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 require 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.

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, air emissions, biodiversity, and plant and process safety. Her duties include approving overarching Group-wide guidelines such as our Environment, Health and Safety (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 Sustainability Board. Every year, SQ prepares a comprehensive environment, health and safety report covering topics such as climate action, water management and waste and recycling as well as plant and process safety. The Sustainability Board uses this report to steer the strategic direction and provide verification for our ISO 14001 and ISO 45001 certifications.

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.

Across our business sectors, the Operations Leadership Committee (OLC) makes strategic decisions on issues pertaining to **emissions**, **energy**, **water**, and **waste**. This body comprises representatives from Life Science, Healthcare and Electronics as well as 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 Sustainability Board.

Our commitment: Standards and standard operating procedure

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 high environmental sustainability and safety standards. Our EHS policy thus complements the **Supplier Code of Conduct** 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 have in place a number of further internal environmental protection standards such as our **Air Emissions Standard**, **Waste Management Standard**, **Sustainable Water Management Standards**, and **Energy Management Standard**.

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 € 149 million (2022: € 148 million), 96% (2022: 94%) of which was attributable to Merck KGaA, Darmstadt, Germany. For details see consolidated financial statements under "**Other provisions**".

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 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", "fair", "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 incompliances can increase the frequency. In 2023, we commissioned **a total of 34 audits** (2022: 41), one of them "excellent", 23 of them "good" and 10 of them "fair".

For large-scale investment projects, SQ provides the EHS expert statement, which is a high-level summary of remaining EHS risks known at the time of project approval. This EHS expert statement integrates input from our sites and covers, for instance, occupational health & safety aspects, process safety requirements, fire safety and protection measures as well as environmental aspects.

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 annually.

In the event of a major occurrence, our digital **Rapid Incident Report System** (RIRS) promptly notifies the SQ and Group Communications functions, which, 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 2023, we recorded no (2022: two) significant incident-related releases of substances.

Environmental training and continuing education

In 2023, we changed our overall approach for training new EHS managers. Eight times a year, we now offer comprehensive virtual live training courses. The seminars cover **energy efficiency and climate action**, **water management**, **occupational safety**, and **process and plant safety** along with our Rapid Incident Report System (RIRS).

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. As in the previous year, 95 of our sites worldwide were covered by the **ISO 14001** certificate in 2023.

Annual external audits are used to monitor our certifications. As part of a defined sample procedure for the Group certificate, a total of 34 sites were externally audited in 2023, with all audited facilities passing (2022: 12). In addition to external inspections, internal audits serve to ensure Group-wide compliance with our requirements.

Biodiversity at our sites

Our initial step towards the goal of protecting biodiversity involves meticulous assessment of our production sites, recognizing them as primary contributors to our ecological impact. These sites grapple with issues such as soil sealing, emissions, waste generation, and water consumption. To gain a comprehensive understanding of our sites' impacts on biodiversity, we have developed Biodiversity Site Profiles using data sourced from the Integrated Biodiversity Assessment Tool (IBAT). This foundation enables us to conduct a thorough quantitative analysis of biodiversity. Consequently, the company's production sites can be systematically compared, enabling us to prioritize initiatives aimed at biodiversity conservation.

In the forthcoming periods, we are dedicated to further refining our site profiles and actively promoting positive biodiversity outcomes across our sites.

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 the basis year 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 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. This approval by SBTi confirms that 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% compared with 2020 (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 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. More information can be found 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”, “Air Emissions” and “Emissions of Refrigerants”. We use 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, 14 sites have been certified in accordance with ISO 50001 to date.

