system. In addition to worldwide monthly internal reporting on the quality organization and company management to monitor quality standards, Knorr-Bremse regularly conducts regional, global and product-specific quality reviews. The reviews and strict escalation processes ensure that potential safety-critical incidents are assessed and resolved at an early stage.

International standards form the basis of the Knorr-Bremse quality management systems. In the RVS division, these are the quality standards ISO 9001 and ISO/TS 22163 (formerly IRIS, International Railway Industry Standard). The rail-specific requirements included in ISO/TS 22163 are firmly anchored in the division's processes and manuals and the Knorr-Bremse production system. For the CVS division, the IATF (International Automotive Task Force) 16949 quality standard applies. In 2022, 109 Knorr-Bremse sites globally had a certified quality management system (ISO 9001, ISO/TS 22163 or IATF 16949). To date, no Knorr-Bremse site has had a certificate revoked.

Number of certified sites with quality management systems

| | 2022 | 2021 | 2020 |
|---|------|------|------|
| According to ISO 9001, ISO/TS 22163 or IATF 16949 | 109 | 101 | 96 |

In order to meet supplier management quality standards, both divisions monitor and audit their supplier base. In addition to a process audit for suppliers, the RVS division uses prior information that suppliers have provided about themselves, including on quality certificates such as ISO/TS 22163. The standard is a requirement for achieving preferred supplier status at Knorr-Bremse. In the CVS division, every supplier goes through the product safety audit and a Sourcing Board assessment.

Products for Greater Transportation Safety

Knorr-Bremse continuously advances the high level of safety and quality of its business processes and product portfolio in both divisions. On this basis, we seek to contribute to improved traffic safety by supplying reliable, high-quality products, systems and services.

The two divisions' product developments for greater transportation safety contain our knowledge of braking systems, which we have acquired over the course of decades, and our in-depth expertise in driver assistance systems and forward-looking digital solutions. Here are a few current examples:

Braking Systems for Improved Transportation Capacity and Safety

Reproducible Braking Distance (RBD) is an innovative braking architecture that helps to increase rail transportation capacity through increased train frequency and improved schedule stability and punctuality. A team of engineers integrates three technologies for this: a new deceleration control (DCC) technology, WheelGrip Adapt for adaptive wheel slide protection and a smart sanding system designed for adhesion management (ADM) across the entire train. Simulations have emphasized the significant potential for improved rail traffic flow.

Electromechanical brakes (EM brakes) are also intended to help boost transportation capacity and efficient train operation, using improved dynamics to shorten braking distances. The system transfers the braking signal and energy electrically instead of pneumatically by using brake by wire.

The modular **SYNACT® disk brake** family ensures that commercial vehicles and buses are safe for transportation. The new, reduced-weight **SYNACT® radial brake** is perfect for urban buses. With its own weight now reduced by 10 kg, it supports efficient vehicle operation while maintaining full capabilities of up to 30 kNm. With the optional Active Caliper Release (ACR) feature, SYNACT® can achieve a fuel consumption reduction of up to 1%.

Systems for Collision Avoidance and Object Recognition

Collision avoidance systems, in the form of an emergency braking assistant and – for trucks – turning assistant, help prevent accidents in rail as well as road transportation. These systems are being enhanced for automated commercial-vehicle driving so that driverless operation can be made possible in the future. Knorr-Bremse supplies collision avoidance systems that feature sensors for environment and status recognition and can be used on rail and road in equal measure. An example of this is ProFleet Assist+ Gen 2 from Knorr-Bremse Truck Services and the Intel company Mobileye, a turning assistant that can be retrofitted for commercial vehicles. The system meets the latest requirements needed for transportation.

A further example for rail is the obstacle recognition technology from the Israeli start-up Rail Vision, a company in which Knorr-Bremse has invested. The driver assistance technology makes it possible to recognize trains, objects and obstacles from long distances and is also an instrument for the realization of automatic train operation (ATO) in the future. The first commercial order that has been placed will see the high-performance sensor systems being used in passenger trains.

Safety with Digital and Electrified Solutions

The **digital freight train** stands for capable and competitive rail transportation with efficient train dispatch and high vehicle availability. **Digital automatic coupling** (DAC, also known as FreightLink) enables automated mechanical and pneumatic railcar coupling and decoupling as well as reliable, train-wide power supply and data communications at all times. With its innovative electric coupler concept – a core module of DAC – Knorr-Bremse is bringing smart services for process acceleration and intelligent maintenance to the freight segment. They include, for example, automated brake tests, remote control of mechanical brakes and condition-based maintenance.

Condition-based maintenance for rail vehicles means data can be generated for braking systems, entrance systems, HVAC systems and other subsystems, and immediately be subjected to smart analysis using cloud-based algorithms. This enables high-precision monitoring of the condition of safety- and function-critical subsystems, which is a crucial tool for safe, high-availability rail transportation.

With key technologies like **fully electric power steering** (EPS) and **advanced hybrid power steering** (AHPS), the Knorr-Bremse steering portfolio comprises solutions for highly automated commercial-vehicle driving up to, and including, SAE level 5. As a result, we offer solutions for electric vehicles as well as conventional ones. Both steering systems boost transportation safety and comfort with a wide array of driver assistance functions, including speed-sensitive steering support, active lane-keeping assistance and steering wheel return. The EPS also reduces fuel consumption and CO₂ emissions through its power-on-demand function.

In our two magazine articles, you can find detailed information about how our product and system solutions contribute to sustainable mobility on road and rail.

→ [Magazine: Setting the Course for Sustainability](#)

→ [Magazine: The Road to Decarbonization](#)

Employment Conditions

A total of 31,599 employees around the world work for Knorr-Bremse and they are a key reason for our business success. To remain successful as a company, we need to be an attractive employer. This is essential in order for us to recruit the best skilled workers and managers and gain their loyalty. As a driver of innovation, Knorr-Bremse depends on highly skilled workers, professionals and talented young employees.

Knorr-Bremse wants to provide all employees with excellent opportunities and conditions in their professional environment so that they can achieve their personal potential. In addition, it is our aspiration to protect employees' rights and ensure fair and appropriate pay. We take guidance from the UN Global Compact, the UN Universal Declaration of Human Rights and the human rights conventions of the International Labour Organization (→ [Due Diligence Processes for Human Rights](#)). The standards we set ourselves are defined in the Knorr-Bremse Code of Conduct and in our Human Rights Policy. Within the Knorr-Bremse organization, these form the basis for daily interaction among employees.

The Group-wide Human Resources (HR) department plans, manages and monitors all overarching activities regarding our employees unless indicated otherwise. The Head of Human Resources bears overall responsibility and reports regularly to the Executive Board member for Integrity, Legal Affairs and Human Resources. Regional HR officers are responsible for implementing HR measures in the regions, which are Asia/Australia, Europe/Africa and America. Local HR officers carry out HR measures at our sites and monitor them. We strive to facilitate a continuous flow of information throughout the entire organization. Employees and external partners can make use of established processes if they need information about the Code of Conduct or violations of this code. The points of contact in case of questions are their immediate supervisors, the compliance organization, the HR department or, if available, works councils. A global whistleblower system can be used to report violations of the Code of Conduct's principles anonymously (→ [Integrity and Compliance](#)).

Repeatedly Recognized as a Top Employer

Excellent teams produce outstanding products and services. To encourage the formation of such teams, Knorr-Bremse seeks to create fantastic working conditions that include systematic and targeted personnel development initiatives. The approach works, too, as an independent study by the Top Employers Institute shows. In 2022, Knorr-Bremse was certified as a "Top Employer: Engineering Germany" for the ninth consecutive time. The recognition attests to Knorr-Bremse having excellent personnel development that stands for a high level of employee orientation and above-average employer support. In particular, the label is evidence of the company's above-average performance in the areas of sustainability, well-being and digital HR. The greatest developments were seen in the areas of learning, performance and career. The 20 HR areas that were reviewed included, for example, HR strategy, the working environment, recruitment of talented employees, education, well-being and diversity and integration.

HR Strategy 2025 Forms the Basis for Employer Attractiveness

The global HR Strategy 2025 guides us in our responsibility for employees. It is based on our company strategy and is designed to continuously improve employment conditions and increase employer attractiveness. The HR department strives to make important value contributions by employing optimized and globally uniform HR processes within the context of the company's overall strategy. As a learning organization that actively helps shape the shift toward digitalization and new forms of work, we want to make continuous progress. The focus is on a future-oriented action plan for further developing and empowering staff and on increased process digitalization, among other objectives. The HR transformation project ONEHR contributes to these strategic targets through uniform processes and transparent

information. On the basis of a new IT infrastructure and a globally standardized data set, the Group-wide recruitment portal was rolled out in the year under review. Different modules on talent management will gradually follow next year.

Employee Satisfaction

One important indicator of good employment conditions is employee satisfaction. In order to analyze and manage this, we conducted the seventh Group-wide employee survey in 2022.

A total of 74%¹ of employees around the world took part in the confidential digital survey on a voluntary basis. One particularly important indicator of workplace attractiveness is the engagement score, which is composed of questions on satisfaction with the workplace and willingness to recommend Knorr-Bremse as an employer. The engagement score of 71 achieved in 2022 is close to the average score ascertained by the survey service provider (75). Employees affirm a high level of commitment to the Knorr-Bremse brand and the work set for them, and they also have positive expectations for the future of the Group. In particular, the company culture and internal career opportunities are two areas where improvements could be made. Follow-up workshops, follow-up measures and a short survey (pulse survey) on the changes are planned for 2023. The survey is planned to be conducted every two years and result in tangible recommendations for improving working conditions. The outcomes will be communicated to employees in a clearly defined process and discussed with them in workshops. Managers will also derive individual measures from the outcomes and the progress of these measures will be monitored.

71

This engagement score is evidence of our employees' strong commitment to the Knorr-Bremse brand

¹ All Knorr-Bremse employees, including temporary workers, were invited to participate.

Work-Life Balance

A good work-life balance is an important factor of employee satisfaction. We take this into account in our New Work concept, which encourages agile and collaborative working. Our comprehensive options for mobile working also contribute to a good work-life balance, as do flexible working hours and online training opportunities. The various options for making day-to-day life easier include:

- Care services for families: referrals to childcare services or nursing services for relatives as well as vacation programs for children
- Financial and social support programs for families: special grants or a contribution to medical checkups and health insurance; time off from work when children or relatives fall ill, maternity and parental leave – including in countries that do not have such legal provisions
- Workplace health promotion: a range of health programs and facilities

All seven of Knorr-Bremse's German sites are certified in accordance with the berufundfamilie audit, which assesses if HR policy is conscious of both family and life stage. Working with a professional childcare provider, Knorr-Bremse initiated the construction and inauguration of a day care center in the Munich region. Planned to open in mid-2023, Knorr-Bremse employees will be able to obtain needs-based and affordable day care for their children.

Remuneration, Additional Benefits and Codetermination

Knorr-Bremse wants to be a fair employer that ensures that its employees around the world receive rates of pay in line with the market. Salaries at Knorr-Bremse should differ only on the basis of employees' qualifications and performance. We adhere to local minimum wages, but they are not relevant for the majority

of the workforce due to the high level of qualifications required. With the objectives of fair pay and international comparability of pay, we intend to assess all job profiles in accordance with a globally uniform system and compare them with reference values. This has currently been implemented for 73% of all employees (2021: 68%).

The greater the responsibilities of a position, the higher the variable remuneration. This form of remuneration is based on the company's current success and individual targets, which are discussed and set between managers and employees during the standardized, global Staff Dialogue process (→ [Personnel Development](#)). The inclusion of sustainability aspects in an employee's targets depends on his or her function. In fiscal year 2022, a new remuneration system was introduced for management levels 0 to 2 (Executive Board, senior management, regional managing directors and heads of department). The short-term variable remuneration paid in this system takes the achievement of sustainability targets into account (→ [Responsible Corporate Governance](#)).

In addition to pay, Knorr-Bremse offers its employees site-dependent, voluntary additional benefits, mostly in the form of financial benefits or benefits in kind. This can include assistance for employees facing special situations in their lives. In Germany, for example, this is provided by Knorr-Bremse's support association, which unbureaucratically provides financial aid to employees who are primarily facing crisis situations.

The Heinz Hermann Thiele share program is a Group-wide benefit that was initiated in September 2021. It enables eligible Knorr-Bremse employees to purchase subsidized shares in Knorr-Bremse AG each year. The second wave of the global share program followed in September 2022. An additional 12 countries participated in the program for the first time. Overall, around 25,600 employees from 23 countries who had been employed by the Group for at least six months were eligible. The participation rate among these eligible employees was 15%.

With regard to codetermination by employees and their representatives, Knorr-Bremse relies partly on direct feedback such as the employee survey. In addition, the company is conscious of the importance of cooperation in a spirit of trust, which includes factual communication with bodies representing employees, such as the Group Works Council. We respect employees' right to freedom of association and assembly and to collective bargaining, wherever this is legally permitted and possible. The members of bodies representing employees and trade unions are treated equally in the Group and neither disadvantaged nor favored.

Employee Turnover

Knorr-Bremse strives to ensure high employee satisfaction and to have that satisfaction reflected in the lowest-possible turnover rate. However, the current labor market situation in various countries where it has sites as well as the macroeconomic climate were a negative influence on employee turnover in 2022, in terms of both general turnover as well as employee resignations. This effect can be seen in all regions and is particularly prevalent in North America (where it has been labeled the "great resignation"). We wish to counteract this development by continuously refining the measures listed here for the improvement of employment conditions. In addition, we will further expand our recruitment processes and channels to hire new employees in a timely manner. Lay-offs due to the sale or restructuring of business operations have been reduced to a minimum (1.5%). Age-based resignations are also at a low level (1.1%).

Turnover Rate¹

in %

| | 2022 | 2021 | 2020 |
|---|------|------|------|
| Staff turnover worldwide | 18.7 | 14.1 | 14.0 |
| Staff turnover limited to employee resignations | 10.4 | 8.7 | 5.1 |

¹ Definition: Number of employees leaving as a proportion of the average total workforce. Increase in proportion partly caused as a result of taking account of all ways in which employees leave and of employees with fixed-term employment contracts for the first time in 2022. The figure for 2022 has also been reported as a head count for the first time. It was previously reported as full-time equivalents.

Personnel Development

Qualified employees are a competitive advantage and a basis for the company's success. In personnel development, we focus on developing managers in addition to ongoing specialist training programs and promotion of specialist skills. In terms of the content of the personnel development programs, we are guided both by our company's objectives and market requirements such as new job profiles influenced by digital transformation. We systematically survey strengths and potential improvement to initiate necessary improvement processes in personnel development.

Our HR process model serves as the substantive framework for our personnel development. It focuses on two performance areas::

■ Source

Recruitment of new and talented employees, long-term development of effective employer branding and collaborative partnerships with universities and training institutions

■ Develop

Evaluation and challenging of our employees/managers, provision of audience-specific training programs and ongoing refinement of the management culture and management principles

Promotion of New Management Strategies

Knorr-Bremse is influencing the digitalization of mobility with its products, such as highly automated driving for example. The opportunities offered by digitalization are changing the way people think and the way certain processes are conducted, including the innovation process and the development of new business models. The market demands agile corporate and leadership cultures, and such cultures are fostered within the Group. Knorr-Bremse made a statement in 2022 with its online “Digital News” event. Involving members of the Executive Board, experts introduced employees to the technology and culture of Self-Service Dashboarding for a smooth flow of information across the Group.

Agile leadership can be the management method of choice in the search for the best solutions. In addition to training on and the application of various agile methods like scrum, design thinking and business model canvas, a focus is placed on something called the “agile mindset.” Events such as “Digital News,” training courses and internal initiatives fuel the transformation process. In this area, Knorr-Bremse places high priority on the long-term and systematic use of new management methods. At the same time, the company also applies the management methods that have shaped its success. Knorr-Bremse wants to combine classic and new approaches purposefully.

Advanced Training and Qualification Initiatives

Personnel development offers qualification and training measures tailored to individual employee needs, including in the areas of soft skills, project and quality management, technology and IT applications. In addition to in-person and virtual training, the self-learning tool LinkedIn Learning supplements training with around 17,000 courses on topics relevant to work. At around 7,000 individuals¹, the use rate among eligible employees increased by 37% in 2022 compared to 2021. The users viewed 45,000 courses and spent more than 11,000 hours in training.

The findings of the Staff Dialogue are relevant to the professional and personal development of employees. The annual employee appraisal results in an evaluation of performance and potential capabilities and individual written agreements on targets. We also see these as a good basis for developing training programs.

¹ The reduced number of available licenses compared to 2021 is the result of the establishment of a separate local training program in China.

“Digi News” to Follow “Digital Days”

Knorr-Bremse has transformed the established multi-day event called Digital Days into a new digital event format called “Digi News.” More than 120 guests from Knorr-Bremse’s management team and business partners took part in the new online format at the end of 2022. It presented an important tool called Self-Service Dashboarding, which will be used as part of the transformation into a data-driven company for all employees. In the future, employees will be able to use their computer to access relevant data from a variety of tools and sources and then combine it. This will make it possible for them to create dashboards, reports and graphics flexibly and by themselves – a change that is designed to accelerate business decisions. No matter the subject, whether it is IT, purchasing, the supply chain or sustainability, the insights offered by and the use of real-time data strengthens efficient, smoother-running processes. It will require a BI (business intelligence) tool to be installed on each computer and access to the data lake. However, possessing the technology is just one aspect. A further requirement is the transformation of the company’s culture and mindset along with further training for employees. It is an exciting and dynamic task, and the onboarding campaign for Self-Service Dashboarding will begin in 2023.

Staff Dialogue Coverage and Completion Rates

in %

| | 2022 | 2021 | 2020 |
|------------------------------|------|------|------|
| Coverage rate ¹ | 76.3 | 78.2 | 82.1 |
| Completion rate ² | 92.0 | 90.7 | 89.7 |

¹ Coverage rate: the share of employees who participated in the Staff Dialogue. Fluctuation is predominantly caused by the purchase of new companies (delayed system rollout) and a high share of new recruits in the second half of the year, as the Staff Dialogue is not held during an employee's first year. The relevant categories of people are not part of the Staff Dialogue process, although they are included in the total number of employees.

