Sustainability Report 2022

TABLE OF CONTENTS

Strategy & management

Business ethics

Products

Employees

Environment

Community

Facts & figures

STRATEGY & MANAGEMENT

Company profile

We are Merck, a science and technology company. We are pioneers of human progress, driven by our curiosity.

We have a unique setup, with different disciplines under one roof. Our Life Science business sector provides the tools, high-grade chemicals, and consumables that accelerate scientific breakthroughs and enable the biopharmaceutical industry to ensure that medicines are safe and effective for a global population. With a broad and deep portfolio of more than 300,000 products and an industry-leading e-commerce platform, we are focused on impacting life and health with science. In our Healthcare business sector, we advance innovation through our pipeline; enable life-changing therapies for serious illnesses; treat more than 90 million patients worldwide with cardiovascular, diabetes and thyroid disorders every day; and help many couples to realize their wish to have a child. In our Electronics business sector, we are the company behind the companies, advancing digital living. Our semiconductor and display solutions can be found in almost every electronic device. Thus, we are changing the way information is processed, releasing the potential of data and opening up possibilities for positively influencing the way we live. In addition, our specialists also explore visionary new solutions at the intersection of our three diversified business sectors.

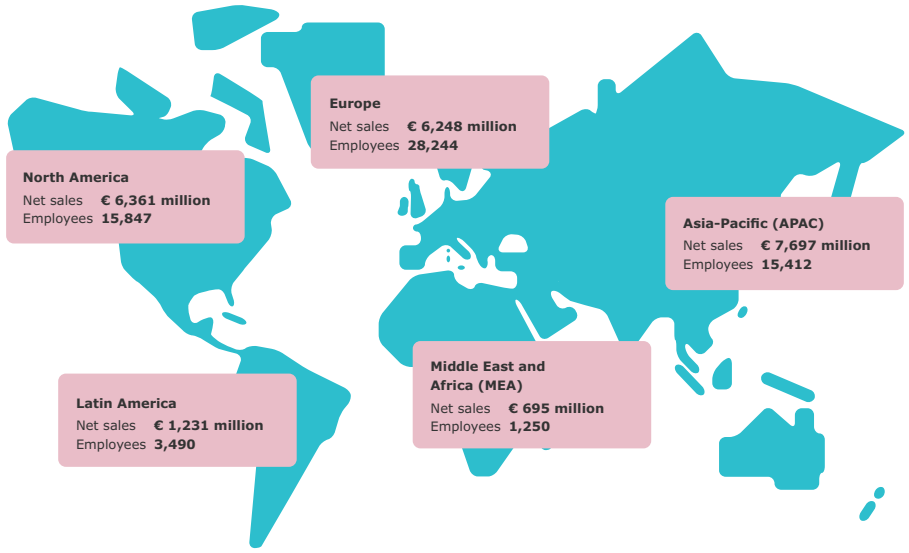
Established in 1668, our exceptional track record shows we continuously reinvent ourselves and think long-term. This mindset is rooted in responsibility, care, and respect: for our work, our people, our customers, patients, society, and our planet. We want to become the global 21st century science and technology pioneer, working toward an ambitious future: sustainable progress for humankind.

We hold the global rights to the Merck name and brand. The only exceptions are Canada and the United States. In these countries, we operate as MilliporeSigma in the Life Science business, as EMD Serono in the Healthcare business, and as EMD Electronics in the Electronics business.

Apart from our three business sectors, our financial reporting presents five regions: Europe, North America, Asia-Pacific, Latin America, the Middle East and Africa. As of December 31, 2022, we had 64,243 employees worldwide. The figure as of December 31, 2021, was 60,348 employees.

In 2022, our 224 fully consolidated companies with personnel in 66 countries generated sales of € 22.2 billion. Our 101 production sites are located across 19 countries.

Employees and sales by region – 2022



Group structure

In accordance with our strategic orientation our company comprises three business sectors: Life Science, Healthcare and Electronics.