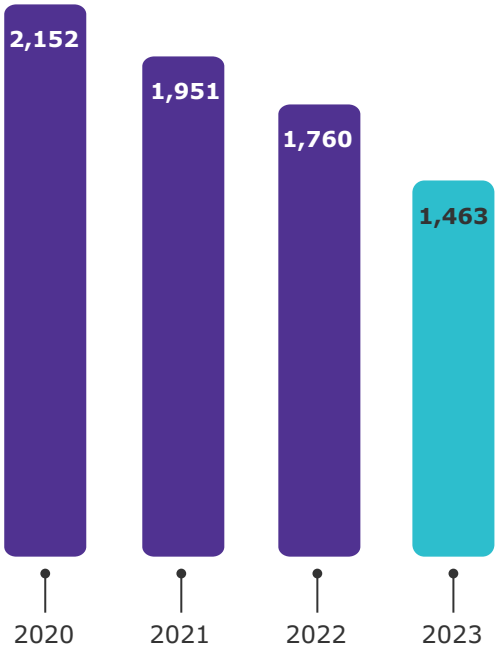
Our co-generation plant in Darmstadt and heating plant in Gernsheim (both in Germany) have made it necessary for us to participate in **EU emissions trading** since 2005. The EU 2030 Climate and Energy Framework is designed to achieve the objectives of the Paris Agreement, with EU emissions trading playing 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 2023, we reduced our greenhouse gas emissions by nearly 17% compared with the previous year, emitting a total of approximately 1,463,000 metric tons of **CO_2 equivalents** (CO_2eq) (2022: 1,760,000).

Our direct emissions (Scope 1) totaled 1,236,000 metric tons of CO_2eq (2022: 1,518,000), with process-related emissions accounting for 990,000 metric tons of CO_2eq and fuel use accounting for the remainder. Indirect emissions (Scope 2) totaled roughly 227,000 metric tons of CO_2eq (2022: 242,000) calculated according to the **market-based method** (approximately 381,000 metric tons of CO_2eq 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 (2022: 0.08).

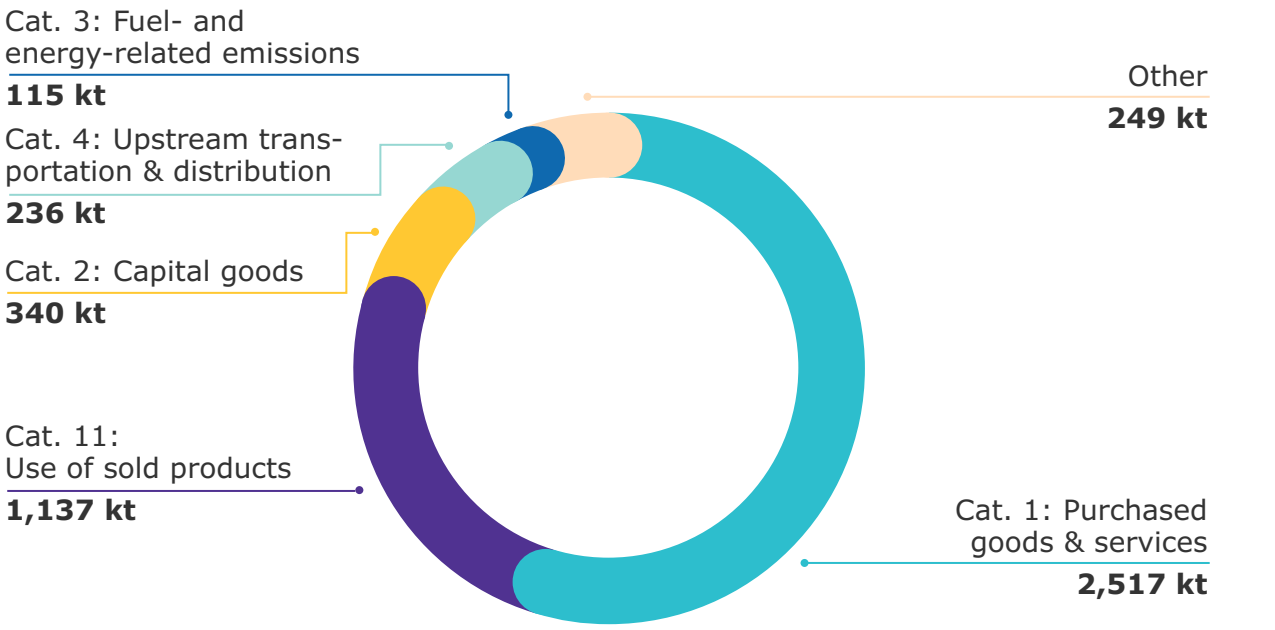
Greenhouse gas emissions in metric kilotons of CO_2 equivalents, Scope 1 and 2[1]



The Greenhouse Gas Protocol defines 15 categories for Scope 3 emissions from upstream and downstream activities. In 2023, these emissions totaled around 4,594,000 metric tons of CO_2eq (2022: 6,680,000). Categories 1 and 2 (Purchased Goods and Services and Capital Goods) accounted for 62% (2022: 69%) of our total Scope 3 emissions in this period.