² Completion rate: the share of employees in the Staff Dialogue who fully completed the process. The delta between the rate and 100% primarily results from employees not having yet completed the Staff Dialogue as of May 31, 2022.

Recruiting and Developing Managers and Young Professionals

Good leadership is essential when it comes to maximizing the Group's performance, innovation and long-term success. This is why we seek to recruit only the best managers throughout all age groups and to enhance their skills. The Knorr-Bremse Leadership Principles describe how leadership should be practiced and help managers to create a working environment in which employees can harness their potential optimally. The principles comprise five core themes: reflecting, progressing, inspiring, developing and doing.

The Leadership Feedback initiative provides important insights about the individual professional development needed by managers. In this process, managers who supervise three or more employees are given feedback on their leadership. Leadership Feedback is obligatory and must be conducted within a period of two years. Measures for improved cooperation can be developed on the basis of the results. The last Leadership Feedback in 2021 achieved a completion rate of 92%. The 2022 Leadership Feedback was postponed to the following year for procedural reasons in order to include findings from the 2022 employee questionnaire in the survey.

Knorr-Bremse has relied on local managers at its global sites from a very early stage. Their proximity to the markets and customers as well as their language and cultural knowledge can be key success factors in combination with initial and advanced-training courses that are targeted to their needs. Knorr-Bremse strives to fill vacant managerial positions internally with talented employees wherever possible. To promote leadership development and succession planning, Knorr-Bremse employs potential analysis procedures (the Development Center). It also offers global and regional development programs for the purpose of training upcoming managers and young professionals in-house:



Global Development Programs

Management Evolution Program (MEP):

Trainees explore three different business areas during this 18-month program, gain experience in international projects and spend at least six months at an international site. Training, events and a mentor also support an individual's personal and professional growth.

International Management Potential Group (IMPG):

This development program provides high-potential, mid-level managers around the world with an opportunity each year to hone their talent in training courses and projects, to strengthen their managerial skills and to expand their personal international network.



Regional Development Programs

Junior Management Potential Group (JMPG):

This support program is designed for employees who have demonstrated their potential to take on a (future) team leadership function due to their strong performance.

Engineering Development Program (EDP):

This program enables students who majored in technical subjects at colleges in the United States to attend a two-year advanced-training program in mechatronics, by transferring to positions in different departments or working abroad in Mexico for example.

Training and University Programs

Knorr-Bremse trains people for careers in areas that are in demand in the Group. These include industrial mechanics, machining technology, electronics, mechatronics and IT.

Number of Trainees as of December 31



¹ For 2022, the figure has also been reported as a head count for the first time. It was previously reported as full-time equivalents.

In the area of academic training, especially in the dual approach that combines academic studies and on-the-job training, we work closely with German and international universities. Knorr-Bremse has been a partner company of the Baden-Württemberg Cooperative State University (DHBW) in Ravensburg and its branch campus in Friedrichshafen since 2008. As part of this partnership, the company provides students majoring in industrial engineering, electrical engineering, mechanical engineering and business information systems with an opportunity to attend a three-year program that combines university studies and on-the-job experience. To retain talented managers and young professionals, Knorr-Bremse offers programs such as the Management Evolution Program (MEP) for trainees and professional development through the International Management Potential Group (IMPG) (→ [Recruiting and Developing Managers and Young Professionals](#)).

Diversity and Equal Opportunity

Knorr-Bremse has 31,599 employees working at over 100 sites in more than 30 countries. We view the international character and diversity of our workforce as a commercial success factor and as a driver of creativity, innovation and cultural competence in business partnerships. All of these features are components of the business strength of Knorr-Bremse and are qualities that underpin its leading position in technology and the market. We have set out the requirements for diversity and equal opportunities in our Code of Conduct and our Human Rights Policy. A fundamental principle is the equal treatment of all our employees – irrespective of gender, age, country of origin, sexual identity, state of health, religion or beliefs. We confirmed this in 2020 by signing the Diversity Charter in Germany.

Diversity Organization Expanded

We have made progress on achieving the goal of gradually integrating diversity management into the HR and sustainability strategy. With the organizational structure established in 2022, we want to further develop the current four focus issues of cultural diversity, gender equality, age and severe disability more intensively and in a targeted manner across the Group.

The Knorr-Bremse Group's newly installed diversity officer reports to HR management on subject-specific matters and reports to the Executive Board member for Integrity, Legal Affairs and Human Resources in respect of functional management. The diversity officer is responsible for the Group-wide diversity strategy, for deriving initiatives and measures and for coordinating the new diversity champions network. The regional diversity champions implement measures taking the regional specifics into account and are contacts for the diversity officers at selected locations.

We use campaigns and training courses to raise employee awareness on the topic and to motivate employees. These include relevant social media campaigns in the context of Diversity Day and World Women's Day 2022. Training opportunities posted on the intranet, like those designed to uncover unconscious bias, are also offered as a LinkedIn Learning Path and as Knorr-Bremse training at the German sites. In the year under review, we began the awareness training in the divisions with a workshop for representatives of various sites and for local diversity officers. An important agenda item was sharing experience, taking regional diversity aspects into account. Held for the RVS division in 2022, the event will also be held for the CVS division in 2023.

Procedures for the possible detection of risks and breaches of our requirement for diversity and equal opportunities have already been established in the Group. If there is a possible case of discrimination with regard to a matter or course of action, each Knorr-Bremse subsidiary has a designated point of contact who can be reached directly and will be responsible for the case. As an alternative, employees who work at the company's sites in Germany may consult with the respective HR department (pursuant to the German General Equal Treatment Act, AGG) or the Works Council. Complaints can also be submitted via the general whistleblower system operated by Compliance (→ [Integrity and Compliance](#)).

Promoting Cultural Diversity

As a global Group, cultural diversity is an important success factor for Knorr-Bremse. Around 82.5% of the company's workers are employed at sites outside Germany. At Knorr-Bremse's German sites, our non-German employees represent 10.6% of the workforce and come from 63 different countries. Top management roles in the regions are mainly filled with local residents to ensure that local and cultural circumstances are taken into account (2022: 86.9%, 2021: 84.9%, 2020: 83.6%).

We support international communication with intercultural training, language courses, cross-site projects and stays abroad. Given the company's presence in more than 30 countries, many employees of Knorr-Bremse receive international assignments. These expats can spend anywhere from six months to five years abroad. They are assisted with these assignments by the International Transfers department at Knorr-Bremse, from the initial preparation of the exchange to reintegration at the employee's former place of work. 38 employees around the world were assigned to other Knorr-Bremse locations in 2022 (2021: 47, 2020: 60).

Distribution of Employees Internationally as of December 31, 2022



Gender Equality

Knorr-Bremse supports gender equality and seeks to increase the share of women in the workforce and management, to support women's careers more strongly and to recruit qualified women. The following global targets were set for the Knorr-Bremse Group in 2022: 25% share of women in the workforce and 20% in management levels 1 to 4 by the end of the third quarter of 2027. Management levels 1 to 4 incorporate female managers as well as female employees who are experts or specialists (without their own leadership responsibility). The achievement of the targets is supported by a concept that was finalized in 2020 and calls for at least one female candidate in the final round of the selection procedure for applications at management levels 2 to 4 at Knorr-Bremse companies in Germany. At least one-third of the participants in Knorr-Bremse development programs should be women. The trainee program MEP exceeds this target with women already representing 38% of its participants (2021: 30%). The following diagrams provide an overview of the global development of female representation in the workforce and in management positions. The latter comprises female managers at management levels 1 to 4 as well as female managers below level 4.

25%

Target: 25% share of women
in the workforce and 20%
at the management levels 1 to 4

Proportion of female employees globally¹

in %



Proportion of females in management positions in all departments globally¹

in %



¹ Approximately 97% of the total workforce covered due to the latest M&A activities.

² Female employees with their own leadership responsibility have been included since fiscal year 2022. The basis used through to 2021 was (solely) the categorization as management levels 1 to 4. If made comparable to the previous year, the rate would be 15.2%.

We want to strengthen gender equality with development programs for talented young women and female professionals. A mentoring program launched in Munich in 2022 is aimed at increasing the professional potential of female employees through knowledge transfer. This initiative originates from the Women@Knorr Bremse (Munich) network. Other newly founded women's networks in the Group include Women@Bendix (Avon, USA) and the Mexico chapter of Women@Bendix (Acuña, Monterrey, Mexico City). They offer our female employees platforms for communication and initiating projects.

We are working together with various initiatives and universities to boost the share of young female employees in technical professions. The partnership with the Technical University of Munich in the mentorING program is directed at supporting female college students in scientific and technical degree programs. Through participation in the Cross-Mentoring Munich initiative, we want to support the next generation of female managers by means of cross-company mentoring tandems.

Generation Management to Safeguard Knowledge

In 2022, the average age at Knorr-Bremse was 41.6 (2021: 41.3, 2020: 40.4). It will continue to rise as a result of demographic change in industrial countries. Our generation management is intended to offer employees of all ages the best working conditions. We are gradually creating the conditions for this, including by providing ergonomic workplaces, active health management and formats for cross-generational knowledge sharing. For example, the understanding and collaboration among the generations is fostered by seeking the engagement of former employees. After retiring, these former employees share their experience with younger colleagues. They are usually skilled workers or managers who were responsible for projects and advisory duties.

Age Structure in the Group¹

in %

| | 2022 | 2021 | 2020 |
|----------|------|------|------|
| Up to 20 | 1.0 | 1.4 | 1.2 |
| 21–25 | 5.4 | 5.5 | 4.0 |
| 26–30 | 11.0 | 11.4 | 12.7 |
| 31–35 | 16.9 | 17.2 | 20.3 |
| 36–40 | 15.7 | 15.6 | 17.2 |
| 41–45 | 13.8 | 13.3 | 13.0 |
| 46–50 | 11.6 | 11.4 | 11.2 |
| 51–55 | 9.9 | 10.1 | 9.6 |
| 56–60 | 9.5 | 9.5 | 7.3 |
| over 60 | 5.2 | 4.6 | 3.5 |

¹ Share of the workforce included in the age data in 2022: around 97%.

Inclusion on the Job

Employees with severe disabilities and health limitations are an important part of the diverse workforce at Knorr-Bremse. We have implemented inclusion measures for the particular protection and special advancement of employees with severe disabilities and health limitations. The disabled persons' delegation helps people with disabilities find the right workplace for them within the Group, equipped according to their needs. We maintain contact with social sponsors and organizations, and conduct activities with them as part of ongoing partnerships. The aggregate ratio of people with severe disabilities at the German sites was 4.6% in 2022 (2021: 4.4%, 2020: 4.5%).

Occupational Health and Safety

Our sustainability strategy's important objectives include providing a safe working environment and protecting and promoting employee health. We see this as a responsibility to the individual employee and as a prerequisite for the long-term success of the company. Our measures and processes encourage preventive health management, medical care, ergonomic workplaces and the avoidance of accidents at work.

The Group-wide Health, Safety and Environment (HSE) Policy defines obligations and material guidelines in the areas of health and safety. The Executive Board has the overarching responsibility for these areas. The central HSE departments of the RVS and CVS divisions develop strategic guidelines and bundle all cross-site management and coordination tasks. At the sites, the HSE professionals bring together all the activities on health and safety and help the managers to implement them. Focal points include the assessment of injury and accident risks at production facilities, at workstations and in procedures as well as of knowledge on the handling of hazardous materials. The initiation of measures based on this work is one of the key responsibilities of HSE experts.

Occupational safety management is defined through the Group's own HSE processes and embedded in our structures. The processes and standards are geared to laws and international standards such as ISO 45001, ISO 14001 and ISO 9001. System and process audits, HSE safety audits, equipment acceptance audits and inspections at the sites encourage compliance with the processes. In the Rail Vehicle Systems division, 46 production and service sites around the world are certified on occupational health and safety in accordance with ISO 45001 (2021: 44, 2020: 43).

Prevention of Occupational Accidents

Knorr-Bremse aims to prevent occupational accidents as far as possible and to continue to lower the rate of occupational accidents per 200,000 contractually agreed hours of work. We draw on the very latest findings from work processes to develop even more effective ways to prevent occupational accidents and threats to employees' health. We analyze reported accidents and near-miss accidents, define support measures when necessary and monitor their effectiveness. The following regularly recurring measures also make a contribution to safety awareness in the workforce and thus to effective accident prevention: internal training, information campaigns and regular meetings on occupational safety and reporting as well as follow-up.



Tool for Coordinating Occupational Health and Safety with External Companies

Internal specialists at Knorr-Bremse Spain, based in Pamplona, have been honored with an award for exceptional and exemplary HSE management. The business location introduced a tool that is used to coordinate the various legal requirements related to occupational health and safety. Knorr-Bremse informs contract partners, such as forwarding companies, about current HSE requirements and the partners can upload corresponding documentation. There are status and reminder functions to ensure a constant flow of information and continuous processes. Because requirements related to occupational health and safety can be discussed and fulfilled in advance, it is now possible, among other things, to digitally regulate the forwarding companies' access to Knorr-Bremse's premises. Suppliers and visitors also receive the latest HSE information automatically and digitally. Reporting is done in real time for purposes such as documenting access authorizations. There is also a special app that looks after access authorization for visitors.

In addition, the safety@work program for assessing the safety culture was launched in the CVS division in 2022. Using employee surveys and on-site audits at European production sites, the areas of management, organization and processes were assessed with regard to their contribution to the safety culture. As a result, improvement potential was identified, and this will be translated into an action plan and implemented from 2023.

Number of Workplace Accidents per 200,000 Contractually Agreed Hours of Work¹

in %



Number of Lost-Time Workplace Accidents per 200,000 Contractually Agreed Hours of Work¹

in %



¹ The figure relates to all sites under operational control excluding sites with fewer than 50 employees other than production sites or service workshops. This covers around 97% of Knorr-Bremse's employees.

Occupational Health Firmly Established

Knorr-Bremse is aware of the importance of functioning occupational health protection and offers a range of measures for disease prevention and preventive healthcare at the sites. For example, it has rolled out the “mein EAP” employee assistance program. Employees at German sites and their family members can use the counseling service during challenging periods of their lives. Various internal communication channels provide information on the options, and their rates of use imply good acceptance.

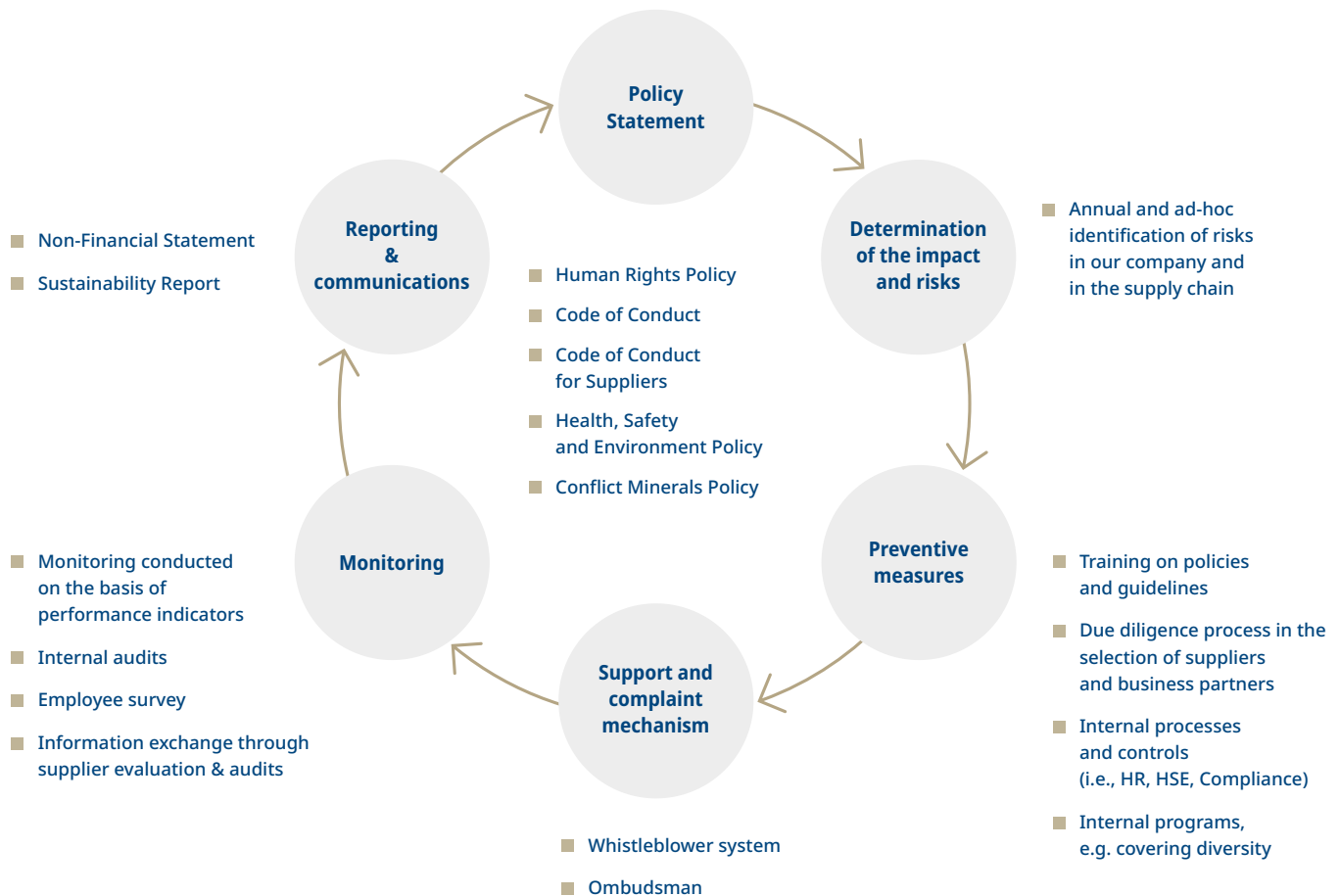
meinEAP: Strengthening and Supporting Employee Health

“meinEAP” (Employee Assistance Program) is the name of a company health management service for employees at German sites and their family members. Individuals can use an external counseling service that is free, accessible 24/7 and anonymous if desired. It provides professional, short-term advice regarding health, career and personal questions. Such issues can include work and career, health concerns or critical situations in life. A “meinEAP coach” is also available. This individual can help managers and function holders to optimally use meinEAP in their area of responsibility. The program helps them with issues related to leadership and change management, and with coaching on issues related to the working environment. To increase the program’s visibility, Knorr-Bremse uses internal media to promote meinEAP, a service that proved itself during the pandemic in particular. Other measures designed to boost the mental health of employees include seminars and workshops about issues such as mindfulness, healthy sleep and healthy mobile working. Psychological risk assessments are conducted along with live monthly talks about issues such as depression and addictive behavior. Working with its service provider, Knorr-Bremse plans to identify health management needs more systematically and include them in its range of support services in the medium term.

