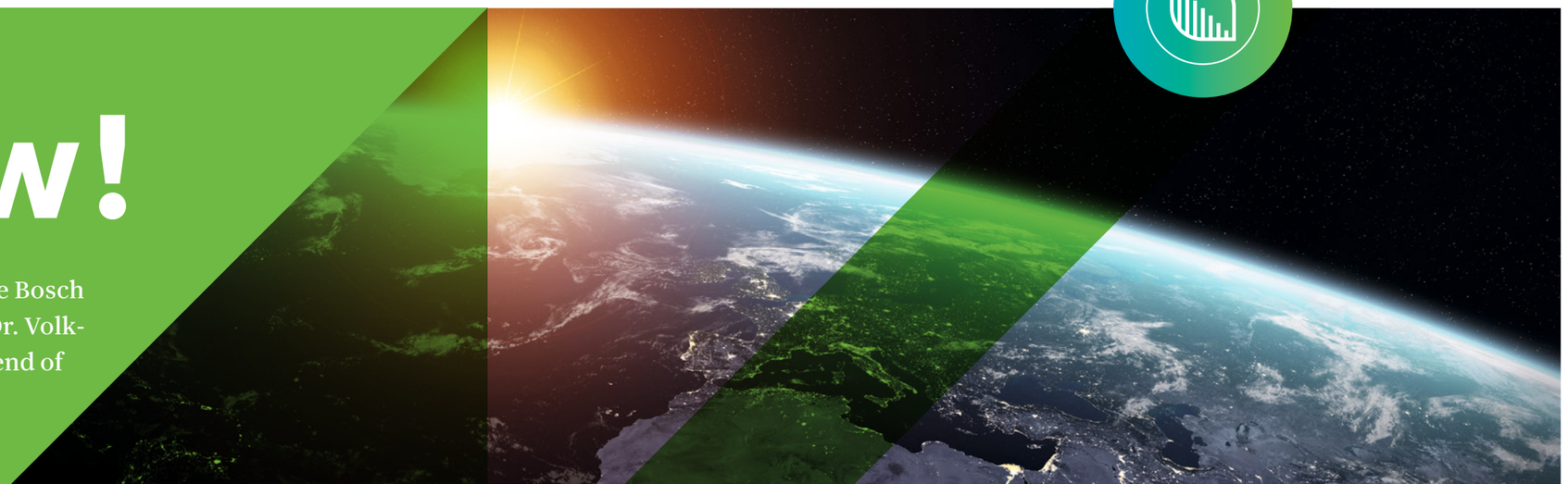

BOSCH
Invented for life
BOSCH
CHINA
SUSTAIN-
ABILITY
REPORT
2020
Bosch CO_2 neutral

Done. **Made it.**

Bosch is pursuing its sustainability goals systematically and vigorously. The "New Dimensions – Sustainability 2025" target vision defines key topics: climate, energy, water, urbanization, globalization, and health. Selected examples from 2020 illustrate what Bosch China has achieved specifically in sustainability, talents and charity.

We can do it. Here and **now!**

Stuttgart, May 9, 2019, annual press conference of the Bosch Group with journalists from all over the world. CEO Dr. Volkmar Denner announces an ambitious project: by the end of 2020 all Bosch locations are to be climate neutral.



No other global industrial enterprise has formulated a comparable voluntary commitment and made a similarly ambitious promise to the environment.

Since 2020, the Bosch Group has been climate neutral. The more than 400 locations worldwide no longer leave a CO_2 footprint with their activities (scopes 1 and 2), including 46 locations in China, among which 38 are manufacturing sites for business from mobility solutions, industrial technology, consumers goods to building technology. As both the practitioner of achieving carbon neutrality and the provider of climate solutions, Bosch sees the achievement in climate neutrality a key milestone and hopes that its experience offers insights for peers and partners who are willing to act for the common climate challenge.

WHEN IT COMES TO CLIMATE CHANGE, WORDS ARE NOT ENOUGH. WE HAVE TO TAKE ACTION | Dr. Volkmar Denner, chairman of the board of management of Robert Bosch GmbH

Lever 1: Improve energy efficiency

It is the most profound lever among the four and the closest to manufacturing activities. Since 2019, more than 0.38 terawatt-hours (TWh) of energy have already been saved through efficiency measures at some 400 Bosch locations worldwide, and this figure is to be raised to 1.7 TWh by 2030. To achieve this goal, Bosch intends to invest a total of around one billion euros by 2030.

The key to achieving higher energy efficiency is sensing the potential. According to the second law of thermodynamics, energy transfer is accompanied by energy loss. In each step of energy transfer lies the potential of energy saving.

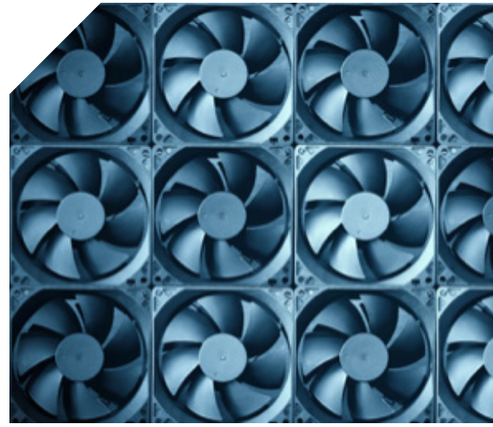
Facility utilities and manufacturing facility upgrade

Electrical power is the main source of energy for Bosch factories and office facilities. Utilities and manufacturing equipment need almost non-stop supplies of the kinetic power from motors, compressed air and fans. Upgrading these utilities and equipment to meet actual requirements can result in substantial energy saving. For instance, replacing regular motors with permanent magnet motors; recovering from compressed air; and variable frequency updates for equipment. Other than providing kinetic power, electrical power is also the source of lighting and air conditioning. Therefore using LED lights, anticipating heating and cooling needs and adjusting power accordingly and even free cooling mean visible cost saving.

Energy management system

A finer sensing and controlling of the flow of energy will have an accumulative result of energy saving. In essence this is the result of intelligence. An energy management system that senses the energy saving potential and offers insights is equally powerful for the facility utilities and for the manufacturing processes.

Manufacturing processes ask fine control of the environment, for instance dust-free, a narrow margin of temperature and humidity fluctuation. The fine control of the environment requires the fine orchestration of facility utilities and manufacturing equipment, namely the heating, cooling, air handling, filtering, dehumidification. Not only their operating hours, but also standby and pre-heating hours. In other words, the complexity of the progresses means more steps of energy transfer, thus energy loss. Having control of these steps requires sensing the flow of energy in each step and act accordingly. For instance, if concurrent needs of heating and cooling exist in the same areas of the factory floor, then decreasing the overlap saves energy. In general, the shutdown management need to tune in with the cycle time.



Running on full power or extremely lower power both result in lower efficiency. Taking the fans for example. When we need to handle small amount of air, using a huge fan on its minimal power is extra; while when we need to handle large body of air, a small fan on its full power will not be insufficient. The grid fans can compensate actual working load with its variable -frequency nature.