We currently calculate the majority of emissions based on "spend" data, with inflation causing an increase in emissions using this method. Our gradual plan involves shifting to a hybrid calculation of spend- and weight-based calculations and continue increasing share of primary data from our suppliers. More information on the Supplier Decarbonization Program can be found under **Sustainable supply chain**.

Greenhouse gas emissions 2023 in metric kilotons of CO_2 equivalents, Scope 3



Reducing process-related emissions

Within our Electronic business, a key area of focus is mitigating Scope 1 emissions, primarily stemming from the production of specialized chemicals crucial to the electronics industry. Our previously commissioned pilot exhaust gas abatement unit in Hometown, Pennsylvania, USA, has demonstrated high efficiency of almost 99%. In 2023, we began planning to expand this technology to two sites that produce these chemicals. Once completed, this expansion will significantly reduce our process-related emissions in our Electronics business sector.

In our Life Science business sector, we are tracking process-related emissions primarily from the release of perfluorinated hydrocarbons (PFCs). Consequently, we replaced several emission-intensive production lines with equipment that does not emit PFCs, resulting in a reduction of CO_2eq by 11,795 metric tons in 2023. We also continued developing methods to eliminate the remaining PCF emissions from these processes, which we plan to implement before 2030.

Reducing product-related emissions

We are working to reduce the carbon footprint of our products across all three of our business sectors. In 2023, we successfully completed a pilot project for an IT tool designed to calculate the carbon footprint of our product

portfolios; one product family per business was used to evaluate the feasibility of the solution. This tool enables us to calculate and assign emissions at various steps of the product life cycle, from procuring raw materials to transport and processing, culminating in the finished product. Following the pilot, we have expanded this carbon footprint assessment to further products in our portfolios. To ensure we meet industry standards and use comparable data analytics and expert analysis, we collaborate in industry initiatives with our peer companies, including 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

Building on the progress made with air-to-sea conversion of our Healthcare logistics routes, our Life Science business sector launched its global Mode Shift program in 2023 to transition from air to sea freight shipments where feasible. The rollout is continuing across our Life Science operations as a major decarbonization lever.

Evaluating investments for sustainability

In 2023, we again performed sustainability evaluations on all investment projects worth more 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 **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 2023, we scored A- (2022: B) for climate change

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 our first analysis of qualitative climate scenarios and in 2023 we enriched our initial findings with a quantitative analysis. More information can be found under **TCFD reporting**.

Energy efficiency

In 2023, a variety of **energy efficiency initiatives** helped us save around 2,800 metric tons of CO_2eq at our global headquarters in Darmstadt (2022: 3,000). For instance, we improved heating, ventilation and air conditioning systems and reduced base loads for compressed air systems.

Slight decline in energy consumption

We consumed 2,337 gigawatt hours of energy in 2023 compared with 2,432 gigawatt hours in 2022. As in the previous year, our energy intensity relative to sales remained at 0.11 kWh/€ in 2023.

Renewable Energy

In 2023, we further strengthened our focus on purchasing electricity from renewable sources. In this period, we sourced 51% of our purchased **electricity from renewable energies**, meaning direct supply contracts and energy attribute certificates (2022: 47%). The share of our total energy consumption by renewable energies increased to 23% in 2023 (2022: 20%).

In 2023, we signed virtual power purchase agreements (VPPAs) in Europe for a total of around 300 gigawatt hours (GWh) of renewable energy per year. This means that 100% of our electricity currently purchased in the European Union (EU) and Switzerland will be covered with renewable energy certificates as of 2025.

Our Life Science business sector addresses energy efficiency at our sites through its EDISON Program for energy and water efficiency, investing approximately € 10 million annually until 2030. For example, heat pumps were installed in 2023 at two buildings at our site in Molsheim, France, to reduce its dependency on natural gas.

At our site in Toluca, Mexico, we have also installed our first solar panels across our operations in Mexico. The 550 kW system is expected to account for almost 70% of the site's annual energy consumption, and avoid approximately 170 metric tons of CO_2 annually. In addition, we have set up solar parks at other sites in the network, for example in Mollet, Spain, which will generate up to 2,800 MWh hours per year of green electricity.

