BOSCH
Invented for life

Sustainability report 2018

spotlights

More facts and figures?

ACCESS TO THE FACTBOOK

The report

The year 2019 is the first in which the Bosch Group is releasing two publications about sustainability-related activities. “spotlights” presents the highlights from the reporting year, while the contents of the comprehensive “factbook” orient to the sustainability reporting standards defined by the UN Global Compact, the German Council for Sustainable Development, and the Global Reporting Initiative (GRI). As specified by the GRI standards, the publication contains non-financial information. Both publications are available online as PDF files in German and English at sustainability.bosch.com.

Contents

Smart approaches for more sustainability

With technology “Invented for life,” the Bosch Group aims to help solving the challenges society faces. To secure the livelihoods of current and future generations, the company is taking smart approaches to making all its fields of business more sustainable. Bosch sees connected products and services as a way of protecting natural resources and making the lives of people around the world easier. At the same time, the company also relies on smart, innovative solutions in both its interaction with associates and its activities related to social responsibility. With this comprehensive approach, Bosch contributes to making life, work, and mobility more sustainable.

“We aim to achieve carbon neutrality by 2020”

In the current reporting year, the Bosch Group has formulated a new sustainability strategy. Dr. Volkmar Denner, Chairman of the Board of Management, and Torsten Kallweit, Head of EHS and Sustainability at Bosch, address the responsibility of the industry, the company’s role in expanding the use of renewable energy, and the path to carbon neutrality.

Pursuing visionary targets for climate protection: Volkmar Denner, Chairman of the Board of Management (l.), and Torsten Kallweit, Head of EHS and Sustainability at Bosch

Mr. Denner, Mr. Kallweit, what should companies do to mitigate climate change?

Denner: We must step up our efforts. According to current forecasts, average global temperatures will increase more than three degrees Celsius by the end of this century, one degree more than the target set in the Paris Agreement. This is why the most recent report of the Intergovernmental Panel on Climate Change (IPCC) demanded urgent action. By 2050, emissions must be reduced to zero. Companies will play a major role in this regard: industrial activity accounts for 24 percent of global energy consumption, and thus more than road traffic. We therefore see supporting the goals of the Paris Agreement as our responsibility, and we aim to do this with sustainable products, and, above all, by taking immediate action ourselves. Climate change, rising energy consumption around the world, and resource scarcity call for new answers. Finding those answers is the aim of our "New Dimensions – Sustainability 2025" target vision.

Kallweit: This vision addresses the most pressing social challenges and sets measurable targets in the areas of urbanization, globalization, health, energy, climate, and water. For example, we aim to reduce absolute water consumption at our locations in water scarcity regions by 25 percent by 2025.

Which targets are you pursuing with regard to climate change?

Denner: We take the IPCC's call for carbon neutrality very seriously, and are already rigorously complying with it: we will achieve carbon neutrality by 2020. This would make our industrial company, with its more than 400 locations around the globe, the first to reach this target. At present, the Bosch Group's carbon footprint amounts to 3.3 million metric tons of CO_2 per year in Scope 1 and 2. This includes both direct and indirect emissions related to purchased energy. We want to reduce these emissions to zero. While we had initially planned to achieve this target in the next decade, the IPCC's special report shows that immediate action is needed, and we at Bosch are in a strong position to move forward in this regard. In recent years, we exceeded our targets. We had reduced our CO_2 emissions relative to value added by 20 percent by as early as 2014, well ahead of our original target of 2020. Consequently, we upped the ante to 35 percent. We have now achieved a 31 percent reduction of greenhouse gas emissions, and have thus almost reached our target once again. Now, we not only want to reduce CO_2 emissions relative to value added, but also to decrease absolute emissions.

In 2018, you consumed 7.8 TWh of energy. You remain a manufacturing company. How exactly do you plan to achieve carbon neutrality?

Denner: We are taking a fourfold approach. First, we aim to increase energy efficiency as well as our share of New Clean Power, meaning renewable energy from new facilities. We also aim to purchase more clean energy and offset CO_2 emissions. In 2018, we successfully initiated some 300 energy efficiency projects at our locations. Our connected energy platform, which continuously analyzes large amounts of data, played a central role at many of our locations. It allows us to carry out demand-driven machine management, and thus to operate machinery as efficiently as possible. To develop solutions like these and keep increasing the efficiency of our facilities and buildings, we plan to spend some 100 million euros a year until 2030. By then, our aim is to save 1.7 TWh of energy, more than one-fifth of our current annual consumption.

What about the three other levers: on-site generation, the purchase of green energy, and offsets?

Kallweit: By 2030, 40 percent of the energy we consume will be New Clean Power, which is solar power and wind energy. To this end, we are installing more solar panels at our locations, following the example of our Bidadi and Nashik locations. In the long term, we aim to enter into exclusive agreements with external providers who will build new renewable power generation facilities for us. Regardless of this move, we will initially need to source renewable power from existing facilities. In addition to this, we are using compensation projects in developing and emerging countries to offset our 26 percent share of energy from direct combustion. This means that we will save the exact equivalent of our CO_2 emissions elsewhere. We are also supporting compensation projects in countries where it may be difficult to implement the above-mentioned measures. This can be the case, for instance, with regard to the purchase of green energy.

But these are measures up to 2030. How does Bosch intend to achieve carbon neutrality by 2020?

Denner: In areas where greenhouse gas emissions are inevitable, for instance at our foundries, we will offset them completely in other areas. By financing compensation projects and purchasing green energy, we can drastically reduce our carbon footprint as early as next year. With both measures, we are ensuring top quality: the green energy is from existing solar and wind power generation facilities. And the compensation projects we support also meet high standards. What is more, we have become a member of the Alliance for Development and Climate, an initiative of the German Federal Ministry for Economic Cooperation and Development.

Your model is complex. How will you make your progress in reducing emissions transparent in the future?

Kallweit: Targets and key performance indicators for specific periods are stated in our new target vision. This will allow us to measure our progress and to communicate it in our annual factbook, which serves as a progress report. In addition to this, our approach will be analyzed with well-known ratings such as CDP – formerly known as the Carbon Disclosure Project. We are also involved in the Global Reporting Initiative.

Is it even possible to achieve carbon neutrality if emissions from the upstream and downstream supply chains – which you address with Scope 3 – are not included?

Denner: According to the Greenhouse Gas Protocol, Scope 3 emissions are not a mandatory part of determining a company's carbon footprint. We will first make our own emissions neutral with Scope 1, and direct emissions resulting from the energy provided by third parties through Scope 2. All other emissions related to our activities must first be analyzed. To professionalize this process, we are planning to apply to the Science Based Targets Initiative.

As a company, you have the power to control the carbon footprint of your own products. Are you planning to take action in this area as well?

Kallweit: As early as in the development process, we apply our internal Bosch standard, which pays close attention to the sustainable use of resources, and focuses on the continuous improvement of our products. As a matter of principle, we start optimizing products in the development phase, applying the following criteria: energy and material efficiency, emission reduction, and repairability. In so doing, we take the entire product life cycle into account, from procurement and manufacturing to product use and end-of-life. We have already carried out life-cycle analyses in all our major product groups, thus covering 50 percent of our sales.

As the world's largest automotive supplier and a company that still relies on diesel technology and the internal combustion engine, how can Bosch become a leader in terms of sustainability?

Denner: There is no question that pollutant emissions in road traffic must be reduced. At present, they account for 18 percent of global greenhouse gas emissions. However, the direct emissions of car engines are not the only ones that matter; the emissions of fuel production and power generation are also relevant for the climate. The focus has to be on the entire chain, from well to wheel, not only from tank to wheel. We offer modern diesel technology that keeps the powertrain system's nitrogen oxide emissions in real driving conditions far lower than future emission limits. We are committed to the technological transition from the internal combustion engine to the electrical powertrain. However, for a successful transition, the energy used for electric cars must come

At the new IoT campus in Berlin, new sustainable, connected solutions are being developed that contribute to improving quality of life

from renewable sources, and the internal combustion engine must use more low-emission fuels.

You have defined six areas of action and around a dozen new targets. You want to be a pioneer in your industry. What makes you confident that you can implement your strategy?