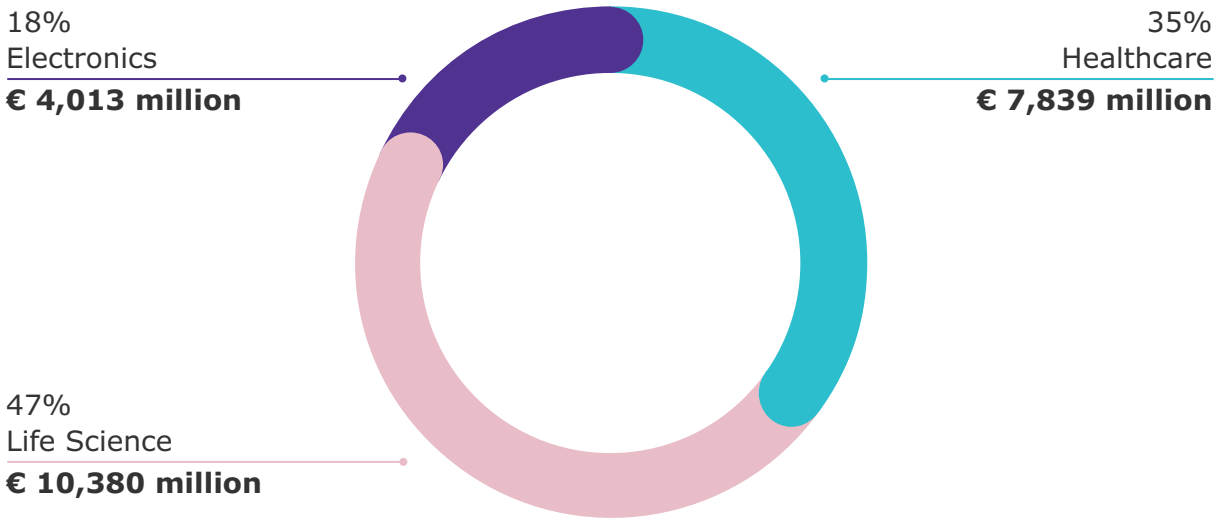
In **Life Science**, we are a leading global provider of tools, chemicals, and equipment to academic labs, biotech and pharmaceutical manufacturers, and the industrial sector. With a strong focus on innovation, we are committed to delivering the products, services, and digital platforms to create a sustainable future for generations to come. In early 2022, we announced the reorganization of the sector to support Life Science's long-term growth strategy and to better serve our global customers' evolving needs. The existing Contract Development and Manufacturing Organization and Contract Testing services were split from the Process Solutions business and consolidated into one global, fully integrated Life Science Services organization for traditional and novel modalities, including monoclonal antibodies, high-potency active pharmaceutical ingredients, as well as antibody-drug conjugates and viral and gene therapies including mRNA. The Process Solutions business will continue its focus on delivering our leading product offering for pharmaceutical development and manufacturing, including filtration devices, chromatography resins, single-use assemblies and systems, processing chemicals, and excipients. The Research Solutions and Applied Solutions business units were combined into one organization called Science and Lab Solutions. This business unit serves the pharma and biotech, industrial and testing, academic and government, and diagnostics sectors, providing customers a more seamless experience and access to a broad portfolio including reagents, consumables, devices, instruments, software, and services for scientific discovery, in addition to lab water instruments, consumables and services, microbiology and biomonitoring products, test assays, analytical reagents, and flow cytometry kits and instruments.

Our **Healthcare** business sector discovers, develops, manufactures, and markets innovative pharmaceutical and biological prescription drugs to treat cancer, multiple sclerosis (MS), infertility, growth disorders, and certain cardiovascular and metabolic diseases. Healthcare operates across four therapeutic areas with a clear ambition to become a global specialty innovator: Neurology and Immunology, Oncology, Fertility, and Cardiology Metabolism & Endocrinology. Our R&D pipeline positions us with a clear focus on strengthening our leadership

positions in oncology, neurology, and immunology. Since the start of the Covid-19 pandemic, we have been continuously making every effort to proactively handle the situation and minimize the impact of the pandemic and also of any challenges from the external context on the supply of our medicines locally and globally. To this end, we are using three main levers: the thorough implementation and further development of our business continuity plans across our network, the active management of our stocks, and the assessment of alternative transportation routes to reach our customers and patients.