Furthermore, we are covering the power needs of multiple South American sites (for example in Argentina, Chile and Guatemala) through renewable energy certificates. The same applies to several of our sites in China. In order to advance the decarbonization of our own business operations and our supply chain, we have joined the Energize industry network as a sponsor. Details can be found in the **Supply Chain Management chapter**.

Employee incentives

We encourage our people to do their part to preserve the climate by providing helpful information and tips on our intranet. We consistently provide updates on company-wide climate protection initiatives within our internal sustainable network, which serves as a dedicated platform where employees who are passionate about sustainability convene regularly to exchange ideas and deepen their understanding of pertinent topics. Moreover, we support members of our workforce who are seeking greener modes of living:

- At our German subsidiaries, we offer a subsidy of € 150 towards monthly lease payments to employees who opt for an **electric company car**.
- For those on the road, we offer the "Laden@road" program, which enables our employees to charge their company or private cars at approximately 100,000 stations across Europe. Our approach includes helping employees switch to electric vehicles by providing charging facilities at various sites, for instance in Germany, France, Switzerland, the United Kingdom, and the United States.

- At our German sites, we also encourage employees to use climate-friendly forms of transportation through “bike4me”, a program enabling them to **lease a bike** at discounted rates with payments being deducted from their pre-tax income.
- German employees are also eligible to receive a Deutschland-ticket subsidy of € 10 per month to travel using regional and local public transportation.
- 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 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 consider water-related risks in our supply chain when purchasing important raw materials. In the long term, we aim to transparently map water use and environmental impacts throughout the entire life cycle of our products.

To this end, we have defined two targets: Firstly, we originally aimed to achieve a 10% reduction in our **Water Intensity Score** by 2025 compared with the baseline of 2020. In 2023, we met and surpassed this target, successfully lowering the Water Intensity Score by 25%. Consequently, we have set a new target based on a new and more transparent calculation. By 2030, we strive to achieve a 50% reduction in our water efficiency ratio of water intake per revenues compared with the 2020 baseline. The new target covers the complete water intake of our company. Our 2020 baseline year was chosen to align this new target with other existing environmental goals.
Our second objective focuses on mitigating our environmental impact. Specifically, we are committed to reducing potentially harmful residues in our wastewater to levels below the established 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 our administrative facilities as production generally poses a higher risk to aquatic ecosystems.

Roles and responsibilities

The Group function Corporate Sustainability, Quality and Trade Compliance is responsible for water management. At our sites, engineers work closely with our EHS managers to reduce water use and treat wastewater. Further information can be found under **Environmental protection**.

Our commitment: Standards and procedures

Our **Sustainable water management principles** set the framework for three Group-wide standards that detail how we integrate mechanisms of sustainable water management into our management system: Sustainable Water Management Part 1 – Wastewater; Sustainable Water Management Part 2 – Water Use; and

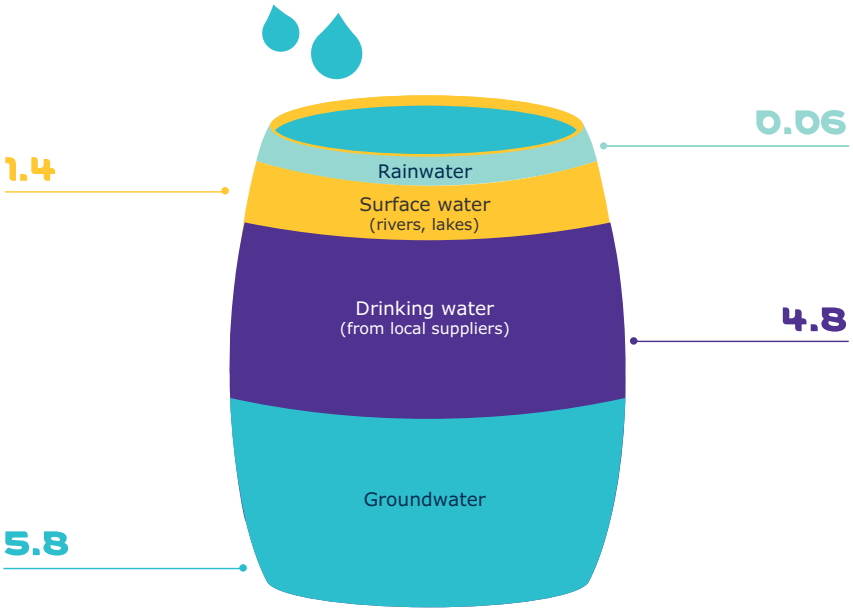
Sustainable Management Part 3 – Water Risk Management. All three standards are based on the commitments we made under the **Responsible Care®** initiative.