Kallweit: The new target vision is both a roadmap and a commitment. We are taking advantage of the innovative strength of our associates at Bosch locations around the world. For example, in recent years, we were able to increase our share of solar power to 55 GWh thanks to a broad range of projects. By 2030, we aim to increase this figure to 400 GWh. In January 2019, we presented the EHS Award to outstanding projects. More than 100 projects from 19 countries were submitted. The prize winners were innovative initiatives in a broad range of areas, from energy management to the biggest solar power installation in the Indian automotive industry. We strongly believe that many individual projects like these will shape the way to a carbon-neutral company.

Denner: Our founder Robert Bosch believed that "improvements in the world of technology and business should always also be beneficial for mankind." Later on, we applied this principle to our "Invented for life" ethos – a groundbreaking move. The foundation of our strategy has not changed. Our values continue to determine the way we do business every day, just as they did when Robert Bosch was alive. This means that we are working flat out to solve the social challenges the world currently faces, while at the same time keeping an eye on the future. In so doing, we trust in the qualities that set Bosch apart: outstanding innovative strength, a comprehensive definition of sustainability, and a commitment to improving quality of life. I strongly believe that this approach will continue to make a difference in the future.

Bosch aims to source more electricity from renewable energies – to this end, the company is installing more solar panels at its site in Bidadi, India, for instance

Sustainability at the Bosch Group

The Bosch Group strongly believes that a social and ecological balance is needed to do business successfully in the long term. For this reason, the company aims to secure its business success in a way that preserves resources for current and future generations. With a new target vision, Bosch is now defining ambitious goals that it plans to achieve by 2025, and is focusing its activities even more on solving the challenges society faces.

With technology "Invented for life," Bosch gives technical answers to ecological and social questions. The company focuses its efforts on connected solutions that make life easier and conserve resources. Today, the Internet of Things (IoT) already improves energy consumption in buildings and helps make mobility as emissions-free, accident-free, and stress-free as possible. In the future, smart products will shape the way people live, work, and move in cities.

Sustainable products, resource-saving production

Applying the systematic "Design for Environment" approach, Bosch continuously works on improving the environmental performance of its products. As early as in the development phase, engineers take a product's overall carbon footprint into account, considering its entire life cycle, from purchase and use to end-of-live. For Bosch, developing eco-friendly products also means keeping an eye on the company's own energy and resource consumption. At 89 percent of its manufacturing and development locations with more than 100 associates, an environmental management system based on ISO 14001 is already in place. To date, 232 locations have received external certification, or 78 percent of manufacturing locations worldwide. Within the framework of its supply chain management, Bosch requires that its suppliers comply with the labor standards set by the International Labor Organization (ILO), and checks compliance with audits. Until now, 862 thorough environmental and occupational safety audits have been conducted. Moreover, some 550 preferred suppliers must demonstrate that they apply a certified environmental management system.

Social commitment

A commitment to addressing social issues is another aspect of the Bosch definition of sustainability. In this regard, Bosch is active in two ways: first, with its presence in emerging markets and developing countries, Bosch is helping strengthen local economies. Second, by funding corporate foundations in Brazil, China, India, Mexico, and the United States, Bosch improves access to education. Robert Bosch Stiftung is also active in this field. With the dividends it receives from Bosch, the foundation supports a broad range of charitable initiatives. Besides education, it also funds projects in the areas of society, healthcare, international relations, and science.

In the company's efforts to keep economic, ecological, and social concerns in balance, Bosch has defined six targets in recent years, and made significant progress toward reaching them:

– 31.1 % fewer CO_2 emissions (relative)
(target: 35 % by 2020 compared with 2007)

– 3.5 % less waste (relative)
(target: – 6.9 % compared with 2015)

– 6.3 % less water consumption (relative)
(target: – 6.9 % compared with 2015)

862 environmental and occupational safety audits of suppliers (target: 1,000 between 2010 and 2020)

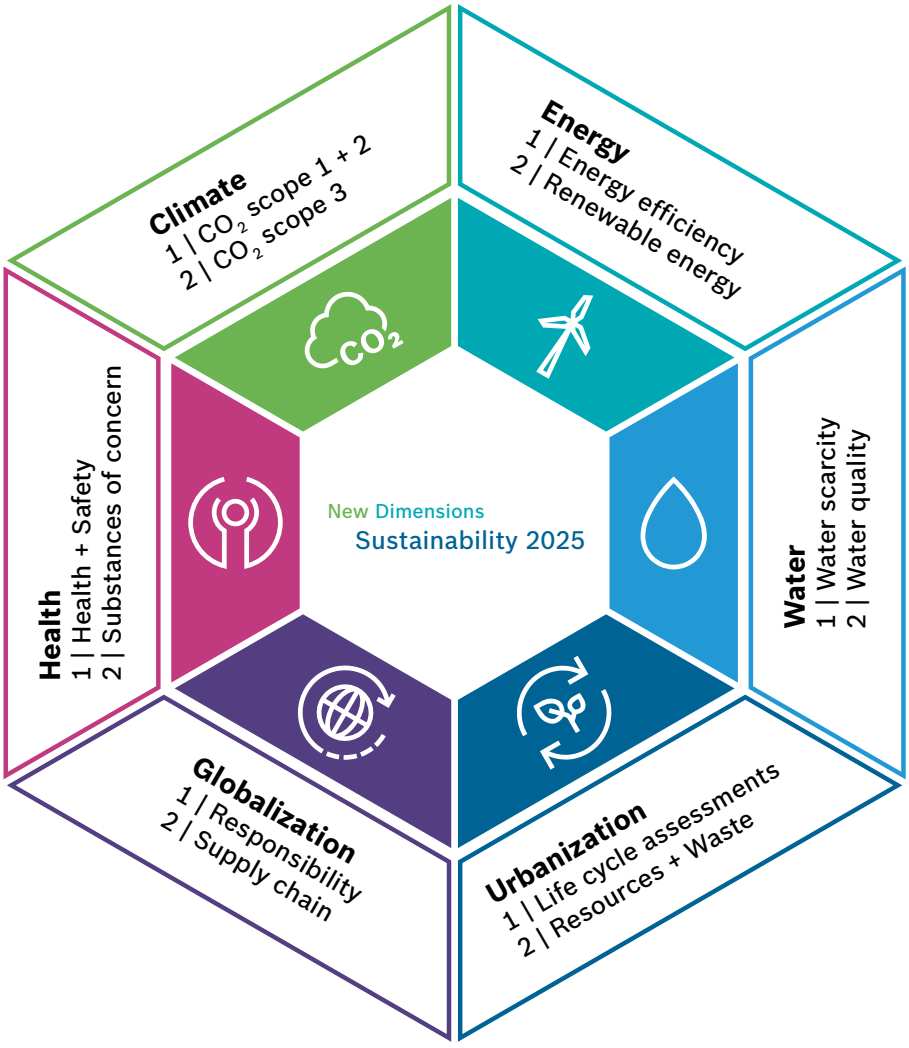
16.6 % women in management positions
(target: 20 % in the medium run)

2.2 or fewer accidents per million hours worked
(target: 1.7 or less by 2020)

The new target vision

Bosch has set itself new sustainability-related targets, which the company aims to achieve by 2025. In so doing, the company maintains its commitment to sustainability, while focusing more strongly on societal challenges. To define these targets, Bosch sustainability experts analyzed global megatrends and sustainability trends, benchmarked progressive companies, and engaged in dialogue with stakeholders. The result is the target vision "New Dimensions – Sustainability 2025".

In the future, Bosch will focus on the following six megatrends: climate, energy, water, urbanization, globalization, and health. Each area includes two central aspects and medium-term targets.



The new target vision in detail

Climate

Aspect 1: CO_2 scope 1 + 2

Bosch is committed to climate action and to achieving the Paris Agreement's two-degree target. The company aims to be carbon neutral by 2020, both in terms of direct (Scope 1) and indirect emissions related to purchased energy (Scope 2). To achieve this, Bosch is focusing particularly on energy efficiency measures at its own locations, as well as on New Clean Power (NCP). This means that the company will rely on exclusive long-term supply agreements for green energy from new power generation facilities. Bosch also sources green energy with guarantees of origin from existing facilities using renewables. In addition, the company purchases high-quality CO_2 certificates, such as "Gold Standard" certificates.

Aspect 2: CO_2 scope 3

In 2019, Bosch intends to analyze other indirect emissions (Scope 3) and aims to join the Science Based Targets Initiative (SBTi). Founded by members of the CDP (formerly the Carbon Disclosure Project), the United Nations Global Compact (UN GC), the World Resources Institute (WRI), and the Worldwide Fund for Nature (WWF), the initiative currently has more than 500 member companies. SBTi aims to make scientific targets standard practice in private sector efforts to reduce CO_2 emissions.