With our **Electronics** business sector our main focus is on materials and solutions for the electronics market. We realigned our portfolio toward the accelerated digitization and the growth of data. This drives the need for more and higher sophisticated semiconductor chips and displays. Today, we are optimally positioned to leverage our key strengths: With a well-balanced and broad technology portfolio of materials and equipment, industry leading R&D and a global production network close to our customers, we have become one of the most relevant suppliers of materials and solutions for the semiconductor and display industries – and are on track to further expand our position. In addition, our decorative and functional solutions for innovative surfaces of all kinds make life more colorful. The business sector consists of three business units: Semiconductor Solutions, Display Solutions, and Surface Solutions.

Net sales by business sector – 2022



Governance

Based in Darmstadt, Germany, our company operates in the legal form of a corporation with general partners (Kommanditgesellschaft auf Aktien – KGaA). The general partner E. Merck KG holds around 70% of the total capital of Merck KGaA (equity interest); the shareholders hold the remainder, which is divided into shares (share capital). Our shares have been included in the DAX®, the blue-chip index of the Deutsche Börse, since 2007. In September 2008, our company was added to the FTSE4Good Index, a sustainability index that assesses the social, ecological and ethical conduct of companies.

Group strategy

We are curious minds dedicated to human progress. We believe that scientific exploration and responsible entrepreneurship are key to technological advances that benefit us all. Our values – courage, achievement, responsibility, respect, integrity, and transparency – guide us in every step we take and in every decision we make. As a company, we have a strong foundation. These fundamentals have been defined by the Merck family. We always take them into consideration when discussing and deciding on our Enterprise strategy.

- We follow a risk diversification strategy with three distinct business sectors, and we avoid overexposure to any single customer, industry, or geography. We ensure resilience against business disruption and deep crises.
- With our science and technology focus, we want to be leaders in our fields of expertise and markets, always pushing the boundaries to find new solutions and drive innovation. We aim to create value for our business and for society.
- We continue to operate under our current ownership with the Merck family as the majority owner.
- We deliver sustainable value, and we want to maintain an attractive financial profile (for example, a strong credit rating) while assessing and considering the ESG (environmental, social, governance) impact of our growth ambition.
- Mergers and acquisitions (M&A) are an important driver of our long-term value creation strategy with a focus on innovation-driven technology.

Our ambition is to become the global 21st century science and technology pioneer. To achieve this, we will continue to focus on our “Big 3” businesses: Process Solutions and Life Science Services, new Healthcare products, and Semiconductor Solutions. Until 2025, these businesses are expected to generate approximately 80% of the targeted sales growth, and more than 50% of total sales by 2025.

Our highly resilient business sectors are the foundation for our bold plans to accelerate efficient growth and seize organic and inorganic opportunities. We attribute our high capacity for resilience to several factors, notably:

- Good financial position: strong balance sheet, sufficient cash reserves and moderate fixed cost exposure
- High degree of diversification in the three business sectors amid low cyclicality
- Robust supply networks due to increasing localization
- Lower dependency on single regions thanks to diversified footprint
- Strong focus on sustainability as an integral part of the company strategy, linked with clear sustainability goals.

You can find more information on our company strategy in our **Annual Report 2022**. Details on the sustainability strategy can be found there and **here in the report**.

Letter from the CEO

Dear readers

A cascading series of global crises and conflicts starting with the Covid-19 pandemic has made our world much more complex and uncertain.

The threats these global challenges pose to health, security, and sustainability were highlighted in two U.N. reports issued in 2022. The **first** stated that the 17 Sustainable Development Goals (SDG) under the 2030 Agenda "are in jeopardy." The **second** declared that there is no longer a realistic pathway to restricting climate change to 1.5 °C. Moving forward, the only viable path to avoid the worst effects of the climate crisis is through the "rapid transformation of societies."

In short, we have only a few decades to fundamentally change the ways in which we consume food, energy and other resources while addressing global inequity in health, education and living standards. It will require nothing less than humanity raising the bar higher than ever before.

As the leader of Merck, I am confident we can do it. Most of all, three things will enable society to rise above these challenges and thrive in the 21st century: resilience, collaboration and technology.

Resilience underpins us

Resilience allows us to navigate through tough times and seize the moment. It is what has helped our company for centuries to cope with and emerge stronger from major international economic and geopolitical crises. Our resilience is helping to ensure that we remain firmly on track to achieve our most important sustainability goals. By 2030, we aim to have integrated sustainability into all value chains and contributed to human progress for more than one billion people through sustainable science and technology. And by 2040, we expect to achieve climate-neutral operations.