Due Diligence Processes for Human Rights

Knorr Bremse wants to fulfill its human rights due diligence duty along its value chain: to its own employees, to contractors and employees in the supply chain and to customers and society. To respect and protect human rights, we are systematically expanding our processes in accordance with our internal obligations, external guidelines and legal requirements. Knorr-Bremse has signed the UN Global Compact, thus also committing itself to compliance with human rights. Moreover, we are committed to respecting the relevant national legal frameworks, the International Labour Organization (ILO) conventions relating to human rights and the UN Universal Declaration of Human Rights. We orient our processes with the UN Guiding Principles on Business and Human Rights and the German Supply Chain Due Diligence Act.

Human Rights Due Diligence at Knorr-Bremse



The Knorr-Bremse Code of Conduct, which is binding for all employees, includes central principles and rules for respecting human rights. The Human Rights Policy rolled out globally in 2021 specifies the code's requirements and combines all human rights aspects from various internal policies. The Human Rights Policy was rewritten by the Executive Board in the form of a policy statement. The policy describes how we intend to protect the human rights of everyone who directly or indirectly works for us by reducing any negative impact of our actions. The respect for human rights that the Human Rights Policy requires of suppliers and subcontractors supports and adds to corresponding requirements in the Knorr-Bremse Code of Conduct for Suppliers. Our [↓ Conflict Minerals Policy](#) also influences the due diligence duty for human rights.

Knorr-Bremse Human Rights Policy

The Knorr-Bremse Human Rights Policy brings together all aspects of the company's various internal guidelines. It addresses the following issues:

- Work schedules, wages, social benefits and occupational safety and health
 - Child labor, forced labor and modern slavery
 - Freedom of speech, freedom of assembly and collective bargaining
 - Equal opportunity, privacy and physical and mental stress
 - Corruption and security management
- ↓ [Human Rights Policy](#)

In the Knorr-Bremse organization, the Executive Board and the senior management of the companies have responsibility for risk management with regard to human rights. Following the introduction of the German Supply Chain Due Diligence Act (SCDDA), the Executive Board concretized the responsibilities for human rights risk management and delegated them to the respective departments in 2022. These include Purchasing, the HR department, the Health, Safety and Environment department and the Compliance department, which are responsible for the operational implementation and review of these activities. The compliance organization monitors compliance with the requirements of the SCDDA in the Group and reports regularly on this to the Executive Board.

Determining Human Rights Risks

We are working on integrating human rights due diligence even more strongly into our operating processes to minimize human rights risks and prevent negative effects from our business operations. To do this, we also use the results of the human rights risk analyses and associated information on potential human rights breaches.

During the reporting period, we continued our analysis of the human rights risks in our supply chain and in our own business divisions in accordance with the legal requirements. For example, we used external sources to assess the potential risks of our direct suppliers and our own sites in respect of procurement categories, country risks, site sizes and numbers of blue-collar workers. By comparing this data with the sustainability assessments available to us at the supplier level and with countermeasures such as ISO certifications, we have been able to determine supplier risk and location risk. When defining and following up on risk-reducing measures, we prioritize suppliers whose actions we can influence due to level of purchasing volume. In the future, we will conduct the risk analysis annually and whenever required.

In the supply chain, we identified around 600 suppliers who are being reviewed with a very high or high priority regarding the need for further action due to their propensity to take risks and the level of our purchasing volume. This equates to 2% of suppliers. Risks were identified in our own area of business, particularly in the field of occupational safety and also in ensuring respect for human rights at the Brazil, China, India and Mexico sites.

The human rights risk analysis is included as a criterion in the selection of internal auditors to conduct audits. Selected human rights are also audited on-site within this regular audit and, in the event of complaints, remedial actions are determined.

Reporting Human Rights Violations

Knorr-Bremse employees and external stakeholders can report information on suspected human rights breaches or complaints anonymously or choose to provide their contact details (→ [Integrity and Compliance](#)). In fiscal year 2022, no cases of child labor, forced labor or modern slavery were reported through the whistleblower system. In total, we received 90 reports (2021: 45, 2020: 21) through our whistleblower system. 29 of these cases (2021: 10) concerned reports of discrimination and other topics relating to the workplace. In two of these cases, the information was confirmed. In five cases, the investigations are still ongoing. The remaining reports could not be confirmed.

Transparent Communications

We strive to continuously expand our reporting on human rights due diligence. Our annual Sustainability Report explains our activities in more detail. Furthermore, Knorr-Bremse publishes separate declarations on its website setting out its guidelines on and measures for preventing modern slavery and human trafficking in accordance with the requirements of the [UK Modern Slavery Act](#) and the [Australian Modern Slavery Act](#).

Raising Awareness and Providing Training

Knorr-Bremse promotes awareness of human rights due diligence within the Group and along the supply chain. We engage in constant dialog on the topic with the departments. The Chief Compliance Officer regularly provides information to company management on realized and planned Group-wide activities in close communication with the Head of Sustainability. The Supervisory Board is also informed about current developments on the protection of human rights and corresponding measures by Knorr-Bremse. Knorr-Bremse employees are informed about the obligation to respect human rights by the Code of Conduct and by the Human Rights Policy. The compliance management system provides support through mandatory training on the Code of Conduct. We maintain a dialog with suppliers on a wide range of sustainability topics (→ [Sustainability in the Supply Chain](#)).

In addition, we contribute to the automotive industry dialog on the National Action Plan (NAP) of the German Ministry of Labor and Social Affairs. Together with other companies, politicians, civil society and NGOs, we want to develop solutions to be able to live up to the increasing requirements for protecting human rights.

Social Commitment

At Knorr-Bremse, business success and social responsibility belong together. For good reason: Social engagement adds value – for affected and supported individuals as well as for the business locations and the employees of Knorr-Bremse. In this context, we want to encourage our employees to take part in social projects.

Knorr-Bremse's social commitment is focused on local and global challenges, which is reflected in Knorr-Bremse Local Care and the non-profit organization Knorr-Bremse Global Care. Both initiatives carry out joint and individual projects.

|  Knorr-Bremse Local Care |  Knorr-Bremse Global Care |
|--|--|
| Knorr-Bremse Local Care comprises all social activities of our locations. It includes financial support to non-profit organizations and corporate volunteering projects in which employees personally take part. These activities focus on the environment, education, health and social cohesion. | Knorr-Bremse Global Care consists of independent non-profit organizations in Germany, Hong Kong and the United States that fund long-term projects with extensive financial support around the world. The work is aimed at offering new prospects to people who find themselves in need through no fault of their own. Knorr-Bremse Global Care closely collaborates with partner organizations and supports their projects particularly in the areas of education and WASH (water, sanitation and hygiene). |

Closely integrating the sites – more than 100 of them in over 30 countries – is very important to us. Within the communities of our sites, Knorr-Bremse has the possibility to have a direct and indirect economic and social impact on the respective region: as an employer, as a purchaser of materials and services and with its products. Thus, we feel responsible for the community. We ensure a high impact from our local engagement activities because of the long-term integration of our sites and their local cultural knowledge. In addition, employees identify even more closely with Knorr-Bremse and the company's social image.

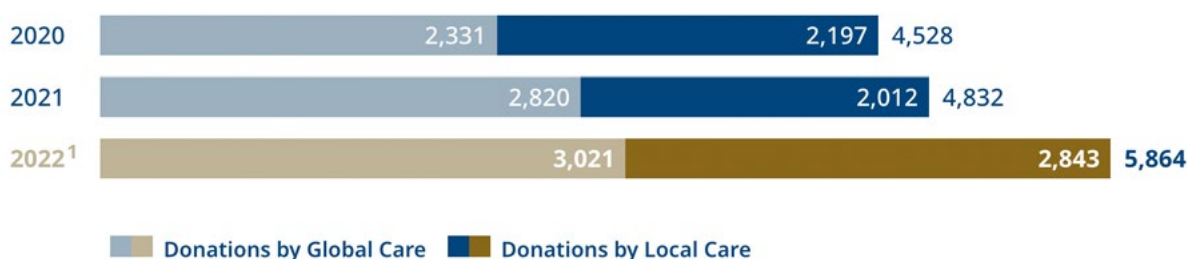
5.9 Mio €

The Knorr-Bremse Group donated around €5.9 million for social purposes in 2022 through Global Care and Local Care.

In 2022, the Knorr-Bremse Group donated around €5.9 million for social projects through Local Care and Global Care. Knorr-Bremse Global Care received 52% of this support.

Donation Volume

in € thousand



¹The donations made by Local Care in 2022 included €892,000 that Knorr-Bremse AG contributed to Ukrainian relief projects.

Local Care: Engagement in the Local Communities

Local Care organizes and financially supports a broad range of social activities that improve the lives of people who live in proximity to our company sites. These activities range from financial support of non-profit organizations to corporate volunteering projects with the personal involvement of employees.

Local Care's social engagement projects involve the environment, health, education and social cohesion. The instruments used to implement Local Care measures include:

- Voluntary monetary donations for charitable causes
- Corporate volunteering projects: Knorr-Bremse exempts employees from working hours to support non-profit organizations
- The Get-Involved Initiative: Donations are made to private volunteer activities performed by employees for non-profit organizations and projects
- Financial donation programs: Knorr-Bremse matches the donations of its employees or contributes an amount significantly more than the original donation

In 2022, more than 400 Local Care projects were conducted on every continent of the world. More than 600 employees actively participated in social projects in 2022. We would like to introduce a few of our projects:

Social Commitment Globally



Granville, Australia |  Education

Knorr-Bremse Australia Pty. Ltd.

The aim of the Waalitj Foundation is to improve the quality of life of Aboriginal and Torres Strait Islander people by providing education, employment and business opportunities. Knorr-Bremse Australia Pty. Ltd. has provided funding in particular to the „Deadly Sista Girlz“ program. The project is designed to help Aboriginal and Torres Strait Islander girls develop self-esteem and self-confidence and convey pride for their identity. The program is also intended to improve the quality of the girls' education. With the help of Knorr-Bremse, the tutoring and mentoring programs for participating girls can be expanded.

Itupeva, Brasil |  Education


Knorr Bremse – Sistemas para Veículos Comerciais Brasil Ltda. und Knorr Bremse – Sistemas para Veículos Ferroviários Ltda.

The social project called “Tech Plus Program” enables young people from low-income families to begin a technical training program. The two divisions of Knorr-Bremse and Knorr-Bremse Global Care help 16 adolescents enter the job market by offering them a course in mechanics and maintenance and an opportunity to enter a high-quality vocational training program. The knowledge imparted brings the young people closer to their dream of a better life. On average, Knorr-Bremse offers full-time jobs to 70 % of the young people.

Shanghai, China |  Health

Knorr-Bremse Commercial Vehicle Systems (Shanghai) Co., Ltd.

As a result of China's strict Covid-19 policies, no social activities could be conducted in person in 2022. Accordingly, employees of Knorr-Bremse CVS (Shanghai) and Knorr-Bremse Suzhou who are active in social projects as members of the local "KB love" team worked with other colleagues to produce two educational videos: one that covers safety- and health-related topics and a second that explores the subject of self-care and self-protection. The videos are to be shown to more than 550 pupils at elementary schools located near eight Knorr-Bremse sites in China each year to help improve child safety.

Berlin, Germany |  Education

HASSE & WREDE GmbH

MetrumBerlin GmbH is a recognized provider of youth services that has been active for 15 years in the Marzahn-Hellersdorf borough, close to the Knorr-Bremse site. Its assistance primarily consists of outpatient family and care assistance. In particular, HASSE & WREDE GmbH provides funding to the project "Jugendbüro 15plus" ("15+ youth office"). Here, young people from difficult social backgrounds receive educational counseling and support, for example, with job applications.

Munich, Germany |  Health

Knorr-Bremse Services GmbH

At the Munich site, employees who engage in social projects on a voluntary basis in their free time can apply for financial support for „their“ project as part of the Get Involved initiative. Martin Pauli, an employee of Knorr-Bremse Services GmbH, has been an active volunteer at the Passau Mountain Rescue Service since 1992. His initiative and a donation from Knorr-Bremse made it possible to purchase an intubation-capable resuscitation manikin for the rescue service. The 47 mountain rescuers can use the manikin to practice emergency medical situations.

Tinqueux, France |  Environment

Knorr-Bremse Systèmes Ferroviaires France S.A.

Knorr-Bremse Systèmes Ferroviaires France has sponsored two beehives (equivalent to 80,000 domestic bees) from a local beekeeper. In addition, insect houses and larvae were distributed to employees to attract wild bees to their gardens or balconies.

Pune, India |  Education

Knorr-Bremse Systems for Commercial Vehicles India Private Ltd.

Knorr-Bremse CVS India has cooperated with Knorr-Bremse Global Care Asia Pacific to finance the Air Brake Training Van. The van is used to provide high-quality technical training to students being supported by the NGO Don Bosco. The revamped bus is equipped with a wide range of high-tech equipment, including a virtual reality (VR) headset and VR gloves, to enable complex technical information to be taught in the best possible way. As part of the "Learn Differently" program, the van provides mobile VR workshops in the Indian state Maharashtra. This innovative teaching approach supports the training of students and mechanics at Don Bosco's locations. Graduated participants receive course certificates and have a chance to gain practical experience in the different departments of Knorr-Bremse Systems for Commercial Vehicles in Pune.

Florence, Italy |  Environment

Knorr-Bremse Rail Systems Italia S.r.l.

Thanks to the financial support provided by Knorr-Bremse Rail Systems Italia, Treedom, an organization established in Florence, was able to plant 200 trees. By using the Treedom web platform, a tree can be planted remotely and its growth can be tracked online. The trees and their fruit belong to local farmers who tend to the trees. The start-up funding for fruit trees can contribute to food security and create new income opportunities for farmers. Farmers receive training in agroforestry in complementary courses.

La Pocatière (Québec), Canada |  Education

Technologies Lanka inc.

"Addicted to Technology," an organization that has been financially supported by Technologies Lanka inc. since 2017, is directed at schoolchildren who are 11 to 14 years old. The aim is to awaken their interest in training programs and careers in science and technology. As part of a trade fair held in 2022, employees of Technologies Lanka organized interactive activities around the key switch that the company manufactures. This gave the students the opportunity to experience real work processes at the plant.

Acuña, Mexico |  Social cohesion

Bendix Acuña

A severe tornado ravaged the region around Acuña in May 2015, destroying more than 1,000 houses. Bendix Acuña has been supporting Casas por Cristo, a local non-profit organization that assembles teams of volunteers who build houses for families in need, ever since. Each year, the volunteers from the Bendix site spend four days building a house. The house is secure and protected and has a concrete foundation, electricity, windows and doors. Twenty-four employees took part in the program in 2022.

Mödling, Austria |  Health

Knorr-Bremse GmbH

Knorr-Bremse GmbH in Mödling has provided funding to Rheumalis, an association that offers therapy and assistance to children suffering from rheumatism, as part of a volunteer program. Thanks to the dedication of an employee who volunteers at the organization, Rheumalis received a donation from Knorr-Bremse that was used to offer a popular week of therapy to 14 families from all parts of Austria. The program included both physiotherapy, ergotherapy and art therapy as well as consultations with physicians, psychological counseling and a range of presentations. The children also had a chance to use a dummy hand to take a blood sample. This game-like exercise helped to reduce the children's fear of blood tests.

Lund, Sweden |  Social cohesion

Knorr-Bremse Nordic Rail Services AB

Knorr-Bremse Nordic Rail Services AB in Lund gives families in its region financial support so that their children can take part in athletic and recreational activities. In 2022, assistance was provided to a total of 17 girls and boys between the ages of 4 and 15. The supported activities included membership in a swimming club, dance lessons and soccer training with all the necessary equipment.

Madrid, Spain |  Health

Knorr-Bremse España, S.A.

Knorr-Bremse España supports the Spanish NGO ACEOPS (center for early recognition and psychosocial counseling). The organization promotes preventive, rehabilitative, educational and psychosocial programs to provide care to disabled children and their families. The aim of this support is to increase the children's mental, physical and social development potential as well as to improve their social inclusion. The project funds technical equipment for the department of neuropsychology and ADHD for children between the ages of 4 and 16. Employees of Knorr-Bremse España have volunteered at ACEOPS for years. The NGO reaches about 200 children and their families each year.

Johannesburg, South Africa |  Education

Microelettrica Scientifica Pty. Ltd.

For ten years, Microelettrica Scientifica Pty. Ltd. has been supporting a girls' school in a suburb of the Soweto Township. Many of the students' parents are unemployed and rely on government subsidies. The Ministry of Education funds the schools, but almost all of the money is used for stationery, books and maintenance. Investments in the school are almost impossible due to the lack of budget. The schools' labs, computer center and classrooms were in poor condition, which meant the girls were unable to receive a high-quality STEM education. Yet, with the help of donations from Microelettrica Scientifica, the labs and computer center have been able to be upgraded. The girls can now use this improved learning environment to prepare for higher education.

Warsaw, Poland |  Social cohesion

Knorr-Bremse Polska SfN Sp. z o.o.