Energy

Aspect 1: energy efficiency

Energy efficiency is the key to reaching the climate target. Bosch has set itself the goal of saving 1.7 terawatt hours (TWh) of energy by 2030. With investments of a billion euros over the next eleven years, the company aims to promote innovative measures to improve energy efficiency.

Aspect 2: renewable energy

At the same time, Bosch aims to increase energy generation from renewable sources at its sites from 55 GWh to 400 GWh by 2030, while raising its consumption of green electricity from new plants up to 40 % of its total energy consumption (so-called New Clean Power). To achieve this, Bosch is entering into long-term supply contracts and thus also promoting further construction of renewables-based power plants.

Water

Aspect 1: water scarcity

Climate scenarios predict that current water risks will worsen as a result of scarcity and poor water quality. For this reason, Bosch has replaced its relative target with an absolute one: by 2025, the company aims to reduce its absolute water consumption by 25 percent at 61 locations where water scarcity is an issue. To assess water risks and respond to them appropriately, Bosch uses the water risk filter developed by WWF. Bosch supports this project with investments of ten million euros per year in order to quickly make improvements and achieve the goals it has set.

Aspect 2: water quality

With a dedicated project in 2019, Bosch also aims to improve transparency in the area of water quality and wastewater management.

Urbanization

Aspect 1: life-cycle assessments

In an increasingly urbanized world, products are used on a daily basis whose production, use, and disposal leave an ecological footprint. To make this footprint as small as possible, Bosch has already carried out life-cycle assessments in its major product groups. These account for around 50 percent of the company's sales volume. The company uses the results of these analyses to identify potential for further improving its products' ecological and social impact. One important aspect of this is the idea of a closed-loop or circular economy.

Aspect 2: resources and waste

Waste in production is the second focal point of urbanization-related activities. Bosch has replaced its past targets with two new initiatives: reducing hazardous waste and increasing the material recycling rate.

Globalization

Aspect 1: responsibility

As a global company with some 460 subsidiaries and regional companies as well as 410,000 associates, Bosch is committed to social and environmental responsibility. Accordingly, the company aims to make the ecological, social, and economic impact of its business activities transparent, and to improve its performance in terms of sustainability. To this end, Bosch continues to improve its reporting practices in line with international standards and to communicate its progress annually. From the 2018 reporting year onward, a Factbook will be published that for the first time corresponds to the GRI Standards "Core" option.

Aspect 2: supply chain

As a company that does business responsibly, Bosch increasingly has an eye on the upstream supply chain (the suppliers of suppliers) in the context of the global flow of goods. Starting in 2019, Bosch aims to more clearly identify the ecological and social risks in its supplier network and, on this basis, further develop the existing measures.

Health

Aspect 1: health and safety

Bosch is committed to keeping people and the environment from harm. By 2020, the company aims to reduce the number of accidents per million hours worked to a maximum of 1.7. Since the majority of accidents are the result of human behavior, the company will analyze near-miss accidents intensively throughout 2019. The aim is to recognize accident and health risks for associates, and to introduce suitable preventive measures at an early stage.

Aspect 2: substances of concern

Ensuring that banned substances are not used and reducing the use of hazardous substances are decisive in protecting people and the environment. This applies both to manufacturing processes and the products themselves. To efficiently manage substance restrictions and bans, especially for products, Bosch is expanding its corporate material data management for compliance and sustainability (MaCS) system. The scalable IT system makes it possible to check lists of materials used in products automatically, and to ensure compliance with regulations. It has already been successfully rolled out at several of the company's divisions.

Smart connectivity

AI – INVENTED FOR LIFE

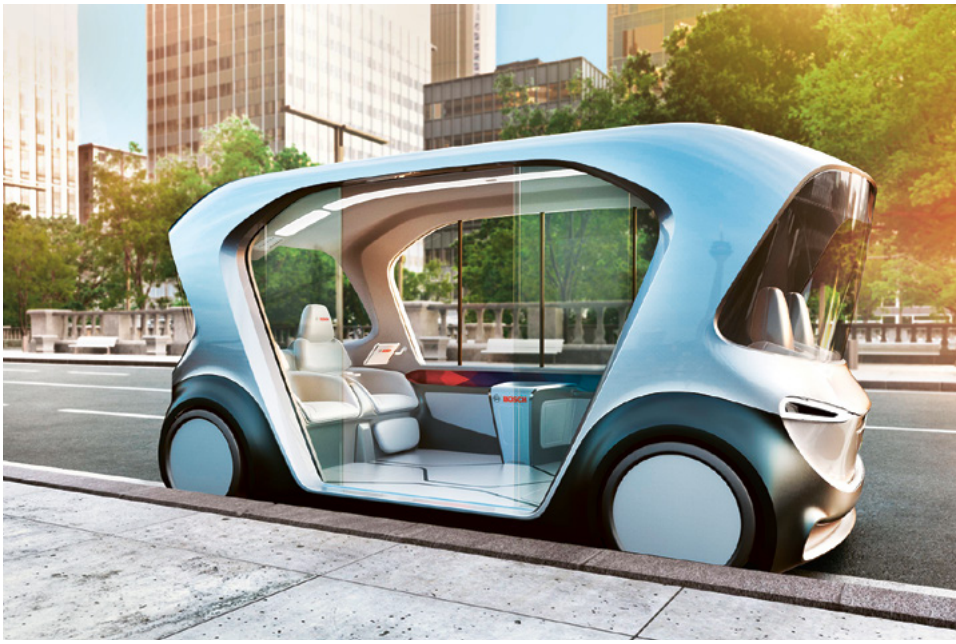
Three questions for Christoph Peylo, head of the Bosch Center for Artificial Intelligence

Mr. Peylo, why do we need artificial intelligence?
At Bosch, we aim to develop technologies that make life easier. Artificial intelligence makes an important contribution to achieving this goal. In the modern world, technological progress and digitalization have made many things so complex that people often find them difficult to manage. AI can reduce this complexity and make decision-making processes easier. It doesn't replace people, in other words: it supports them.

When it comes to AI, how did Bosch progress in 2018 and what are you currently working on?
We have now initiated more than 150 AI projects. We are currently working intensively on a manufacturing analytics system to optimize production processes. The system aims to identify errors in production processes and then correct them more quickly. To this end, we are developing an intelligent, data-based decision support system that provides the associates concerned with relevant information and thus helps them make decisions. In another project, we are using intelligent control systems to understand their influence on vehicle emissions and thus reduce these emissions. This example shows another important area of application for AI: the eco-friendly design of technical systems.

To a certain degree, intelligent machines act independently. This means they could potentially make wrong decisions. How can this risk be mitigated, and how can AI be used responsibly?
The use of AI calls for clear rules – if objects are intelligent, they can act independently. According to our understanding of social values, action also includes responsibility. This means that any actions must be compatible with social rules and values, and will be judged according to those rules and values. But a machine cannot tell whether its actions meet this requirement. This is why people are needed: they must make the rules that determine the machine's actions.

The whole interview can be found here:
sustainability.bosch.com



Driverless, connected shuttles will make mobility more sustainable in the cities of the future

These activities support the following Sustainable Development Goals: SDG 3, SDG 9, SDG 11

By 2020, about 250 million connected vehicles around the world will be engaged in a constant exchange of information with the Internet and their environment. Together with the automation and electrification of vehicles, this trend toward connectivity will be decisive in making the mobility of the future as accident-free, stress-free, and emissions-free as possible. In other areas of life as well, the Internet of Things (IoT) can play a role in tackling global challenges such as climate change and urbanization. For example, smart solutions can make food production more efficient and sustainable. The Bosch Group uses the potential of digital connectivity to develop innovative products and services that make everyday life easier for people around the world.

In the future, driverless connected electric shuttles will be a common sight on city streets. By 2025, about 2.5 million shuttlebuses are expected to be on the road in Europe, the United States, and China alone, ready to transport passengers on demand. Bosch supplies components and systems for the shuttles of the future – from electric motors and 360-degree surround sensor systems to connectivity solutions and services. In the future, Bosch will combine its digital mobility services intended to make driverless modes of transportation suitable for everyday use to form an intelligent and seamlessly connected ecosystem. These smart services will deliver information that helps drivers adapt their driving styles to weather and traffic conditions. If desired, a digital assistant will simultaneously make reservations while passengers are being driven from place to place.