We made significant strides towards the achievement of these overarching goals during 2022. For example, the independent Science Based Targets initiative (SBTi) confirmed our targets to reduce direct (Scope 1) and indirect (Scope 2) greenhouse gas (GHG) emissions by 50% by 2030 compared with 2020. Furthermore, SBTi

confirmed our plans to halve Scope 3 emissions as a percentage of gross profit across our entire value chain by 2030. These targets will help us in complying with the goal of the Paris Agreement to limit global warming to 1.5 °C.

Our direct and indirect GHG emissions fell by almost 10% in 2022, thanks to our reduction of process-related emissions, implementation of energy efficiency measures, and increasing the share of energy we use from renewable sources. After signing two new Virtual Power Purchase Agreements (VPPAs) in 2022, renewable sources now cover 90% of our electricity consumption in the U.S. and 55% globally. We look forward to securing additional VPPAs in Europe, the Asia-Pacific and other regions.

It is also important to highlight some of our many significant SDG contributions. For Good Health and Well-Being (SDG 3), I refer you to the latest **benchmarking report** of the Access to Medicine Foundation on how the top 20 largest research-based pharmaceutical companies support low-and middle-income countries. Our company advanced from eighth to fifth place in the 2022 ranking thanks to our strong performance in R&D, intellectual property waivers and local capacity building.

Regarding to gender equality (SDG 5), we increased the percentage of women in leadership positions from 36% to 38% in 2022 and aim to achieve gender parity by 2030. And for life on land and below water (SDGs 14 and 15), we committed globally to even higher animal welfare standards in 2022.

Collaboration makes us stronger

My second reason for confidence in the future advancement of society lies in how public and private organizations, including our company, have successfully collaborated in recent years. Through the pandemic, we learned how important it is to amplify our collective impact by aligning with a sense of urgency around a common purpose and shared values.

Our company’s partnerships with more than 100 organizations to develop Covid-19 vaccines, therapeutics and diagnostic solutions are prime examples of collaboration at its finest.

But also consider our efforts to improve health equity worldwide by building long-term partnerships with global and local stakeholders to help underserved patient populations. As one example, we have collaborated with the World Health Organization (WHO) and other NGOs across sub-Saharan Africa to combat schistosomiasis – the world´s second most devastating tropical disease in terms of public health burden and economic growth. By providing more than 1.7 billion praziquantel tablets to WHO over the last 15 years and enabling many other on-the-ground initiatives to prevent, diagnose and treat schistosomiasis, we expect to eliminate this disease as a public health problem by 2030.

I am also proud to represent our Group on a new Health Systems Taskforce recently established under the **Sustainable Markets Initiative**. Together with six other pharmaceutical companies, we jointly agreed to ambitious near-term GHG reduction targets in 2022 and to collaborate with our global networks of suppliers to further accelerate the shift to a climate-neutral healthcare industry.

Technology leverages untapped potential

My third reason for confidence is the untapped potential of science and technology itself. Many of the technologies needed to deliver a sustainable future in the coming decades are already known today. Most, however, such as those for green hydrogen, carbon capture and cultured meat, are still being developed or commercialized by various innovators. However, if society is to make a difference, we must become more efficient and effective in how we select the most promising technologies and accelerate their path to market.

As a globally diversified science and technology business with strong values and leading positions across life science, healthcare and electronics, we are in the sweet spot. It is our goal to serve as a preferred development partner and solutions provider for sustainability. That is why sustainability is now a cornerstone for future innovation and growth.

We are committed to helping new and existing customers meet their sustainability targets. Our ambition is to embed sustainability across our entire value chain until it becomes a core competitive advantage for us.

As our transformation into a global sustainability leader accelerates, we will remain accountable for our positive and negative impacts, and transparent in how we track our performance. As one example, we will measure our progress in integrating sustainability across all value chains together with 54,000 suppliers across more than 140 countries. Furthermore, accountability must always start at the top. That is why my compensation and that of my fellow Executive Board members is now clearly linked to achieving these and other sustainability goals.