The associates are main practitioners of energy saving strategies. To make them aware of why and how we carry out the energy saving measures, Bosch creates a show installation for people to experience energy. They can pull the lever and create electricity, seeing how energy is generated, transferred, dissipated, saved, or wasted. This installation debuted in Bosch Shanghai headquarter in July 2020 and is now touring along Bosch locations.

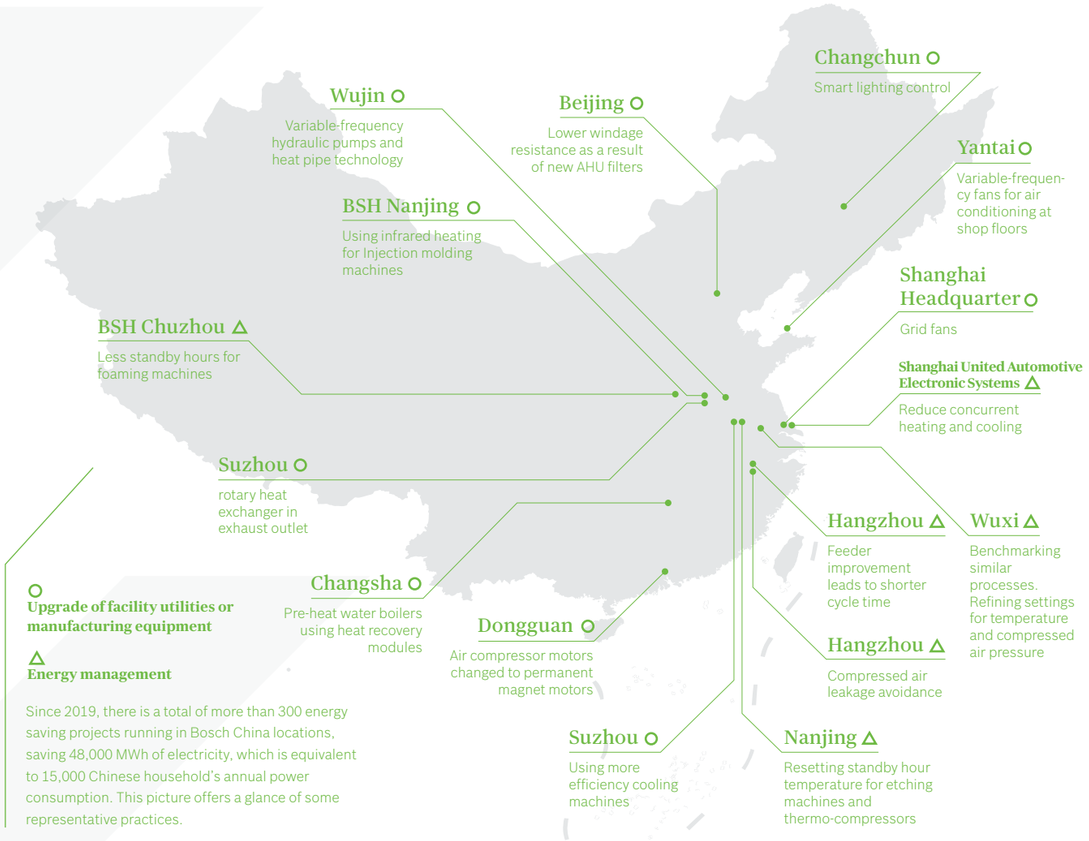
Energy saving is also an organic part of continuous improvement of manufacturing processes, which target resource saving, efficiency and cost benefit. A majority of these progresses are initiated by frontline engineers who spot room of improvement from their daily work, or derive insights from the energy management system.

Surface mounting technology department in Bosch Automotive Electronics hopes to bring standby hours of their welding machines to zero. At a working temperature of above 220 degrees Celsius, these welding machines are literally furnaces and therefore very energy intensive. After the first step, which proved the feasibility of the approach, a digital solution was developed in 2020 to automatically shut down the furnaces. With the new solution, it was possible to capture annual energy savings of around 1.1 gigawatt-hours (GWh). Having established that the project team's idea is best practice, Bosch can now roll it out throughout the company.

By the end of 2020, Bosch has installed the Energy Platform at 122 of its own plants, among which 13 are in China. Developed by Bosch, this cloud-based software was introduced at the Qingdao plant in 2018, where it now aggregates and analyzes data and information from a range of sources, including building management systems and machine sensors. The platform therefore provides a genuinely connected approach to energy management, based on a full and clear picture of the flow and consumption of energy within the plant. Last year, a range of energy-saving measures at the Qingdao plant yielded savings of almost 510 megawatt-hours. Three-quarters of these savings—around 380 MWh—were achieved with the help of the Energy Platform.

Analysis of cooling-load data revealed a surprising fact. The graphics from the Energy Platform showed a wave form, indicating massive fluctuations in the plant's cooling-load requirements. Last November, the plant installed an AI system developed by the Bosch Center for Artificial Intelligence. This now controls the chilled water system for the cooling load. Using data from the Energy Platform, AI is able to forecast cooling-load requirements for the coming hours and adjust the system accordingly. Once a month, the platform reviews how well the AI system has been able to forecast the actual demand for cooling load. Based on this analysis, the AI system can be further trained, leading to ever-greater predictive accuracy. This results in energy savings for the chilled water system by 10 percent and raised the cooling coefficient (COP)* of the system to 8.5.

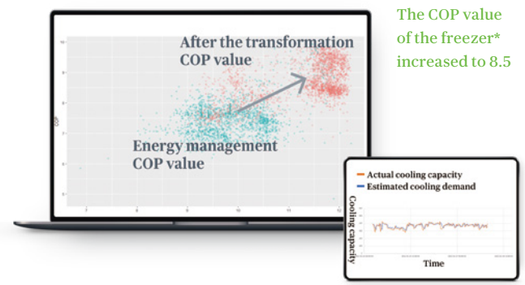
Power and heat are the two areas of our focus.



○ **Upgrade of facility utilities or manufacturing equipment**

△ **Energy management**

Since 2019, there is a total of more than 300 energy saving projects running in Bosch China locations, saving 48,000 MWh of electricity, which is equivalent to 15,000 Chinese household's annual power consumption. This picture offers a glance of some representative practices.



8.5

The COP value of the freezer* increased to 8.5

Energy saving reached

10%

*The coefficient of performance of a heat pump, refrigerator or air conditioning system is a ratio of useful heating or cooling provided to work required. Higher COPs equate to higher efficiency.

69 GWh

Bosch generates 69 GWh of renewable energy at its locations.

WE ARE THE FIRST LARGE INDUSTRIAL ENTERPRISE IN THE WORLD TO DEMONSTRATE HOW QUICKLY A CARBON FOOTPRINT CAN BE REDUCED TO ZERO | Torsten Kallweit, head of EHS and Sustainability

Lever 2: Generate energy from renewable sources

Generating power from renewable sources is the second lever and is vital for China's 2030 target and 2060 target. In Bosch China locations, distributed photovoltaic projects are installed in Bosch sites including Nanjing, Chuzhou, Changzhou, Suzhou and Shanghai headquarter as of the end of 2020. With a capacity of 23 Megawatt, they generated 19 megawatt in 2020. That is the power consumed by 6000 households in China. One Nanjing location dedicates 100,000 square meters space to photovoltaics and reaches a generating capacity of 7 megawatt.