Following the outbreak of Russia's invasion of Ukraine, hundreds of Ukrainian mothers and their children found shelter in a social center in the Warsaw district, close to the Knorr-Bremse Truck site. The workforce of Knorr-Bremse Polska SfN Sp. z o.o. wanted to help actively. They drew up a budget, employees bought food and hygiene products and they then transported these donations to the social organization each week on a rotating basis.

Chachoengsao, Thailand |  Education

Knorr-Bremse Commercial Vehicle Systems (Thailand) Ltd.

Knorr-Bremse Global Care Asia Pacific teamed up with the Education for Development Foundation (EDF) in Thailand to create a scholarship program for socially disadvantaged schoolchildren. A total of 160 youths between the ages of 14 and 17 are now benefiting from the program in the Thai province of Chachoengsao. Colleagues at Knorr-Bremse Thailand are also providing financial support to students at a nearby school as well as conducting Local Care activities. Tables and chairs were purchased for the school cafeteria, for instance, and Knorr-Bremse employees helped to set them up. Employees also regularly visit the students and talk to them about topics such as their future career opportunities.

Modřice, Czech Republic |  Social cohesion

IFE-CR, a.s.

For years, colleagues from IFE-CR have been providing voluntary support to the Czech Kociánka Center, which supports children and adults with disabilities in particular. In the summer of 2022, for example, a group of volunteers prepared the grounds for hippotherapy (a form of therapeutic riding). They built horse paddocks, cleaned the greenhouse and repaired the gates. Volunteer Tomáš, was pleased: „People in Kociánka do socially relevant work - it's great that we can support them.“

Stráž nad Nisou, Czech Republic |  Environment

Knorr-Bremse Systémy pro užitková vozidla ČR, s.r.o.

Knorr-Bremse Systémy pro užitková vozidla ČR provided financial support to the Czech environmental group Nadace Ivana Dejmalá in 2022. The organization's work is primarily aimed at regenerating water supplies in the countryside, restoring stable forest ecosystems and protecting valuable natural spaces. The organization's long-term goal is to help people to develop a positive attitude about nature and protect it.

Budapest, Hungary |  Social cohesion

Knorr-Bremse Vasúti Jármű Rendszerek Hungária Kft.

Magyar Élelmiszerbank is a Hungarian food bank. Its mission is to bring excess food to people in need in Hungary as a way of fighting poverty, hunger and malnutrition. More than 30 employees of the Brake Control department at Knorr-Bremse Vasúti Jármű Rendszerek Hungária volunteered at the Hungarian food bank and helped prepare 1,000 servings of food. The food bank also received a financial donation.

Avon, USA |  Environment

Bendix

The Avon Green Team at Bendix joined forces with the NGO Drink Local Drink Tap to clean up the banks of Lake Erie around Cleveland, Ohio. Drink Local Drink Tap is an international non-profit organization that develops solutions to problems related to water justice and quality. Fifteen Bendix employees and family members took part in an event and cleaned up plastic and other litter on the lake's shores. A donation was also made to support the organization's work.

Watertown, USA |  Social cohesion

New York Air Brake

Since 2019, the Knorr-Bremse subsidiary New York Air Brake has been providing financial support to the relocation and expansion of the local YMCA community and aquatic center as part of a five-year project. YMCA Watertown supports families in the community with a wide range of programs, including youth development, sports, swimming lessons and a further variety of activities for all age groups.

Westminster, USA |  Education

Knorr Brake Company (KBC)

The Boys and Girls Club in Westminster wants to prepare young people to meet the challenges of tomorrow's world of work. As part of the "Workforce Development Program Series," 12 employees of Knorr Brake Company helped 15 to 20 young people lay the foundation for successful careers last year. During a series of events, the volunteers gave the young people advice on preparing résumés and held simulated job interviews with them. At the end of the program, the young people had an opportunity to tour the plant at Knorr Brake Company, talk to employees about their jobs and gain career insights.

We select and implement Local Care projects based on the Local Care donation guidelines that we revised in 2022. These guidelines set goals and benchmarks, define support areas and criteria; and provide transparency about the donation process with the help of organizational specifications and approval requirements.

Many Knorr-Bremse locations have appointed a Local Care officer, who coordinates and assumes responsibility for Local Care activities. Every location plans the selection, financing and oversight of its Local Care projects on its own and allocates its own budget for social purposes. We believe that this local focus facilitates efficient, sustainable and successful project management. The Local Care program of Knorr-Bremse Rail Systems Budapest, Hungary, was honored with the CSR Doing Good Award in the "social" category in 2022. We recognized its focus on the local community, social values, participation and equal opportunity.

Global Care: Worldwide Engagement

Knorr-Bremse Global Care is a globally active non-profit organization set up by Knorr-Bremse employees. The main objective of Knorr-Bremse Global Care is to promote the independence and autonomy of people who find themselves in need through no fault of their own and to support high-impact projects. Through targeted long-term project partnerships, the organization strives to contribute to structurally relevant and far-reaching changes in society. Knorr-Bremse Global Care has identified education and WASH (water, sanitation and hygiene) as areas for its support and aligned its specific targets with the subgoals of SDGs 4 and 6 of the United Nations.



SDG 4: Quality Education

SDG 4 aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Knorr-Bremse Global Care supports medium- and long-term education projects. We focus our support on vocational training, because we see great leverage for creating prospects for marginalized people in it. In alignment with SDG targets 4.3 and 4.4, we contribute to reducing unemployment among young people through projects that provide vocational training and job-related skills or to help individuals find a career path.

Examples of activities in 2022:

- Global scaling of the Safe-Hub concept with our strategic partner AMANDLA (→ [Magazine: Safe-Hubs](#))
- Occupational qualifications for people who have experienced asylum or migration in a modular gastronomy academy in Munich, Germany



SDG 6: Clean Water and Sanitation

SDG 6 aims to ensure the availability and sustainable management of water and sanitation for all. Clean water and improved hygiene can protect communities from disease and create a stronger foundation for individual, educational and developmental opportunities. The WASH engagement of Knorr-Bremse Global Care is geared toward lowering morbidity and mortality rates related to water-borne illnesses. One main goal of Knorr-Bremse Global Care is to decrease the rate of children younger than 5 who die of water-borne illnesses. WASH-related activities include providing access to safe drinking water as well as sanitary and hygiene improvements, which contribute to SDG targets 6.1 and SDG 6.2. We also want to involve the communities through training courses and jobs.

Examples of activities in 2022:

- Holistic WASH project for healthcare facilities and the residents of a district in → [Ghana](#).
- A WASH and training program in Pune, India, carried out with the NGO Save the Children

Ghana: WASH Project Launched

The WASH project in the rural Nkwanta South District of Ghana shows how a holistic approach combines technical support and individual responsibility. Since 2022, Knorr-Bremse Global Care has worked with the NGO World Vision Deutschland to implement a WASH project in this district. The 13,000 people who live in the region are benefitting from the project. Nearly half of households and healthcare facilities lack basic water supply. This is the reason why water-borne tropical diseases are so widespread there. Two mechanical water units are being installed at healthcare facilities and schools. These mechanical water units are being connected to the public water supply to provide clean drinking water. World Vision is also implementing training programs to complement the new WASH infrastructure. First, healthcare personnel is being trained in hygienic practices. Second, WASH committees in 10 communities received training about water systems and hygiene for the purpose of maintaining the infrastructure and sensitizing local residents about water and hygiene.

Since its founding in 2005, Knorr-Bremse Global Care has worked with partner organizations to improve the lives of around 973,000 people. In total, more than €29 million in funding was made available for this purpose. In 2022, Knorr-Bremse Global Care supported 71 projects around the world and invested about €2.8 million in them. More than 71,000 people benefited from the supported projects.

The majority of Knorr-Bremse Global Care projects are implemented in countries where the Group operates locations. As a result, we can remain in direct contact with the projects we are supporting with the help of Knorr-Bremse employees. Our goal is to sensitize our colleagues about social engagement and encourage them to take action themselves. The organization also supports development projects in 10 other countries: Ethiopia, Ghana, Cambodia, Kenya, Colombia, Myanmar, Peru, Sri Lanka, Tanzania and Ukraine.

86%

of the funds donated by Knorr-Bremse Global Care in 2022 flowed into projects being conducted in countries with sites of the Knorr-Bremse Group.

Wide-Ranging Support for Ukraine

The fast, unbureaucratic and, above all, targeted support provided to Ukrainians affected by the war showed just how effective the well-developed relief structures of the Knorr-Bremse Group can be in times of crisis. Knorr-Bremse Global Care, the Knorr-Bremse Group and individual Knorr-Bremse locations created a comprehensive support package for people in and from Ukraine with donations totaling more than €1.4 million. The employees and business locations of Knorr-Bremse also conducted the widest range of initiatives to support Ukraine:

- **Shelter:** Knorr-Bremse locations in Germany, Hungary, the Czech Republic and Switzerland organized shelter for refugees, including in company apartments, hostels and a conference center.
- **Non-cash donations:** Knorr-Bremse Polska CVS shipped food and hygienic products each week to a social center in Warsaw where Ukrainian mothers and their children had taken shelter.
- **Monetary donations:** Knorr-Bremse employees donated about €400,000 at the beginning of the war, and the Knorr-Bremse Group doubled the figure to €800,000. The Group also donated €500,000 to the ↗ [Deutsche Rote Kreuz](#) and ↗ [UNICEF](#) immediately after the outbreak of the war.
- **Volunteering:** Colleagues who speak Ukrainian receive paid time off so that they can serve as interpreters for refugees arriving in Munich.
- **Job offers:** A number of locations took part in job offer initiatives. A total of 12 refugees found jobs at Knorr-Bremse in Kecskemét, Hungary, alone.
- **Long-term partnership:** Knorr-Bremse Global Care is financially supporting an orphanage in Lviv, Ukraine, and a training center run by the Society of Saint Francis de Sales. The organization has assumed the costs for food, shelter and medical and psychological care for domestic refugees who have taken shelter there (up to 260 a day).

Knorr-Bremse Global Care consists of the non-profit association located in Munich, Germany, and the two independent regional organizations Knorr-Bremse Global Care North America Inc. in the United States and Knorr-Bremse Global Care Asia Pacific Ltd. based in Hong Kong. The Munich-based association is supported by Knorr-Bremse companies in Europe and employee donations. It benefits from its members and employees of the Group. The holding companies in Hong Kong and the United States financially support their own Global Care organizations and, where possible, provide personnel support from local business locations. All Knorr-Bremse Global Care units work closely with local partner organizations. Our partners carry out local projects in an efficient, impact-driven manner. They work with needs-based approaches and provide transparent documentation. We engage with local communities within the projects to ensure that the activities are useful and sustainable. Joint impact goals are set and pursued during every project. Occasionally, our members or employees act as mentors to the project and, in addition to their personal support, also offer professional expertise. These structures help partner organizations and their projects beyond mere funding.

Knorr-Bremse Global Care effectively achieves its aspiration of having a high impact while working in strategic partnerships. These partnerships also strengthen project partners, enabling them to plan and work on a long-term basis. Identification with our projects also grows – among Knorr-Bremse employees and in the communities around the company's locations. Strategic partnerships with proven partners also improve impact measurement. Against this backdrop, complementary evaluations measure the results of our activities. These evaluations also contribute to the derivation of new findings. Resources can therefore be used in a more targeted manner or adjusted to the needs of the people who suffer. As a result, we have an effective tool in our hands which enables us to improve the long-term lives of marginalized people by efficiently using resources. As an example of this commitment, Safe-Hub Global gGmbH was established in mid-2021 by Knorr-Bremse Global Care and the non-profit organization AMANDLA in South Africa. The non-profit organization plans to jointly scale the Safe-Hub approach globally – as one of the world's highest-impact youth and community development projects. Safe-Hubs are secure places for children and adolescents. The hubs provide these young people with access to services in the areas of education, employability, early-child development and more. The Safe-Hub concept was developed and implemented by AMANDLA in South Africa (→ [Magazine: Safe-Hubs](#)).

You can find more information about the work of Global Care at: ↗ [Knorr-Bremse Global Care](#).



Governance

Corporate governance as practiced by Knorr-Bremse aims, without exception, to adhere to responsible business practices and principles. We increasingly and continuously integrate aspects of sustainability into our organization and business processes. This principle applies to both company financing and the structure of the supply chain. Moreover, we believe it is particularly important to apply predictive risk and opportunity management as this approach can yield information that is vital to the company's future.

Responsible Corporate Governance

Knorr-Bremse responds to industry trends such as connectivity, e-mobility and sustainability with innovative, long-term, system-based solutions. In doing so, we act as a driving force to help our global customers in the rail and commercial vehicle industries to develop their sustainable mobility solutions and achieve digital transformation. Our systems for the reliable, safe and efficient transportation of goods and passengers are designed to add value for our customers and make a positive contribution to society.

We take the responsibility associated with our entrepreneurial activities very seriously. We apply responsible corporate governance that observes laws, strengthens our image and creates trust in Knorr-Bremse among our shareholders, the capital market, customers, business partners, employees and the general public. Each goal set and activity undertaken by Knorr-Bremse must always reflect our company values: entrepreneurship, technological excellence, reliability, passion and responsibility. We believe that these company values are the foundation of long-term success.

Our governance structures support our commitment to responsible corporate governance and ensure transparency as well as clear leadership and responsibilities. They apply to the entire leadership and monitoring systems at the company and include Knorr-Bremse's organizational structures, business policy principles, guidelines and internal and external management and monitoring mechanisms. We adhere largely to the recommendations of the German Corporate Governance Code. More information about Knorr-Bremse's implementation of these recommendations can be found on our website ([→ Corporate Governance](#)) and in our [→ Corporate Governance Statement 2022](#).

Our commitment to sustainability is an integral part of our business activity. The sustainable direction for corporate governance has been firmly integrated into the company's organizational structures as well as its allocation of responsibilities and business processes through sustainability management ([→ Sustainability Management](#)). The Executive Board has defined a set of key performance indicators that are designed to help plan and steer the sustainable direction of Knorr-Bremse. A selection of KPIs are linked to the new remuneration system for management levels 0 to 2 (Executive Board, senior management, regional managing directors and heads of department) as ESG criteria. Implemented for the first time in fiscal year 2022, 20% of the short-term variable remuneration (short-term incentive) is now linked to the achievement of sustainability targets on climate protection and occupational safety as well as to external sustainability ratings ([→ Compensation Report](#)). The inclusion of ESG criteria in short-term variable compensation is planned to be expanded to other management levels analogously to management levels 0 to 2. This link between remuneration and ESG criteria will embed the spirit of sustainability throughout the company's management team even more strongly and thus in the day-to-day conduct of the company's managers and workforce, as well.

Integrity and Compliance

Compliance management is guided by our aspiration of always complying with laws, internal regulations and voluntary commitments. This is because only as reliable business partner will we gain the trust of employees, customers and business partners needed for sustainable company growth and thus shareholder value. We therefore place great emphasis on dealing with our stakeholders with integrity and responsibility. Combating corruption and bribery is an important part of corporate responsibility and one of the key topics in compliance management at Knorr-Bremse. We do not tolerate any form of corruption or other unfair business practices and expect the same of our business partners. Conflicts of interest, including and especially in dealing with our business partners, must be avoided. We have also established the respective compliance policies.

Our compliance requirements across the entire supply chain are set out in a Group-wide Code of Conduct. On the basis of Knorr-Bremse's corporate values and the principles of the UN Global Compact, the code defines the principles for Group-wide responsible business conduct, including a prohibition of corruption in any form. These principles of action and rules are binding for all the Group's employees and are a component of the written employment contracts for new employees around the world. We have given concrete expression to these principles through six Group-wide compliance policies:

- Dealing with Gifts and Invitations
- Donations and Sponsoring
- Corruption Prevention
- Conflicts of Interest
- Screening of Business Partners
- Fair Competition

Moreover, we have developed compliance guidelines for our suppliers. Our mandatory Group-wide Code of Conduct for Suppliers defines our expectations regarding responsible working relationships with these suppliers. The code is a way to combat corruption and addresses a wide range of issues, including human rights and environmental protection (→ [Sustainability in the Supply Chain](#)).

Relevant compliance risks are compiled and assessed in the Compliance Management System (CMS). The CMS's main goal is to effectively anchor compliance in business processes. For example, we want to ensure that employees comply with the law and internal regulations, prevent systematic misconduct and detect and remedy breaches.

Corruption prevention, ensuring fair competition and avoiding conflicts of interest are defined as the focus issues for Knorr-Bremse's CMS. The basis of this decision is a compliance risk analysis, which was carried out with the involvement of selected business areas and markets and was updated in 2022. As part of a worldwide compliance risk assessment, possible compliance risks were compiled and assessed on the basis of risk scenarios. The compliance processes were also reviewed and the manner of their implementation was recorded regionally. Around 50 Knorr-Bremse companies, which cover more than 80% of Knorr-Bremse AG's annual revenue, were assessed.

Establishing a Compliance Organization

The Chief Compliance Officer (CCO) is responsible for implementing the CMS, except in the area of anti-trust and competition law, where the Legal department is responsible for the CMS. The CCO reports to the member of the Executive Board responsible for Integrity, Legal Affairs and Resources. Compliance topics are also a regular agenda item in Executive Board meetings. The Supervisory Board and the Audit Committee are also informed regularly about the status of the CMS. Along with the global heads of Knorr-Bremse's Controlling, Human Resources, Accounting, Legal and Internal Audit departments, the CCO is a member of the Compliance Committee. The Compliance Committee advises on initiatives and strategies for developing the CMS, on current compliance topics and on focuses of compliance activities. In the Knorr-Bremse regions, regional compliance officers take on the role of advising and training employees, processing compliance cases and identifying local risks. The compliance organization's head count was even increased in 2022. Business activities in China, India, South America and the US are now supervised by full-time compliance officers. Local compliance officers are additionally assigned to almost all Knorr-Bremse companies and are involved in the local implementation of the Compliance Management System.

The internal Group audit department supports the Executive Board in its monitoring function through independent and objective audit procedures. These are geared to improving business processes and uncovering any breaches of laws or internal rules or guidelines. The Internal Control System (ICS), to which we added further compliance-specific controls in 2022, further serves to verify adherence to compliance guidelines. Knorr-Bremse sites must also conduct spot checks to prove that they are effectively implementing the guideline requirements. In 2022, preparations were begun for auditing the Compliance Management System for adequacy and effectiveness in 2023.