Thinking and acting sustainably is deeply important to me, the Merck family of owners and the 64,000 people who work for our Group companies worldwide. By continuing to demonstrate leadership in resilience, collaboration and technology, we look forward to helping our company, our customers and society to aim higher and thrive. I look forward to keeping you updated on our progress.

Belén Garijo
Chair of the Executive Board and CEO

Sustainability strategy & goals

The world is facing multiple challenges that we too as a company face. These include climate change, international conflicts and economic crises, for instance. Our ambition is to leverage science and technology to achieve sustainable progress for mankind.

Our approach: sustainable progress

For us, sustainable entrepreneurship and profitable growth go hand in hand; we can remain competitive only by creating **added value for society**. Through our innovative and high-quality products, we want to help meet global challenges. At the same time, these types of product secure our financial performance capability.

Responsible action is an integral part of our company culture. This also includes respecting the interests of our employees, customers, investors, and society. For more than 350 years, our company has been shaped and **guided by strong values**. Our success is built on courage, achievement, responsibility, respect, integrity, and transparency – values that underpin our understanding of sustainable entrepreneurship. We want to set an example for ethical conduct.

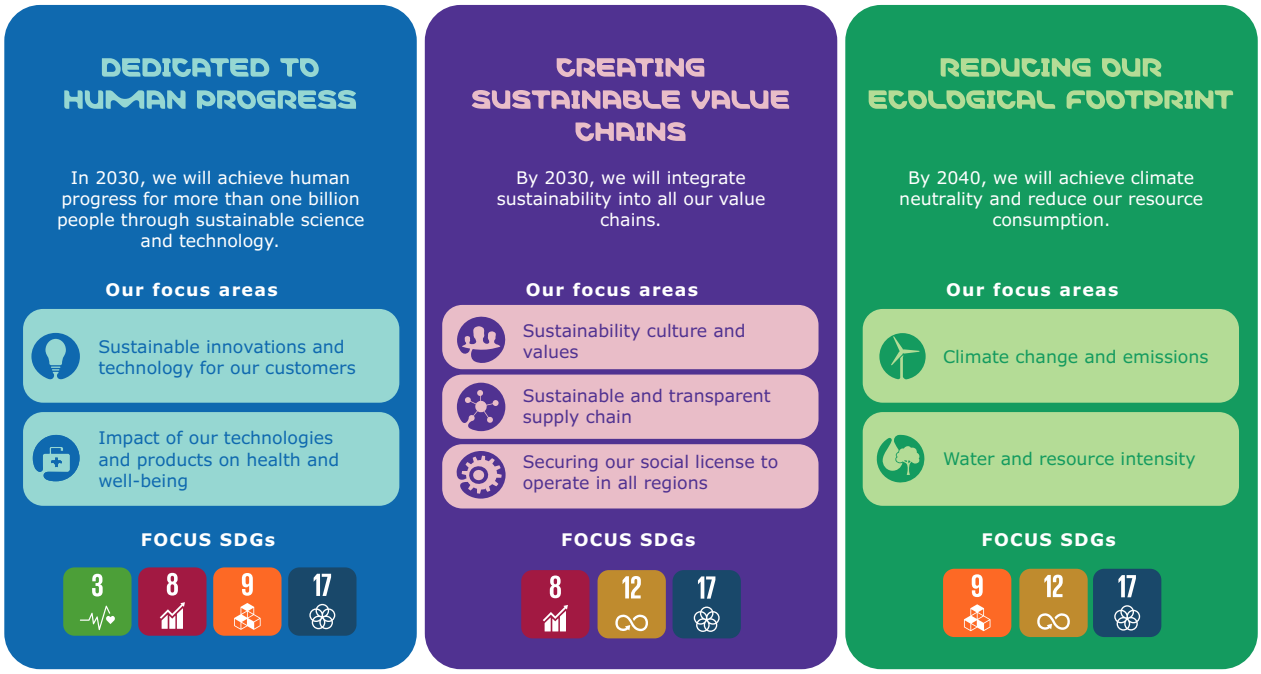
Safety and ethics matter just as much to us as business success. We mitigate **ethical, economic, environmental, and social risks** as far as possible. From the early stages of development through to disposal, we keep an eye on the entire life cycle of a product. We apply strict sustainability standards to our procurement activities. During product manufacture, we strive to keep the environmental impact as low as possible, which is why safe production techniques, high environmental standards and strict quality management are of course so important to us. And with our sustainable products, we also help the companies that we supply to achieve their sustainability goals.