Our Wastewater Standard defines criteria for assessing our wastewater discharges into ecosystems. It also helps us achieve our targets regarding trace substances in wastewater from our operations. The Water Use Standard sets out mandatory Group-wide requirements for the responsible use 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 covers risks such as contaminated rainwater and flooding. We perform internal **EHS audits** to verify that our sites comply with our three standards. All sites are 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 withdrawals from our own wells and local suppliers

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. We extract less water from our own wells than the amounts permitted. We simultaneously monitor potential trends that could lead to the reclassification of water sources, which involves assigning heightened levels of protection to specific regions.

Water withdrawals (millions of m^3) – 2023



The cooling water used in 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 2023, we recycled a total of 20.5 million m^3 of water (2022: 20.7).

Using water more efficiently

We seek to minimize our impact on water availability in the vicinity of our sites. In 2023, we withdrew 12.1 million m^3 of water in total (2022: 13.2). We assess local conditions to determine whether a sufficient water supply is available. In our water conservation efforts, we pay particular attention to sites in water-scarce areas. To measure how we improve our water efficiency, we have defined the Water Intensity Score, which relates the amount of water either purchased or withdrawn from our own wells at a site to the number of hours worked, taking local water availability into account. In 2023, we already exceeded our target set for 2025 to lower the Water Intensity Score by 10% (baseline year 2020). Initiatives that helped us reach our original goal include effects from shifts in product mix as well as initiatives such as recycling of wastewater in Rio de Janeiro (Brazil), St. Louis (USA) and Mollet del Valles (Spain).

We have therefore set ourselves a new target: By 2030 we will reduce our sales-normalized water intake by 50% compared with 2020 (2020: 792 m^3 per million € net sales (100%), 2023: 580 m^3 per million € net sales (-30%)).

In the past, our Gernsheim site in Germany was excluded from both the score and our water conservation efforts because we must extract a minimum water quantity from our own wells to meet regulatory requirements. Our new target will cover the entire Group, including Gernsheim.

Our site in Mollet (Spain) is one example of how we mitigate the risk of water scarcity in local communities. In Mollet, have we invested in multiple projects such as retrofitting pumps for water circulation, reusing water for cooling and changing to dry technology dedusters. This has reduced our absolute water intake in Mollet by around 20% since 2018.

Our wastewater

In 2023, we generated a total of 11.1 million m^3 of wastewater (2022: 12.4). This comprised around 7.6 million m^3 of “direct discharge” water (2022: 8.6) into surface waters. 3.4 million m^3 was classified as “indirect discharge” (2022: 3.8) water and treated at external treatment plants. We take extensive measures to ensure that we comply with 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 they will not be compromised by our activities.

In 2023, 53% of our total wastewater was discharged by three of our sites. Our Gernsheim site in Germany discharges its treated wastewater into the Rhine River, and our Onahama site in 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. 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% (2022: 98%) is to be further increased in the future thanks to activated carbon filters. We commissioned the improved plant at the end of 2023.

Residues in wastewater

We continuously work to optimize our production streams and purification processes to conserve water and minimize residues. We have appointed an expert for each of our business sectors to provide guidance for our sites. This approach aims to reduce the amount of **pharmaceutically active ingredient residues** as well as all substances with water-hazardous properties. All wastewater from relevant sites is processed in wastewater treatment plants before being discharged into the environment. This is done either in our own plants or by offsite third parties such as municipal wastewater treatment plants.

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 is strictly segregated and undergoes an additional purification process. Only then do we discharge it into the ecosystem, thereby minimizing remaining antibiotic residues.

When discharging wastewater, we strictly adhere to government regulations. However, even when meeting 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 aim to reduce potentially harmful residues in our wastewater to below the no-effect threshold. To achieve this objective, we are executing a series of project steps. In 2023, we initiated risk assessments for pertinent substances at designated sites, evaluating deviations from the no-effect threshold and implementing corrective measures. Notably, eight out of the 79 sites under consideration, have established that concentrations of all water-hazardous substances in their effluents are below the no-effect threshold. The remaining sites are currently in the assessment phase, evaluating the impact of their effluents.