Well-Developed Complaint Management

Employees, business partners and external individuals can report information on any possible compliance breach to the compliance organization by email, directly through the compliance organization or online through an independent and anonymous whistleblower system. This globally accessible portal operated by an external service provider allows information on any compliance breaches to be reported in 31 different countries and in 20 languages (→ [Knorr-Bremse Compliance](#)). Information about the system is communicated internally and during training events and in the Group-wide intranet. In addition, the Incident Notification and Alarm Services (INAS) system is used for non-anonymous reporting of time- and safety-critical events from the areas of compliance, data protection, information security and Group security. Events classifiable as critical reach the responsible area of the Group directly via the system.

Starting in 2023, the whistleblower system will be extended by commissioning an external ombudsman service, which will serve as an additional point of contact for receiving information and complaints. The external ombudsman service will then pass the information and complaints on to us.

Complaint



Whistleblower gains knowledge of suspected reportable action



Report is received via various reporting channels – including anonymously if desired



Initial review



- Clarification of open points and consultation with the whistleblowers (where possible)
- Clarification of whether a direct remedy is possible
- Clarification of internal responsibilities



Internal forwarding

Complaint is forwarded to the relevant body within the Group

Assessment



Assessment by the relevant body

- Assessment of report's subject matter and of potential damage
- Consultation with the whistleblowers, where possible
- Consultation with other parties involved
- Proposal for next steps



Decision on the investigation

- Report is substantiated
- The matter can be clarified using the available means in a legally conforming way

Internal investigation



Examination

- Interviews, document review, site visits, etc.
- Final report with recommendations for action



The management decides on **sanctions and remediation**

Remediation and root cause analysis



Remediation, e.g.,

- Disciplinary measures
- Adjustment of processes
- Training & communication
- Compensation & reimbursement
- Adjustment of risk analysis



Implementation by the local management or relevant body

In 2022, the Executive Board approved new rules of procedure for dealing with whistleblower information and complaints. These govern the process, responsibilities and the rights of whistleblowers and the individuals concerned. Key principles include the protection of whistleblowers from disadvantages, the fairness and confidentiality of the process, the independence of investigations and the safeguarding of data privacy. We follow up on every suspicious activity report or forward it on to the competent departments for further investigation. Where the initial suspicion is substantiated, investigations are carried out. Any misconduct found is penalized.

In the year under review, 90 reports were recorded in our Group-wide whistleblower system (2021: 45; 2020: 21). The number of reports thus doubled compared to the previous year. 29 of the reports (2021: 10; 2020: 6) concerned information on discrimination or other labor law topics (→ [Due Diligence Process for Human Rights](#)). Nine reports (2021: 2; 2020: 6) concerned information on corruption. In three cases, the information was not confirmed. In the remaining six cases, the investigations are still ongoing. There were no lawsuits, judgments or fines due to corruption offenses in the reporting period. In one case reported internally before the reporting period, personnel measures were taken in 2022 and two employees were dismissed.

Prevention through Training and Communication

To prevent compliance breaches, Knorr-Bremse relies on transparent communication and employee training. In the year under review, the Executive Board confirmed its commitment towards integrity and communicated its expectations of managers and employees clear on the intranet and at various manager events and employee meetings.

A global e-learning module on our Code of Conduct is available in 13 languages and needs to be completed online every two years. In addition, another e-learning module on the topic of preventing corruption, aimed at employees in purchasing or sales, was rolled out in 2022. This training too must be repeated every two years. In December 2022, around 96% (2021: 97.5%, 2020: >95%) of the 17,270 employees with access to e-learning platforms (approximately 55% of the entire workforce) had a valid certificate for the training on the Code of Conduct. 3,770 employees were enrolled for the anti-corruption training, of which 95% had obtained a valid certificate by the end of December 2022.

In addition to e-learning, audience-specific face-to-face events for employees are held on specific compliance content and our guidelines. 64 compliance training courses were held globally (2021: 25) in 2022.

Management of Sustainability-Related Risks and Opportunities

As an international corporate Group with global structures, Knorr-Bremse encounters risks as well as opportunities in its business activities. The goal of risk management is to identify risks across the Group and minimize their potential impact on the Group's anticipated business position. Equally, such risk management should proactively leverage opportunities to increase the company's value.

Risk Management

The risk management system is rooted within a Group policy that comprehensively defines areas of responsibility and reporting structures. The processes used in risk management are based on the procedures within Knorr-Bremse's organizational structures.

For this reason, Knorr-Bremse encourages all employees to proactively report risks and requires them to deal with risks in a responsible manner. A global risk inventory that involves all of the Group's companies is conducted every quarter. In addition to regular reporting periods, an internal ad hoc reporting process enables risks of major significance to be identified at an early juncture. The Executive Board of the Knorr-Bremse Group receives a quarterly report that outlines the development of the opportunity and risk situation. The details are then discussed at the Executive Board meetings. The Supervisory Board conducts an in-depth review of the risk report at least once a year and also on an ad hoc basis if necessary.

The risk management system established in the Group is subject to continuous refinement, which includes adjustments of internal and external requirements. It also includes the risk category "sustainability." It encompasses risks in connection with environmental and climate protection and the protection of human rights.

The risks relating to environmental and climate protection concern, for example, rising energy and material costs as a result of increased environmental regulations and the increasing taxation of carbon emissions as part of the journey to a decarbonized economy. In the future, meeting ESG requirements will have an increasing influence on the financing of the Knorr-Bremse Group. In addition, climate change can disrupt supply chains and impact material properties that are relevant to product quality. The company deals with these risks at an early stage in order to be able to react to them adequately and with appropriate measures in all areas. We respond to the risks that could arise from the implementation of the German Supply Chain Due Diligence Act by integrating human rights due diligence into our operating processes even more strongly, with the goal of minimizing human rights risks and preventing negative impacts on our business activities. Therefore, we also use the results of the human rights risk analyses and associated information on potential human rights breaches (→ [Due Diligence Processes for Human Rights](#)).

In addition to risks in the "sustainability" category, we provide information regarding risk categories such as "compliance," "human resources" and "IT systems & IT security." Descriptions of these and other material risks as well as a detailed explanation of our risk management system can be found in our → [Report on Risks, Opportunities and Expected Developments](#).

TCFD Reporting

To provide transparent information about the climate risks and opportunities we face as a company, we have reported based on the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) since 2021. The appendix contains a reference table reflecting the status of our climate-related reporting based on the areas of governance, strategy and risk management as well as key performance indicators and targets (→ [TCFD Reference Table](#)).

Opportunity Management

The opportunity management system at Knorr-Bremse follows the processes used in the risk management system. In addition to regular management reviews, opportunities are reported in the quarterly report on risks and opportunities.

Alongside the megatrends of urbanization, digitalization and mobility, the megatrend of sustainability also unlocks important, strategic opportunities for Knorr-Bremse.

Knorr-Bremse is benefiting from opportunities to expand rail transportation as cities, states and countries make growing efforts to combat climate change. Electrification and other energy-efficient and eco-friendly solutions are the result of a growing public awareness of the importance of energy efficiency, combined with intensified government energy initiatives such as stricter emission regulations. End-to-end EcoDesign in our products is helping to reduce carbon footprints and make transportation more energy-efficient.

More information about our opportunity management system can be found in our
→ [Report on Risks, Opportunities and Expected Developments](#).

Sustainable Company Financing

As a player in the capital market, Knorr-Bremse sees orientation toward ESG criteria as increasingly important. Financial market players measure corporate performance in the area of sustainability by means of ESG criteria and use the findings as the basis for investment decisions. Numerous conversations with investors and rating agencies (→ [Stakeholder Management](#)) in 2022 showed that the capital market is increasingly interested in sustainability issues at Knorr-Bremse. Knorr-Bremse has already received many above-average ratings for its sustainability measures (→ [Sustainability Ratings and Rankings](#)).

70%

of the long-term capital market
financing instruments used by
Knorr-Bremse are linked
to sustainability criteria

The integration of sustainability goals into financial instruments around the world is being driven by Knorr-Bremse. From our perspective, it is a clear sign of the importance of effective sustainability measures for success. The share of Knorr-Bremse's financing that is linked to sustainability criteria amounts to slightly more than 40%. The total is about 70% for long-term financing instruments.

Since January 2022, we have had syndicated financing with a credit line of € 750 million in place, the interest rate of which is linked to our sustainability rating by ISS Corporate Solutions. In September 2022, Knorr-Bremse placed its first sustainability-linked bond in the European debt market. The bond has a volume of € 700 million, and a key component is the commitment to define a Scope 3 target in accordance with the international standards of the Science-Based Targets initiative (SBTi) (→ [Climate Protection](#)).

Knorr-Bremse also made its Supplier Early Payment Program more sustainable during the reporting period. The Sustainability-Linked Supply Chain Finance Program (SSCF), which was implemented in collaboration with Deutsche Bank, is now linked to the ESG rating of suppliers. The global SSCF serves as an important instrument that Knorr-Bremse uses to foster stronger commitment to ESG among its suppliers. The program exemplifies our fundamental beliefs: We will only be able to achieve the sustainability-driven transformation when we resolutely foster ESG throughout the entire value chain.

EU Taxonomy

With the EU Taxonomy, a new classification system for sustainable business practices was introduced. It is designed to steer capital streams toward sustainable companies and help reach the EU's climate and energy objectives by 2030. Only a few of the products and technologies of Knorr-Bremse are currently included in the EU Taxonomy. Maintenance and modernization of systems used in electrical rail vehicles and activities in the area of rail infrastructure are classified as taxonomy eligible. The production of parts and components for commercial and rail vehicles does not fall within the scope of the EU Taxonomy¹, a system that currently applies only to the activities of end manufacturers. Knorr-Bremse supports the expansion of the EU Taxonomy so that the contributions of the value chain can be considered in the future as well.

→ [EU Taxonomy Report](#)

¹ With the exception of Kiepe Electric, a company that produces vehicles (electric).

Suppliers Who Have an ESG Ranking Receive Better Financing Terms

The Sustainability-Linked Supply Chain Finance Program that was introduced in collaboration with Deutsche Bank makes an ESG rating for suppliers particularly appealing. Under this program, they receive their money earlier as the bank provides a line of credit for the time until Knorr-Bremse pays their invoices at attractive interest rates. The financing costs for suppliers are based on the creditworthiness of Knorr-Bremse, a feature that generally lowers suppliers' financing costs. The inclusion of sustainability components in the program creates additional financial benefits for suppliers: Companies that do business more sustainably can reap dividends from improved financing terms. The result is a win-win situation: for our suppliers and for Knorr-Bremse.

Data Protection and Information Security

Knorr-Bremse views digitalization as an opportunity for efficient internal processes and new business fields. At the same time, the company must handle the information in its possession responsibly. We use information protection measures to safeguard intellectual property and business secrets while shielding personal data through extensive data protection activities.

Data Protection

The processing of personal data is a key aspect of the increasing pace of digitalization. At Knorr-Bremse, the protection of such sensitive data is an important precondition for the development of new business fields and interaction with our internal and external stakeholders. Many different legal requirements, particularly the EU General Data Protection Regulation, provide the framework for our actions.

In response to such requirements, Knorr-Bremse set up an organizational structure for data protection in 2018. This structure is led by the Group Data Protection Officer, who, in turn, is supported by data protection managers in the divisions and at sites globally. Data protection coordinators in the central departments also serve as points of contact and information disseminators for data protection. The company created the Data Protection Board in 2022. This board makes decisions regarding the direction of the Knorr-Bremse data protection management system and monitors the system's continuous refinement. The Data Protection Board is composed of representatives from the Executive Board, division management teams, IT and HR.

Our corporate policy on data protection serves as the foundation of all data protection measures within the company and lays out binding specifications and processes for the implementation of legal requirements. Furthermore, protecting the personal rights and privacy of every individual is an important aspect of our internal Code of Conduct.

Our Data Protection Measures

- Our employees are instructed about data protection requirements through e-learning courses and in-person training sessions. They also are taught to handle personal data with care.
- Data protection is monitored and documented (a register of processing activities) by the organizational structure for data protection with the help of a globally available IT tool.
- A central reporting system used for data protection and security incidents ensures that data protection incidents can be reported quickly and directly to the organizational structure for data protection and be addressed.
- Data protection violations can be reported by employees or external stakeholders at any time via the company's compliance whistleblower system. Whistleblowers may provide their information anonymously or with their personal details. Once a report is submitted, an established process is initiated to investigate the matter (→ [Integrity and Compliance](#)).

Information Security

The Information Security department ensures that the three key information values – confidentiality, availability and integrity of all of our data – are adhered to without exception. The department is led by the Corporate Information Security Officer and is managed by a Corporate Security Board. The members of this board include the member of the Executive Board who oversees this area as well as the managing directors of both divisions and the Chief Information Officer.

The maturity of the management processes has improved significantly in recent years. This improvement resulted in part from a revision of the Group guideline on information security, which is based on the international ISO/IEC 27001 standard for information security and values. This guideline is complemented by internal specifications designed to meet the legal requirements that apply at each site. We have also introduced a new process for audits and risk management.

The main focus for operational projects is on the preventive protection of Knorr-Bremse's IT infrastructure through Group-wide IT security solutions.

Protection of Digitalized Products

Knorr-Bremse's products and services assist our customers in the digital age and promote sustainable mobility. Examples of new, digitalized business fields include condition-based maintenance in Rail Vehicle Systems and highly automated or autonomous driving in Commercial Vehicle Systems.

As part of this portfolio development, data protection and information security (something that is also termed "cybersecurity" in this context) are playing an increasingly important role. For this reason, Knorr-Bremse takes data protection requirements as early as the product development stage (for privacy by design) into account.

Dedicated organizational units and teams for information security in both divisions ensure that aspects of cybersecurity are firmly integrated into project development processes and customer projects.

Cybersecurity Center of Competence

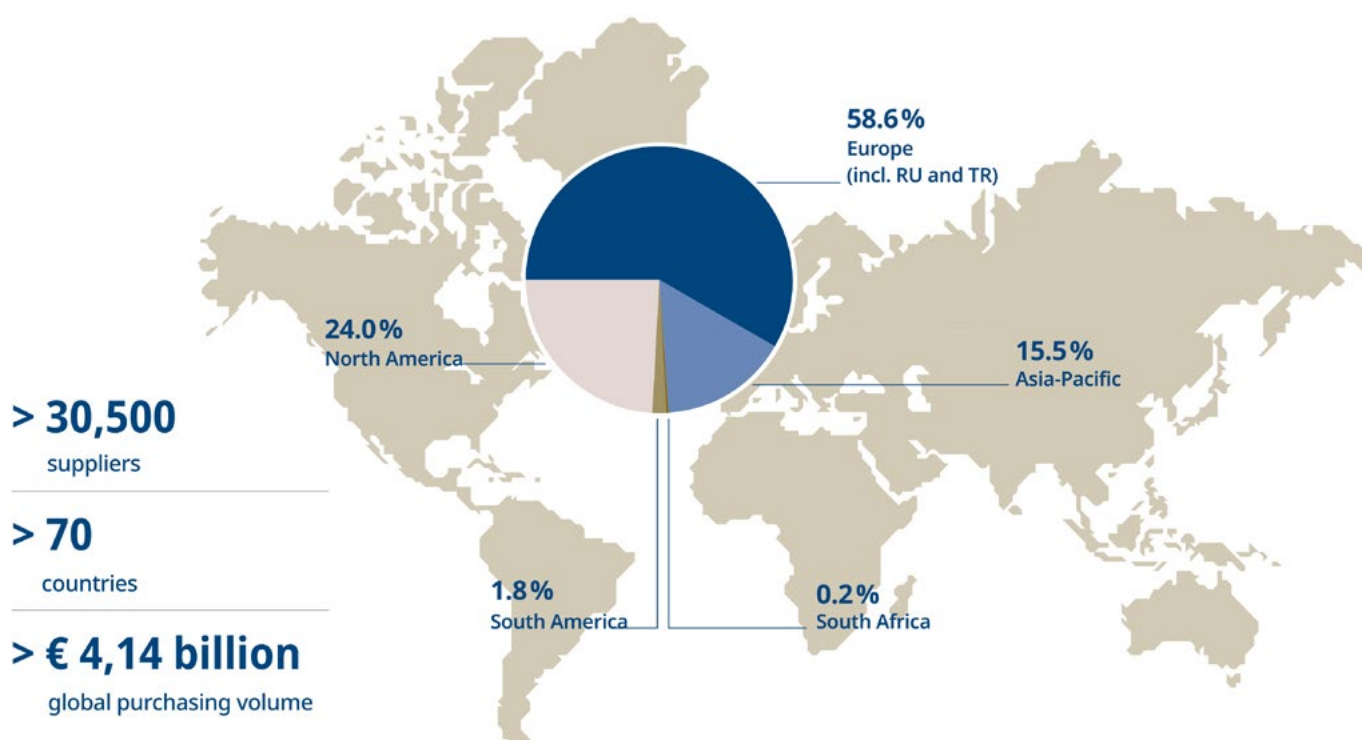
In addition to intelligent transport solutions, digitalization also enables predictive maintenance and assistant systems for automated train operation. Knorr-Bremse's Cybersecurity Center of Competence, in Rail Vehicle Systems, develops solutions that make the digitalized products and systems of today and tomorrow resistant to attacks and shield them accordingly. The Center of Competence is part of the Digital Products & Services department, a unit whose expertise is in digitalizing Knorr-Bremse's products. The security experts focus in particular on security by design, a process that employs a defense-in-depth concept for built-in safeguards. Simply protecting a network's outer boundaries is no longer enough. There is an additional option called endpoint protection that can be used in systems. Permanently installed computer chips encrypt important data and check software identity and integrity. Knorr-Bremse plans to use this forgery-proof digital identity in many of its devices in the near future. The necessary public key infrastructure (PKI) to manage these security certificates has been set up. The Center of Competence continues to drive the development of a modern and agile platform to identify and eliminate cybersecurity vulnerabilities.

