Press release
Bosch eBike Systems

July 2024

The journey to a more sustainable future
How Bosch eBike Systems is committed to a lower-emission supply chain and a sensible circular economy

- Joint CO_2 analysis with TÜV Rheinland: Potential for greater sustainability in eBike system development and production identified
- Taking responsibility: Transparency and emissions reduction as selection criteria in the purchasing process
- Circular economy: Expansion of the remanufacturing portfolio for drive units and global commitment to battery recycling

Stuttgart/Reutlingen – The eBike is an important building block for the mobility revolution. It helps to reduce traffic and its impact on the environment, takes up little space and does not cause noise or local emissions[1]. Compared to cars, eBikes are not only cheaper, but also more environmentally friendly, space-saving and often faster in city traffic. They offer an important alternative to the car, especially for short distances of up to around 5 to 10 kilometers[2]. In an international study conducted by Bosch eBike Systems this year, 49 percent of eBike users surveyed stated that half of the journeys they used to make by car are now made by eBike[3]. This active form of mobility not only helps to reduce CO_2 emissions in cities, but also benefits each and every individual: Travelling by bike or eBike is good for your health and is also fun!

As an evaluation by the Federal Environment Agency shows, the eBike is one of the lowest-emission means of transport. When using an eBike, the electricity consumption results in average CO_2 emissions of 3 g CO_2/person-kilometer (pkm), depending on the electricity mix. In comparison, a motor vehicle with an internal combustion engine emits about 166 g CO_2/pkm, while public transport

[1] World Health Organization (2022): "Walking and cycling: latest evidence to support policy-making and practice", p. 1, https://apps.who.int/iris/rest/bitstreams/1426622/retrieve (retrieved on 30 May 2024).

[2] Federal Environment Agency (2023): "Welche Umwelttipps Sie bei Elektrofahrrädern beachten sollten" (Environmental tips to consider when using electric bikes), https://www.umweltbundesamt.de/umwelttipps-fuer-den-alltag/mobilitaet-reisen/e-bike-pedelec#gewusst-wie (retrieved on 30 April 2024).

[3] Bosch eBike Systems, n= 4,200, countries: Denmark, Netherlands, USA, UK, Poland, Switzerland, Germany, Austria, Italy, field time: 30 November 2023 – 29 December 2023

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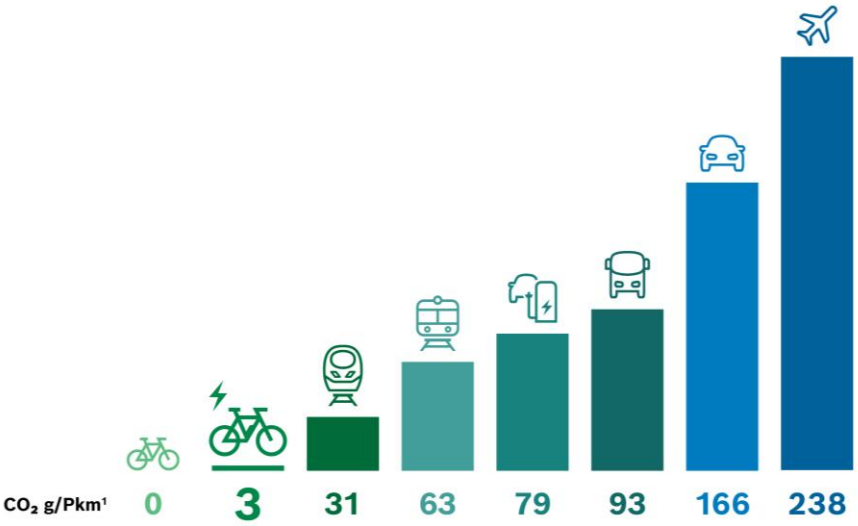
emits between 58 and 93 g CO_2/pkm[4]. eBikers using the smart system from Bosch can now view their CO_2 savings compared to a car after every ride via the activity tracking function of the eBike Flow app[5].

CO_2 emissions during the use of different means of transport



[1] g/Pkm = grams per passenger kilometre

The chart is shown in ascending order: Bicycle, eBike, long-distance rail transport, tram and urban and underground railway, electric car, public transport bus, car (all drives), domestic aircraft.

Source: Own representation based on Federal Environment Agency figures (2022): "Vergleich der durchschnittlichen Emissionen einzelner Verkehrsmittel des Linien- und Individualverkehrs im Personenverkehr in Deutschland 2022" (Comparison of the average emissions of individual means of regular and private passenger transport in Germany in 2022); https://www.umweltbundesamt.de/bild/vergleich-der-durchschnittlichen-emissionen-0 (accessed on 24/4/2024). Our TÜV analysis, calculated using the German electricity mix, confirms the eBike value.