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 and evaluates their processes and performance on a scale from A to D-. As in the previous year, we were awarded a B for our water management practices in 2023.

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 strive to prevent waste as far as possible by, for instance, developing new production processes or optimizing existing ones. When prevention is not feasible, we aim to recover materials or energy from the waste we generate. 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 waste disposal standards. In doing so, we take local legal regulations as well as the available disposal options into account.

We aim to limit the loss of raw materials and reduce the impact our waste disposal practices have on ecosystems. In 2023, we achieved our previous goal of lowering our Waste Score, our key waste management indicator, by 5% by 2025 (against a 2016 baseline). As we achieved this goal ahead of schedule, we have set ourselves a new ambitious new goal: By 2030, we aim to achieve a circularity rate of 70% across the entire Group (2023: 68%).

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 (2022: 95) 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 calls (e.g. on circular economy) to keep our local EHS managers and site directors as well as other employees up-to-date on the topic and to raise awareness.

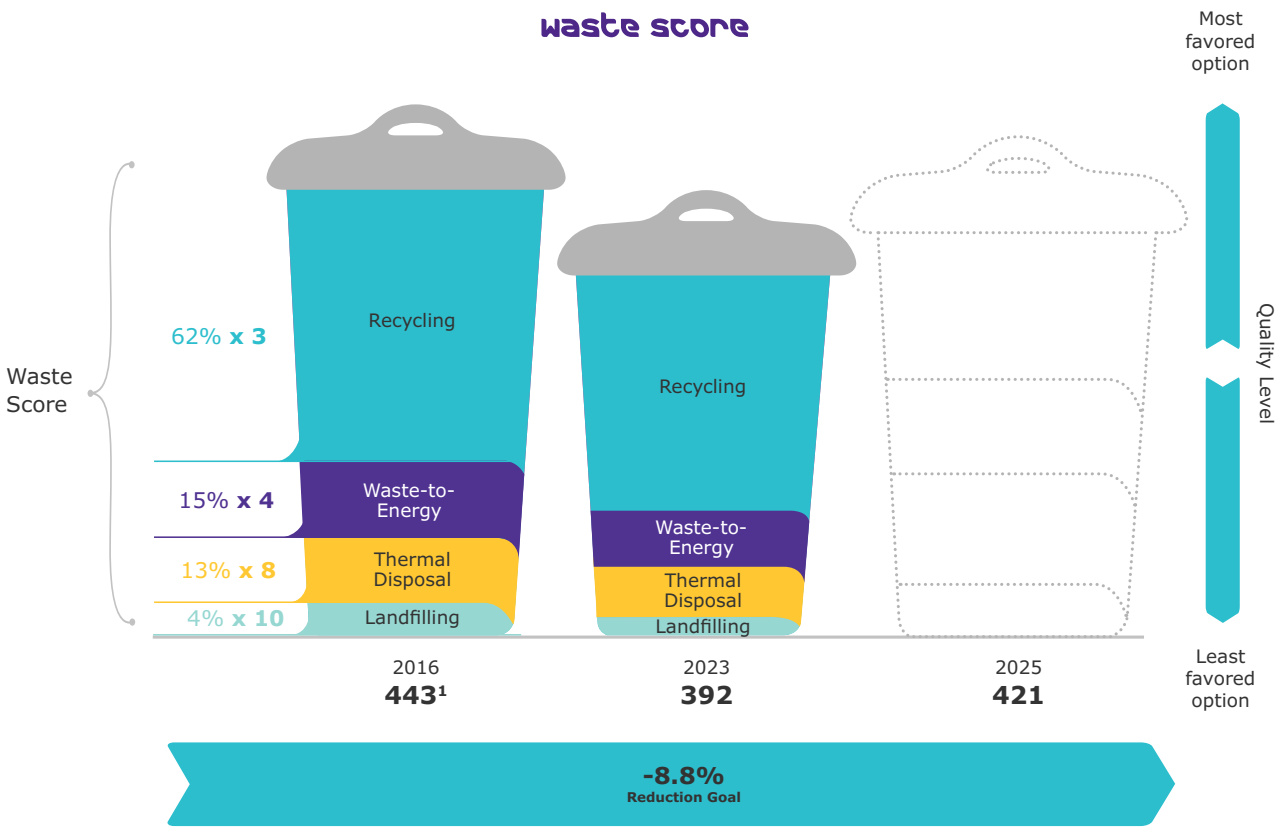
Further information can be found under **Environmental protection**.

