ENVIRONMENT

Environmental protection

Our business activities release emissions into the air and water and generate wastewater and waste. In addition, we use materials that can adversely affect the environment if not handled properly. We aim to minimize our impact on the environment and have developed strategies to improve our environmental performance. This includes making the most efficient use of increasingly scarce resources.

Our approach to environmental protection

Minimizing negative environmental impacts and taking meaningful climate action requires a holistic approach while also constantly monitoring practices and performance. Our goal is to decouple business growth from negative environmental impacts wherever possible. Our production sites are located in established industrial and commercial zones. Before acquiring a company – and thus its facilities – we first conduct an environmental risk assessment, taking into consideration information from publicly accessible sources such as local residents and non-governmental organizations (NGOs).

Roles and responsibilities

The Chair of the Executive Board and CEO of our company is responsible for environmental protection, which also covers climate action, water management, waste and recycling, biodiversity, and plant and process safety. Her duties include the approval of overarching Group-wide guidelines such as our EHS Policy. Furthermore, our Sustainability Board (MSB) monitors the Group-wide implementation of environmental protection goals.

The Group function Corporate Sustainability, Quality and Trade Compliance (SQ) is responsible for steering all the related measures globally. SQ senior leadership approves operational standards and regularly reports on environmental protection to the Executive Board. Every year, SQ prepares a comprehensive environment, health and safety report that covers topics such as climate action, water management, waste and recycling, and plant and process safety. The Executive Board uses this report to steer the strategic direction and as verification for our ISO 14001 certifications. Additionally, the Executive Board receives a monthly update so that measures can be adjusted in a timely manner.

At our individual sites, each site director is responsible for environmental compliance as well as occupational health and safety at the operational level. At larger facilities, the site directors receive support and advice from EHS managers, with EHS coordinators performing this role at smaller sites. These local EHS units report to the corresponding business sectors, working in close collaboration with them. As of December 31, 2022, we employed **149 EHS managers**, supported at the local level by additional staff members.

Within our business sectors, the Operations Leadership Committee (OLC) makes strategic decisions on issues pertaining to **emissions**, **energy**, **water**, and **waste** topics. This body consists of representatives from Life Science, Healthcare and Electronics as well as from SQ. Decisions made by the OLC and any resulting actions are implemented by the respective business sector. Once per quarter, the OLC members update their leaders on matters relating to environmental protection, and this information, if relevant, is then shared with the MSB.

Whenever designing new sites or plants, we always involve SQ, which is responsible for reviewing the ecological aspects of a project and advising our sites. Additionally, SQ performs detailed environmental impact assessments for large-scale projects.

Our commitment: Standards and standard operating procedures

Our approach to environmental management is founded on our **Group EHS (Environment, Health and Safety) Policy**, which has been approved by our Executive Board. Aligned with the requirements of the chemical industry's **Responsible Care® Global Charter** and the ISO 14001 environmental management standard, this policy underscores our leaders' responsibility for environmental protection and **health and safety**. It is also aimed at our **suppliers**, calling on them to likewise adopt higher environmental sustainability and safety standards. Our EHS policy thus complements the **Supplier Code of Conduct** (formerly Responsible Sourcing Principles) of our Group Procurement function. Through our Contractor EHS Management Standard we aim to ensure that our contract partners also take environment, health and safety aspects into account.

Internal guidelines, standards and standard operating procedures define how we put the principles of our EHS Policy into practice, **structure our environmental protection efforts and implement occupational safety Group-wide**. In addition, we also have in place a number of other internal environmental protection standards such as our **Air Emissions Standard**, **Waste Management Standard**, **Sustainable Water Management Standards**, and **Energy Management Standard**.

Potential EHS risks posed by acquisitions, divestments or site closures are assessed within the scope of due diligence, a process defined in our EHS Due Diligence and Post Merger Transaction Standard. We prioritize new sites when performing audits.

Material investments in environmental impact mitigation

Efforts to prevent and monitor air, water and soil emissions entail significant expense on our part, as does proper waste disposal. Moreover, we set up provisions for **groundwater and soil remediation** to ensure that we can execute all the necessary measures. As of December 31, 2022, **our provisions for environmental protection** totaled € 148 million, 94% of which was attributable to Merck KGaA, Darmstadt, Germany.

Assessing environmental impacts

As a matter of principle, we conduct risk-based assessments along with audits of all our production facilities every three years with the goal of analyzing and minimizing our environmental footprint. Conducted by Corporate Sustainability, Quality and Trade Compliance (SQ), these assessments serve to ensure that our requirements are being met, with appropriate corrective measures being implemented as needed. In our Group EHS audits, we assess our sites' performance on a five-tier scale ("excellent", "good", "satisfactory", "poor" and "critical"), which in turn determines how frequently audits are conducted. If the findings are deemed to be good, we audit the facility less often, while significant violations can increase the frequency. In 2022, we commissioned a **total of 41 audits**, which were conducted either virtually or on site. Almost all audited sites received either a "good", "satisfactory" rating, one site was rated "poor" and no sites were rated as "critical".

Reporting incidents and violations

To review critical situations, near misses and environmental incidents as quickly as possible and take countermeasures, we have a set of **reporting procedures** in place that allow us to track the respective incident, its degree of severity and all risk mitigation efforts. We record all incidents Group-wide and report them to the Executive Board on an annual basis.

In the event of a major occurrence, our digital **Rapid Incident Report System** (RIRS) promptly notifies SQ and Group Communications functions, who, if necessary, inform the Executive Board. Major incidents could include fatalities, accidents with multiple casualties, incidents that impact neighboring communities or natural disasters such as earthquakes and flooding. Through the RIRS, we can quickly coordinate with all those involved and inform the other sites immediately of the respective event. In addition, employees as well as external stakeholders can report any violations of our standards to Group Compliance.

In 2022, we recorded two significant incident-related spills. One took place at a production site in Germany, the other one in the USA. In neither case were people injured nor were negative environmental impacts expected, which is why it was not necessary to communicate these incidents to the public.