Bosch and Daimler are currently planning to jointly develop an automated level 4/5 driving system with the aim of improving the flow of traffic in urban areas and enhancing road safety. In 2019, the cooperation partners will test an automated ride-sharing service in a pilot project in the Silicon Valley city of San Jose.

Driving safely without a driver

It is often a matter of a few centimeters: precise positioning is essential for the safety of autonomous vehicles. For driverless vehicles to position themselves with a high degree of precision, Bosch has developed a vehicle positioning and motion sensor (VPMS). This device has a high-performance reception unit that receives signals from the global navigation satellite system (GNSS). To give one example, satellite data making their way to earth can be distorted by cloud layers. In response to this challenge, Bosch makes use of correction data from various providers. Together with its partners, the company has set up the Sapcorda joint venture. With the help of a network of precisely mapped-out reference stations on the earth's surface, inaccuracies in the GNSS positioning information can be corrected. The correction data subsequently arrives in the car via a cloud or through geo-stationary satellites. In addition, the movement and position sensor has integrated inertial sensor technology, which is comparable to the human organ of equilibrium. Just as people use their sense of touch and balance to move, the sensor knows exactly where the vehicle is headed.

Connected driving can only be safe if vehicles are able to communicate with one another and their environment. They can then warn each other about traffic jams up ahead or other dangers, including accidents or slick roads. To date, there is no standard global technological basis for this exchange of data, which is also known vehicle-to-everything (V2X). Bosch has thus developed a connectivity unit that can process information in any of the transmission languages that smart vehicles use.

Innovative assistance systems such as adaptive range and speed controls make driving two-wheelers safer and less stressful

With the aim of eliminating road fatalities due to wrong-way drivers, Bosch uses a solution to issue alerts. In Germany alone, some 2,000 wrong-way drivers on highways are reported on in traffic alerts per year, and 20 people die as a result of wrong-way drivers annually. One in three wrong-way drivers stop after a distance of 500 meters. When it comes to issuing an alert, every second counts. Bosch has developed a cloud-based solution that alerts wrong-way drivers and endangered drivers in the vicinity within ten seconds. The application has already been integrated into 15 radio and navigation apps in 13 European countries. In Germany, the wrong-way driver alert function can be found on the radio app provided by Antenne Bayern.

Smart protection for motorcyclists

Radar-based assistance systems enhance motorcycle safety. The technology behind them combines a radar sensor, a braking system, engine management, and a human-machine interface. Bosch's adaptive distance and cruise control (ACC) system, for example, adjusts the vehicle's speed to the flow of traffic, and automatically maintains a set distance between the motorcycle and the vehicle ahead of it. The result is a smoother, more efficient ride. In addition, Bosch is the first supplier worldwide to have developed a production-ready ABS antilock braking system for e-bikes. It reduces the probability that the front wheel will skid, or that the rear wheel will lift off the ground when the brakes are suddenly applied. With this system, one-quarter of all accidents with pedelecs could be prevented. The ABS for selected models of pedelecs has been available since 2018. About 150 e-bikes equipped with this technology were tested at selected bicycle-fleet suppliers.

The future of freight transportation

When goods are transported in the future, smart technologies will reduce accidents, stress, and emissions to the greatest extent possible. This will cut costs, optimize logistics chains, and make driving easier. For instance, Bosch is electrifying the trailer axle to recover energy during braking. This energy can then be used to supply power to the truck trailer. Instead of allowing the trailer's axles to simply roll along as in the past, Bosch has now integrated an electric machine into them. Using this energy to run the cooling unit of a refrigerated trailer can save up to 9,000 liters of diesel fuel each year.

A modular powertrain design for light commercial vehicles, which puts the electric motor and power electronics in one unit, is making urban delivery vehicles cleaner and more efficient. In the

Bosch has developed a cloud-based solution that alerts wrong-way drivers and endangered drivers in the vicinity within ten seconds

future, a highly efficient fuel-cell powertrain will be used in long-haul heavy trucks. Bosch is pursuing this development project in cooperation with its partners Nikola Motors in the United States and Weichai Power in China. A fuel-cell system that will intelligently link all powertrain components is expected to be ready for production in 2021.

Connected services support drivers and logistics specialists even while goods are on the road. To ensure that the goods arrive undamaged at their destination, the data logger – a small box with integrated sensors – keeps track of their condition by measuring criteria such as temperature, humidity, and the rate of vibration. In addition, Bosch driver assistance systems make driving commercial vehicles more relaxed and safer. One such system is a radar-guided warning system for turns and blind spot detection, which gives drivers an early warning about other road users that may cross their path. If a collision with objects in front of the truck appears imminent, the predictive emergency braking system will automatically engage the brakes. The lane departure warning system keeps the vehicle within its lane with gentle steering interventions.

Connected agriculture

According to the United Nations' Food and Agriculture Organization (FAO), farmers will have to increase production by 50 percent by 2050 to feed a growing world population. To achieve this, smart technological innovations in agriculture are needed. The Bosch Plantect project in Japan is one example of what these innovations might look like. Until now, farmers have been losing large portions of their harvests because they do not know when pesticides can best be applied. With the help of artificial intelligence, Plantect optimizes greenhouse cultivation. Sensors measure important environmental parameters such as humidity, temperature, and solar radiation. The Bosch IoT Cloud analyzes the data and displays the results on an app. Pesticides can thus be applied in a more pinpointed manner. This approach has been successful: in a field test, the risk of plant disease was cut to one-third, and the use of chemicals was reduced by 30 percent.

Other projects

Coup is launched in Madrid
After Berlin and Paris, the Coup e-scooter sharing service developed by Bosch was launched in Madrid in September. With the help of an app, 850 electric scooters can be located and rented across the city. There are now 3,500 Coup electric scooters in use all over Europe. This service makes emissions-free and nearly noiseless local trips possible.

Better view with wide-angle mirrors
Bosch and its partner Mekra Lang have developed the Daimler Mirror Cam system. The exterior mirror system replaces the main and wide-angle mirrors with video sensors on the vehicle's cab. The images from the cameras are shown to the driver in real time on two high-resolution monitors. Moreover, its aerodynamic construction reduces drag, and thus cuts fuel consumption by up to two percent. In 2018, the new model of the Mercedes-Benz Actros was the first truck to include the Mirror Cam as standard equipment.

On the path toward carbon-neutral mobility
At three own service stations in Germany, Bosch has replaced conventional fuel with R33 Blue Diesel. Thirty-three percent of this fuel's components are from renewable sources, thus enabling a 20-percent reduction in CO_2 emissions. And that's not all: the Bosch board of management's corporate vehicle fleet has run on 100 percent renewable diesel since November 2018.

The Plantect smart sensor system optimizes the cultivation of tomatoes in greenhouses

Smart manufacturing

INTELLIGENT INNOVATIONS

Eco-friendly behavior and a safe workplace are important parts of the Bosch definition of sustainability. In each of these areas, the company honors innovative projects and approaches with its Environment, Health, and Safety (EHS) Award. In 2018, resource efficiency was added as a category alongside energy efficiency and safety. The response was very positive, with 105 project submissions from 19 countries. This was twice as many as in 2017, the year the awards were launched. The Bosch plant in Nashik was among the prize winners with a three-pillar model for systematic energy management and a photovoltaic facility. The improvement of the energy efficiency resulted in savings of 18,700 MWh between 2016 and 2018 alone.

More information about the EHS Award recipients can be found at: sustainability.bosch.com

These activities support the following Sustainable Development Goals: SDG 9, SDG 12, SDG 13

A healthy environment and the availability of natural resources are prerequisites for a strong economy and the livelihoods of current and future generations. For this reason, the quest for feasible solutions to challenges such as climate change and resource scarcity is a pressing social challenge. According to the United Nations Environment Program's Emissions Gap Report, global CO_2 emissions reached an all-time high of 53.5 gigatons in 2018. This development makes the Paris climate targets even more difficult to achieve. As a manufacturing company, the Bosch Group believes it has a special responsibility. To actively shape climate action and mitigate negative environmental impact, the company actively reduces direct and indirect CO_2 emissions, relies on eco-friendly technologies, makes its locations more energy efficient, and uses resources responsibly.