We closely monitor new **global trends and challenges**. For example, in order to clearly understand the complex nature of the expected changes, we make use of the so-called scenario technique, which enables us to identify and incorporate aspects of strategic relevance. In addition, we participate in dialogues and initiatives, consult with other organizations in our industry and assess media and news coverage. This allows us to minimize risks while also leveraging **new business opportunities**.

Implementing the strategy globally

The rapidly growing challenges facing both society and the environment require a clear objective for the coming years. Consequently, sustainability is an essential element of our enterprise strategy. We are pursuing three strategic sustainability goals.

Our sustainability strategy



In order to achieve our sustainability goals, we are concentrating on **seven focus areas** within which we are realizing numerous initiatives and projects today and tomorrow, measuring our progress as we go.

Implementing the sustainability strategy

In 2022, we focused on creating the right conditions for achieving our sustainability goals. All three business sectors derived sustainability strategies from the overarching company strategy and started executing them. We are fostering the cultural change within the company by embedding sustainability aspects even more firmly into daily work and the decisions made by employees. Training courses and best-practice sharing are two routes we follow to achieve this.

On the basis of 14 key indicators, which we defined back in 2021, we record and assess our progress towards achieving our sustainability goals. In 2022, we implemented various digital working tools that we believe will allow us gain greater transparency with regard to our achievements. For instance, we record internal and external sustainability data in our ESG database, allowing us to compare, correlate and use them as the basis for initiatives and measures.

In the year under review, we specified that also when assessing potential acquisitions, we would **always include sustainability aspects**. This will be the case even more so in the future, also when it comes to capital allocation and investment decisions as well as research & development. To assess the potential impacts of our products throughout their entire life cycle, we use a scorecard developed in-house. We introduced this scorecard for all three of our business sectors in 2022.

Moreover, we added a sustainability factor to the Merck Long-Term Incentive Plan (LTIP) in 2022. It measures the performance of three selected sustainability goals over a period of three years, thus making it possible to

increase or reduce target achievement resulting from the key financial performance indicators by up to 20%. Details on how this sustainability factor is calculated can be found in **the Compensation Report**.

We are now in the process of transforming the company and are integrating sustainability into the innovation process and all parts of the value chain. It is our aim to decouple the growth of our businesses from negative environmental impacts.

Our key indicators

Goal 1: In 2030, we will achieve human progress for more than one billion people through sustainable science and technology.

Focus area	Sustainability key indicators	Further details
Sustainability innovation and technology	◆ Percentage of newly published patent families with positive sustainability impact	Sustainable innovation & technologies
Health and wellbeing impact	◆ People treated with our Healthcare products[1]	SASB index

Goal 2: By 2030, we will integrate sustainability into all our value chains.

Focus area	Sustainability key indicators	Further details
Sustainability culture and values	◆ Percentage of women in leadership positions	Diversity, equity and inclusion
	◆ Percentage of employees trained on sustainability	Attracting and retaining talent
Sustainable and transparent supply chain	◆ Percentage of relevant suppliers (in terms of number and supplier spend) that are covered by a valid sustainability assessment1[1]	Responsible supply chain
Securing our social license to operate in all regions	◆ Environment, Health and Safety (EHS) Incident Rate	Process, plant and transport safety
	◆ Violations of Global Social and Labor Standards Policy	Human rights
	◆ Lost Time Injury Rate (LTIR)	Health and safety

1 The key indicator is used to determine the sustainability factor for the Merck Long-Term Incentive Plan (LTIP).

Goal 3: By 2040, we will achieve climate neutrality and reduce our resource consumption.