Environmental training and continuing education

All new EHS managers are required to complete a three-day orientation course at our global headquarters in Darmstadt. The seminar covers **energy efficiency and climate action**, **water management**, **occupational safety**, and **process and plant safety** along with our Rapid Incident Report System (RIRS). In 2022, we conducted EHS onboarding online.

ISO 14001:2015 Group certificate

Since 2009, our company has held an ISO 14001 Group certificate that requires all production sites with more than 50 employees to implement an **environmental management system with predefined indicators** such as greenhouse gas emissions and water consumption. Other facilities are not obligated to undergo certification. The annual internal audit reports and management reviews carried out under the Group certificate give us a better overview of how all our sites are performing. In 2022, 95 of our sites worldwide were covered by the **ISO 14001** certificate.

Annual external audits are used to monitor our certifications. As part of a defined sample procedure for the Group certificate, a total of 12 sites were externally audited in 2022, with all audited facilities passing. In addition to external inspections, internal audits serve to ensure Group-wide compliance with our requirements.

Biodiversity at our sites

Unsealed surfaces represent an important habitat for plants and animals. At our facilities, however, we are required to seal certain surfaces to minimize the risk of chemicals entering the ecosystem. When safety requirements permit, we increase the number of surfaces that are unsealed. Based on an assessment in 2021, several measures were taken to increase biodiversity at our headquarters in Darmstadt. For instance, several species protection meadows have been created and nesting boxes for cavity-nesting birds as well as beehives have been installed. Older buildings are also greened where possible. In 2022, one green roof was added.

Climate action

Climate change is one of the major challenges facing society in the 21st century. In 2015, the United Nations collectively agreed to take action to significantly limit the rise in global temperatures. Since climate action and energy efficiency will pay off in the long run – both for the environment and our business – we have also made it our mission to help stem the tide of climate change.

How we are taking climate action

We want to do our part to preserve the climate and comply with the Paris Agreement on climate change. Therefore, we have set our own objectives:

By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) greenhouse gas **emissions by 50% compared with 2020.** We aim to achieve this mainly by reducing process-related emissions, implementing energy efficiency measures and purchasing more electricity from renewable sources.

In May 2022, this near-term goal for 2030 was **approved by the Science Based Targets initiative (SBTi)**, which independently assesses and approves company targets based on its strict climate science criteria. With this confirmation, we are contributing to limiting global warming to 1.5 °C, thus complying with the requirements of the Paris Agreement.

We also aim to cover **80% of our purchased electricity with renewables** by 2030.

Moreover, we aim to reduce our Scope 3 emissions across the entire value chain by 52% (per euro of gross profit) by 2030. This target was also approved by SBTi.

By 2040, we intend to have achieved **climate-neutral operations** throughout our entire value chain; this target covers our Scope 1, 2 and 3 emissions.

Roles and responsibilities

Corporate Sustainability, Quality and Trade Compliance (SQ) is responsible for overseeing all climate action efforts throughout the Group, with our individual sites and business sectors worldwide implementing the necessary measures at the local level. You can find more information under **Environmental Protection**.

Our commitment: Standards and legal frameworks

We have three EHS standards in place to manage energy and process-related emissions consistently across the Group, specifically “Energy Management”, “Emissions” and “Emissions of Refrigerants”. We utilize an internal audit process to randomly check compliance with all EHS standards.

In addition to our own standards, **we are subject to a wide array of national and international energy and climate regulations**. At European level, for instance, we are required to comply with the EU Energy Efficiency Directive (2012/27/EU), which stipulates that companies must conduct regular energy audits or implement an ISO 50001-certified energy management system. The sites subject to these requirements are responsible for taking the requisite actions and furthermore undergo audits conducted by internal and external experts. In total, 13 sites have been certified in accordance with ISO 50001 to date.

Our co-generation plant in Darmstadt and heating plant in Gernsheim (both in Germany) have made it necessary for us to participate in EU emissions trading since 2005. The EU 2030 Climate and Energy Framework is designed to achieve the objectives of the Paris Agreement, with **EU emissions trading** playing a key role in this. The amended EU Emissions Trading Directive (2003/87/EC) took effect in April 2018, thereby updating the legal framework for the fourth phase of the EU emissions trading program (2021-2030) and tightening the rules for free CO_2 allowances. Going forward, we will therefore increasingly have to purchase CO_2 emission allowances.

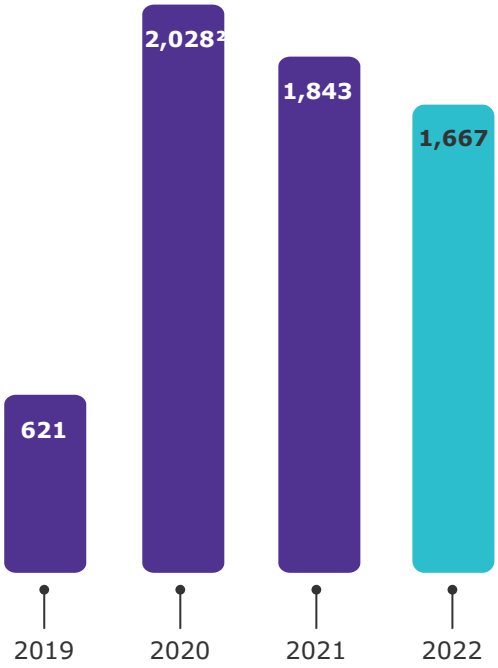
Emissions reduced further

In 2022, we reduced our greenhouse gas emissions by nearly 10%, emitting a total of approximately 1,667,000 metric tons of CO_2 equivalents (CO_2eq) (2021: 1,843,000 metric tons).