CO_2 equivalents indicate the climate impact of the different greenhouse gases. We have considered the effects of CO_2 as well as other greenhouse gases and climate-relevant substances, insofar as these are relevant to the analysis. In order compare the impact on the climate of the various greenhouse gases and climate-relevant substances, they are shown as CO_2 equivalents. For ease of reading, we use CO_2 synonymously with CO_2 equivalents.

"Bosch eBike systems are already driving a society in which people are travelling more sustainably. With our products and solutions, we make a contribution to future-proof mobility. It is also important to us to continue to improve our eBike systems in terms of sustainability throughout the entire product life cycle," explains Claus Fleischer, CEO of Bosch eBike Systems. "Because sustainability is not an additional task, but an integral part of our corporate culture."

[4] Federal Environment Agency (2022): "Vergleich der durchschnittlichen Emissionen einzelner Verkehrsmittel des Linien- und Individualverkehrs im Personenverkehr in Deutschland 2022" (Comparison of the average emissions of individual means of regular and private passenger transport in Germany in 2022), https://www.umweltbundesamt.de/bild/vergleich-der-durchschnittlichen-emissionen-0 (retrieved on 30 April 2024)

[5] The emissions saved relate to the use phase. The calculation is based on the Federal Environment Agency's assumption (2022): Car = 166 g CO_2/pkm, eBike = 3 g CO_2/pkm

From vision to realisation: Bosch eBike Systems focuses on three pillars of sustainability

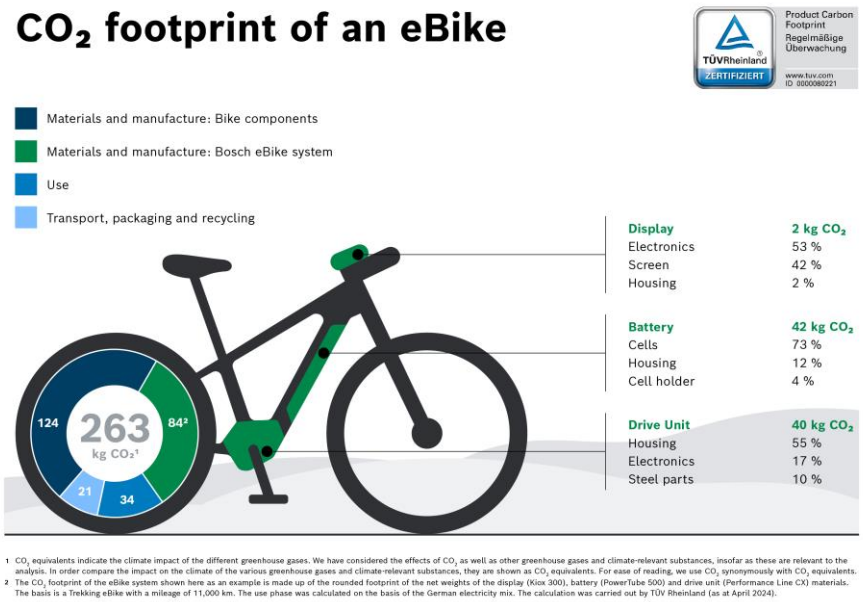
Bosch eBike Systems has defined three pillars of sustainability and firmly anchored them in its strategy:

- The "Carbon footprint" pillar aims to measure, identify and reduce CO_2 emissions at company, product and material level.
- The "Responsibility in the supply chain" pillar defines measures to ensure that all materials and primary products are selected sustainably and responsibly and that social standards are adhered to.
- The "Circular economy" pillar is concerned with the goal of extending the service life of products, i.e. reusing raw materials and further increasing recycling efficiency, for example.

For Bosch eBike Systems, the pillars are strategic guard rails that contribute to a common goal: to make eBike systems even more future-proof. To achieve this goal, the company derives specific measures that are implemented both internally and externally in collaboration with partners and suppliers.

CO_2 analysis focusing on savings potential

To intensify efforts to reduce emissions, Bosch eBike Systems, together with TÜV Rheinland, conducted a holistic analysis of the eBike's carbon footprint in 2022 and refined and updated it in 2024. Using the results of the analysis, the company has calculated the carbon footprint for each product in its portfolio. The aim of the analysis was to identify and evaluate the greatest CO_2 savings potential that can be found both in the system components and in the entire supply chain.



1 CO_2 equivalents indicate the climate impact of the different greenhouse gases. We have considered the effects of CO_2 as well as other greenhouse gases and climate-relevant substances, insofar as these are relevant to the analysis. In order compare the impact on the climate of the various greenhouse gases and climate-relevant substances, they are shown as CO_2 equivalents. For ease of reading, we use CO_2 synonymously with CO_2 equivalents.
2 The CO_2 footprint of the eBike system shown here as an example is made up of the rounded footprint of the net weights of the display (Kiox 300), battery (PowerTube 500) and drive unit (Performance Line CX) materials. The basis is a Trekking eBike with a mileage of 11,000 km. The use phase was calculated on the basis of the German electricity mix. The calculation was carried out by TÜV Rheinland (as at April 2024).