Lever 3: Green electricity

In order to reach carbon neutrality as quickly as possible, Bosch has primarily increased the proportion of green power used. In Germany, the company has been purchasing exclusively green electricity with corresponding guarantees of origin since 2019. Group-wide, the proportion of green electricity was around 83 percent as of the end of 2020. Wilhelm Relard, who is responsible for the coordination of energy procurement, explains: "Through our regional organization, we aim to cover all electricity consumption, if possible, from appropriate sources."

Lever 4: Carbon offsets

For Bosch, measures to compensate for CO2 emissions are only an interim solution to offset unavoidable emissions from combustion processes. Also, when not enough green electricity is available in a country, the company relies on what are referred to as "carbon credits" from projects certified according to the Gold Standard or the Verified Carbon Standard. The spectrum of activities supported is correspondingly broad. It ranges from the reforestation of rainforests in South America to the distribution of climate-friendly cooking stoves.

Working with professional social organizations, Bosch invests in carbon credit projects, for instance the WWF Mamize Firewood-saving Cookstove Project. By increasing burning efficiency of the old stove, this project saved the firewood consumption of 1600 local households, 10 tons per household per year. As a result, the deforestation in that panda habitat was alleviated and the indoor air pollution was avoided.

Goal achieved – what's next?

The task now is to further optimize the mix of the four levers – in other words, to refine the measures used. Only then can we reduce our climate impact in the long Term.

Another goal is also already in focus: by 2030, 15 percent of indirect emissions are to be saved, which corresponds to more than 60 million metric tons of CO2. These are emissions that occur outside Bosch's direct sphere of influence – for example, at suppliers, in logistics, on business trips, or during product use.

The climate action targets have been externally confirmed by the Science Based Targets initiative (SBTi), which provides an independent assessment of companies' targets for reducingemissions based on scientific evidence. Bosch is the first automotive supplier to join the initiative with a concrete goal.

Scope 3 – the view outside

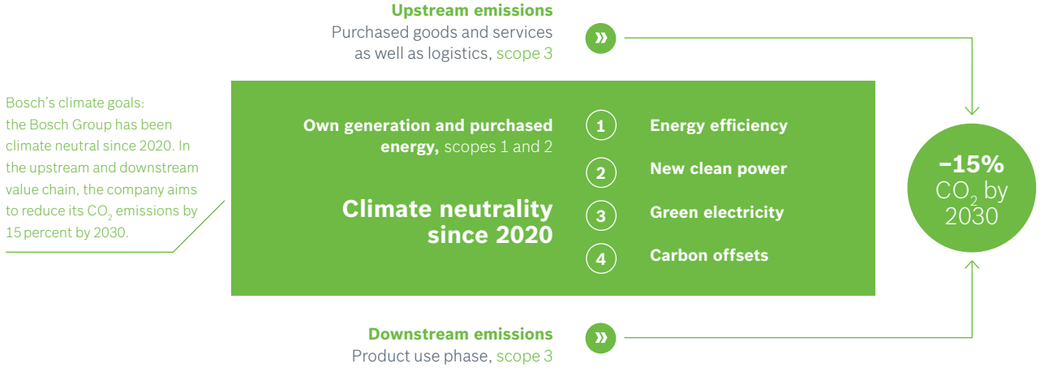
A 15 percent decrease in indirect emissions by 2030: compared with making the entire group carbon neutral, this might hardly appear ambitious – but only at first glance. The scope 3 target is arguably the most ambitious of our targets. Our purchasing function is setting itself clear goals and supporting our business partners in their development toward sustainability. In logistics, the focus is on optimizing procurement, pooling shipments, and last but not least avoiding air transport. A large proportion of the deliveries destined for Bosch are to be shipped by sea in the future. At the same time, the in-house climate activists expect important steering effects from an internal carbon tax on business trips, and making Bosch's internal vehicle fleet environmentally friendly will also bring about visible changes soon.

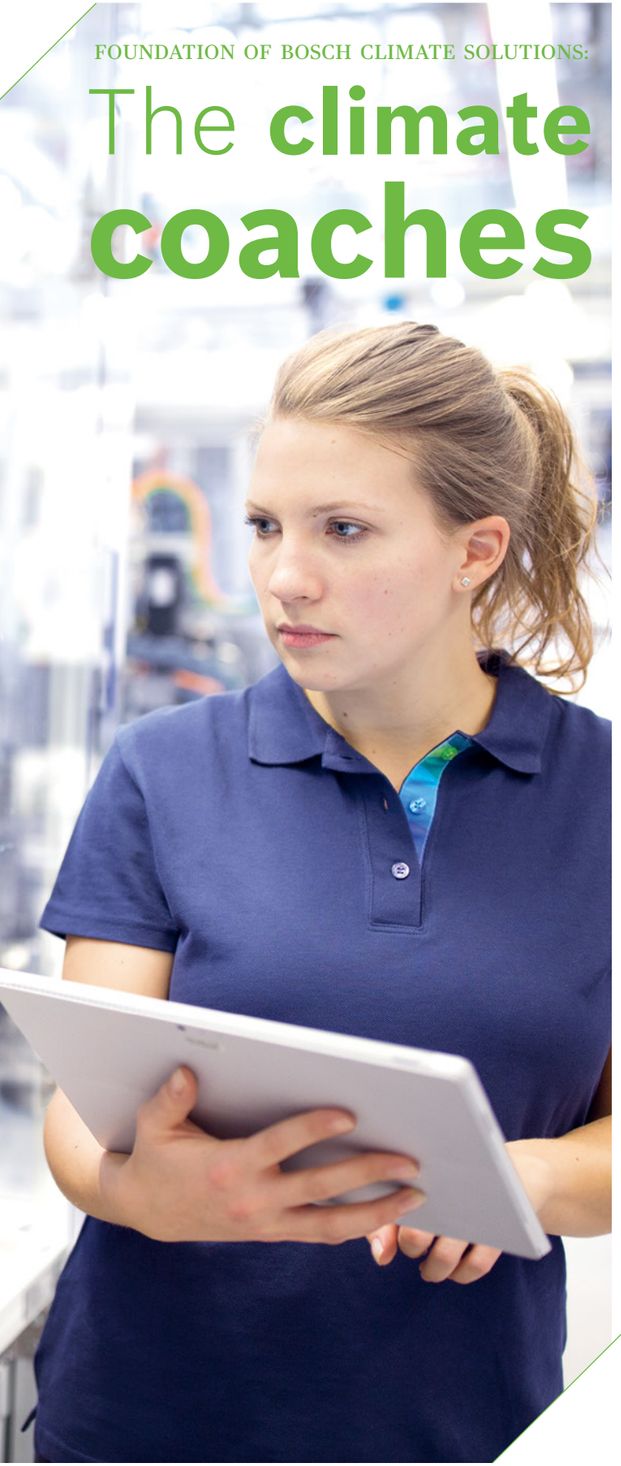
However, the greatest potential for reducing CO2 emissions is in the use phase of products. This alone accounts for around 90 percent of scope 3 emissions. Business sectors are actively transforming towards product sustainability. For instance, the mobility solutions business sector has been pushing the efficiency of ICE higher while bringing more innovative electrical solutions on the table. From 48v systems, plug-n hybrids to EVs, Bosch fully commits to local investment and innovation. The same dedication to product sustainability goes for consumer goods and drive and control technology sectors. ◄

CDP DISCLOSURE INSIGHT ACTION A LIST 2020 CLIMATE

Bosch is in the not-for-profit organization CDP's A List for its climate actions in 2020.