Our direct emissions (Scope 1) totaled 1,425,000 metric tons of CO_2eq, with process-related emissions accounting for 1,167,000 metric tons of CO_2eq and fuel use accounting for the remainder. Indirect emissions (Scope 2) totaled roughly 242,000 metric tons calculated according to the market-based method (approximately 377,000 metric tons according to the location-based method). Greenhouse gas emission intensity (Scope 1 and 2) amounted to 0.07 Kg of CO_2eq per € of net sales in this period (2021: 0.09).

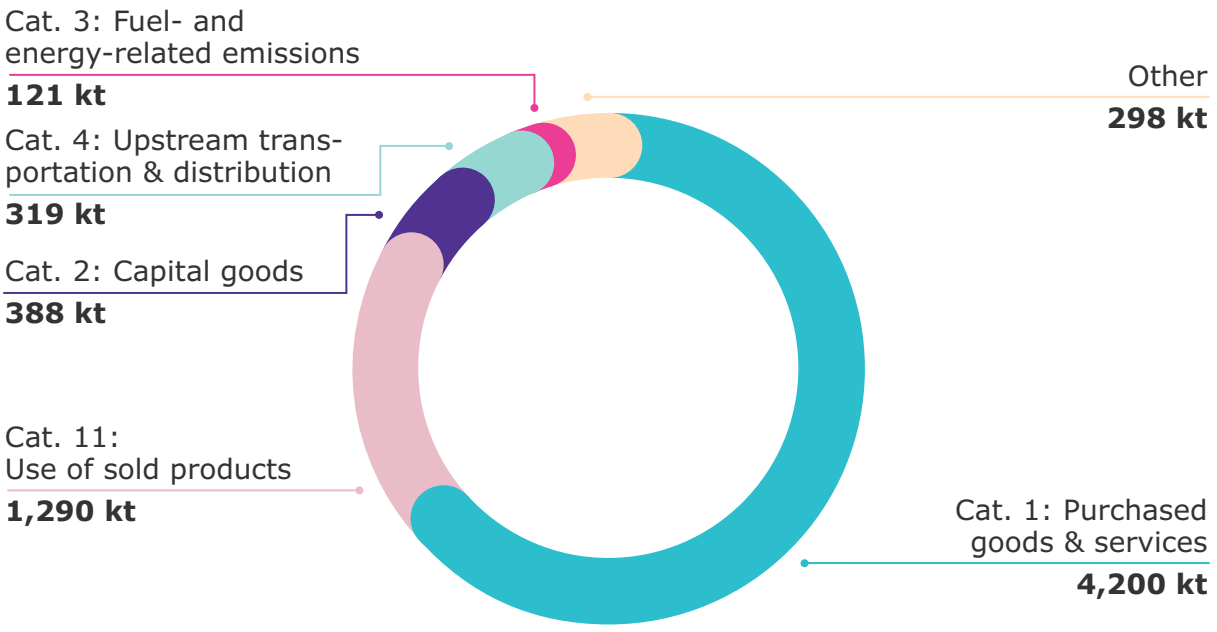
In 2022, we focused on creating more transparency on our Scope 3 emissions. The Greenhouse Gas Protocol defines 15 categories for Scope 3 emissions from upstream and downstream activities. In 2022, these emissions totaled around 6,616,000 metric tons of CO_2eq. Categories 1 and 2 (Purchased Goods and Services and Capital Goods) accounted for 69% of our total Scope 3 emissions in this period. You can find more information on the Supplier Decarbonization Program under **Sustainable supply chain**.

Greenhouse gas emissions in metric kilotons of CO_2 equivalents, Scope 1 and 2[1]



1) In line with the Greenhouse Gas Protocol, for all previous years greenhouse gas emissions were calculated based on the current corporate structure as of Dec. 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).
2) The increase in greenhouse gas emissions as of 2020 is attributable to the acquisition of Versum in 2019.

Greenhouse gas emissions 2022 in metric kilotons of CO_2 equivalents, Scope 3



Reducing process-related emissions

With the integration of Versum Materials, acquired in 2019, into the Electronics business sector, our process-related emissions increased sharply – mainly in the production of special chemicals for the electronics industry. In 2022, our pilot exhaust gas abatement unit in Hometown (Pennsylvania, USA) reached operational readiness, achieving a high efficiency of almost 99%. Based on this technology we will invest in additional units in 2023 to reduce process-related NF_3 emissions in subsequent years.

In our Life Science business sector, we are tracking process-related emissions primarily from the release of perfluorinated hydrocarbons (PFCs). Consequently, we already replaced several emission-intensive production lines with equipment that does not emit PFCs, resulting in a reduction of CO_2eq by 40,000 metric tons between 2021 and 2022. In 2022, we also focused on developing the methods to eliminate the remaining PCF emissions from these processes, which we plan to implement and complete before 2030.

Reducing product-related emissions

Across all three of our business sectors, we aim to reduce the carbon footprint of our products. To achieve this, we have started a pilot project for an IT tool that will help us calculate the carbon footprint of our product portfolios. To ensure we work based on industry standards and can rely on comparable data analytics and expert analysis, we collaborate with our peer companies in industry initiatives such as Together for Sustainability (TfS).

Reducing emissions within our supply chain

You can find more information on the Supplier Decarbonization Program under **Sustainable supply chain**.

Shifting to ocean freight

In 2019, our Healthcare business sector initiated a major transformation of its means of transport, significantly reducing not only our CO_2 emissions but also our logistics expenses. Our ambition was to reduce greenhouse gas emissions by switching **from air to sea shipment wherever possible**. We initiated two model projects on the use of biofuels for road transport – one in 2021 and another in 2022. The aim is to learn more about the sustainability of alternative fuels (biofuels) and the actual CO_2 reduction. During the pilot phase in 2021, we reduced CO_2 emissions by 70% (well-to-wheel analysis) for shipments to the Asia-Pacific region (excluding China).

Green business case

In 2022, we introduced a sustainability evaluation for all investment projects greater than € 10 million. The shadow price that must be considered for these investment projects is € 100 per metric ton of CO_2eq. With these measures, we aim to establish a clear focus on reducing CO_2 emissions in all our large capital expenditure projects.