Around 79 percent of an eBike's CO_2 emissions are caused by the materials used and in production, and 13 percent through use. The remaining eight percent is accounted for by transport, packaging and recycling.

Overall, an eBike has an average carbon footprint of 263 kg of CO_2 equivalents over its entire life cycle. If the eBike components are considered individually with approximately 84 kg of CO_2 equivalents, approx. 50 percent of the emissions are attributable to the battery, 48 percent to the drive unit and 2 percent to the display. If you ride around 515 kilometers on an eBike instead of using a motor vehicle with an internal combustion engine, the Bosch eBike system will have already paid for itself in terms of CO_2 consumption.

The CO_2 savings potential identified in the display are the electronic components (53 percent) and the screen (41 percent). In the drive unit, the housing accounts for the largest share of CO_2 at 55 percent, followed by the electronic components at 17 percent. In the battery, the greatest savings potential comes from the cells, which account for 73 percent of the CO_2 emissions, followed by the housing at 12 percent and the cell holder at four percent.

Reducing emissions along the entire supply chain

In the purchasing process, the carbon footprint is an important decision-making criterion when it comes to supplier selection, alongside other sustainability criteria. For this purpose, the CO_2 emissions of the materials used and purchased parts are requested from suppliers.

Claus Fleischer emphasises: "The joint analysis with TÜV Rheinland has shown us which areas we can and will prioritise to further reduce the carbon footprint of our eBike systems. Our measures focus on optimising materials and reducing emissions in production and the supply chain. Together with our partners and suppliers, we are making enormous efforts here, which are gradually paying off."

In the production of the new Bosch CompactTube 400, for example, the company uses alternative materials for the cell holders, which make up the largest plastic parts within the PowerTubes, in order to reduce the carbon footprint. For this purpose, a plastic is used whose emission factor is 64 percent lower than that of the plastic previously used. This material change will in future become the standard for all Bosch eBike Systems batteries integrated within the frame.

Beyond material and product level, Bosch eBike Systems also focuses on the corporate carbon footprint of its direct suppliers and makes this an important decision-making criterion in the purchasing process. By participating in the global

system for the disclosure of environmental data provided by the non-profit organisation CDP, the company can record and assess the efforts of its direct suppliers to take climate protection measures. The aim is to make climate protection the standard: Suppliers that have a low CDP ranking and do not commit to the goals of the Paris Climate Agreement through an SBTi voluntary commitment[6] will be given a lower rating in the purchasing process. Suppliers that disclose via the CDP currently account for 97 percent of the purchasing volume of Bosch eBike Systems – this figure is set to rise to 100 percent by 2025.

An important factor for reducing CO_2 is the use of green electricity. Bosch eBike Systems expects its suppliers to switch their production to electricity from renewable sources in order to reduce their emissions.

Responsibility and transparency as selection criteria in the purchasing process

Bosch eBike Systems places great value on the transparency and traceability of its supply chain, particularly with regard to batteries. In doing so, Bosch eBike Systems goes beyond the legal obligations stipulated by the Supply Chain Act and not only checks and qualifies its direct suppliers, but also endeavours to understand the entire supply chain in order to avoid potential risks in the procurement of raw materials. This applies in particular to the raw materials in the battery cells, which are comprehensively traced back to the mines. This approach will also be extended to the drive unit and displays in the future.

With regard to environmental protection, Bosch eBike Systems expects its suppliers to set up and develop an environmental management system in accordance with ISO 14001. As of this year, 100 percent of our direct suppliers have appropriate certification.

Circular economy: Remanufacturing & recycling at the end of the product life cycle

For Bosch eBike Systems, the high quality, safety and long service life of its products are paramount. The useful life of an eBike and the number of journeys with other modes of transport it replaces make a significant contribution to reducing the impact on the environment. Nevertheless, it is inevitable that the products will reach the end of their lifetime at some point.
This is where the circular strategy comes in, with which Bosch eBike Systems aims to improve the sustainability of products throughout their entire life cycle.

[6] The SBTi voluntary commitment allows companies to set science-based targets for reducing greenhouse gas emissions. Through this voluntary commitment, companies demonstrate their willingness to actively contribute to climate protection and align their business practices with the goals of the Paris Agreement.