I AM CONFIDENT BOSCH WITH ALL OF OUR BUSINESS PARTNERS WILL BE ABLE TO REACH THIS AMBITIOUS CARBON REDUCTION TARGET AND SHAPE THE CLIMATE TOGETHER. | Dr. Thomas Schulte , Senior Vice President Corporate Supply Chain Management Purchasing





FOUNDATION OF BOSCH CLIMATE SOLUTIONS:

The **climate coaches**

With the experts from Bosch Climate Solutions, companies benefit from the experience Bosch has gained on its journey to carbon neutrality.

A total of 2,000 energy efficiency projects implemented by drawing on the experience of more than 1,000 experts: with the carbon neutrality of its own locations in 2020, Bosch has reached a milestone in climate action and at the same time gained important expertise for reaching the next goals in its climate action strategy. But that's not all: Bosch is sharing its knowledge and experience.

Since the end of April 2020, the newly founded consulting company Bosch Climate Solutions has been supporting companies on their journey to become businesses that develop, manufacture, and operate in a way that conserves resources and is climate neutral. "With this consulting service, we are serving as multipliers to spread climate action beyond our own company," says Bosch board of management member Dr. Christian Fischer. He heads the Energy and Building Technology business sector, in which the new unit is organizationally anchored.

There is huge demand for consulting services of this kind: three out of every four companies in Germany aim to reduce CO2 emissions, but only 16 percent have already implemented measures to achieve climate neutrality in their production.* The core team of Bosch's in-house start-up advises on the planning, selection, and implementation of suitable solutions from both ecological and economic perspectives, and it draws on the know-how of the more than 1,000 climate experts in its virtual network who have contributed to Bosch's carbon neutrality. The Bosch consultants take a holistic approach consistent with the company's own climate action activities. Such an approach includes measures to increase energy efficiency, expand the supply of renewable energy, procure more green electricity, and offset unavoidable CO_2 emissions. And because every company is different, the range of consulting services is always adapted to each customer's specific needs and requirements.

1,000

experts contribute their know-how.

Donya-Florence Amer, CEO of Bosch Climate Solutions, explains the methodology: "In order to identify the corresponding potential, we first analyze scopes 1 and 2 of the carbon footprint – that is, the portion of CO2 emissions that the company can influence directly. After this CO2 audit, an initial master plan with individual scenarios is drafted that sets out the path to carbon neutrality. Next comes the concrete concept, which contains a detailed plan for the implementation of the various measures and takes into account both regional and local conditions. And, of course, it also factors in the corresponding costs that have to be budgeted for reaching carbon neutrality."

This four-week analysis is followed by a three-month detailed concept phase so that just four months are needed from the first analyses to the ready-to-implement concept. But even after that, the Bosch experts stay on board in the third phase of the consulting engagement. Amer: "If the customer wishes, we also support with execution. We capture the identified potential, drive forward the implementation of the measures, and continually optimize the new concept in the process. That way, everyone finds their personalized path to neutralizing CO2 emissions. The concept is accompanied by comprehensive change management, including governance, performance metrics for controlling, and a communication plan."

One of the first clients was the engineering company Prettl. With the support of Bosch experts, the company developed a tailored CO2 reduction concept. "A scenario analysis revealed where we had technological and economic room to maneuver and allowed us to define our own path toward reducing CO2," says Willi Prettl, partner of the Prettl Group.

Based in southern Germany, the bathroom fittings manufacturer Hansgrohe has been drawing on the support of Bosch's new CO2 consulting service since November 2020. "We probed the market to see who has the most expertise," says Reinhard Mayer, deputy chairman of Hansgrohe's board of management. In collaboration with Bosch Climate Solutions, the company has analyzed how it can optimize its manufacturing process, what can be done about packaging, and how to switch to green energy. "We want to benefit from the experience Bosch has gained working at its own plants so that we become even more energy efficient in a first step," Mayer adds.

The success of Bosch Climate Solutions' new service is already evident today – only one year since the company's foundation. "We are constantly receiving new inquiries – from medium-sized companies to major corporations," says Amer. But it's the climate that stands to win most. ◄

* Source: Boston Consulting Group

WE PROBED THE MARKET TO SEE WHO HAS THE MOST EXPERTISE AND DECIDED THAT WE WANT TO BENEFIT FROM THE EXPERIENCE BOSCH HAS GAINED WORKING AT ITS OWN PLANTS | Reinhard Mayer, deputy chairman of the executive board of the Hansgrohe Group

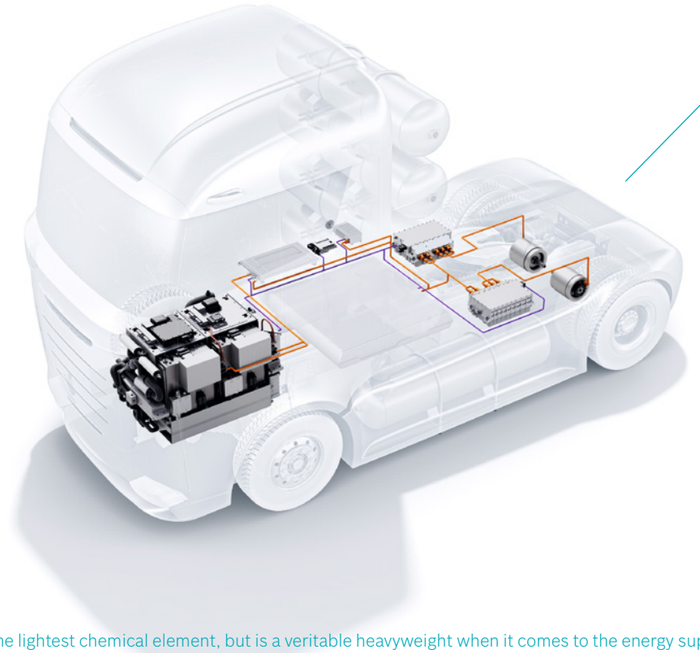
IN ORDER TO IDENTIFY THE POTENTIAL, WE FIRST ANALYZE SCOPES 1 AND 2 OF THE CARBON FOOTPRINT – THAT IS, THE PORTION OF CO2 EMISSIONS THAT THE COMPANY CAN INFLUENCE DIRECTLY | Donya-Florence Amer, CEO of Bosch Climate Solutions

HYDROGEN:

The future starts **with H**

Hydrogen can secure the energy supply of the future: now is the time to set the course ahead. Bosch is driving the development of fuel cell technology in various areas of application.

At the heart of the fuel cell is the stack – an assembly of galvanic cells. Each of these cells comprises an anode (positive pole) and a cathode (negative pole), separated by an electrolyte. There, hydrogen and oxygen are converted into electrical energy.



Bosch offers a variety of solutions for mobile fuel-cell systems that address customer requirements around the world: for the stack as the core of the design, the individual components in the submodules, or the complete system for commercial vehicles.