Transparency on CO_2 emissions and energy consumption

We report to the Carbon Disclosure Project (CDP) on an annual basis. This organization assesses the ways in which companies are working to lower greenhouse gas emissions and minimize the risks and consequences of climate change, along with their strategy for doing so. Companies are rated from A to D-, with A being the top score. In 2022, we scored B (2021: B) for climate change and B (2021: A-) for water security.

Green mobility

We aim to transition our car fleet primarily to lower emission engines by 2025 and are working to reduce the average emissions of our vehicles by approximately 50% relative to 2020 levels. Through our Green Fleet pilot, we help employees at our German sites make the change to electric vehicles. In 2022, we increased the number of charging stations where employees can recharge their company or personal cars to 88. We also provide our employees access to charging facilities in other countries, such as France, Switzerland, the United Kingdom, and the United States.

For those on the road, we offer the “Laden@road” program, which allows our employees to charge their company cars or personal vehicles at roughly 160,000 stations across Europe.

Climate-related risks and opportunities

In order to comply with all disclosure requirements of the **Task Force on Climate-Related Financial Disclosure (TCFD)**, we started with a detailed assessment of climate-related risks and opportunities. In 2022, we conducted a qualitative scenario analysis, which will be followed by a quantitative study in 2023. Scenario analyses are among the key recommendations of the TCFD and are closely related to EU taxonomy. They are now a legal requirement in the United Kingdom. This endeavor is aimed at understanding the risks and opportunities our organization may face due to climate change. In our qualitative analysis, we have identified both the transition risks associated with a world moving towards net zero as well as the physical climate risks related to a society that does not commit to decarbonization. More information can be found in the **TCFD index**.

Energy efficiency

In 2022, a variety of **energy efficiency initiatives** helped us save around 3,000 metric tons of CO_2eq at our global headquarters in Darmstadt (1,700 metric tons of CO_2eq in 2021). For instance, we improved heating, ventilation and air conditioning systems and reduced base loads for compressed air systems.

As part of the energy and water efficiency program of our Life Science business sector, we rolled out new **tools and governance structures** in 2022 to help us assess projects to save energy and water. The energy and water efficiency program had a capital expenditure budget of € 4.6 million in 2022, which we will increase to € 9.3 million in 2023. In 2022, we formally trained 18 Facility, Plant Engineering, and EHS Managers from sites globally on energy management.

As part of our ongoing effort to expand renewable energy, our Life Science business sector initiated the installation of a 700 kW solar photovoltaic (PV) system at our Darmstadt site and an additional 100 kW solar PV

system at our site in Bangalore, India. We also entered into a 30-year land lease agreement with the local electric company that serves our Sheboygan, Wisconsin (USA) site to install a 2,250 kW solar PV system on our land. We will receive and retain the renewable energy certificates generated by these projects.

In 2022, several of our energy efficiency investment projects at our Healthcare sites achieved double-digit percentage point scope 1 emissions reductions. In Vevey, Switzerland, we invested in replacing the natural gas-fueled white steam generator with an electrical model, achieving a reduction of 15%, and in Aubonne, Switzerland, we upgraded coolers and installed heat pumps, achieving a reduction of 25%. We also put in place heat pump technology in one of our core development sites in Ivrea, Italy, which counterbalances the GHG emissions associated with a major expansion.

Slight decline in energy consumption

We consumed 2,432 gigawatt hours of energy in 2022, compared with 2,454 gigawatt hours in 2021. Our energy intensity relative to sales totaled 0.11 kWh/€ in 2022 (2021: 0.12 kWh/€).

Purchasing electricity from renewable sources

In 2022, we further strengthened our focus on purchasing **electricity from renewable sources**. In this period, we sourced 47% of our purchased electricity from renewable energies, meaning direct supply contracts and energy attribute certificates (2021: 30%). The share of our total energy consumption by renewable energies increased to 20% in 2022 (2021: 13%). After signing a 12-year Virtual Power Purchase Agreement (VPPA) with the Azure Sky Wind and Storage project, the project went into commercial operation in May 2022. Furthermore, in 2022, we expanded our renewable energy commitment through another VPPA with a 16-year term. With these two deals, we cover 90% of the company’s electricity consumption in the United States and 55% globally.

We are covering the power needs of multiple South American sites (for example Argentina, Chile, Guatemala) through renewable energy certificates. The same applies to several of our sites in China. In line with our renewable energy strategy, we completed an assessment of the European renewable electricity markets to determine our best path forward. This assessment will guide our renewable electricity purchasing strategy in the coming years. We are currently in the process of selecting project developers to achieve our green electricity sourcing objective.

Employee incentives

We encourage our people to do their part to preserve the climate through helpful information and tips on our intranet. In our newsletter we regularly report on **group-wide climate protection measures**. Moreover, we support members of our workforce who are seeking greener modes of transportation:

- At our German subsidiaries, we offer a subsidy of € 150 towards monthly lease payments to employees who opt for an **electric company car**.
- At our German sites, we also encourage workers to use climate-friendly forms of transportation through “bike4me”, a program enabling them to **lease a bike** at discounted rates with payments coming out of their pre-tax income.
- In the United States, our Life Science employees can choose from several subsidies including up to US$ 3,500 towards the purchase or lease of qualifying hybrid or electric vehicles, US$ 1,000 towards the installation of **solar photovoltaic systems or solar thermal collectors** at their homes, and US$ 100 towards the cost of a home energy assessment.

Resource efficiency

Water management

Water is becoming increasingly scarce globally. Since our company also depends on the availability of water, sustainable water management is an important part of our environmental protection efforts. Our wastewater may also contain trace substances, such as pharmaceutical active ingredient residues. We continuously aim to improve our water protection activities. This includes adapting our practices to increasingly strict legal requirements.