Climate, energy, and water are among the global issues that Bosch has addressed with its "New Dimensions – Sustainability 2025" target vision. For these and other issues, the company has defined medium-term targets. Reducing the CO_2 emissions of Bosch locations is one focus of the company's sustainability-related activities. In 2020, Bosch wants to reduce the emissions it can influence directly (Scope 1 und 2) to zero (see page 8). Compared with the 2007 reference year, in 2018 the company had already reduced its emissions relative to value added by 31.1 percent. Thousands of projects and individual measures at Bosch locations worldwide have contributed to this.

A role model for other sites

The Bosch location in Bidadi, in the Indian state of Karnataka, works consistently to achieve carbon neutrality, and focuses on reducing emissions to a minimum. Based on four pillars, the strategic initiative that took third prize at the internal EHS Awards 2018 shows how it is done. To reduce its CO_2 emissions significantly in the next four years, Bidadi is relying on renewable energy and on using a proprietary Bosch energy platform to analyze its energy consumption. In addition to this, the location is making greater use of liquid natural gas rather than diesel and methane for its heating needs, which also helps reduce greenhouse gas emissions. It has also supported local initiatives that have planted trees or cultivated vegetables and herbs on the plant premises.

Bidadi wants to achieve most of its CO_2 savings with solar energy. In the coming years, the location is planning to install more solar panels, with the aim of gradually increasing capacity from the current 4.7 MWp to 15 MWp. The ultimate goal is to cover 43 percent of the location's total energy needs with energy from renewable sources. Consistent energy monitoring helps identify untapped potential for efficiency, continuously improve processes at the location, and thus further reduce CO_2 emissions. As the key figures show, Bidadi is on the right path with its comprehensive approach: between mid-2016, when the project was launched, and mid-2018, it was able to reduce its CO_2 emissions by 37 percent. It has thus come one step closer to realizing the vision of carbon neutrality.

Sustainability: a group effort

For Bosch, the efficient use of energy is a matter of ecological and economic responsibility, and a strategic priority in terms of sustainability. Bosch sees climate action not just as the responsibility of companies, but also as a social responsibility, which calls for the commitment of each and every individual. Increasing associates' awareness of the issue and encouraging them to act in a sustainable manner across units and locations were central aims of the 2018 Energy Efficiency Week at the Bosch location in Curitiba, Brazil. For five days, associates there were invited to take part in events and attend presentations on improving energy efficiency. In addition, 20 associates worked on developing their own energy-saving ideas in four project teams. At the end of the week, the teams presented their results, the feasibility of which are now being assessed with creative techniques such as design thinking. The winning team's project alone has the potential to save 85,000 kWh of energy annually at the location. Along with the other 200 suggestions made during Energy Efficiency Week and the newly appointed ambassadors for CO_2 reduction, a good foundation has been laid for effectively addressing the topics of energy efficiency and climate protection in the future as well.

Taking the entire life cycle into account

While the manufacture, use, and disposal of products are generally the focus of initiatives to protect the environment, other factors need to be taken into account as well. For instance, the production of raw and auxiliary materials as well as fuels that are used in manufacturing also have an impact on the environment. Conducting life-cycle assessments (LCA) makes it possible to assess the environmental impact of products and services throughout their life cycles in a systematic and comprehensive manner. Bosch teams at different units and locations are now using this method to analyze resource consumption and CO_2 emissions in relation to product use, on the basis of which they can assess the impact on global warming and derive improvement measures accordingly. Life-cycle assessments have already been carried out for all the major Bosch product groups.

The work of six associates in Brazil offers one good example of how the LCA method has been applied. In October 2018, they gave a presentation titled "Life Cycle Assessment – The Sustainable Development of Products," at the 14th Sustainability Forum (XIV Fórum de Sustentabilidade) of the National Association of the Automotive Components Industry in São Paulo. During the event, representatives from science and industry discussed the concept of product life cycle, as well as its potential and prospects for the future. The Bosch team's work was one of three projects to receive an award at the Forum.

Other projects

A flat rate for energy efficiency
Older household appliances often use unnecessarily high amounts of energy, and are incorrectly disposed of. In the Netherlands, Bosch now offers a sustainable solution for both of these challenges. With the Blue Movement initiative, consumers can rent energy-efficient washing machines and dryers for a monthly fee. Bosch then assumes the cost of potential repairs and handles the recycling and reprocessing of discarded machines.

World Environment Day in India
Using the tagline "Beat Plastic Pollution," in June 2018 Bosch India celebrated World Environment Day and helped increase the environmental awareness of its associates. Among other things, associates looked for alternatives to plastic and examined ways of collecting rain water in their own homes.

Bosch Blaichach receives prize for energy management
The plant in Blaichach, Germany, was another recipient of a Bosch EHS Award. There, Bosch uses an online software solution to monitor the energy consumption of each machine and make suggestions for improvement. So far, the pilot project has enabled some 120 tons of CO_2 to be saved by the plant's 19 machines.

In Japan, a development team headed by Bosch partnered with the Japan Auto Parts Industry Association (JAPIA) to address questions related to life-cycle assessments in the automotive sector. Together, the experts developed techniques that make it possible to estimate and assess ecological risks in the production and use of vehicles. The innovative calculation methods, which the Japanese Ministry of Economics, Trade, and Industry honored at the LCA Japan Forum in 2018, are easy to use, requiring only technical product data and simple tools to assess environmental impacts.

Sustainable water management

Bosch is committed to using water responsibly at all its locations and is working continuously to reduce water consumption. In so doing, the company focuses especially on regions such as Brazil and India, where water scarcity is a major challenge. By 2025, Bosch aims to reduce absolute water consumption by 25 percent at more than 60 locations.

The Bosch plant in Campinas, Brazil, shows how this target can be achieved. Opened in 1960, the location has thoroughly overhauled its water management practices in recent years. In addition, it has installed treatment facilities for drinking and industrial water, and built an artificial lake that collects rain water for industrial use. As a result of these measures, the Bosch Campinas site has reduced its consumption of water from the public network by 90 percent. Prior to making these changes, the site consumed some 360,000 cubic meters of water from the public system each year, a third of which flowed back into the municipal network as wastewater. Another third evaporated during manufacturing. Today, Bosch uses mainly its own rainwater reservoir for industrial purposes as well as treated water. As a result, the site has not only reduced the amount of fresh water it consumes, the wastewater it produces has decreased by 43 percent.

In Ahmedabad, India, Bosch has also implemented several measures to reduce its water consumption and use the valuable natural resource as responsibly as possible. Thanks to a reservoir with 23 soakaways, the location now returns about 81,000 cubic meters of rainwater to the natural water cycle each year. Moreover, a water pipe more than 3.7 kilometers long helps enable the use of surface water rather than ground water. And the Ahmedabad location uses only treated water to water the site's green spaces. The site monitors overall water consumption with the help of measurement tools. In 2017, these measures helped save some 10,400 cubic meters of water, about 18 percent of total water consumption.

The Bosch site in Blaichach, Germany, relies on smart energy management

Smart commitment

LEARNING AT BOSCH

In the future, around three-quarters of all jobs will require specialist knowledge in the STEM disciplines (science, technology, engineering, and mathematics). However, the number of people studying these subjects is declining in many countries. To spark enthusiasm for the STEM subjects at an early stage, Bosch has launched the Learn@Bosch initiative in Australia. The project invites sixth graders to the Bosch site in Clayton, where they meet associates and learn how cutting-edge technologies work, from augmented reality and 3D printing to robotics. More than 1,000 pupils from 17 schools took part in the program in 2018. The initiative is the only one of its kind in the country, and has been made part of the state of Victoria's education network. In 2019, Learn@Bosch will be rolled out at other locations.

Read more about Learn@Bosch online at sustainability.bosch.com

Bosch Jugendhilfe not only provides financial support to the children of associates in Germany, it also regularly organizes workshops on different topics

Promoting social cohesion

These activities support the following Sustainable Development Goals: SDG 1, SDG 3, SDG 4

Education shapes the foundation of an independent life and social participation. This is why, at almost all its locations around the world, the Bosch Group supports local, associate-driven initiatives and projects aimed at helping children and young people. To provide long-term help, Bosch has set up corporate foundations that carry out educational and social projects in Brazil, China, India, Mexico, and the United States. In 2018, the foundations made 9.8 million euros available for local projects. Bosch also focused its efforts on disaster relief. The company responds to global crisis situations by donating goods and money, while local associates contribute their time to rebuild and provide immediate assistance. In total, the Bosch Group provided 24.5 million euros for charitable causes in 2018.