It might be the lightest chemical element, but is a veritable heavyweight when it comes to the energy supply of the future: hydrogen. Safe, clean, and available in unlimited quantities, hydrogen can easily be produced by electrolysis. And if electricity from renewable sources is used in the process, the loop can be closed for a climate-neutral solution. As if that were not enough, hydrogen is also comparatively easy to store and transport – making it one of the most important energy sources of the future.

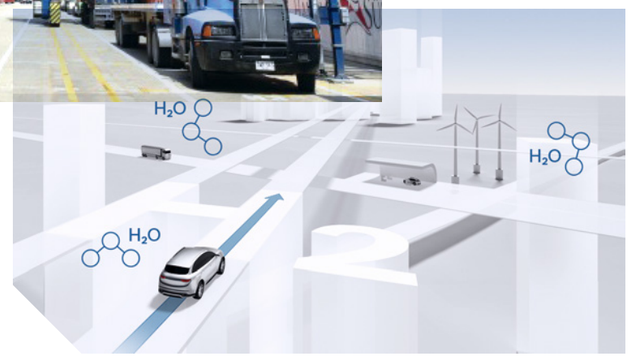
Many experts are already talking about the climate-neutral, hydrogen-based economy. And policymakers, too, are recognizing the potential of hydrogen. This is especially true of the EU, whose hydrogen strategy aims to establish a hydrogen economy by 2050. A special focus was set on transport and road traffic. Although electromobility is gaining momentum with battery-powered vehicles, it is reaching its limits in the case of trucks due to the weight of the batteries used. This is where the advantages of the hydrogen fuel cell come into play: due to the high energy density of compressed hydrogen, a good seven kilograms are sufficient for a 40-metric-ton truck to drive 100 kilometers. Once the tank is empty, the vehicle can be refueled by conventional means in just a few minutes. “The fuel cell is always the first choice for applications in which many kilometers have to be driven every day and larger loads have to be moved,” says Dr. Uwe Gackstatter, chairman of the Bosch Powertrain Solutions division. These are great opportunities, and Bosch is making a correspondingly wide-ranging commitment – from the serial development of the stacks to the efficiency optimization of the powertrain system. For instance, in the EU-funded H2Haul project, Bosch is currently working with other companies to put a fleet of 16 fuel-cell trucks on the road and test them in the field at four locations in Europe – including the corresponding refueling infrastructure to enable rapid refueling. The results of the project should be available by 2024. And what works for trucks could also power cars, trains, ships, and even aircrafts in the future.

1 kg

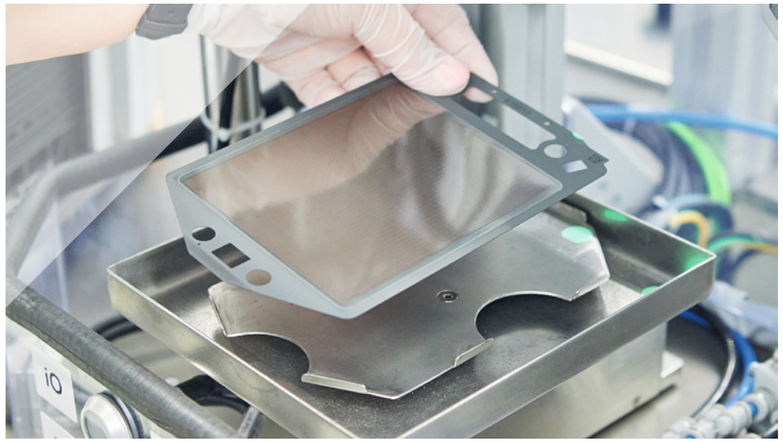
of hydrogen is sufficient for a car to drive roughly 100 kilometers; a truck would need about seven kilograms.

According to the newly released Energy Saving and New Energy Vehicle Technology Roadmap 2.0 by SAE China, the total registration of fuel cell vehicles will amount to 1 million units, with a clear trend of earlier penetration in the commercial vehicle sector by 2030-2035. Bosch believes in a hydrogen future and has been making continuous investments in this sector, such as the establishment of a fuel cell center in Wuxi, which is mainly engaged in Research and Development and will begin small-scale production of fuel cell products in 2021. Bosch China and Qingling Motor (Group) Co., Ltd., a high-end commercial vehicle manufacturer in China, officially signed a joint venture agreement in Chongqing to develop and market fuel cell technologies and solutions. The joint venture will mainly be responsible for fuel cell system development, application, assembly, sales and service. It will take advantag of the cutting-edge technologies and local market knowledge of both parties. With a joint vision of a hydrogen future, Bosch will be responsible for providing key fuel cell system knowhow and supplying key components including stack and BOP, while Qingling offers in-depth understanding of commercial vehicles and the local market.

The establishment of the joint venture is a key step and strategic move for Bosch to commercialize fuel cell technologies in China. China is a strategically relevant market for the development and application of fuel cell technology. By integrating Bosch's comprehensive expertise in fuel cell systems and Qingling's experience in commercial vehicle manufacturing and strong commitment to fuel cell electric vehicles, the joint venture will bring cutting-edge solutions to the market and strive to supply advanced and competitive fuel cell systems Chinese vehicle OEMs.



In 2024, Bosch plans to start series production of distributed power plants based on solid-oxide fuel cell technology.



Testing a fully processed solid-oxide fuel cell at Bosch' Bamberg site.

Bosch aims to install an annual production capacity for SOFC systems of some 200 megawatts. That would be enough to supply around 400,000 people with electricity in their households.

Stationary fuel cells – the foundation for a distributed energy supply

Bosch experts are also working on the hydrogen-based future beyond the transportation sector. For example, in the form of fuel cell stacks for stationary applications with SOFC (solid oxide fuel cell) technology. These scalable systems manufactured by Bosch are to be used, among other things, as decentralized power plants, which are needed in cities, data centers, and for operating charging stations for electric vehicles. So what's the benefit? SOFC plants are particularly future-proof as they can be operated with hydrogen, biogas, accelerate the development of distributed energy systems of this kind.

Although the research community still has work to do, the path to a hydrogen-based, and thus climate-neutral, economy is clearly outlined. The technology for the production of hydrogen is proven and controllable; if there is sufficient demand, production can be increased substantially at short notice.

Furthermore, fuel cells have since reached the technological maturity necessary for their commercialization and widespread use. As a result, hydrogen is increasingly catching up in competition with conventional energy sources – and will soon begin to overtake them. This is also the view of the experts at the Hydrogen Council – a global initiative of more than 100 leading energy, transportation, industrial, and investment companies with a shared, long-term vision for the development of the hydrogen economy. They are working on the assumption that the hydrogen economy can reach competitiveness in the next ten years. ◄

INTENSIFIED WATER MANAGEMENT:

Time is of the ESSENCE

Without water, there is no life. The United Nations would agree. Coinciding with the publication of the World Water Report 2020, the United Nations makes the same point: "All areas of life depend on the availability of sufficient safe water: food, health, households, energy, industry, and ecosystems." However, 40 percent shortfall in freshwater resources is expected by 2030. As a technology company intent on operating sustainably on a global scale, Bosch sees tackling water shortage as an important sustainability scope and has also included water quality as a key criterion in its "New Dimensions – Sustainability 2025" sustainability target.