Our approach to sustainable water management

To us, sustainable water management means obtaining freshwater or discharging treated wastewater without negatively impacting aquatic ecosystems. We are also concerned with addressing water scarcity. To determine whether a site is located in a water-stressed area, we apply a risk factor of the Aqueduct Water Risk Atlas of the World Resources Institute (**WRI**). We want to reduce the environmental impact of our wastewater and make our processes more water-efficient. In the medium term, we will also take into account water-related risks that exist in our supply chain when purchasing important raw materials. In the long term, we intend to transparently map water use and environmental impacts throughout the entire life cycle of our products.

To this end, we have defined two targets: First, by 2025, we aim to lower our Water Intensity Score by 10% compared to 2020. Second, by 2030, we want to reduce potentially harmful residues in our wastewater below the no-effect threshold.

Our regular EHS audits at our production and development facilities also review **site-specific water management practices**. Our water management efforts focus more heavily on our manufacturing sites than on our administrative facilities because production generally poses a higher risk to aquatic ecosystems.

Roles and responsibilities

The Group function Corporate Sustainability, Quality and Trade Compliance (SQ) is responsible for water management. At our sites, engineers work in close collaboration with our EHS managers to lower water consumption and treat wastewater. Further information can be found under **Environmental protection**.

Our commitment: Standards and procedures

Our Group-wide Sustainable Water Management Part 1 – Wastewater, Sustainable Water Management Part 2 – Water Use and Sustainable Management Part 3 – Water Risk Management standards detail how we integrate **mechanisms of sustainable water management** into our management system. All three standards are based on the commitments we made under the **Responsible Care®** initiative. At the same time, our **Sustainable water management principles** set the framework for the three aforementioned standards.

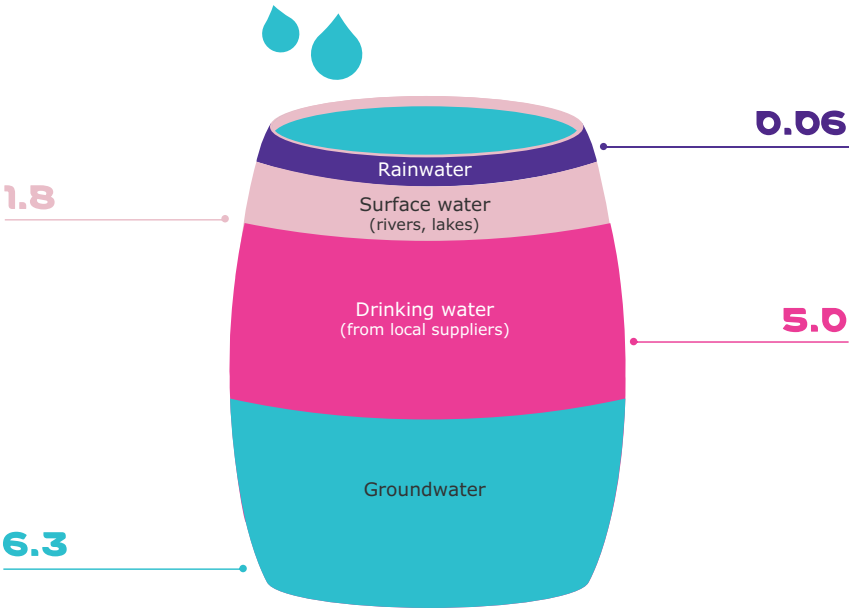
Our Wastewater Standard defines criteria for assessing our wastewater discharges into the ecosystem. It also helps us to achieve our target as regards trace substances in wastewater from our operations. The Water Use Standard sets out mandatory Group-wide requirements for the responsible consumption of water. The Water Risk Management standard establishes a way for us to manage the risks that arise from direct or indirect water

extraction and also covers risks such as contaminated rainwater and flooding. We perform internal **EHS audits** to verify that our sites comply with our three standards. They are all required to measure and assess the risks and impacts of the hazardous substances in their wastewater. Moreover, they must also analyze withdrawal and wastewater risks and comply with the respective requirements of the local authorities.

Water withdrawn from our own sources

For the most part, we draw water used for our production processes from our own wells and source drinking water from local suppliers. In doing so, we do not want water extraction to impair any protected areas, sensitive ecosystems or habitats. Our aim is to extract less water from our own wells than the amounts approved in our permits. At the same time, we keep an eye on trends that could potentially lead to sources being reclassified in the future.

Water withdrawals (millions of m^3) – 2022



The cooling water used for our production processes generally runs in a circular system. Depending on regulatory standards and the energy footprint, we sometimes use freshwater for cooling in a once-through system. However, this is only done in regions with high freshwater availability. For certain applications, we treat production wastewater and reuse it. In 2022, we recycled a total of 20.7 million m^3 of water (2021: 23.5 m^3 of water).

Using water more efficiently

We seek to minimize our impact on water availability in the vicinity of our sites. In 2022, we withdrew 13.2 million m^3 of water in total (2021: 13.5 million). Local conditions determine whether a sufficient water supply is available. In our water conservation efforts, we pay particular attention to sites in water-scarce areas. To improve our water efficiency, we have therefore defined an intensity score – the Water Intensity Score. The score relates to the amount of water either purchased or withdrawn from our own wells at a site to the number of hours worked, while taking the local availability of water into account. The Gernsheim site (Germany) is excluded from both the score and our water conservation efforts because we must extract a minimum water quantity from our own wells in order to comply with regulatory requirements. In 2022, we lowered the Water Intensity Score by 8.6% in comparison with the baseline year 2020 (2025 target: 10% reduction).

Our site in Rio de Janeiro conducted a project to reduce water consumption by upgrading the on-site wastewater treatment plant and reusing treated wastewater in the cooling towers. After two years of implementation, the average annual volume of water that is reused is approximately 20,000 cubic meter/year, which contributes together with other water saving measures to a reduction of 33% of total water intake compared to 2020. Another example can be found at our site in Mollet (Spain), where the replacement of water scrubbers for dry technology dedusters in 2021 and 2022 led to estimated water savings of 12,400 m^3/year.