Sustainability in the Supply Chain

Taking responsibility along the value chain is part of our self-image as a sustainable company. Strategic procurement, including the selection of suppliers and materials, lays the foundation for Knorr-Bremse's sustainable, reliable and safe products.

As a global Group, we work with a large number of mainly local suppliers. We currently purchase products and services from approximately 30,500 suppliers from over 70 countries. These include approximately 7,000 manufacturing and production partners for parts, components and materials for our products, who alone represent 74% of procurement spending. The products ordered include primarily metals, friction components, electronic components and plastics, with the proportion of raw materials purchased by us being low.

Regions of origin in purchasing volume



We are aware that Knorr-Bremse's selection of suppliers has a significant impact on the environment and society in production countries. That is why we require our suppliers to comply with our high sustainability standards in the supply chain. Breaches by suppliers could entail reputational and cost risks for Knorr-Bremse, its customers and its investors.

The Knorr-Bremse strategy for sustainable procurement is embedded in purchasing processes across the Group. The purchasing managers for direct and indirect materials are responsible for ensuring sustainable procurement. Compliance with and optimization of sustainability standards in the supply chain are supported by experts at the Group level. The Sustainable Purchasing Steering Committee discusses and decides on strategic and current sustainability topics several times a year. This committee consists of the managers of Knorr-Bremse's global purchasing units and representatives of the Sustainability department. We provide process descriptions and guidance to implement our sustainability standards in internal procurement processes. These give an overview of the sustainability criteria and management approaches to be incorporated into the global purchasing processes. Internal guidelines specify the extent to which sustainability aspects are to be taken into account in purchasing decisions for various categories, including renewable energy, business travel or energy-

efficient products, equipment and services. As part of our EcoDesign approach, we are working on implementing sustainability requirements in the material specifications of the products and components we acquire. We are guided by the EcoDesign Standard on Hazardous Substances in Products in the RVS division (→ [Environmental Product Design](#)).

Further information on climate protection and respect for human rights in the supply chain:

- → [Climate Protection](#)
- → [Due Diligence Processes for Human Rights](#)

Direct and indirect procurement

The procurement organization at Knorr-Bremse consists of direct procurement, which is globally controlled by the respective division, and cross-divisional indirect procurement with global responsibility. Direct procurement acquires production materials (direct materials). This includes all externally sourced raw materials, items and components that are directly or indirectly delivered to our customers as part of our products. Indirect procurement handles the sourcing of non-production materials (indirect materials) and services that are not an integral part of Knorr-Bremse products but that serve to support the internal organization indirectly.

Sustainability in Supplier Relationships

We rely on three pillars for the implementation and realization of sustainability standards in the supply chain: determination of our sustainability requirements, evaluation and assessment; and qualification of our suppliers and procurement specialists.



Sustainability Requirements for Suppliers

We have set out Knorr-Bremse's commitment to sustainability in the supply chain in our Supplier Code of Conduct and our sustainability guidelines. We expect our suppliers to act in a manner that is in line with our values and takes account of international environmental and human rights guidelines and standards. These include the principles of the UN Global Compact, the International Labour Organization (ILO) conventions and the UN Universal Declaration of Human Rights. These requirements are specified in further detail in our guidelines:

Supplier Code of Conduct

Our Group-wide ↓ [Supplier Code of Conduct](#) is intended to promote and require the systematic inclusion of sustainability aspects in the production methods and conduct of our suppliers. Available in 14 languages, the code sets out the standards our suppliers are required to meet with respect to working conditions, human rights, environmental protection, safety, business ethics and compliance. We expect our suppliers to comply with the code and implement it in their upstream supply chain. The Code of Conduct for Suppliers is an integral component of all supplier contracts and binding for all our suppliers.

Human Rights Policy

In accordance with our ↓ [Human Rights Policy](#), we expect our suppliers and subcontractors to respect human rights. They are also instructed to convey this expectation to their suppliers and contractors. Our procurement and supplier management strives to support suppliers in improving their (→ [Due Diligence Processes for Human Rights](#)).

Conflict Minerals Policy

The ↓ [Conflict Minerals Policy](#) governs the handling of conflict materials and thus serves as a guideline for procurement at Knorr-Bremse as well as our suppliers.

Procurement Quality Standards

In accordance with our quality guidelines, we require our suppliers to, among other things, observe the Principles of the UN Global Compact as well as our Code of Conduct for Suppliers.

Review and Assessment of Suppliers

We use targeted instruments to review and assess compliance with our requirements and also include these results in our procurement decision-making.

Sustainability Assessments

Sustainability assessments at suppliers are continuously conducted by external service providers with industry experience. They survey and assess the implementation of suppliers' sustainability management systems. We currently have a valid sustainability assessment for around 2,500 suppliers. The coverage rate is therefore 69% of the global purchasing volume. This means we met the target of 65% we set for 2022, and we are aiming for a target rate of 75% in 2025 (see diagram on following page).

Integration in Sourcing Decisions

We take account of suppliers' sustainability assessments in our contract award process. In the CVS division, sustainability assessment is integrated into the so-called Sourcing Board, the review and decision-making body for supplier orders. In the RVS division, preference is given to suppliers who have been granted "Preferred" or "Potential Preferred" supplier status. To be able to reach the highest supplier status, Knorr-Bremse requires a valid supplier sustainability assessment or proof that such assessment is in progress. Moreover, the suppliers should be able to present a certified environmental management system that is in line with the international standard ISO 14001. Currently, a number of suppliers covering 62% of the direct production volume meets this requirement.

Risk Classification

We use the findings from the sustainability assessments of both divisions to conduct a risk assessment of the suppliers. Based on the individual assessment results, we classify our suppliers into the categories A, B and C, where C represents the level with the potentially highest sustainability risks. We want to reduce the proportion of suppliers in the C category. To this end, we draw up action plans for improving their sustainability performance with the suppliers in question. In the long term, Knorr-Bremse only sees two development paths for suppliers in category C: They measurably and demonstrably make progress on their sustainability performance or we gradually relocate the purchasing volume allocated there. In addition, a comprehensive human rights risk analysis was carried out in 2022. As a result, we were able to categorize potential high-risk suppliers in order to pursue risk mitigating measures for them (→ [Due Diligence Processes for Human Rights](#)).

Sustainability Audits

We also audit and assess suppliers' sustainability performance in supplier visits and external audits. Firstly, we have integrated sustainability aspects into standard supplier visits. Knorr-Bremse employees in the area of supplier development use the supplier on-site sustainability risk checklist so that they can identify and assess sustainability risks on-site at suppliers. The results of the completed checklists are used as a decision-making criterion regarding additional sustainability audits on-site or other in-depth investigations. Secondly, independent experts conduct sustainability audits of suppliers on their own and assess compliance with the applicable social and environmental standards. Furthermore, the management approaches of the suppliers and the implementation thereof are assessed in the following areas: compliance, environment, occupational health and safety, human and labor rights, and supplier management. Thirty on-site audits were conducted this way in 2022 (2021: 18; 2020: 0 audits due to COVID-19), of which 9 were follow-up audits (2021: 8; 2020: 0). If an audit or a sustainability assessment reveals breaches or improvement potential, Knorr-Bremse develops and implements action plans for improvement with the suppliers and conducts follow-up audits.

Sustainability assessment coverage rate for suppliers

in % of purchasing volume



Qualification and Professional Development

To meet our sustainability requirements over the long term, we offer training programs to support our suppliers in the further development of their sustainable business practices. At the same time, we provide our employees with qualification and training on the topics as well.

Awareness and Training

We continuously work to raise awareness and develop the skills of our employees in the area of sustainability. In coordination with a few service providers responsible for the sustainability assessments, we also offer corresponding webinars and additional support on the subject. For example, we provide training materials on the subject of conflict minerals. In 2023, we will continue to advance our approach to training and developing suppliers in the area of sustainability.

Supplier Development Programs

If a sustainability assessment reveals breaches or improvement potential for a supplier, this is followed up with corresponding action plans for improvement or with follow-up audits. In addition, the audit results help us to identify potential risks fields, which we will pay particular attention to in the future as part of our supplier management.

Training for Procurement Specialists

Raising the awareness of and training Knorr-Bremse employees are key prerequisites for sustainable purchasing management. Around the world, they should develop the know-how to be able to assess, advise and audit suppliers. We therefore held webinars on the topic of "Sustainability in procurement" for purchasing specialists in 2022. We were also able to establish an e-learning program on our sustainable procurement processes and practices, which is part of the Knorr-Bremse onboarding training course and recommended for all employees in global purchasing. The participation rate was 53% and is to be further increased.

Involvement in Industry-Specific Sustainability Initiatives

As a leading and global player in the industry, Knorr-Bremse actively participates in industrial sustainability initiatives. We are an engaged founding member of the Railsponsible initiative in the rail industry and an active member of the German Association of the Automotive Industry (VDA) in the automotive industry. This means we can improve sustainability standards in the supply chain together with customers, competitors and other stakeholders.

Preparatory measures for complying with the German Supply Chain Due Diligence Act were a focus topic in 2022. We conducted a comprehensive risk assessment of our supply chain and a review of our processes (→ [Due Diligence Processes for Human Rights](#)). Based on these, we are defining measures to integrate sustainability criteria into purchasing decisions to an even greater degree, to increase transparency in the supply chain and to improve our suppliers' practices with regard to respect for human rights and environmental matters.

Handling of Conflict Minerals

As a manufacturer of brakes and other systems for rail and commercial vehicles, we are aware of our responsibility to procure our raw materials sustainably. This pertains above all to the procurement of minerals from conflict or high-risk areas, referred to as “conflict minerals.” These minerals are partly mined in regions of conflict and used to finance armed conflicts. They include tin, tantalum, tungsten and gold (“3TG”). In order to protect human rights in the area of conflict minerals, we have introduced a due diligence process. We create transparency in the conflict mineral procurement process by following the recommendation of the Responsible Mineral Initiative. Key instruments for managing and reporting conflict minerals include the Group-wide binding Conflict Minerals Policy and supplier surveys. In an annual survey, we ask direct suppliers with 3TG relevance for information on the origin of the minerals used for entry in the Conflict Minerals Reporting Template (CMRT). Our last survey identified 24 (2021: 6; 2020: 5) smelting plants classifiable as critical. As part of the Joint Smelter Outreach Initiative, Knorr-Bremse conveys to them the importance of independent audits so that their procurement process can be verified as conflict-free and responsible. This due diligence is conducted in partnership with other companies that have the same obligations as Knorr-Bremse. To ensure due diligence in the cobalt and mica supply chain, we have started to collect information with the aid of the Extended Minerals Reporting Template (EMRT). At the end of 2022, 2,301 suppliers were asked to answer the questionnaire by mid-2023.

Railsponsible – Sustainability Standards in the Supply Chain

The Railsponsible initiative was founded by its 15 members – a series of renowned European rail companies, including the RVS division of Knorr-Bremse – at the beginning of 2015 with the goal of establishing sustainable procurement practices in the rail industry. Railsponsible’s objective is to motivate customers and suppliers in the rail industry to demonstrate ethical and socially responsible actions as well as responsible business and environmental practices. Knorr-Bremse currently chairs the Responsible Procurement working group. Its work focuses on conveying well-founded knowledge to members and suppliers regarding sustainable procurement practices, transparent business processes and the further development of suppliers. The measures and instruments include corresponding procurement guidelines, the introduction of sustainability audits and supplier training.

Reporting of Conflict Minerals

| | | 2022 ¹ | 2021 ² | 2020 |
|---|--------|-------------------|-------------------|-------|
| Suppliers invited to take the CMRT survey | Number | 2,301 | 2,449 | 1,517 |
| Response rate of the suppliers surveyed | % | 51 | 62 | 62 |

¹ The figures relate to the percentage of suppliers who have provided a valid response within the data collection campaign. It represents the response rate of the reporting period July 2022-April 2023. At the time of the editorial deadline of this Sustainability Report, the conflict minerals campaign was still open. For this reason, the final result will be published in the next reporting cycle. The non-financial statement 2022 only covers the period June – December, resulting in varying figures.

² In the 2021 Sustainability Report the published figure was 45%, which was an interim result at the publication of the report.

Appendix

Key Figures

Financial Indicators

| | | 2022 | 2021 | 2020 |
|---|--------------|-------|-------|---------|
| Revenues | in € million | 7,150 | 6,706 | 6,157 |
| EBITDA | in € million | 1,046 | 1,207 | 1,107 |
| Earnings per share | € | 3.03 | 3.85 | 3.07 |
| Equity ratio | % | 33.6 | 33.7 | 26.0 |
| Operating Cash flow | in € million | 541.6 | 975.5 | 1,036.0 |
| Capital expenditure | in € million | 352.2 | 375.5 | 341.7 |
| Revenue with refurbished products relative to total revenue | % | 10.3 | 9.9 | 9.7 |
| R & D costs ¹ | in € million | 466.1 | 431.4 | 396.4 |
| R & D employees (Dec. 31) | Number | 4,216 | 3,980 | 3,793 |

¹ Research and development costs include all costs over a financial period (including capitalized costs) that can be allocated to research and development of new products, further development of existing products and pure research.

Environment

Certified Sites

| | | 2022 | 2021 | 2020 |
|---|--------|------|------|------|
| Sites with certified quality management system (ISO 9001, ISO/TS 22163, IATF 16949) | Number | 109 | 101 | 96 |
| Sites with certified environmental management system (ISO 14001) | Number | 71 | 70 | 67 |
| Sites with certified energy management system (ISO 50001 or EN 16247) | Number | 37 | 38 | 36 |

Energy Consumption¹

| | | 2022 | 2021 | 2020 | 2018 ⁵ |
|--|----------------------------------|------|------|------|-------------------|
| Primary energy consumption | GWh | 180 | 131 | 119 | 159 |
| Natural gas | GWh | 138 | 99 | 91 | 126 |
| Fuels | GWh | 39 | 31 | 26 | 33 |
| Self-generated renewable energy ² | GWh | 2 | 1 | 1 | 0 |
| Secondary energy consumption | GWh | 344 | 301 | 287 | 349 |
| Purchased electricity ² | GWh | 336 | 287 | 273 | 338 |
| Of which renewable energy ³ | % | 94 | 98 | 86 | 12 |
| District heating | GWh | 8 | 14 | 13 | 11 |
| Total energy consumption⁴ | GWh | 524 | 431 | 406 | 508 |
| Energy efficiency | MWh/ € millions of revenue | 73.3 | 64.3 | 65.9 | 76.9 |

¹ The figure for 2022 relates to all sites under operating control, excluding sites with fewer than 50 employees other than production sites or service workshops. This covers around 97% of Knorr-Bremse's employees.

² Figures for 2021 adjusted: 0.7 GWh was generated by an on-site PPA and corresponding credits were sold by the operator to the electricity market.

³ The reduction of the figure is due to the higher electricity consumption of our M&A activities in Japan, for which no green power is currently being purchased.

⁴ The increase in energy consumption is due to new sites included in the reporting scope as a result of M&A activities and new buildings. Around 21% of the total energy consumption is attributable to these sites. The figures from 2021 and 2020 have not been retroactively adjusted.

⁵ Data from the 2018 base year were recalculated in accordance with our Restatement Policy.

Direct and Indirect Carbon Emissions¹

| | | 2022 | 2021 | 2020 | 2018 ² |
|--|---|------------|------------|------------|-------------------|
| Scope 1 direct carbon emissions | Thousands metric tons of CO ₂ | 38 | 28 | 26 | 34 |
| Scope 2 indirect market-based carbon emissions | Thousands metric tons of CO ₂ | 12 | 7 | 27 | 127 |
| Scope 2 indirect location-based carbon emissions | Thousands metric tons of CO ₂ | 122 | 152 | 147 | 151 |
| Total market-based carbon emissions | Thousands metric tons of CO ₂ | 50 | 35 | 53 | 161 |
| Total location-based carbon emissions | Thousands metric tons of CO ₂ | 160 | 180 | 173 | 186 |
| Carbon intensity | Metric tons of CO ₂ /€ million | 7.0 | 5.2 | 8.6 | 24.4 |

¹ The recording of carbon emissions is aligned with the recognized requirements of the Corporate Accounting and Reporting Standard (Scopes 1 and 2) of the Greenhouse Gas Protocol. The increase in carbon emissions is due to new sites included in the reporting scope. Around 33% of the market-based carbon emissions are attributable to these sites in 2022. The figures from 2021 and 2020 have not been retroactively adjusted.

² The levels from the base year of 2018 were recalculated in accordance with our Restatement Policy. Our mergers and acquisitions (United States, Japan, Germany) and divestments (Russia) had a significant impact on our CO₂ emissions. In addition, our emission factors for electricity were shifted from the standard of the German Association of the Automotive Industry to → [IEA-Data](#). The newly calculated base year now has 161,000 t of CO₂ as the new reference level for 2018 (market based) (compared with 133,000 t of CO₂ as the baseline in the → [2021 Sustainability Report](#)).

Carbon Emissions in the Value Chain (Scope 3)¹

| | | 2022 ² | 2021 |
|---|--|-------------------|--------------------|
| 3.1 Purchased goods and services | Thousands metric tons of CO ₂ e | ✓ 1,802 | 1,855 ⁴ |
| 3.3 Fuel- and energy-related activities | Thousands metric tons of CO ₂ e | 45 | 53 ⁵ |
| 3.4 Upstream transportation and distribution ³ | Thousands metric tons of CO ₂ e | ✓ 184 | 191 |
| 3.6 Business travel | Thousands metric tons of CO ₂ e | 6 | 4 |
| 3.7 Employee commuting | Thousands metric tons of CO ₂ e | 25 | 26 ⁶ |
| 3.9 Downstream transportation and distribution ³ | Thousands metric tons of CO ₂ e | ✓ 47 | 50 |
| 3.11 Use of sold products ³ | Thousands metric tons of CO ₂ e | ✓ 26,301 | 27,736 |

¹ A detailed description of the calculation methodology can be found (→ [here](#)).