Our commitment: International guidelines and requirements

Our Group-wide **EHS** Waste Management Standard provides a **consistent framework for waste management across all 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 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. Having surpassed our initial goal ahead of schedule, we have now set a more ambitious target for ourselves: By 2030, we aim to achieve a 70% circularity rate throughout the entire Group.

Our new waste goal is calculated as the sum of recycled and avoided waste divided by the total waste in metric tons. It is important to note that waste-to-energy is excluded from this calculation as it is not considered circular. The scope of measurement includes production waste but excludes one-time effects from specific waste

streams such as sludge from wastewater treatment facilities (subject to disposal restrictions by regulators), construction and demolition waste, and soil waste. All sites within the Group are included in this assessment.

The amount of waste we generated in 2023 decreased, totaling 291 metric kilotons (2022: 371 metric kilotons). Soil, construction and demolition waste accounted for 43% of our total waste in 2023 (2022: 53%). Our Waste Score as well as the circularity rate do not factor in this type of waste, which can rarely be avoided and must be disposed of in accordance with clearly prescribed methods.

Promoting circular economy

Through our ProMec (Progressive Material Economy) initiative at our Darmstadt site (Germany), 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.

In 2023, together with the Technical University of Darmstadt (TU Darmstadt), we successfully completed the development of a **digital platform prototype for the optimum use of waste and its avoidance**. The project aimed to bring together waste generators and specialized waste recyclers for a secondary market. It will be established in the market under the name ‘Green Garnet’ within a start-up at TU Darmstadt.

At our site in Dallas, Texas (USA), we implemented a project that recycles plastic drums into rigid polyethylene (HDPE), which can be used for multiple new applications. During the reporting year, the site expanded this recycling process to include customer waste. More information can be found under **Sustainable Products**.

To give new life to equipment and materials that are no longer needed, we donate them to organizations such as universities. We also run internal exchange platforms for chemicals and equipment at some of our sites. In 2023, we donated 146.7 metric tons of material. We also partner with nonprofit organization Seeding Labs to donate equipment to under-resourced labs and universities around the world, totaling an additional 1.1 metric tons in 2023.

Additionally, we have actively engaged in a fertility pen take-back initiative in Denmark. We collect used pens from our patients with the aim of maximizing the amount of recycled content in new pens.

Shifting from landfill to waste-to-energy

At our site in St. Louis, Missouri (USA), we divert a vast proportion of our waste from landfill by employing waste-to-energy recovery. As of the end of 2023, this applied to 1,451 metric tons (2022: 1,310). Furthermore, the site is currently participating in a project to compose or reuse filter media in farming applications.

Plant, process & 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.

Our approach to plant, process and transport safety

We seek to **minimize manufacturing process hazards** wherever possible in order to prevent workplace accidents, production outages and chemical spills. To this end, we regularly review our approach to plant and process safety and continuously gauge it using our EHS key 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.

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.

As applicable, we have EHS managers for the relevant sites as well as **dangerous goods managers** for sites with logistics activities involving 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 2023, we conducted 34 EHS audits (2022: 41) 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 were no reportable events 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 2023, the ratio was 2.4 (2022: 2.8).
- The EHS IR also contains our **Loss of Primary Containment (LoPC)** indicator. In 2023, we did not record any significant incident-related releases of substances (2022: two).
- The EHS **Leading Rate (EHS LR)** reflects the number and the results of the analyses of near misses and hazardous conditions or behaviors, as well as other proactive safety activities such as risk assessments.
- For the **Lost Time Injury Rate (LTIR)** we set ourselves the goal of lowering our Group-wide LTIR to under 1.0 by 2025 (number of accidents Group-wide resulting in at least one missed day of work per million hours worked). In 2023, our LTIR was 1.3 (2022: 1.2).

Our EHS managers perform standardized audits at third-party warehouses and using a digital third-party audit reporting system. This approach helps 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.