Our wastewater

In 2022, we generated a total of 12.4 million m^3 of wastewater (2021: 13.3 million). This consisted of around 8.6 million m^3 of freshwater, which we discharged into surface waters. 3.8 million m^3 was classified as “other water” and was treated at external treatment plants or disposed of in an ecologically sustainable manner. We take extensive measures designed to ensure that our company complies with the respective legal requirements when directly discharging wastewater into aquatic ecosystems. Before we obtain a discharge permit, the local authorities review the profile of the local aquatic ecosystems on site to ensure that they will not be compromised by our activities. 54% of our total wastewater was discharged by three of our sites. Our Gernsheim site (Germany) discharges its treated wastewater into the Rhine River and our Onahama site (Japan) into the Pacific Ocean. The wastewater generated at our site in Darmstadt (Germany) is treated in our own treatment plants before being released into the Schwarzbach/Ried Creek, a tributary of the Rhine River. The volume of treated wastewater we discharge represents approximately 2,7% of the average annual water volume of the Schwarzbach/Ried Creek, with the statutory regulations currently in force serving as orientation. We are preparing for a potential tightening of the statutory requirements on discharging treated wastewater.

We have been expanding our central wastewater treatment plant in Darmstadt by adding a fourth purification stage. Its current treatment performance of up to 98% (2021: 98%) is to be further increased in the future thanks to activated carbon filters. We are planning to commission the improved plant at the end of 2023.

Residues in wastewater

We continuously work to optimize our production streams and purification processes in order to conserve water and minimize residues. An expert has been appointed for each of our business sectors to provide guidance for our sites. Apart from aiming to reduce the amount of **pharmaceutical active ingredient residues** in wastewater, we expanded our measures to include all substances with water-hazardous properties in 2022. All the relevant sites have their own wastewater treatment plants and regularly analyze their wastewater to check for harmful substances.

We also process antibiotic active ingredients on a small scale. To prevent adverse effects on people and the environment, the wastewater generated from these activities undergoes an additional purification process. Only then do we discharge it into the ecosystem, thereby minimizing remaining antibiotic residues.

When it comes to discharging wastewater, we strictly adhere to government regulations. However, even though we meet all applicable requirements, slight amounts of trace substances still end up in the ecosystem. Our target therefore goes beyond the stipulations of legal requirements: By 2030, we plan to reduce potentially harmful residues in our wastewater to **below the no-effect threshold**. To this end, we are undertaking multiple project steps. We completed the first step– identifying the relevant sites – in 2022. The next steps will be conducting a risk assessment for the relevant substances, assessing how high the deviation from the no-effect threshold is, and implementing improvement actions.

Assessing our water management practices

In addition to reporting on our **climate action efforts**, we also report water-related data to the **CDP**, which collects environmental data from companies once a year, evaluating their processes and performance on a scale from A to D-. In 2022, we were awarded a “B” for our water management practices (2021: A-).

Waste & recycling

Although waste may contain valuable raw materials that can be reused in the production stream, it can also pose a wide range of risks to the environment. We therefore consider it essential to either prevent or recycle as much of our waste as possible.

Our approach to waste and recycling

We aim to limit the loss of raw materials and reduce the impact of our waste disposal practices on ecosystems. To this end, we are working to lower our Waste Score, our key waste management indicator, by 5% by 2025 (2016 baseline).

We strive to prevent the generation of waste by, for instance, developing new production processes or optimizing existing ones. When prevention is not feasible, we do our best to recover materials or energy from the waste we generate. Our waste scoring system helps us support a circular economy. Waste separation makes it possible to **recover and recycle raw materials**, while unrecyclable waste is disposed of in an environmentally sustainable manner in line with the strictest waste disposal standards. In doing so, we take local legal regulations as well as the available disposal options into account.

Responsibility for the waste disposal process

As a generator of waste, we are responsible for the ultimate disposal of our waste and therefore choose our service providers with the utmost care, contractually stipulating disposal requirements. We conduct random audits to verify their compliance with our disposal standards, especially when it comes to hazardous waste.

Roles and responsibilities

Our Corporate Sustainability, Quality and Trade Compliance (SQ) function bears overall responsibility for our waste management and recycling practices. Additionally, our site EHS managers are responsible for implementing our requirements at the sites and for maintaining legal compliance with the applicable regulations. We have a Group-wide committee consisting of experts from SQ and our business sectors to coordinate our approach to waste management.

Waste management forms part of our Group-wide environmental management system, with 95 sites (2021: 90) certified to ISO 14001. In addition to undergoing external certification, we also conduct internal EHS audits to review our waste management practices. Moreover, we regularly host activities such as EHS forums and conferences to keep our local EHS managers and site directors up to date on the topic and to raise awareness.