² The most material scope 3 indicators with a ✓ have been reviewed with limited assurance by KPMG Wirtschaftsprüfungsgesellschaft (→ [Assurance Statement](#)). Scope 3.1, 3.4, 3.9 und 3.11 are estimated to account for more than 95% of Knorr-Bremse total Scope 3 emissions. Further key figures, including ones on energy consumption and Scope 1 and 2 emissions, were also reviewed as part of the limited assurance engagement for the separate non-financial statement in the Group management report (→ [Annual Report 2022](#)).

³ The carbon emissions in the Scope 3 categories 3.4, 3.9 and 3.11 have been calculated for the first time for reporting years 2021 and 2022 in the reporting period 2022.

⁴ Restatement of 2021 figure due to change of data model.

⁵ Restatement of 2021 figure due to change of emission factor set in order to be consistent with Scope 1+2 calculation, using IEA emission factors as well as DEFRA methodology for electricity.

⁶ Restatement of 2021 figure due to switch to well-to-wheel emission factors (from tank-to-wheel emission factors).

Water¹

| | | 2022 ² | 2021 | 2020 |
|-------------------|------------------------------|-------------------|------|------|
| Water consumption | in thousands of cubic meters | 657 | 533 | 594 |

¹ The figure for 2022 covers more than 80% of Knorr-Bremse's employees.

² The increase from the previous year is due to new production processes and the inclusion of new locations in the reporting.

Social

Employees at the Group

| | | 2022 | 2021 | 2020 |
|-----------|--------|--------|--------|--------|
| Employees | Number | 31,599 | 30,544 | 29,714 |

Turnover Rate ¹

| | | 2022 | 2021 | 2020 |
|---|---|------|------|------|
| Staff turnover worldwide | % | 18.7 | 14.1 | 14.0 |
| Staff turnover limited to employee resignations | % | 10.4 | 8.7 | 5.1 |

¹ Definition: Number of employees leaving as a proportion of the average total workforce. Increase in proportion partly caused as a result of taking account of all ways in which employees leave and of employees with fixed-term employment contracts for the first time in 2022. The figure for 2022 has also been reported as a head count for the first time. It was previously reported as full-time equivalents.

Staff Dialogue Coverage and Completion Rates

| | | 2022 | 2021 | 2020 |
|------------------------------|---|------|------|------|
| Coverage rate ¹ | % | 76.3 | 78.2 | 82.1 |
| Completion rate ² | % | 92.0 | 90.7 | 89.7 |

¹ Coverage rate: proportion of employees who participated in the Staff Dialogue. Fluctuation is predominantly caused by the purchase of new companies (delayed system rollout) and a high proportion of new recruits in the second half of the year, as the Staff Dialogue is not held during an employee's first year. The relevant categories of people are not part of the Staff Dialogue process, though they are included in the total number of employees.

² Completion rate: proportion of employees in the Staff Dialogue who fully completed the process. The delta between the rate and 100% primarily results from employees not having yet completed the Staff Dialogue as at May 31, 2022.

Global Proportion of Women ¹

| | | 2022 | 2021 | 2020 |
|---|---|------|------|------|
| Proportion of female employees | % | 21.1 | 20.3 | 19.9 |
| Proportion of women in leadership positions across all departments ² | % | 16.4 | 14.1 | 13.2 |

¹ Approximately 97% of the total workforce covered due to the latest M&A activities.

² Female employees with their own leadership responsibility have been included since the 2022 fiscal year. The basis used up until, and including, 2021 was (solely) the categorization as management levels 1-4. If made comparable to the previous year, the rate would be 15.2%.

Age Structure in the Group¹

| | | 2022 | 2021 | 2020 |
|----------|---|------|------|------|
| Up to 20 | % | 1.0 | 1.4 | 1.2 |
| 21-25 | % | 5.4 | 5.5 | 4.0 |
| 26-30 | % | 11 | 11.4 | 12.7 |
| 31-35 | % | 16.9 | 17.2 | 20.3 |
| 36-40 | % | 15.7 | 15.6 | 17.2 |
| 41-45 | % | 13.8 | 13.3 | 13.0 |
| 46-50 | % | 11.6 | 11.4 | 11.2 |
| 51-55 | % | 9.9 | 10.1 | 9.6 |
| 56-60 | % | 9.5 | 9.5 | 7.3 |
| over 60 | % | 5.2 | 4.6 | 3.5 |

¹ Proportion of workforce included in the age data in 2022: around 97%.

Average Age in the Group

| | | 2022 | 2021 | 2020 |
|-------------|-------|------|------|------|
| Average age | Years | 41.6 | 41.3 | 40.4 |

Proportion of Employees with Severe Disabilities

| | | 2022 | 2021 | 2020 |
|--|---|------|------|------|
| Ratio of people with severe disabilities at German sites | % | 4.6 | 4.4 | 4.5 |

Occupational Health and Safety at Sites

| | | 2022 | 2021 | 2020 |
|---|--------|------|------|------|
| Sites with certified occupational health and safety management system (ISO 45001) | Number | 46 | 44 | 43 |

Safety¹

| | | 2022 | 2021 | 2020 |
|---|--|------|------|------|
| Workplace accidents per 200,000 contractually agreed hours of work | | 0.7 | 0.8 | 0.9 |
| Workplace accidents resulting in lost days per 200,000 contractually agreed hours of work | | 0.6 | 0.6 | 0.7 |

¹ The figure relates to all sites under operational control excluding sites with fewer than 50 employees other than production sites or service workshops. This covers around 97% of Knorr-Bremse's employees.

Social Commitment

| | | 2022 ¹ | 2021 | 2020 |
|--------------------------|-----------|-------------------|-------|-------|
| Donations by Global Care | in Tsd. € | 3,021 | 2,820 | 2,331 |
| Donations by Local Care | in Tsd. € | 2,843 | 2,012 | 2,197 |
| Total | in Tsd. € | 5,864 | 4,832 | 4,528 |

¹ The donations made by Local Care in 2022 included €892,000 that Knorr-Bremse AG contributed to Ukrainian relief projects.

Governance

Compliance

| | | 2022 | 2021 | 2020 |
|--|--------|------|------|------|
| Reports filed via whistleblower system | Number | 90 | 45 | 21 |

Suppliers

| | | 2022 | 2021 | 2020 |
|---|------------------------|------|------|------|
| Sustainability assessment coverage rate for suppliers | % of purchasing volume | 69 | 61 | 48 |
| Sustainability audits of suppliers | Number | 30 | 18 | 0 |

Reporting of Conflict Minerals

| | | 2022 ¹ | 2021 ² | 2020 |
|---|--------|-------------------|-------------------|-------|
| Suppliers invited to take the CMRT survey | Number | 2,301 | 2,449 | 1,517 |
| Response rate of the suppliers surveyed | % | 51 | 62 | 62 |

¹ The figures relate to the percentage of suppliers who have provided a valid response within the data collection campaign. It represents the response rate of the reporting period July 2022–April 2023. At the time of the editorial deadline of this Sustainability Report, the conflict minerals campaign was still open. For this reason, the final result will be published in the next reporting cycle. The non-financial statement 2022 only covers the period June – December, resulting in varying figures.

² In the 2021 Sustainability Report the published figure was 45%, which was an interim result at the publication of the report

Carbon Calculation Method

Knorr-Bremse calculates its carbon emissions – Scope 1, Scope 2 and relevant categories from Scope 3 – in accordance with the revised edition of the Greenhouse Gas (GHG) Protocol, A Corporate Accounting and Reporting Standard and the Corporate Value Chain Accounting and Reporting Standard. The balance sheet limits are applied on the basis of operational control via business units. In the following, we describe the calculation methods for the CO₂ emission figures published by us for the three Scopes of the GHG Protocol.

Scope 1 and Scope 2 – Direct and Indirect CO₂ Emissions

The carbon accounting at Knorr-Bremse factors in direct CO₂ emissions from the company's own emission sources (Scope 1) and indirect emissions from the generation of purchased energy (Scope 2). As with the underlying energy consumption, we report on emissions in accordance with our HSE reporting guideline. As such, we account for locations with more than 50 employees or locations with an environmental management system, which primarily concerns production and service sites. This results in a coverage rate of around 97% of Knorr-Bremse employees.

Scope 1

For Scope 1, we calculate direct emissions that arise within the company from burning natural gas, oil, coal, petroleum-based fuels and liquefied petroleum gas, or from our own generation of electricity. The calculation also includes fuel consumption by the company's own vehicles. Emissions are calculated using the emissions factors published by the VDA¹ in 2022.

Scope 2

For Scope 2, we calculate emissions from the energy purchased in the form of electricity, district heating, district steam and district cooling. Since 2021, we have reported both market-based and location-based emissions. To calculate location-based CO₂ emissions, we use the country-specific emissions factors of the VDA¹, published in 2022, and those of the IEA².

For the market-based approach, we use the specific CO₂ emissions factors of the electricity suppliers or account for the emissions factor with 0 kg CO₂/kWh if renewable electricity is used. If the data for the electricity providers is not available, we use the European residual mix of the Association of Industry Bodies (AIB). The average emissions factors for a given country, as provided by the IEA² (see "Location-Based Approach"), are used if neither the data of the suppliers nor the residual mix is available.

Scope 3 – indirect CO₂e emissions

In addition to the indirect emissions from upstream business activities, which we reported for the first time in 2021, we also published the indirect emissions from up- and downstream transportation and distribution and from the downstream use of our sold products in 2022. They are recognized as CO₂ equivalents and are currently limited to the following categories:

Scope 3.1 – Purchased Goods and Services

The emissions from purchased goods and services are calculated using a spend-based approach, i.e., based on the expenditure on materials and services. The emissions factors used for this come from an external data model. The model used combines the methods of input-output modeling (EEIO, environmental extended input/output methodology) and greenhouse gas accounting with trade data and further external data sets. The emissions calculated cover the entire upstream supply chain ranging from the production of commodities through to tier-one suppliers (cradle to gate).

Scope 3.3 – Fuel- and Energy-Related Activities

This category includes upstream greenhouse gas emissions for energy generation prior to combustion that are not factored in under Scopes 1 or 2. For calculation, we use the emissions factors of the IEA2), published in 2022, as well as the UK Government GHG Conversion Factors for Company Reporting from the Department for Business, Energy & Industrial Strategy (BEIS) and the Department for Environment, Food & Rural Affairs (DEFRA), including the underlying methodology.

Scope 3.4 – Upstream Transportation and Distribution and Scope 3.9 – Downstream Transportation and Distribution

This category comprises transportation-related emissions from incoming, internal and outgoing (paid by Knorr-Bremse) transportation (Scope 3.4) as well as from outgoing transportation paid for by the customer and carried out by external carriers (Scope 3.9). Different calculation methods were used for the divisions CVS and RVS. For CVS, a large part of the footprint is based on primary emissions data provided by suppliers. Another large part was calculated using a distance-based approach while the remaining part was calculated with a spend-based approach. For RVS, the footprint was calculated using a purely distance-based approach. Standard well-to-wheel emissions factors from the Smart Freight Centre GLEC Framework v2 were used for the distance-based approach. The spend-based estimates are based on emissions factors from the Quantis Scope 3 Evaluator. The emissions of external warehouses are calculated using a square meter basis as well as the global pathway greenhouse gas values for industrial distribution warehouses, provided by CRREM, per year and square meter. These emissions values were added onto the transportation-related emissions.

Scope 3.6 – Business Travel

Calculation of CO₂e emissions from business trips is carried out by our three most relevant travel agencies on the basis of flight lengths. The travel agency for Europe and parts of the APAC3) region calculates emissions in accordance with the Greenhouse Gas Protocol. The agencies for North and South America and China use emissions factors for short-, medium- and long-haul flights.

Scope 3.7 – Employee Commuting

Emissions arising from the commutes of our employees are calculated using average commute distances from Germany as well as the EMEA⁴, North and South America and APAC³ regions. The modes of transportation included are cars, public transportation, bicycles and walking. The number of working days and employees are also included in the calculation. The increase in working from home due to measures to prevent the spread of COVID-19 is accounted for at around 18%. The emissions factors for Scope 3.7 are taken from the BEIS/DEFRA emissions factors published in 2022.

Scope 3.11 – Use of Sold Products

Knorr-Bremse's footprint in Scope 3.11 comprises the direct emissions from the use phase of products with direct energy and fuel consumption in rail and commercial vehicles. Nineteen relevant product groups have been identified for RVS and one for CVS. For CVS, an estimate of further product groups with direct energy consumption was calculated. The estimate indicated that those product groups together represent approximately 3% of CVS' Scope 3.11 emissions and are therefore not seen as relevant, which is why they are added on as a lump sum. Regional emissions factors were used for the RVS modeling while global emissions factors were used for CVS, in both cases in accordance with the IEA² and BEIS/DEFRA.

¹ VDA – Verband der Automobilindustrie; German Association of the Automotive Industry.

² IEA – International Energy Agency

³ APAC – Asia and Pacific regions

⁴ EMEA – Europe, Middle East and Africa

Restatement

In the event of methodological or structural changes or incorrectly reported indicators, the base years for the climate targets are adjusted retroactively if the changes entail an impact greater than 5% on the total emissions of an emission category.

TCFD Reference Table

Knorr-Bremse follows the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and the amendments to established reporting standards regarding the publication of climate-related risks and opportunities. In the CDP Climate Change Request 2022, Knorr-Bremse reports key indicators, risks and opportunities, as well as strategies for managing climate-related topics. Additionally, a cross-functional working group was established in 2021 to develop measures for the implementation of the TCFD recommendations. The focus in this regard was on identifying relevant risks and opportunities along the value chain and on integrating these topics into risk management. In 2022, taxonomy-relevant information was added to the TCFD reference table. The following table describes the results according to the TCFD recommendations.

Governance

Board's Oversight

| Climate-Related Information by Category | Reference to additional information |
|---|---|
| <p>Sustainable Development Goal (SDG) 13 of the United Nations is ascribed a high level of priority at Knorr-Bremse and is operationalized by the Knorr-Bremse Climate Strategy 2030, which was approved in 2019 by the Executive Board. The Executive Board monitors implementation of the climate strategy and approves comprehensive investments to this end. Climate-related topics were on the agenda of the Executive Board several times in 2022.</p> <p>The Knorr-Bremse Supervisory Board serves in a monitoring capacity for the sustainability and climate strategy as well as the implementation thereof. In 2022, the work of the Supervisory Board focused on the critical appraisal of the new Knorr-Bremse remuneration system, including climate-related aspects, and the expansion of the climate targets in line with the requirements of the Science Based Target Initiative, including Scope 3 targets. Furthermore, the Supervisory Board regularly dealt with the Knorr-Bremse Risk Report in detail, at least once a year as well as on an ad hoc basis.</p> <p>The new remuneration system for management level 0-2 (Executive Board, senior management, regional managing directors, heads of division) sets incentives for achieving our sustainability targets. Implemented for the first time in the 2022 fiscal year, 20% of the short-term variable remuneration (short-term incentive) is now linked to the achievement of sustainability targets, including performance indicators from the context of the climate strategy.</p> | <ul style="list-style-type: none">■ Sustainability Management■ 2022 Annual Report, "Sustainability Strategy and Organization", page 40■ 2022 CDP Climate Change response: "Governance" (C1) |

Management's Role

Climate-Related Information by Category

The company's senior management is involved in the system for managing risks and opportunities. An essential component of regular risk reporting is a summary Group risk report. This is discussed and adopted in the Risk Committee. The participants in the Risk Committee are the heads of finance with regional responsibility, the heads of other governance functions and the global quality managers. The Group risk report is then presented to the Knorr-Bremse Group's Executive Board at quarterly intervals and explained and discussed at the relevant Executive Board meeting. The Sustainability department is responsible for the further development and coordination of the climate strategy, as well as for integrating climate-related risk and opportunity management into the existing risk processes. The Sustainability department regularly reports directly to the CFO and to the ESG board.

The ESG Board is the key body that discusses and defines the sustainability and climate strategy at Knorr-Bremse. It comprises two members of the Executive Board, a representative of the senior management from each of the two divisions and of each of the Knorr-Bremse regions Americas and Asia-Pacific, the Chair of Knorr-Bremse Global Care e. V. and the Head of the Sustainability department.

In autumn 2021, a cross-functional working group was established to implement the TCFD recommendations. The working group is made up of representatives from the Strategy, Risk Management, Procurement, Production and Sustainability departments, as well as representatives of the America and Asia-Pacific regions. In particular, the working group dealt with a TCFD gap analysis and a qualitative scenario analysis.

Reference to additional information

- [Sustainability Management](#)
- [2022 Annual Report, "Sustainability Strategy and Organization", page 40](#)
- [2022 CDP Climate Change response: "Governance" \(C1\)](#)

Risks and Opportunities Identified over Different Time Horizons and Potential Business Impact

Climate-Related Information by Category

In its planning, Knorr-Bremse defines short-term (0–1 years), medium-term (1–3 years) and long-term (3–5 years) timelines. Additionally, in autumn 2021, Knorr-Bremse carried out a comprehensive qualitative scenario analysis for the years 2030 and 2050.

The findings of the analysis supplement the regular risk management approach. The analysis focused on climate-related risks and opportunities along the value chain, both upstream and downstream, on the basis of the two following scenarios:

The net-zero-emissions (NZE) scenario for 2050 of the International Energy Agency (IEA) was primarily chosen to represent the transition risks resulting from a 1.5°C global warming scenario. The RCP 6.0 scenario of the Intergovernmental Panel on Climate Change (IPCC) was primarily chosen to represent the physical risks resulting from a 2.7°C global warming scenario. Knorr-Bremse's selection of scenarios is therefore in accordance with the current and expected external requirements of the TCFD and the Corporate Sustainability Reporting Directive (CSRD). Additionally, the transition risk scenario is in accordance with Knorr-Bremse's ambition to contribute to the limitation of global warming to 1.5°C through its own climate strategy. As part of the analysis, a distinction is made between the RVS and CVS divisions. The analysis focuses on material business activities in the supply chain, in the company's own operations and in the customer markets in order to identify risks and opportunities that arise from the scenarios and that have the potential to have a significant financial effect for Knorr-Bremse.