According to a recent United Nations analysis, 70.4 million people between the ages of 15 and 24 are currently unemployed around the world. Many of these people live in India, the country with the highest number of young people worldwide. Fifty-six percent of India's unemployed are school dropouts who cannot find work because of poverty, lack of access to education, and a lack of knowledge about the labor market. With the BRIDGE program (an acronym for "Bosch's response to India's development and growth through employability enhancement"), the Bosch India Foundation offers young unemployed people the opportunity to gain the entry-level skills they need to find work in a broad range of areas. In 2018, 7,000 participants found jobs after having taken part in the training program offered at 250 BRIDGE centers in India. When it comes to successful learning, health is decisive. For this reason, Bosch India is committed to promoting the health of children at state schools, for instance with regular check-ups and information sessions on the importance of hygiene. Since it was founded in 2013, the BRIDGE program has reached some 70,000 pupils at 300 state schools.

Helping children in China's cities

Chinese society is currently characterized by a major rural-urban population shift. Some 286 million migrant workers are currently hoping to achieve a better standard of living in China's cities. About 34 million children have moved to cities as a result, and they face many unexpected challenges. Since October 2018, Bosch China has funded the Voices of New Citizens project, which is run by the Center of Youth Talent Enlightened (CYTE), a start-up in Shanghai that is dedicated to promoting the social integration of migrant children. In a program that is tailored to their needs, children from rural regions

learn how to find their way in the big city. The program aims to close gaps in children's education, for instance by teaching them digital and soft skills. Since the program was launched in 2012, 2,000 volunteers have worked with some 30,000 migrant children and helped make their integration easier.

In addition to this, Bosch China has also supported the Voice for Love initiative, which also aims to help the children of migrants in cities. With a curriculum based on experimentation, the children find their voice and develop their personal and job-related skills. Since the project was launched in October 2018, specially trained volunteers have worked with 117 migrant children.

Fully committed to the communities close to Bosch locations

In addition to the work of the foundations, Bosch supports local projects around the world in the communities close to its locations, among them the Caacupé Catholic training center for unemployed youth in Buenos Aires. The organization works with residents of the city's largest slums, many of whom face unemployment, violence, and addiction, and helps them in their job search with a broad range of courses and individual support. In 2018, Bosch Argentina financed the building of a mechanical workshop, which makes automotive repair lessons more hands-on. Moreover, Bosch associates in Argentina volunteered their time by giving presentations on topics such as electric measuring methods and the automotive market. Each year, 1,600 people from the region take part in the Caacupé Center's job training. Starting in 2019, program graduates will be offered jobs in the Bosch Car Service network.

In Germany, a child's educational success is strongly influenced by their parents' level of education. To change this, Bosch's Jugendhilfe iniative encourages the children of associates who have completed occupational training to achieve a higher level of education than their parents. Children of associates with limited financial means receive scholarships. If needed, schoolchildren and university students can receive funding to study abroad or get extra tutoring, participate in various workshops, or get a monthly allowance to buy books. Bosch associates also take an active role as mentors, thus becoming role models and confidants for the children. In 2018, Bosch Jugendhilfe celebrated its 80th anniversary and supported 89 university students and 57 schoolchildren in Germany.

Rapid local response

In the event of a natural disaster, both emergency relief and long-term rebuilding efforts are very important for the people affected. In September 2018, Hurricane Florence caused major damage on the east coast of the United States and affected more than 5,500 Bosch associates at ten locations. Via the Bosch Community Fund, Bosch donated 200,000 U.S. dollars to different aid organizations, thus providing immediate help to victims in the form of food, accommodation, medical care, and clothing. In addition to this, Bosch partnered with the Red Cross to give associates the opportunity to make direct donations. Bosch plans to top up private donations to 25,000 euros and invest in the rebuilding effort.

Other projects

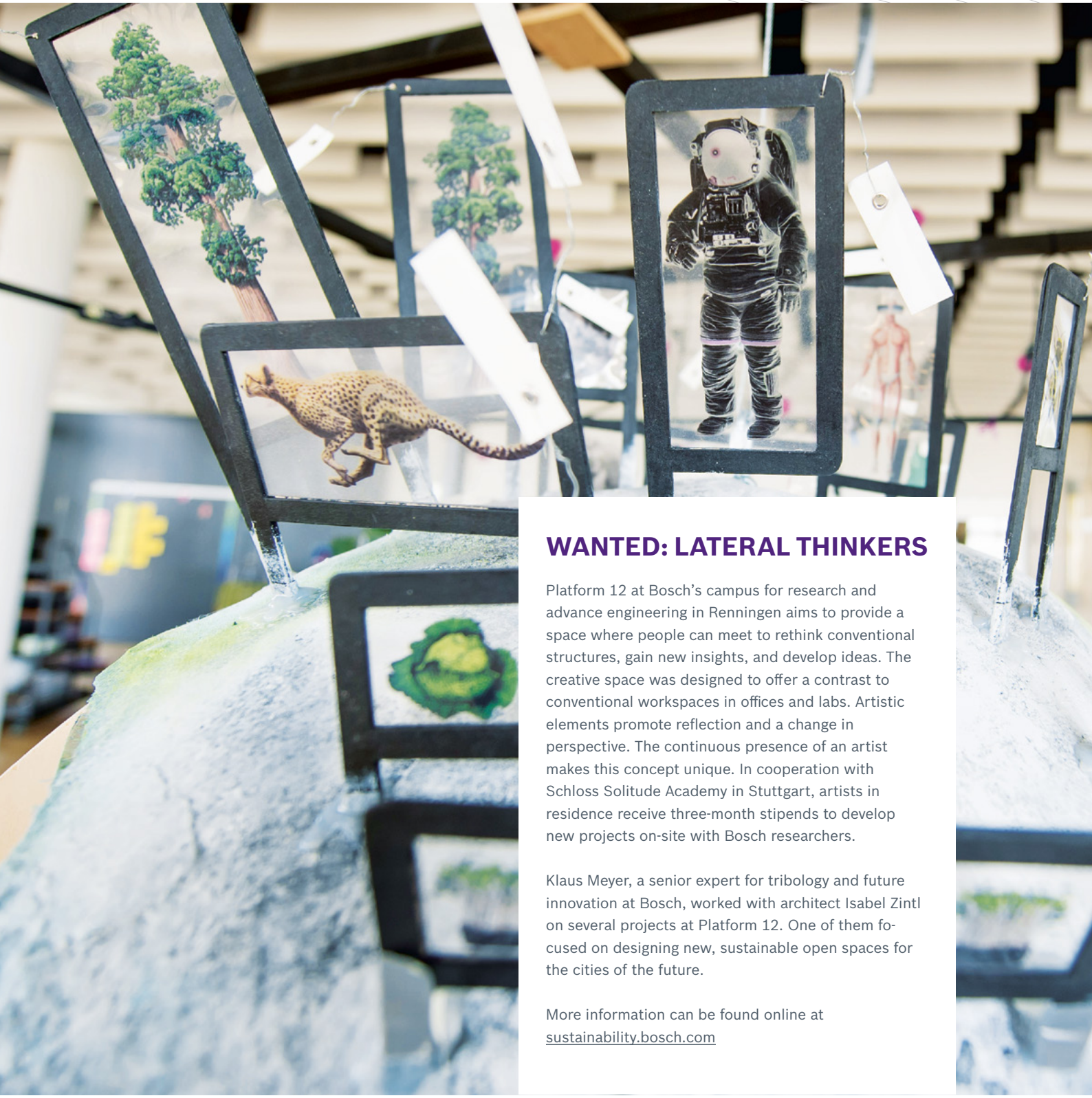
Cents for Help
With the Cents for Help initiative, more than 70 percent of Bosch associates in Germany donate the cent amount from their net pay to charitable initiatives. The company then matches the amount. In 2018, a total of 1.1 million euros was collected. Associates are invited to suggest projects toward which the funds go, both in Germany and abroad. Last year, a total of 210 projects received between 300 and 50,000 euros in funding.

Missione Ambiente celebrates its tenth anniversary
In 2018, the Missione Ambiente environmental education project in Italy celebrated its tenth anniversary with the Clean Air competition. The contest raised awareness among schoolchildren for day-to-day activities that help protect the environment. Since the project was launched, some 1.25 million young people at elementary and secondary schools have been reached.