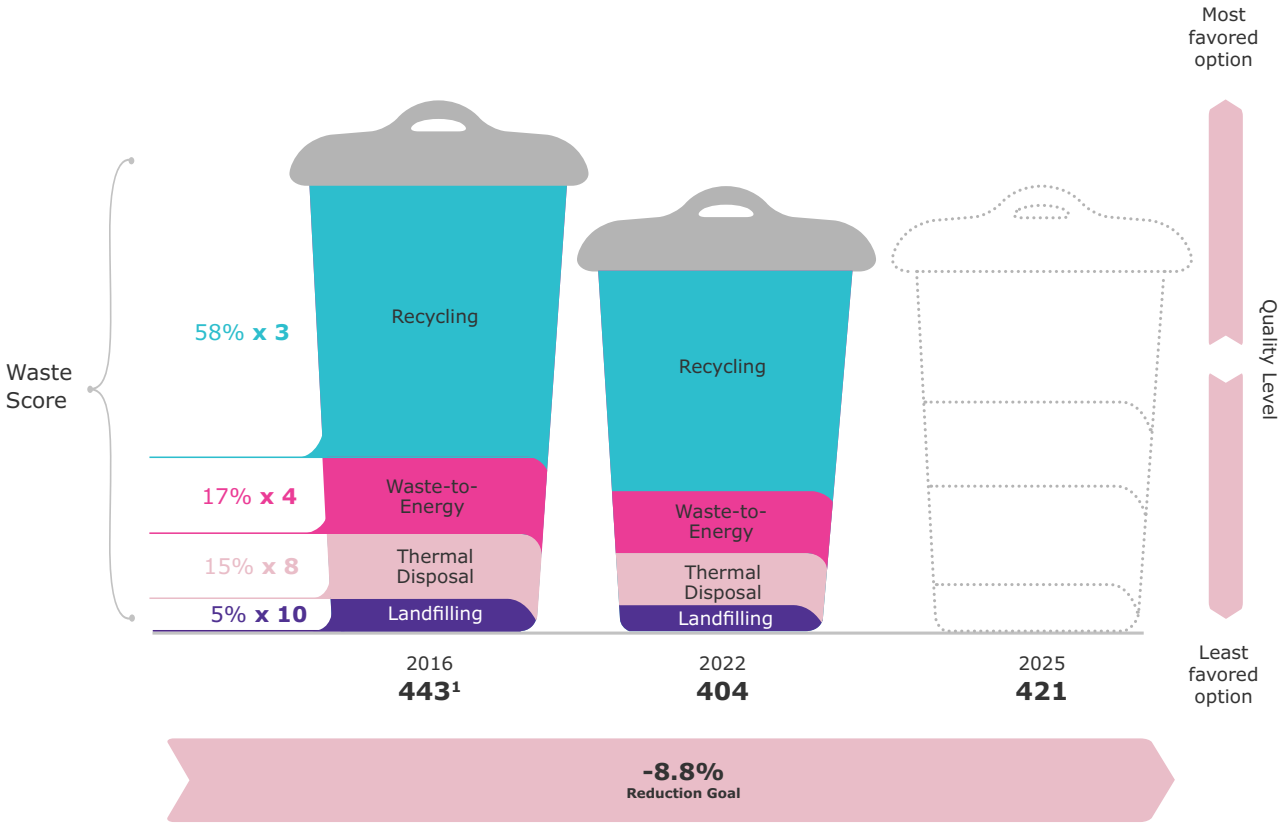
Further information can be found under **Environmental protection**.

Our commitment: International guidelines and requirements

Our Group-wide EHS Waste Management Standard provides a **consistent framework for waste management across all of our sites**, defining organizational structures and minimum requirements. This standard also stipulates that all facilities document their waste by type and quantity and report these data to our SQ function.

Systematic waste reduction

We use a variety of methods for recycling, recovering and disposing of the waste we generate, each of which has a different impact on the environment. To systematically account for these effects, we have put in place a waste scoring system that allows us to compare the amount of waste our individual sites generate and track our various waste streams. In this system, our waste streams are broken down into five categories by percentage: landfilling, thermal disposal, waste-to-energy, recycling, and prevention. This percentage is then multiplied by a factor that increases based on the disposal method's environmental impact. The total from each category is added together to yield our total Waste Score. Prevented waste is multiplied by a factor of zero, thus lowering the overall score.



[1)] The base was retroactively adjusted owing to subsequent data corrections.

Reducing the environmental impacts of waste

We are aiming to reduce our Waste Score by 5% by 2025 compared with 2016. To achieve this goal, we continuously examine our production processes and disposal methods to identify potential areas for improvement, an endeavor supported by the EHS units of the business sectors at each site. They regularly discuss best practices, share lessons learned across our sites and drive the transition to greener disposal methods. In 2022, we succeeded in reducing our total Waste Score by 8.8% relative to 2016.

The amount of waste we generated in 2022 increased, totaling 371 metric kilotons (2021: 214 metric kilotons). Soil, construction and demolition waste accounted for 53% of our total waste in 2022 (2021: 20%). Our Waste Score does not factor in this type of waste, which can rarely be avoided and must be discarded in accordance with clearly prescribed methods.

Promoting the circular economy

Through our ProMec (Progressive Material Economy) initiative at the Darmstadt site, we are promoting a **sustainable, resource-efficient circular economy.** We are refining our solvent recycling practices, thereby minimizing the adverse environmental impacts from the disposal of our production waste.

Together with the Technical University of Darmstadt (TU Darmstadt), we continue to develop a **digital platform for the optimum use of waste and its avoidance**. The project aims to bring together waste generators and specialized waste recyclers. Furthermore, it will be a platform for a secondary market.

Additionally, our Healthcare Green Teams community shares circular economy best practices. In 2022, we fostered a best practice sharing community, which led to the establishment of circular hubs at five manufacturing sites (Vevey and Aubonne in Switzerland, Guidonia and Ivrea in Italy and Darmstadt) to promote the exchange of unused materials and give them a second life.

Shifting from landfill to waste-to-energy

At our site in St. Louis, Missouri (USA) we employ waste-to-energy recovery for vast portions of our waste instead of landfilling it. As of the end of 2022, this applied to 1,310 metric tons (2021: 781). Furthermore, the site is planning to shift further waste streams from landfill to waste-to-energy recovery.

Plant, process & transport safety

Our approach to plant, process and transport safety

Preventing harm to human health and the environment is one of our top priorities. We have management systems in place to help ensure the safety of our plants and processes and to protect our employees and the environment. In addition, we do everything in our power to ensure that our chemical and pharmaceutical compounds are transported and stored properly.

We seek to **minimize manufacturing process hazards** wherever possible in order to prevent workplace accidents, production outages and chemical spills, which is why we regularly review our approach to plant and process safety and continuously gauge it using our EHS performance indicators.