Focus area	Sustainability key indicators	Further details
Climate change and emissions	◆ Greenhouse gas emissions (Scope 1 and 2)[1]	Climate action
	◆ Indirect greenhouse gas emissions (Scope 3)	Climate action
	◆ Percentage of purchased electricity from renewable sources	Climate action
Water and resource intensity	◆ Waste Score	Waste & recycling
	◆ Water Intensity Score	Water management
	◆ Wastewater quality	Water management

1 The key indicator is used to determine the sustainability factor for the Merck Long-Term Incentive Plan (LTIP).

In order to assess the impacts of our products, technologies and business activities on the environment and society, we developed the **Sustainable Business Value (SBV) method**. It enables us to calculate the positive and negative impacts of our activities along our entire value chain, based on various sustainability criteria. The result is a monetary value that quantifies the benefit that product has for consumers, the environment and society, for instance. In 2022, we worked to make the method more user-friendly.

Our operational sustainability goals

Our three strategic goals make our long-term sustainability ambition clear. In order to achieve them, we have also defined operational sustainability goals. These are more specific, may apply for a shorter time frame and are aligned with our current business activities.

Roles and responsibilities

Our Executive Board has Group-wide responsibility for our sustainability strategy. It has adopted our three strategic goals.

The Group Corporate Sustainability unit is responsible for developing and shaping the sustainability strategy and it informs the Executive Board at least once a year about the progress made and the need for action. It is part of the Group function Corporate Sustainability, Quality and Trade Compliance (SQ), which reports to the Chair of the Executive Board. Consequently, overarching Executive Board responsibility for Environment, Social, Governance (ESG) also lies with the Chair of the Executive Board.

Group Corporate Sustainability is also responsible for coordinating the Merck Sustainability Board (previously Corporate Sustainability Council), which was set up in 2022. The Merck Sustainability Board is chaired by the Head of SQ and consists of representatives from our business sectors and from key Group functions, such as Procurement, Communications, as well as Controlling and Risk Management. Members from Europe, the United States and Asia provide input on regional sustainability aspects.

The Sustainability Board steers and monitors the Group-wide **implementation of the sustainability strategy**. It aligns the strategy with the individual business strategies, defines priorities and specifies globally applicable sustainability guidelines. In addition, the Sustainability Board ensures that the initiatives of our various business sectors, Group functions and subsidiaries align with our global sustainability strategy. Moreover, it recommends corresponding initiatives to the Executive Board. Within their respective area of responsibility, each Executive Board member is also responsible for sustainability, reviews the priorities that have been set, and decides on the implementation of initiatives.

In 2022, the Sustainability Board met nine times by video conference. The participants addressed the following topics: Implementing the sustainability strategy in the business sectors, key indicators for measuring and steering sustainability within the company, lowering greenhouse gas emissions, and supply chain due diligence requirements.

The measures adopted by the Sustainability Board are implemented by our line managers as well as by interdisciplinary project teams. To achieve our operational sustainability goals and depending on the topic, responsibility is assigned to specific teams, functions and business units. Those responsible for implementation exchange ideas and coordinate actions in an overarching committee. They identify synergies between the projects and align their direction with our sustainability goals.

An **external expert committee for sustainability** issues has been supporting our company since 2021. The Merck Sustainability Advisory Panel (MSAP) consists of six independent experts on sustainability-related topics from several institutions worldwide. They advise the members of the Sustainability Board on selected issues and assess the sustainability of our company's business models as well as planned activities. Moreover, they provide their external insights to help address societal and political challenges and developments that could be strategically relevant for our businesses. This panel is chaired by the Head of SQ.

The members of our Sustainability Advisory Panel

Glynda Bathan-Baterina
Deputy Executive Director of Clean Air Asia

Michael Braungart
Founder and Scientific CEO of EPEA Internationale Umweltforschung, Professor at Erasmus University Rotterdam and Leuphana University Lüneburg

Todd Cort
Faculty Co-Director of both the Center for Business and Environment (CBEY) and the Initiative on Sustainable Finance (YISF) of the Yale School of Management

Maja Göpel
Scholar, speaker, author, advisor, Expert for sustainability policies and transformation research, Honorary Professor at Leuphana University Lüneburg

Ioannis Ioannou
Associate Professor for strategy and entrepreneurship at the London Business School

Huiyao (Henry) Wang
Founder and President of Center for China and Globalization (CCG)

Sustainable Development Goals

The United Nations (UN) 2030 Agenda is a global plan to sustainably promote peace and prosperity and to protect our planet. Since 2016, countries and organizations have been working to implement this agenda with its 17 Sustainable Development Goals (SDGs). Our aim is for our business activities to create shared value that is both measurable and makes a recognizable contribution to society. We rely on the power of science and technology to make a positive impact.