Micropayments for a warm shower
After a visit to Peru, Bosch associate Sara Carvalho developed a business model that aims to make hot water affordable for poor people: a microcredit provider lends needy people money for a solar water heater, and they pay for it in installments via their cell phones. The heater is remote-controlled, and can be switched off if customers do not pay.

Microcredits enable the poor to buy solar water heaters

Smart education



WANTED: LATERAL THINKERS

Platform 12 at Bosch's campus for research and advance engineering in Renningen aims to provide a space where people can meet to rethink conventional structures, gain new insights, and develop ideas. The creative space was designed to offer a contrast to conventional workspaces in offices and labs. Artistic elements promote reflection and a change in perspective. The continuous presence of an artist makes this concept unique. In cooperation with Schloss Solitude Academy in Stuttgart, artists in residence receive three-month stipends to develop new projects on-site with Bosch researchers.

Klaus Meyer, a senior expert for tribology and future innovation at Bosch, worked with architect Isabel Zintl on several projects at Platform 12. One of them focused on designing new, sustainable open spaces for the cities of the future.

More information can be found online at sustainability.bosch.com

These activities support the following Sustainable Development Goals: SDG 3, SDG 5, SDG 8, SDG 9

The Bosch Group is well on its way to becoming a leading IoT company, and is driving innovation forward in the areas of robotics, automation, and artificial intelligence. This is reflected in the range of jobs at the company: today, half of all open positions are related to either software or IT. The company is planning to increase the number of IT experts from 1,000 today to 4,000 by 2021. To prepare its associates for changing requirements, the company has spent 280 million euros on professional training. The digital age also calls for a rethink of well-being and occupational health. Last year, the company thus also focused on innovative approaches to occupational safety and corporate health management.

With the concept of "learnagility," which Bosch defines as the ability to gain knowledge faster, more effectively, and more efficiently, the company wants to prepare its associates for the future. In the form of the Bosch Learning Company initiative, which was launched in 2016, Bosch has already built the framework required to do this. The comprehensive approach is based on the three building blocks of new content, IT tools and methods, and a modern culture of learning. In 2018, the initiative's offerings were significantly broadened. Building Block 1 – training programs in the context of the digital transformation – was expanded to include courses for executives in Europe, North America, and Asia Pacific, to give them the tools to communicate a basic understanding of digital change to their teams. With Building Block 2, digital learning, Bosch has expanded its infrastructure with the Bosch Learning Portal, among other things. Associates can use this central intranet platform to put their own individual learning program together. Thanks to new collaborations with selected online universities and e-learning providers, associates can also take advantage of learning opportunities ranging from basic to university level. In addition to this, Bosch Tube went live in December.

This internal video channel offers associates the chance to make their own learning content available – from instructional videos and presentations to project highlights. Within one month of its launch, 8,000 videos had already been published. In addition to this, a Bosch Tube app is planned for next year. In Building Block 3, the Learnagility Toolbox, Bosch has expanded its portfolio of informal learning offerings. In 2018, self-organized learning forums took place worldwide. These informal learning events, which usually last half a day, focus on the interdisciplinary exchange of knowledge and experience among roughly ten colleagues. The learners organize the events themselves on topics of interest or relevance to them – without a trainer or program.

In addition, the Brain Snack program was launched last year. Four times each year, external experts are brought in to discuss hot topics related to society and technology with associates from all hierarchical levels. In the program's first year, Brain Snacks were held at five German locations on topics such as "megatrends in the automotive industry" and the "corporate culture of the future."

Understanding unconscious bias

Innovative strength calls for training opportunities and a work environment in which everyone's special skills are valued. Achieving this requires that prejudice and stereotypes are actively addressed. As part of its diversity management program, in 2018 Bosch increasingly focused on unconscious thought patterns, otherwise known as unconscious bias (UB), which contributes to reinforcing stereotypes. Since 2015, Bosch has conducted some 180 workshops with around 4,000 associates at 37 German locations. In addition, numerous workshops in more than 20 countries around the world have sensitized associates from all areas and hierarchical levels to their unconscious bias.

Since 2018, Bosch has also offered a special seminar for HR specialists and executives. In selecting talented people, objectivity is especially important. In interactive group exercises, participants analyze their own prejudices, receive tips for their day-to-day work, and apply their knowledge when evaluating job advertisements. The first pilot training session took place in spring 2018 at the Stuttgart-Feuerbach location. Since then, the seminars have been offered throughout Germany, and in 2019 they will be launched worldwide. Unconscious bias was also the focus of Diversity Day on April 26, 2018, at some 200 Bosch locations around the world.

In the Brazilian Ambassadors of Inclusion training program, ambassadors learn how living with a disability feels

Diversity in action

To ensure that associates interact with each other without prejudice, people with disabilities must also be accepted as an integral part of teams, and must have the opportunity to focus on their abilities rather than their limitations. At the Campinas site in Brazil, for example, associates are actively involved in inclusion-related efforts. In the Ambassadors of Inclusion project, more than 300 trained ambassadors are now helping address the concerns of associates with disabilities. They ensure that the day-to-day work of the approximately 200 disabled colleagues is more visible and promote projects to improve accessible infrastructure. What is more, the ambassadors motivate the workforce to actively reduce barriers in their interaction with colleagues with disabilities, for instance by attending sign language training seminars. In 2018, the concept was awarded the "Good Practices for Employees with Disabilities" prize by the State Office for the Rights of Persons with Disabilities in São Paulo.

The Japanese locations in Higashimatsuyama, Shibuya, and Yokohama also encourage associates to support colleagues with disabilities. In 2017 and 2018, three business support centers were opened that are addressing the needs of associates with mental disabilities. Statistics show that in Japan, half of all people with mental disabilities leave their jobs after only one year. The Bosch locations are taking measures to prevent this: each of the 19 associates with mental disabilities has a mentor who provides feedback and helps them achieve their personal goals. At the same time, the former also support interns and thus also have their own responsibilities.

Health and safety at work

Bosch is also breaking new ground in the areas of health and occupational safety. At the Abstatt location in Germany, the company opened a new health center that houses a range of services under one roof for the first time: social services, the company doctor, physiotherapy, health management, and a fitness area. Having everything close by makes it possible for the different areas to cooperate with one another with the aim of promoting the health and well-being of associates. With its comprehensive approach, Abstatt is a trailblazer within the Bosch Group, and will serve as a role model for other locations in the future.

At Bosch, occupational safety takes many forms. At the Bursa site in Turkey, safety experts focus on accidents that are the result of human behavior. To promote safe behavior, they have introduced four measures: first, they are raising awareness of hazards by making occupational safety an integral part of site meetings and the employee suggestion system. Second, each month the Bosch site in Bursa gives a prize to the unit with the best safety record, and also honors the best ideas related to occupational safety. Third, training videos featuring associates address the specific challenges of their departments. And fourth, poster campaigns have increased awareness of safety. The approach has been successful: between

At Bosch sites in Higashimatsuyama, Shibuya, and Yokohama, Japan, all 19 associates with mental disabilities have a mentor to support them

The Safe Hands campaign in China sensitizes Bosch associates to safety risks in the workplace

2016 and 2018, the accident rate per million hours worked at the Bursa site fell by 52 percent. As a result of the preventive measures, associates reported 37 percent more dangerous situations that almost led to accidents, and the number of suggestions related to occupational safety increased by 112 percent. For its commitment to improving safety, the location received the Bosch EHS Award for 2018 in the safety category.

At Bosch locations in Italy and Korea, near-miss accidents were also in focus in 2018. Even when incidents do not end in accidents, it is very important that they are well documented so that safety measures can be adopted accordingly. At the Milan and Daejeon sites, conventional reporting systems have recently been replaced with a QR code system: QR codes have been placed at central locations such as in employee kitchens or on the floor, thus making it easier to report dangerous situations. If the code is scanned via a business cell phone, anomalies can be recorded quickly and forwarded to safety staff.

Safety experts in China have initiated the Safe Hands campaign. In a first step, the aim was to raise awareness about safety risks and clearly communicate responsibilities related to occupational safety. This goal was achieved with the EHS Week: for an entire week, the topic was the focus of several communication measures and workshops. Furthermore, local activities were held at 21 locations, with highlights shared easily via a WeChat group. Overall, the campaign reached 10,000 associates.