Moreover, all our shipments are to reach our customers and sites safely, undamaged and with the required safety information. Several of the materials we store and transport are classified as hazardous. The storage of such dangerous goods and the transport thereof – whether by road, rail, air, or water – are governed by global regulations. To minimize risks to people and the environment, we apply **strict safety requirements across the Group** that also comply with applicable laws. We conduct regular reviews to ensure our own warehouses as well as those of third parties comply with these regulations. In 2022, no third-party audits were conducted due to Covid-19.

We train our employees regularly in an effort to prevent human error and also to detect technical defects before they can cause harm.

Roles and responsibilities

Overriding responsibility for plant, process and transport safety lies with the Group function Corporate Sustainability, Quality and Trade Compliance (SQ), which coordinates plant and process safety for the company and defines Group-wide EHS standards and regulations. In addition, our individual sites are subject to national and international regulations governing environmental stewardship and public safety. At the local level, the **respective site directors** are responsible for ensuring compliance with all safety requirements.

If required, we have appointed an EHS manager for our sites as well as a **dangerous goods manager** for sites with logistics activities with relevant amounts of hazardous materials.This role corresponds to the EU regulations pertaining to the “Dangerous Goods Safety Advisor”. Both individuals advise the site manager on plant, process and transport safety and regularly monitor compliance with safety requirements.

Our commitment: Internal standards and international rules

To ensure safe operation throughout the lifetime of a plant, our Group-wide EHS standards contain specific rules for production plants and processes. These include specifications that determine how special risk analyses and hazard assessments are to be carried out. We have also defined measures for the event of accidental release of chemical substances and for fire protection.

Our Group-wide EHS standards stipulate the safety levels for the storage of hazardous materials at our sites. Along with supplementary standard operating procedures and best practice documents, these EHS standards describe the technology, equipment and organizational infrastructure needed to achieve the appropriate safety levels. Contract warehouses must also adhere to our strict safety requirements. Before we sign a contract with an operator, they must submit a statement detailing how they meet our prerequisites. Our Group-wide EHS standards also define the **technical and organizational requirements** for such warehouses.

Our Group Transport Safety Standard is based on the United Nations Recommendations on the Transport of Dangerous Goods. This guideline is especially important for sites in countries with inadequate local regulations covering the conveyance of hazardous materials.

Assessing potential risks

Before commissioning a plant, we draft a safety concept, which is subject to continuous review throughout the entire lifetime of the facility. It is updated as needed until the facility is decommissioned. This safety concept contains an overview of potential risks and specifies corresponding protective measures. In the event that alterations are made to a plant, we reassess the hazard and risk situation. Our Risk Management Process guides all our sites in **identifying and assessing risks** and serves to devise further measures to minimize them.

We use internal **EHS audits** to complement the inspections conducted by our EHS and dangerous goods managers in order to ensure that our sites comply with process, plant, transport, and storage safety regulations. Normally, these audits are conducted every three years at production sites and every four years at warehouse and distribution sites. If major shortcomings are identified, we re-audit the respective site the following year. Conversely, we may decide to extend the period between audits at facilities where, based on the findings from previous audits, we deem the potential risk to be low. Our sites are required to rectify any deficiencies discovered during the audit, with the auditor subsequently checking whether the specified corrective actions have been taken. In 2022, we conducted 41 EHS audits in accordance with our Group-wide EHS standards.

We report transportation incidents and accidents in accordance with the recommendations on the Transport of Dangerous Goods – Model Regulations (UN Orange Book, 7.1.9) in conjunction with the criteria of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR, 1.8.5.). There was no reportable event in the reporting period.

Keeping a close eye on safety

We track **EHS performance indicators** at all production and warehouse facilities, as well as at major research sites, including both accidents and near misses. We investigate each individual incident and then devise appropriate countermeasures in an effort to reduce the likelihood of such events reoccurring in the future. EHS performance indicator data are reported once a month within each business sector, with the Executive Board receiving reports on the topic once per year. Four indicators are particularly important to us:

- Under our **EHS Incident Rate (EHS IR)**, we track and evaluate all major and minor accidents and incidents as well as further EHS-relevant incidents. The EHS IR covers both our own employees as well as those of contractors. To calculate it, we state the number of incidents and the severity of the event in relation to the number of hours worked. The lower the EHS Incident Rate, the safer the site is. In 2022, the ratio was 2.8 (2021: 3.9). The significantly lower rate is attributable to the fact that we have now fully included all office sites in the assessment.
- The EHS IR also includes our **Loss of Primary Containment (LoPC)** indicator. In 2022, we recorded two significant incident-related spills. One took place at a production site in Germany, the other one at a site in the United States. In neither case were people injured nor were negative environmental impacts expected, which is why it was not necessary to communicate these incidents to the public.
- The **EHS Leading Rate (EHS LR)** reflects the number and the results of the analyses of near misses and critical situations.
- For the **Lost Time Injury Rate (LTIR)** we set ourselves the goal of bringing our Group-wide LTIR below 1.0 by 2025 (number of accidents Group-wide resulting in at least one missed day of work per million hours worked). In 2022, our LTIR of 1.2 remained unchanged in comparison with the previous year.

In January 2022, we harmonized our approach to audits and reporting by introducing standardized third-party warehouse audits by EHS managers. This approach will help us to more effectively identify areas for improvement at third-party warehouses and our interfaces, and better compare the third-party warehouses with each other and with our own warehouses.

Employee training and best-practice sharing

In line with their specific tasks and responsibilities, our employees undergo regular training that is conducted by either their respective supervisor or our EHS managers. They present Group-wide EHS standards as well as site-specific standards and processes, address changes to international requirements and explain the proper procedures for dealing with incidents. In addition, all newly hired EHS managers complete introductory courses on plant and process safety during their EHStart-up! onboarding.

In the interest of improving safety, we consider it extremely important to continuously **share best practices and lessons learned**. Once a month, for instance, site directors and EHS managers participate in safety leadership calls to learn from incidents at other facilities and implement preventive measures. Additionally, the EHS managers of the individual sites regularly hold lessons-learned sessions.