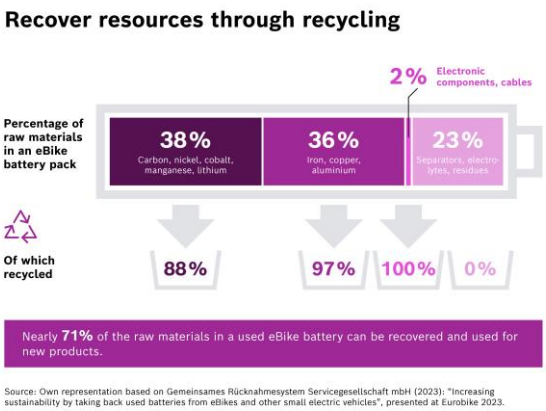
This includes the procurement, production, utilisation, return, reprocessing and recycling of materials.

Since 2014, Bosch eBike Systems has been investing specifically in the recycling of its drive units through remanufacturing. Defective Bosch eBike drive units that qualify after testing are subjected to a detailed reconditioning process. They undergo a complete technical overhaul and are made available to dealers with full functionality after a final test.

"With our commitment to remanufacturing, we are sending a clear signal of our commitment to protecting the environment and promoting sustainable mobility – and have been doing so for over 10 years now," says Claus Fleischer. Further drive units will be added to the remanufacturing portfolio this year.

To be able to reuse valuable raw materials at the end of their lifetime, batteries need to be recycled properly. Bosch eBike Systems supports new and sustainable recycling methods worldwide. The efficiency of recovery depends on the recycling process. In the processes used by the German GRS industry solution, almost 71 percent of many valuable raw materials can be recovered[7] and can be reused for new products.

In future, Bosch eBike Systems will increasingly focus on the use of recyclates in its circular economy.



In all sales countries where it is legally possible, Bosch eBike Systems voluntarily assumes responsibility for recycling obligations and the associated costs through local service partners. In countries where recycling solutions are

[7] Source: Gemeinsames Rücknahmesystem Servicegesellschaft mbH (2023): "Nachhaltigkeit durch Rücknahme von Altbatterien aus E-Bikes und anderen elektrischen Kleinfahrzeugen steigern" (Increasing sustainability by taking back used batteries from eBikes and other small electric vehicles), presented at Eurobike 2023

not yet available or existing recycling solutions are inadequate, Bosch eBike Systems works closely with its partners, promotes pilot projects and supports the development of industry solutions. The company currently supports battery collection systems in 18 countries, including the Czech Republic and the United Kingdom as of this year.

Moving forward together

Through its measures, Bosch eBike Systems contributes to the overarching sustainability goals of the Bosch Group. With more than 400 locations worldwide, the Bosch Group has been carbon-neutral overall since 2020 (Scope 1 & 2).[8] At the same time, the company intends to shape climate protection beyond its direct sphere of influence and also systematically reduce upstream and downstream emissions – the aim is to reduce emissions by 15 percent by 2030 (Scope 3).

"We are aware that we still face a number of challenges on our path to a sustainable future. Responsible and sustainable behaviour is very important to us as a company and is already daily practice in many areas at Bosch eBike Systems. Both small and large improvements have already had a positive impact – and we want to achieve more and more of these in the future," says Claus Fleischer.

[8] Since 2020, the Bosch Group with its more than 400 locations worldwide has been carbon-neutral overall (Scope 1 & 2 according to Greenhouse Gas Protocol Corporate Accounting and Reporting Standard). Bosch uses four levers to achieve this: increasing energy efficiency, generating its own energy from renewable sources, purchasing green electricity and offsetting remaining CO_2 emissions with carbon credits. Further information on the Bosch Group's sustainability strategy can be found at nachhaltigkeit.bosch.com

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Bosch eBike Systems *is shaping the future of eBike mobility with innovative products and digital services ranging from highly efficient drive systems and the first series-ready ABS for eBikes to connected biking solutions. On daily routes through the city, on enjoyable tours through the countryside or for sporty adventures in the mountains: Bosch eBike Systems offers eBikers the right drive system (drive unit, battery, display and app) for every requirement and every area of use, which ensures a unique riding experience. Today, more than 100 of the world's leading bicycle brands trust in the perfectly coordinated, modular product portfolio. As an independent business unit within the Bosch Group, Bosch eBike Systems also uses the group's technology and manufacturing know-how. For healthy, safe and sustainable mobility that is fun.*

For more information please visit www.bosch-ebike.com

The ***Bosch Group*** *is a leading global supplier of technology and services. It employs roughly 428,000 associates worldwide (as of December 31, 2023). According to preliminary figures, the company generated sales of 91.6 billion euros in 2023. Its operations are divided into four business sectors: Mobility, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 470 subsidiary and regional companies in over 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 136 locations across the globe, Bosch employs some 90,000 associates in research and development, of which roughly 48,000 are software engineers.*

The company was set up in Stuttgart in 1886 by Robert Bosch (1861–1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-four percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by Robert Bosch GmbH and by a corporation owned by the Bosch family. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust.

Additional information is available online at www.bosch.com, www.iot.bosch.com, www.bosch-press.com