Concepts such as these have helped further reduce accident rates at Bosch. In 2018, the number of work accidents decreased within a year from 2.3 to 2.2 per million hours worked. As a result, the company came a step closer to reaching its ultimate goal of 1.7 or fewer accidents per million hours worked by 2020.

Other projects

Honors for the Bosch LGBT network
The German Prout at Work foundation honored RBg, the global Bosch lesbian, gay, bisexual, and transgender network, with its Big Impact Initiative Award 2018. The award honors effective public relations work, social media campaigns, and networking efforts that promote the public discussion of equal opportunities in the workplace.

A top employer in Argentina
Bosch took second place in the employer ranking of Apertura, a well-known business magazine. The ranking was based on a survey of human resources departments at Argentina's large companies and included aspects such as salaries, atmosphere at work, and advancement opportunities.

The year **in review**

01

JANUARY

Germany

A creative work environment at the new IoT campus

At the new IoT campus in Berlin, more than 250 Bosch associates are developing connected solutions in the areas of Industry 4.0, mobility, smart cities, and smart homes. The experts are working with the design thinking approach to innovation, and can quickly develop user experience prototypes at their workshop and test them with customers.

03

MARCH

China

Paperless work with digital process chains

Eco-friendly and efficient: the electronics plant in Wujin, China, resigns almost completely on paper as the first Bosch site. Instead of using paper, the plant relies on a range of digital assistants that connect equipment, machines, and systems to one another in a centralized data model. Each year, the digital approach saves the Wujin plant 17,500 working hours, more than 200,000 euros, and 200,000 sheets of paper.

06

JUNE

Switzerland

Daily helpers on e-cargo bikes

The Collectors home delivery service delivers shopping, picks up recycling, and takes the laundry to the laundromat with e-cargo bikes that are powered with Bosch Performance Line drives. Since the social and environmental project was launched two years ago in the Solothurn region in Switzerland, it has been very successful. The eight Collectors drivers now support more than 150 subscribers and make about 8,000 deliveries per year.

07

JULY

Germany

Self-built solar boat cup

Getting young people in Germany interested in the technical professions was the aim of the fourth Solar Boat Cup at an outdoor pool in Lohr. In cooperation with apprentices from Bosch Rexroth AG, ninth graders at high schools from Lohr, Gemünden, and Karlstadt spent a week building their model boats. At the end of their project phase, the five teams presented their solar-powered remote control boats and put them to the test in a race.

AUGUST

India

Water-based cooling system introduced in Chennai

In Chennai, India, the summer months are hot. With a three-level, water-based, and energy-efficient cooling system, the Bosch site in Chennai has succeeded in lowering the indoor temperature to 28 degrees Celsius and in reducing relative humidity by 15 percent. In addition, the cooling system reduces annual CO_2 emissions by 60 percent.

08

OCTOBER

China

Maximum security on Hong Kong's Zhuhai-Macau Bridge

At the end of October 2018, the longest ocean bridge in the world was opened as the first direct connection between Hong Kong, Macau, und Zhuhai. The infrastructure project requires the highest standard of security: Bosch installed 5,700 loudspeakers, which are connected to a digital public address and evacuation system. In addition, 2,000 Bosch HD cameras continuously monitor important areas, such as the customs office.

10

Key figures

ENVIRONMENT

	Reference year 2007	2016	2017	2018
CO_2 emissions[1] thousands of metric tons	**2,586** 0%*	**3,131** −30.6%*	**3,225** −32.8%*	**3,259** −31.1%*
Total energy consumption in GWh	**6,707** 0%*	**7,602** −35.1%*	**7,803** −37.2%*	**7,844** −37.3%*
Electricity[2]	4,538	5,317	5,510	5,554
Natural gas[3]	1,234	1,513	1,517	1,512
District heat, steam, cooling energy[4]	199	211	195	199
Wastewater millions of cubic meters	**13.9**	**15.2**	**14.9**	**16.3**

	Reference year 2015	2016	2017	2018
Waste thousands of metric tons	**675.4** 0%*	**692.5** −1.5%*	**717.4** −4.1%*	**711.4** −3.5*
Water withdrawal millions of cubic meters	**19.34** 0%*	**19.36** −3.9%*	**19.25** −10.1%*	**19.80** −6.3*

* improvement relative to value added

COMPANY

	2018
Sales in millions of euros	**78,465**
Research and development costs in millions of euros	**5,963**
Environmental protection investments in millions of euros	**76.2**
Environmental protection expenditure in millions of euros	**133.4**

PRODUCTS

	2018
Patents	**5,996**
Key materials thousands of metric tons	**2,285**
Steel	1,695
Aluminum	292
Plastics	298
Supplier audits Quick scan assessments	**2,145**

SOCIETY

	2018
Bosch donations for charitable causes in millions of euros	**24.5**
Robert Bosch Stiftung in millions of euros	**153**
Regional commitment in millions of euros	
Bosch Community Fund (Farmington Hills, USA)	4.4
Bosch China Charity Center (Shanghai, China)	2.5
Instituto Robert Bosch (Campinas, Brazil)	0.9
Bosch India Foundation (Bengaluru, India)	1.7
Fundación Robert Bosch México (Mexico City, Mexico)	0.3

ASSOCIATES

	2016	2017	2018
Associates total	383,917	402,619	**409,881**
Share of women in percent			
Total workforce	26.2	26.9	27
Management positions	15.4	16.1	16.6
Training days	734,000	671,000	**680,000**
Training expenditure in millions of euros	250	260	**280**
Work accidents per million hours worked	**2.7**	**2.3**	**2.2**
Work accidents	1,849	1,649	1,567
Work days lost	28,992	27,941	31,449

(1) Scope 1 + 2, Greenhouse Gas Protocol
(2) Purchased electricity, minus resold electricity and self-generated energy sold
(3) Standardized
(4) Standardized

The Bosch Group at a glance

The Bosch Group is a leading global supplier of technology and services. It employs around 410,000 associates worldwide. It comprises Robert Bosch GmbH and its roughly 460 subsidiaries and regional companies in more than 60 countries. In 2018, the company generated sales of 78.5 million euros.

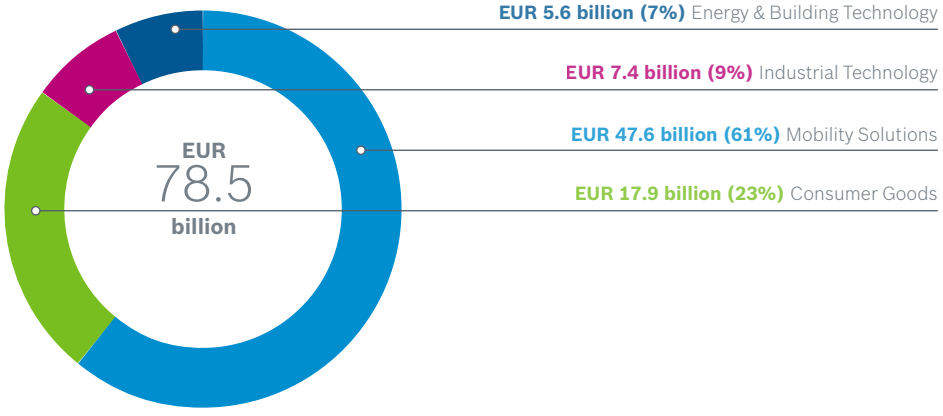
The Bosch Group's operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The company's overriding goal is to develop technology that is "Invented for life": Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. Its strategic objective is to deliver innovations for a connected life. As a leading IoT company, and with its expertise in sensor technology, software, and services, Bosch offers groundbreaking inspiration for smart homes, smart cities, connected mobility, and connected manufacturing.

The basis for the Bosch Group's future growth is its innovative strength: at 130 locations, some 68,700 associates are working in research and development. By 2021, Bosch also plans to quadruple the number of its in-house AI experts from 1,000 to 4,000.

Committed to social responsibility

The company ownership structure secures the Bosch Group's financial independence and allows the company to plan for the long term and make upfront investments in its future. Ninety-two percent of the share capital of Robert Bosch GmbH is held by the charitable foundation Robert Bosch Stiftung GmbH, and the majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The remaining shares are held by the Bosch family and by Robert Bosch GmbH. With the company's dividends, Robert Bosch Stiftung supports a broad range of charitable causes in the areas of society, health, intercultural understanding, and science.

Sales revenue



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