The comprehensive review of the water situation conducted by Bosch at its locations as early as 2018 based on the WWF's Water Risk Filter gave Bosch's 2025 target in this area a solid analytical basis. Bosch expects to reduce 25% water usage in 2025 compared to 2017. Since 2019, there are around 50 water-saving projects in Bosch locations. In this way, Bosch has been able to reduce water withdrawal in regions where water is scarce by 23 percent since 2017

With 20 percent of the world's population, China has about 7 percent of the world's water resources – and its water demand is growing. Bosch plants in China's water-scarce regions account for 27% of Bosch China's total water usage. In these plants, measures such as process improvement, water reuse, rain water collection and reclaimed water reuse significantly reduced water withdrawal: compared to 2017, the year 2020 saw 17% reduction in absolute water withdrawal although the overall output value of these locations grew by 14%.

-17%

Compared with 2017, the annual water consumption in 2020 reduced this amount for Bosch China plants in water-scarce regions

Wuxi, Integrated water management: Sending a signal

The Bosch plant in Wuxi is located near Tai Hu, one of China's largest freshwater lakes. The high industrial withdrawal volumes combined with the wastewater produced place the regional water systems under considerable water stress. Bosch is making an active effort to ease the situation with an efficient water management system. The system is based on an extensive data analysis of all water consumption.

For the first time, the individual measures have been combined and interconnected. This integrated approach means that all data of relevance for water management can be monitored at any time. The benefits are remarkable: since the measures were introduced in 2017 and up to the end of 2020, around 155,000 m^3 of water has been conserved – despite a significant increase in production volumes over the same period. In addition, the project was able to encourage associates at the site to rethink their approach. The initiative has helped to create an awareness throughout the plant of the importance of modern water conservation measures that are no longer reactive but rather proactive, transparent, and digitally enabled. ◄

After machining, diesel injection valves need to be purged by compressed air and washed off its grease. This kind of cleaning processes are very common in Bosch Wuxi. Thanks to energy management system, compressed air and hot water supplies are micro-managed per actual needs.

* From a press release on the UN World Water Report 2020: Water and Climate Change, dated March 22, 2020

GLOBALIZATION and Urbanization

Central purchasing:

TOWARDS SCOPE 3

Our suppliers have held high their performance of quality, cost and delivery as a major contributor for a joint customer satisfaction of Bosch's more than 130 years of success. Now, pursuing the ambition of shaping the climate and values of sustainability, Bosch Supply Chain Purchasing is adding a "sustainable" element in supplier evaluation as a part of Scope 3 "Goods and Service Purchased" Initiative to invite our suppliers in shaping the climate. In 2020 we have started to work with our business partners and other organizations including Carbon Disclosure Projects (CDP, Non-profit organizations) and Science Based Targets Initiative (SBTi) to establish a roadmap in reducing our emissions of Scope 3, through establishing a database of our Bosch supplier's carbon emission and progress reducing those emissions to see their contribution to Scope 3.

Starting in 2020 Bosch Supply Chain Purchasing APAC region has launched the first ever "Bosch Supplier Sustainability Award" to reward our outstanding business partners that have demonstrated their similar vision and actions to shape the climate with Bosch. Through an extensive evaluation criteria based on Bosch's Sustainability Values, two of the first-ever recipients of this prestigious award are Seksun Technology (Suzhou) Co. Ltd. and Defond Electrical Industries Ltd. This new awarding category and new evaluation criteria are signs of our serious commitment to climate actions. ◀

Energy saving at injection molding shop in Defond Electric Technology co., LTD Dongguan, China through motor replacement, new heating processes, rerouting heating, cooling and power lines and heat recovery.

Central purchasing:

BOSCH'S FIRST CHINA RAILWAY EXPRESS

The annual freight volume of Bosch international logistics transportation tasks is about 20,000 tons.

20,000 t

In logistics, the focus is on optimizing procurement, pooling shipments, and last but not least avoiding air transport. In the early morning of Jan 16, 2021, the Bosch train bound for Duisburg, Germany, carrying products and parts produced in Bosch China plants and materials sourced from China, departed from Chongqing, China's southwest portal. It reaches its destination after a 20 days trip. The two years' contract between Bosch China and COSCO (COSCO SHIPPING Logistics Co. Ltd.) provides one-stop solution for the bi-lateral flow of goods between some 100 Bosch plants in Europe and over 30 plants in China. This is an enhancement for Bosch's supply chain because of its stability and high efficiency. Before COVID-19, CR Express served as one of the means for international transportation, moving 20,000 tons of goods per year for Bosch. Under the impact of COVID-19, logistics costs surge as the customs exert tighter control over international airway, land transportation and ports. An additional benefit for railway is its relatively lower carbon emissions compared to other alternatives. This channel will be able to contribute to Bosch group's carbon neutral goals throughout the supply chain from sourcing to the end of the products' life cycle, a big step in Bosch's climate actions towards sustainability goals. ◄

Circular economy:

ENOUGH WITH THE ONE-WAY STREET

"Produce, use, throw away." That thinking has long gone unquestioned, but it has no future. After all, we are facing some of the greatest tasks of our time: the availability and distribution of natural resources, waste avoidance, energy conservation, and effective climate action. The sustainable development of our societies seems scarcely conceivable without a consistent orientation toward the principles of a circular economy. Companies face particularly tough challenges in this respect. "This is where the product life cycle begins – and ideally it ends here, too," says Annette Wagner, head of Sustainability and Ideas Lab at Bosch.

United Automotive Electronic Systems Co., Ltd. (UAES) initiated a series of resource-saving campaigns. Among the many innovative solutions that pop out of each unique process, the packaging recycling project stands out. The electronic parts are put on plastic trays for feeding and unloading, but it used to be that they are used only once. The shopfloor engineers noticed that plastic trays after loading 4 kinds of parts stay intact and can be recycled only after simple treatments. It worked. The year 2020 alone saw 600,000 plastic trays saved —that translates into 30 tons less waste and CNY 1.50 million saved. This circular approach is now rolling out in locations such as Suzhou. ◄

600,000pc

600,000 plastic trays saved

30,000kg

30 tons less waste

1,580,000

CNY 1.50 million saved

Poverty alleviation:
BUSINESS MODEL INNOVATION AND DIGITAL ENPOWERMENT

Sitting on the grassland and receive trainings on hospitality business model. Sanjiangyuan is at the Tibetan Plateau that contains the headwaters of three great rivers of Asia. The retreating grassland and the declining living conditions urge the locals to rethink their future.

2021 is the 10th anniversary of Bosch China Charity Center. By the end of 2020, Bosch China has donated 137 million CNY through 185 charitable projects, covering 29 locations nationwide. Also, BCCC has partnered with 125 NGOs and benefited more than 340,000 people.

Recent trends favor tailored solutions for different groups and their varied situations. In response, our aiding programs and investments are going diverse. We have found that in some cases the key to revitalizing an underdeveloped and labor-starved region is to empower women; environmental protection can bring about new economic opportunities; and that a farm can become so much more after it is digitalized.