The following tables summarize the relevant types of identified risks and opportunities as well as their financial effects for Knorr-Bremse:

Reference to additional information

- [Climate Protection](#)
- [2022 Annual Report, "Climate protection", page 42](#)
- [2022 Annual Report, "EU Taxonomy", page 56](#)
- [2022 CDP Climate Change response: "Risk and Opportunities" \(C2\), "Business Strategy" \(C3\)](#)

1.5°C (Transition) Scenario

Relevant types of climate-related risks and opportunities for the RVS and CVS divisions of Knorr-Bremse

Potential financial impacts

for the RVS and CVS divisions of Knorr-Bremse

Risks

Supply chain: Policy, technology and market risks (RVS and CVS divisions)

Prices for energy-intensive materials such as steel and aluminum are expected to increase by 2030 due to carbon pricing and due to higher costs for the low-carbon production of technologies (e.g., “green steel” production using electric arc furnaces/direct reduction with hydrogen).

Over the long term, the significance of this development will decrease by 2050 due to technological advances in material production. The procurement of critical resources – especially with regard to decarbonization of the global economy (e.g., copper in electric devices) – can lead to supply shortages and influence market prices.

Policy, technological and market risks could potentially have a negative effect on the EBITDA margin through increased procurement costs.

Operations: Policy, technology and market risks (RVS and CVS divisions)

The drastically increasing carbon prices for fossil fuels and the transition to low-carbon logistics are expected to lead to increased expenses for the procurement of energy and logistics services. This effect is already noticeable in 2030 and will continue to increase through 2050.

Policy, technological and market risks could potentially have a negative effect on the EBITDA margin through increased operational costs.

Customer markets: Market risks (CVS division)

In a 1.5°C scenario, measures to decarbonize the economy dampen growth forecasts for the truck business of customers compared to a scenario of “business as usual.” These measures include avoiding transports and a shift toward low-carbon modes of transportation. In consideration of 2050 in particular, this risk will more heavily materialize compared to a moderate risk in 2030.

Market risks for the CVS division could have a negative effect on revenue.

Opportunities

Customer markets: Market opportunities (RVS division)

Independent of the scenario, growth in GDP as well as population presents an opportunity for higher demand. However, in a 1.5°C scenario, the measures to decarbonize the economy – such as the avoidance of transports and modal shift – lead to stronger growth in the rail market compared to a scenario of “business as usual.” These market opportunities are already at a high level in 2030 and will remain high through 2050.

New market opportunities could increase revenue for the RVS division.

2.7°C (Physical) Scenario

Relevant types of climate-related risks and opportunities for the RVS and CVS divisions of Knorr-Bremse

Potential financial impacts

for the RVS and CVS divisions of Knorr-Bremse

Risks

In general, the physical risks become more severe over time in a 2.7°C scenario, meaning that physical risks are exacerbated by 2050 compared to 2030. However, the severity and frequency may vary locally.

Supply chain: Acute risks (RVS and CVS division)

Acute physical risks arising from extreme weather events such as flooding, tropical cyclones and droughts are the most relevant for Knorr-Bremse. The increased probability of droughts puts the production of key raw materials especially in Germany and the United States at risk. The increased probability of flooding and tropical cyclones (India, China, Japan and the United States) poses a threat of business interruption if key local suppliers are affected.

Acute physical risks affecting local suppliers can have a negative effect on the EBITDA margin due to increased procurement costs.

Operations: Acute risks (RVS and CVS division)

The material physical risks within the context of Knorr-Bremse production sites are flooding (China, India, Japan and Germany) and tropical cyclones (China, United States and Mexico), which could lead to damage to assets and interruptions in operations, for example through production downtimes and power outages.

Acute physical risks could lead to damage to production sites, which, in turn, could lead to production downtimes. Increased operating expenses and capital expenditure have an impact on the EBITDA margin and could cause losses in revenue.

Customer markets: Acute risks (RVS and CVS division)

Flooding and tropical cyclones could cause significant damage to the rail network, which, in turn, could lead to operational downtimes and the endangerment of demand for the products of the RVS division. The CVS division is also impacted by acute risks such as flooding and tropical cyclones, but to a lesser extent.

Because the rail infrastructure is particularly vulnerable to extreme weather events, the revenue of the RVS division could be negatively impacted.

Opportunities

Customer markets: Acute risks (CVS division)

Droughts could represent a climate-related opportunity for the CVS division, because domestic ship transport would be replaced by truck transport in case of disruptions.

By replacing inland waterways experiencing temporary droughts, the revenue of the CVS division could increase.

In addition to the qualitative scenario analysis based on the IPCC RCP 6.0 scenario, Knorr-Bremse performed further physical risk analyses in 2022. In accordance with the “do no significant harm” requirements of the EU Taxonomy Regulation, physical climate change risks were evaluated based on the IPCC RCP 8.5 scenario, which is even more pessimistic. The scenario depicts global warm of 4°C and more by the year 2100, covering the range of possible developments connected to the physical effects of climate change. The analyses show that no material financial impacts are expected at the analyzed sites by 2050, based on national data and current assessments. To ensure that the analyzed activities are not impacted by secondary or cascading effects, a climate vulnerability assessment of the most significant direct suppliers was also carried out based on existing data, with a level of detail that will be developed further for the 2023 reporting period.

Resilience

Climate-Related Information by Category

Knorr-Bremse Knorr-Bremse considers its climate strategy to be an essential contribution to limiting transition risks. The strategy was approved in 2019: it pursues the objective of halving Knorr-Bremse's market-based Scope 1 and Scope 2 emissions by 2030 compared to the reference year 2018. The transformation plan is built upon three levers: CO₂ and energy efficiency, generation of its own renewable energy and purchasing renewable energy.

Reference to additional information

- [Climate Protection](#)
- [2022 Annual Report, "Climate protection", page 42](#)
- [2022 CDP Climate Change response: "Business Strategy" \(C3\)](#)

Risk Management

Process for Identifying and Assessing Climate-Related Risks

Climate-Related Information by Category

Knorr-Bremse has defined 14 risk categories within the framework of its risk management. These categories have been mapped to the physical and transition risk types defined pursuant to the TCFD.

For example, in the "legal and regulatory" category, physical risks are allocated to force majeure and regulatory risks are allocated to environmental legislation, while technological risks are allocated to pricing in the "purchasing/procurement" category.

The so-called risk owner at the locations – the person responsible for the process of identifying risks and furthering mitigation measures – and the risk management teams of the divisional units of Knorr-Bremse classify risks as "low," "medium" or "high" according to their expected financial impact. Risks of € 0–€ 10 million are classified as "low," while risks of greater than € 50 million are classified as "high." In this context, all net risks evaluated at greater than € 5 million are classified as substantial and, accordingly, are forwarded to the central risk management department at Knorr-Bremse. Additionally, risks for the Group as a whole are reported directly to the central risk management team by the respective Group departments, including the Sustainability department.

Reference to additional information

- [Management of Sustainability-Related Risks and Opportunities](#)
- [2022 Annual Report, "Report on Risks, Opportunities and Expected Developments", page 83](#)
- [2022 CDP Climate Change response: "Risks and Opportunities" \(C2\)](#)

Process for Managing Climate-Related Risks

Climate-Related Information by Category

In all, the risk management process comprises six stages, from identification through evaluation, mitigation and aggregation to reporting and monitoring. When climate-related risks and opportunities are assessed, company management determines how to deal with them in consideration of the costs and benefits.

If risks are identified (including climate-related risks), operational measures are implemented to limit the risk to a tolerable level. By aggregating individual risks within the existing risk categories, Knorr-Bremse gains a comprehensive view of the risk situation of the organization as well as each divisional unit and local site. In addition to regular risk reporting, ad hoc risk reporting is part of Knorr-Bremse's risk management. Divisional risk reports are consolidated centrally and reported to the Executive Board on a quarterly basis. Knorr-Bremse ensures diligent risk monitoring by continuously assessing risks as well as external audits of the risk management system by the Risk Committee.

Reference to additional information

- [Management of Sustainability-Related Risks and Opportunities](#)
- [2022 Annual Report, "Report on Risks, Opportunities and Expected Developments", page 83](#)
- [2022 CDP Climate Change response: "Risks and Opportunities" \(C2\)](#)

Integration into Overall Risk Management

Climate-Related Information by Category

The climate-related risks and opportunities identified from the climate scenarios were included in the Knorr-Bremse Risk Report.

Reference to additional information

- [2022 Annual Report, "Report on Risks, Opportunities and Expected Developments", page 83](#)
- [2022 CDP Climate Change response: "Risks and Opportunities" \(C2\)](#)

Metrics and Targets

Metrics Used

Climate-Related Information by Category

Knorr-Bremse has published initial estimates of the potential financial effects of climate change as part of its 2022 CDP climate reporting.

CO₂ emissions are the central key figure in managing the decarbonization of Knorr-Bremse. Knorr-Bremse accounts for the emissions in scopes according to the Greenhouse Gas Protocol Standard.

Reference to additional information

- [Climate Protection](#)
- [2022 Annual Report](#),
[“Climate Protection”, page 42](#)
- [2022 CDP](#)
[Climate Change response:](#)
[“Risk and Opportunities” \(C2\)](#),
[“Business Strategy” \(C3\)](#),
[“Targets and Performance” \(C4\)](#),
[“Emission Methodology” \(C5\)](#),
[“Emissions Data” \(C6\)](#),
[“Emissions Breakdown” \(C7\)](#)

Greenhouse Gas Emissions

Climate-Related Information by Category

In 2022, Knorr-Bremse's carbon footprint was as follows:

- Scope 1: 38,000 metric tons of CO₂
- Scope 2: 12,000 metric tons of CO₂ (market-based accounting) and 122,000 metric tons of CO₂ (location-based accounting)
- Scope 3: ~28,400,000 metric tons of CO₂e

The Scope 3 emissions are made up of the categories that are relevant to Knorr-Bremse, which are Scope 3.1 Purchased Goods and Services, Scope 3.4 Upstream Transportation and Distribution, Scope 3.9 Downstream Transportation and Distribution; and Scope 3.11 Use of Sold Products as well as the categories Scope 3.3 Fuel- and Energy-Related Activities, Scope 3.6 Business Travel and Scope 3.7 Employee Commuting.

Reference to additional information

- [Climate Protection](#)
- [2022 Annual Report](#),
[“Climate Protection”, page 42](#)
- [2022 CDP](#)
[Climate Change response:](#)
[“Risk and Opportunities” \(C2\)](#),
[“Business Strategy” \(C3\)](#),
[“Targets and Performance” \(C4\)](#),
[“Emission Methodology” \(C5\)](#),
[“Emissions Data” \(C6\)](#),
[“Emissions Breakdown” \(C7\)](#)

Targets Used

Climate-Related Information by Category

To be in line with the current status of climate science with regard to limiting global warming to no more than 1.5 °C, Knorr-Bremse has set itself the target of reducing the absolute CO₂ emissions of the global locations and the fleet (Scope 1 and Scope 2) by 50% by the year 2030. This means an absolute reduction of CO₂ emissions of 4.2% per year compared to the reference year 2018. By 2022, Knorr-Bremse had achieved a reduction of ~69%, primarily through the purchase of electricity from renewable energy sources as well as through increased energy efficiency.

In addition, we extended Knorr-Bremse's climate goals to the value chain at the beginning of 2023 and set an ambitious reduction target: By 2030, we intend to reduce emissions of the upstream and downstream value chain (Scope 3) that are related to our business activities by 25% compared with the base year of 2021. We focus in particular on emissions from the Scope 3 categories 3.1 Purchased Good and Services, 3.4 Upstream Transportation and Distribution and 3.11 Use of Sold Products.

Reference to additional information

- [Climate Protection](#)
- [2022 Annual Report](#),
[“Climate Protection”, page 42](#)
- [2022 CDP](#)
[Climate Change response:](#)
[“Risk and Opportunities” \(C2\)](#),
[“Business Strategy” \(C3\)](#),
[“Targets and Performance” \(C4\)](#),
[“Emission Methodology” \(C5\)](#),
[“Emissions Data” \(C6\)](#),
[“Emissions Breakdown” \(C7\)](#)

Assurance Statement

Limited Assurance Report regarding selected Scope 3 categories in the Sustainability Report¹

To the Supervisory Board of Knorr-Bremse AG, Munich

We have performed an independent limited assurance engagement on selected Scope 3 categories, published in the Sustainability Report of Knorr-Bremse AG, Munich (hereinafter „company“ or “Knorr-Bremse”) for the business year from January 1 to December 31, 2022 (hereinafter “Report”).

The following selected Scope 3 categories are included in the scope of the assurance engagement:

- GHG Protocol Scope 3 categories: 3.1 „Purchased goods and services“, 3.4 „Upstream transportation and distribution“, 3.9 „Downstream transportation and distribution“ and 3.11 „Use of sold products“

Management's Responsibility

The legal representatives of Knorr-Bremse are responsible for the accurate preparation of the selected Scope 3 categories in accordance with the Reporting Criteria. Knorr-Bremse applies the principles and standard disclosures of the requirements of the GHG Protocol as Reporting Criteria. The responsibility of the legal representatives includes the selection and application of appropriate methods to prepare the selected Scope 3 categories and the use of assumptions and estimates for individual qualitative and quantitative disclosures, which are reasonable under the circumstances. Furthermore, this responsibility includes internal controls relevant for the preparation of selected sustainability performance disclosures of the Report in a way that is free of – intended or unintended – material misstatements.

Independence and Quality Assurance of the Assurance Practitioner's firm

We are independent from the entity in accordance with the requirements of independence and quality assurance set out in legal provisions and professional pronouncements and have fulfilled our additional professional obligations in accordance with these requirements. Our audit firm applies the national statutory provisions and professional pronouncements for quality assurance, in particular the Professional Code for German Public Auditors and Chartered Accountants (in Germany) and the quality assurance standard of the German Institute of Public Auditors (Institut der Wirtschaftsprüfer, IDW) regarding quality assurance requirements in audit practice (IDW QS 1).

Practitioner's Responsibility

Our responsibility is to express a conclusion on the selected Scope 3 categories based on our work performed and the evidence obtained within our limited assurance engagement.

We conducted our work in accordance with the International Standard on Assurance Engagements (ISAE) 3000 (Revised): “Assurance Engagements Other than Audits or Reviews of Historical Financial Information” as well as ISAE3410: “Assurance Engagements on Greenhouse Gas Statements”, both published by IAASB. This standard requires that we plan and perform the assurance engagement to obtain limited assurance of whether any matters have come to our attention that cause us to believe that the abovementioned selected environmental performance disclosures, for the business year from January 1 to December 31, 2019, have not been prepared, in all material respects, in accordance with the Reporting Criteria. In a limited assurance engagement, the evidence gathering procedures are more limited than in a reasonable assurance engagement, and therefore less assurance is obtained than in a reasonable assurance engagement. The choice of audit procedures is subject to the auditor's own judgement.

Within the scope of our engagement, we performed the following procedures:

Im Rahmen unserer Prüfung haben wir unter anderem folgende Prüfungshandlungen und sonstige Tätigkeiten durchgeführt:

- Evaluate the design and implementation of systems and processes to identify, manage, and monitor Scope 3 emissions, including consolidation of data, risk assessments, and the control environment.
- Interviews with Group-level employees responsible for disclosing management concepts, including results and risks.
- Inspection of selected internal and external documents.
- Analytical procedures to determine in detail whether the disclosures are in line with the underlying relevant sources, especially using internal and external documents.
- Analytical procedures to evaluate the data and trends of the quantitative disclosures at Group level.
- Evaluating the overall presentation of the information within the scope of our engagement.

Conclusion

Based on the procedures performed and the evidence obtained, nothing has come to our attention that causes us to believe that the selected environmental performance disclosures, published in the Sustainability Report, for the business year from January 1 to December 31, 2019, are not prepared, in all material respects, in accordance with the Reporting Criteria.

Restriction of Use/ Clause on General Engagement Terms

This assurance report is issued for the purposes of the Supervisory Board of Knorr-Bremse AG, Munich, only. We assume no responsibility with regard to any third parties.

Our assignment for Knorr-Bremse AG and professional liability is governed by the General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften (German Public Auditors and Public Audit Firms) (Allgemeine Auftragsbedingungen für Wirtschaftsprüfer und Wirtschaftsprüfungsgesellschaften) in the version dated January 1, 2017 (↗ https://www.kpmg.de/bescheinigungen/lib/aab_english.pdf). By reading and using the information contained in this assurance report, each recipient confirms having taken note of provisions of the General Engagement Terms (including the limitation of our liability for negligence to EUR 4 million as stipulated in No. 9) and accepts the validity of the attached General Engagement Terms with respect to us.

Munich, 5. May 2023

KPMG Wirtschaftsprüfungsgesellschaft

¹ Our engagement applied to the German version of the Report 2022. This text is a translation of the Independent Assurance Report issued in German, whereas the German text is authoritative.

About the Report

Our annual Sustainability Report has been informing our stakeholders about sustainability-related activities at Knorr-Bremse since 2011. The report describes the company's impact on the environment and society. It also presents key performance indicators and measures that Knorr-Bremse takes to manage its sustainability-related activities. The reporting period is fiscal year 2022. Comparative data from previous years is provided when available. The scope of the report covers the subsidiaries that are fully consolidated in the Consolidated Financial Statements. Content that applies only to individual parts of companies has been identified as such. The report is issued annually. The next Sustainability Report is planned to be published in the spring of 2024.

In addition to this report, a non-financial declaration pursuant to the German CSR Directive Implementation Act is included in Knorr-Bremse's (→ [Annual Report](#)). The declaration covers the information material for the Group due to its relevance to business activities with regard to the required aspects of environmental, employee and social matters, as well as respect for human rights and combating corruption and bribery. The content of the non-financial declaration was reviewed by KPMG Wirtschaftsprüfungsgesellschaft AG in a limited assurance engagement on the basis of audit standard ISAE 3000 (revised).

Editorial Note

The editorial deadline for this report was April 28, 2023. The Sustainability Report has been released in both German and English. If the content differs between the two versions, the German online version takes precedence.

Report Information

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