Environmental actions for poverty elevation

Qumalai is a county of Yushu that locates at the southwest of Qinghai province, a target of China's national poverty elevation. There are 3270 households living under poverty line. Traditionally, animal husbandry has been the only main source of living. Poverty runs so deep that many rely on subsidies. To make things worse, the grasslands are retreating.

In January 2020, Bosch China Charity Center partner with Beijing Fuqun Social Service Cente and Shanghai United Foundation in a project aiming at one of Qumalai region poverty elevation. That region happens to be located at the The Sanjiangyuan, an area of the Tibetan Plateau in Qinghai province which contains the headwaters of three great rivers of Asia. The project helped the locals in building an economy model based on hospitality, local specialties and the superb natural environment. As a result, 309 households (933 persons) no longer live in poverty. This model is being planted to 5 communities in 2 other national reserves.

Grandma' s herbal garden

Yongsheng is a county in Lijiang, Yunnan. As a target of China's national poverty elevation, its residents are mainly women and children. Most men seek opportunities in other places. These women take care of all household work, supporting the old, the underaged while tending the farmlands. Due to gender inequality, these women lack basic education. The farms they tend also do not yield much.

However, the region is rich in certain kinds of herbs. Bosch China Charity Center identified the potential of these herbs with these women and inspired the latter to collaborate within communities and let these herbs "go industry". Women from 100 households mastered modern herb farming techniques as well as managing skills for running their herb industry. Their herbs are now sourced by the pharma industry. This approach proves sustainable and profitable.

Re-building trust in the farms

Hidden deep in Taihang Mountains, Baizhuangzi Village is endowed with a breathtaking scenery and natural landscape in its original shape. The alpine dry land at the elevation of 1,800 meters favors Chinese cabbage. The locals are on average above 55 years old, having made every effort on farming, only managed to sell CNY 2,700 per year per household.

Ql qin, the project initiator of Re-building Trust in the Farms introduced the project vision: "digitalization should bring benefits to these honest owners of farmlands, so that their hard work will become economic gains ".

To digitalize the farmlands, an internet of things (IoT) network comprising satellite communication, drones, weather stations, sensors and a mobile APP is built. On one hand, it gathers real-time data of the farmland and combines it with agricultural know-hows. This helps farmers grow better vegetables. On the other hand, the whole cycles of vegetables are recorded and tracible by customers. This adds value to the vegetables because of the transparency and validity. All these digital skills are downloaded to the local people as well, so that they are able to run the new system independently. By the end of 2020, the 210 households could already sell CNY 6300 per mu (0.0667 hectares).◀

Covid-19:
TOGETHER WE'RE STRONG

Health first: from the very beginning, this fundamental idea was behind all the measures that Bosch has taken to protect its associates since the outset of the corona-virus pandemic. As with any globally operating company, Bosch was faced with consid-erable challenges, especially given the research needed upfront to analyze the virus and determine how to respond. That said, it was clear that comprehensive protective measures had to be developed and implemented quickly.

1.9 mn

masks are produced weekly by five Bosch production lines for associates worldwide.

Looking back on the past twelve months, the decision makers reflect on what has been achieved – but also the suffering that the coronavirus has brought on individual associates and their families despite their best efforts. A degree of humility is evident as well as the unconditional intent to do everything in the future to continue to lead associates and the company safely and as unscathed as possible through the crisis – because nobody here believes it's all over yet.

Locally – coordinate supraregionally

At an international level, the CCMT worked closely with the 62 country crisis teams and the crisis teams at the more than 400 locations around the world. This approach addressed the different responses that were needed given the differences in the way the virus was impacting individual countries. "As a crisis management group, we want to provide support for overarching issues or company-wide governance needs and, most importantly, ensure the rapid dissemination of the latest knowledge and best practices. Actual decisions have to be made locally to the extent possible," Schilling says. And the decisions made were often of great consequence. In the first phase of the pandemic, Bosch had to temporarily shut down or at least severely curtail production at almost 100 locations worldwide.

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> OUR AIM IS TO ENSURE THAT BOSCH ASSOCIATES ARE SAFER AT THEIR WORKPLACES THAN THEY ARE IN PUBLIC | Jörg Weis, leader of the coordination team coronavirus

Remote work

At the same time, at extremely short notice, some 150,000 associates were provided the option of working from home and collaborating in virtual teams. As a consequence, the number of daily Skype meetings rose to roughly 500,000. Some of the working methods introduced at the time have since been recognized as good practice – perhaps one of the few positive aspects of the pandemic in the longer term. Virtual collaboration likewise shaped the CCMT's work. Ulrich Schaefer, head of Global IT Operations and also a member of the CCMT leadership team: "An unbelievable team spirit has grown that has carried us through this very intensive phase."

Vivalytic – rapid results in the fight against the pandemic

Deploying its own know-how to contain the pandemic: an ambition quickly followed by deeds – Bosch launched a rapid test for its Vivalytic analysis device at the end of March, after just six weeks' development. As a multiplex test, it simultaneously checks samples for the SARS-CoV-2 virus and nine other respiratory diseases in two and a half hours. A new, accelerated test exclusively designed for SARS-CoV-2 followed in late September. The test provides a reliable result in 39 minutes and is currently the fastest polymerase chain reaction (PCR) test worldwide. With the different coronavirus tests and variable analysis strategies, Bosch opens up a range of testing scenarios with a Vivalytic device – from screening all the way to supporting differential diagnosis for diseases with similar symptoms. "One of the keys to fighting the coronavirus pandemic is to rapidly identify sources of infection. That's why we focused on following up on our first coronavirus test with an even faster one," says Dr. Volkmar Denner, chairman of the board of management of Robert Bosch GmbH. "This will now enable us to put people's minds at ease even more quickly." In addition, tests for up to five people can now be carried out simultaneously with one cartridge – saving valuable time in the fight against the pandemic.

Developed by Bosch's special-purpose machinery unit in just a few weeks, identical, fully automated production lines for face masks were set up at several company locations.

> WITH VIVALYTIC, WE ARE DELIVERING CUTTING-EDGE MEDICAL TECHNOLOGY. THE RAPID PCR TEST RELIABLY CHECKS SAMPLES FOR THE SARS-COV-2 VIRUS AND ITS MUTATIONS | Marc Meier, president of Bosch Healthcare Solutions

China | aid for the frontline

The novel coronavirus is currently spreading rapidly around the world. China was affected first. Right from the start of the outbreak, an emergency taskforce started to closely monitor the situation in China and updated information on a daily basis. Supported by global teams, this interdisciplinary team of experts immediately worked out precautionary measures, including health care, hygiene guidelines, quarantine policies and put them into action, despite the ongoing holiday. The company was also sharing latest news, relevant policies, and hygiene guidelines very frequently with all our associates to keep them posted.

Bosch has made a quick decision at the beginning of the outbreak to donate power tools, washing machines, and air purifiers to the hospitals in hard-hit regions, such as Wuhan. The total value of these donations comes to more than 8 million CNY (1 Mio. Euro). Meanwhile many of our associates have also offered their individual support to wherever needed.

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8,000,000

Special orders fulfilled

Bosch Huayu Steering Systems Wuhan plant is located in Jangxia district of Wuhan city, mainly producing automobile steering systems and related parts. On the 9th day of lockdown, Liu Piaomi, who lives in Jiangxia District of Wuhan City, went out before 6 o'clock and drove several round trips between different locations in Jiangxia. After receiving several blocking and inspections, he finally completed the mission —driving 11 colleagues to Bosch Huayu Wuhan Plant. A few days before that he received a call from manager Zhao of the Production Department, saying that the factory received an urgent order to produce 1,000 V348 steering system products within 3 days and assemble them on negative pressure ambulances.

On January 31st, 12 employees were in place and the production line officially started. At the same time, frequent hand washing hurt their hands, blisters and ulcers appeared. After 3 days of unremitting efforts, on February 2nd, the last steering gear was finished. A total of 1,000 orders were completed successfully and delivered to customer on the same day.

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1,000

An ordinary person’ s special mission

Meanwhile many of our associates have also offered their individual support to wherever needed.
Before New Year’s Eve, the shortage of medical supplies such as masks was already felt. Many people in Suzhou were worried about the situation, and Yvonne Wang was one of them. The director of Corporate Sector Information and Services was staying at home with her husband and son. One message on social media caught her attention—some factories in Suzhou are recruiting volunteers as most workers left for the spring holiday. She immediately invited her husband and her 16-year-old son to join her on a volunteer mission.

Meng Yang from the same department. Using her own money to source 4,000 masks, she donated 500 of them to hospitals in Changsha city through Red Cross. Working closely with the local Red Cross, she noticed that the latter could use her skills in data management with cataloging. With the help from this engineer , the data system became neat and the information processing gained speed.

Most Bosch plants in China resumed operation, but the public transportation was not secured. When the roads are shut down, the trip back to work can take two days. At six in the morning, it was still dark outside in Lankao, Henan province. There was a 45km hike waiting for Wang Snowy, an operator in Bosch Suzhou. For Wang Yong it was a similar story. He walked through 26 villages in 10 hours to reach the city’s train station. 50 Km later, he spotted a taxi in the city. He took the train on the second day and went back to Beijing safe that day. ◄

Grow, enjoy and inspire. These three dimensions create a wholesome image of a person's career, and is what Bosch China believes to be essential for its associates. It is particularly true when Bosch is going through a fundamental transformation where AIoT is at the heart of its business. To be able to grow, enjoy and inspire, collaboration across disciplines, functions and trades is key.

Talents:

COLLABORATION ACROSS DISCIPLINES, FUNCTIONS AND TRADES

Digital pioneer award

Rafael Torres is responsible for Bosch Power Tools business in emerging markets of Asia, Eastern Europe, Latin America and Africa. Under the traditional sales model in these markets, Bosch is responsible for production while dealers are responsible for sales, with a clear division between each. However, in recent years landscape is changing rapidly with new retail and e-commerce booming up, bringing huge impacts on the whole industry.

"Bosch had very limited control over the midstream and downstream distribution channels and very little direct contact with end users. We need to understand their habits, preferences and needs," says Rafael Torres.

Starting 2017, PT-BE launched market research in 7 emerging markets. After direct interviews with hundreds of users, the team soon had a clear goal: to create a user-oriented online platform to connect Bosch directly with users.

After eight months of system development and testing, BeConnected was officially launched in China in July 2018. From manufacturing, warehousing, dealer to users, BeConnected connects users and the full value stream with one platform. The number of users on BeConnected has been growing, with more than 130,000 registered users as of December 2020 in China. The platform covers 99% of Bosch power tool models in China, including all types of cordless tools.
In 2020, the project was awarded one of Bosch China's 10 digital pioneers for their seamless collaboration across discipline, functions and trades.

The eagle eye and the algorithm

Bosch Automotive Electronics Suzhou and Wujin plants manufacture some 88 million Printed Circuit Boards a year and assemble more than 15 billion components on these boards. For a long time, AOI (automated optical inspection) of components has been introduced to these surface mounting technology (SMT) production lines. A group of visual inspectors carries out further inspection after this AOI system, however they only could find one actual defect for every 2,000 cases.

Chen Yan is one of the senior visual inspectors on SMT production line in AE Suzhou plant. She inspects PCB that have been rejected by the AOI system to check all the soldered connections are in order and the components correctly positioned. With the help of magnifying glasses or even microscope, visual inspectors like her need to find the tiniest flaw on the PCB. One needs six months to become proficient at this job. The eyes of the visual inspectors are called "the eagle eyes" and even the eagle eyes need their visual acuity tested every six months.

Now more than 80 % of Yan's work is related with AI. She now concentrates on training the AI model. Yan has never imagined that her work could be related with AI and even the AI project is named after her. "I was at first worried that AI will one day replace human labor, and I never thought my work will include training the AI model" Yan is full of confidence, "I believe more and more direct associates in Bosch plants could get the chances of working with AI." ◂

THE NEW DIMENSIONS —

Sustainability 2025 target vision defines key topics: climate, energy, water, urbanization, globalization, and health.

Climate

1 | CO_2 scopes 1 and 2
2 | CO_2 scope 3

Bosch is a climate action pioneer, and its business operations have been climate neutral(scopes 1 and 2)since 2020.Along the entire value chain, Bosch contributes its knowledge and technologies, multiplying the influence it has on the reduction of greenhouse gas emissions(scope 3).

Energy

1 | Energy efficiency
2 | Renewable energy

Bosch encourages the expansion of renewables and strives continuously for energy efficiency — from development to manufacturing to the finished product.

Health

1 | Occupational health and safety
2 | Substances of concern

Bosch contributes to human health with innovative products and services and by ensuring that people and the environment do not come to harm in its production processes.

Water

1 | Water scarcity
2 | Water quality

For Bosch, water is a resource to be treated sparingly. Regions in which water is scarce are a special concern.

Globalization

1 | Responsiblility
2 | Human rights

Bosch takes on responsibility and is sensitive to human rights being respected along the entire value chain.

Urbanization

1 | Resource efficiency
2 | Digitalization

Bosch wants to minimize its ecological footprint and strives to create social benefit. In this endeavor. Bosch puts its faith in the principles of the circular economy and the opportunities presented by digitalization.

ABOUT BOSCH GROUP AND BOSCH CHINA

The Bosch Group is a leading global supplier of technology and services. It employs roughly 395,000 associates worldwide (as of December 31, 2020). The company generated sales of 71.5 billion EUR in 2020. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At 129 locations across the globe, Bosch employs some 73,000 associates in research and development.

Bosch set up its first sales office in China as early as 1909. In 1926, the first Bosch car service workshop was opened in Shanghai. Over the past 112 years, Bosch has witnessed the unprecedented development of Chinese society and, in particular, the rapid rise of the economy after the reform and opening up.

With its "local for local" strategy, Bosch in China offers cutting-edge technologies and solutions in the areas of mobility solutions, industrial technology, consumer goods, and energy and building technology. Bosch's innovations in all its areas of business make possible the company's strategic imperative of "Invented for Life". As of December 31, 2020, Bosch operated 56 legal entities and facilities in China, with consolidated sales of 117.3 billion CNY, making it the group's largest single market for the first time, with the largest number of associates outside Germany.

BOSCH
Invented for life

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