Doing our part

Our **sustainability strategy** focuses on the five SDGs on which we have the strongest impact through our entrepreneurial actions.

SDG 3 – Good health and well-being

With our products, we positively impact the health and quality of life of people around the world. Through technological and scientific innovations, we are also helping to improve the health of underserved populations in low- and middle-income countries.

SDG 8 – Decent work and economic growth

We see it as our responsibility to respect human rights both within our company and along our supply chain. That is why we are dedicated to upholding appropriate and fair labor and social standards. We want to drive sustainable economic growth through progressive resource efficiency.

SDG 9 – Industry, innovation and infrastructure

We use our expertise in science and technology to make our products, processes and infrastructure sustainable. In addition, we want to promote the work of scientists worldwide with our innovations and support programs.

SDG 12 – Responsible consumption and production

We use resources efficiently and reduce waste and emissions. We pay attention to this in our product development and in our manufacturing activities. We also help our customers to manufacture their products more sustainably and efficiently and to achieve their own sustainability goals.

SDG 17 – Partnerships for the goals

We need strong partners in order to drive sustainable development within our company and beyond and to better meet societal challenges. We therefore collaborate with a wide range of organizations, companies, federations, and networks.

Through our sustainability strategy, we help **to solve challenges globally**, not just within these five SDGs. Our management approaches and projects also support **SDG 4** (Quality education), **SDG 5** (Gender equality) –

supplemented by diversity and inclusion, **SDG 6** (Clean water and sanitation), **SDG 7** (Affordable and clean energy), and **SDG 13** (Climate action).

Detailed information on our quantitative and qualitative contributions to the specific SDGs is provided in our **interactive SDG tool**.

Our contribution in detail

In our online report, we offer an **interactive tool** to visualize how we contribute to the SDGs in qualitative and quantitative terms.

Stakeholder dialogue

Engaging with our various stakeholders is crucial for us. Through this dialogue, we communicate our decisions and actions transparently in order to secure our social license to operate. We aim to unite divergent interests, as well as build and sustain trust.

Dialogue at various levels

Our key stakeholders include our employees, customers and business partners, various patients, the Merck family as the majority owner of the company, shareholders, and our suppliers. We pursue a continuous dialogue with our stakeholders and use this exchange to identify trends and developments in society and in our business fields so as to take them into account in our corporate responsibility endeavors.

Our stakeholders

We regularly conduct a systematic **materiality analysis** to learn about our **stakeholders' expectations**. In doing so, we identify the economic, social and environmental issues that are important to our stakeholders – and thus also to us.

We have established **guidelines and principles** for interactions with certain stakeholders, with a focus on compliance. For example, we have defined internal policies and review processes for **patient relationships**, **interactions with healthcare stakeholders**, and **business partnerships**.

The Merck Sustainability Advisory Panel (MSAP), a group of external experts from various disciplines, has been advising us on the topic of sustainability since 2021. It enables our company to understand even more diverse stakeholder perspectives and helps us to develop our sustainability strategy further. More information on MSAP and its members can be found under **Sustainability strategy and goals**.

We communicate regularly with our stakeholders through a variety of channels. For instance, we conduct stakeholder surveys and organize topic-specific dialogues at regional, national and international level. We also participate in discussions and informational forums as well as through our advocacy work and industry coalitions. Here are some examples of the dialogue formats used:

Employees

Employee engagement surveys

- **Unlocking our collective potential**
- **Empowering our employees**

360-degree feedback

- **Embracing conversation and dialogue**

Intranet "EVA"

Career fairs

- **Attracting and inspiring key talent**
- **Supporting the next generation**

Patient organizations

Patient Advisory Boards (PAB) to engage patient organizations in our clinical research

- **Close dialogue with patients and advocacy groups**

Member of various initiatives on the quality and efficiency of clinical trials

- **Close dialogue with patients and advocacy groups**

Employee representatives

Involvement of local employee representatives in company decisions

- **Our commitment: Employee representation**
- **A competitive compensation structure**

Science

Merck Ethics Advisory Panel (MEAP); Digital Ethics Advisory Panel (DEAP); TU Darmstadt

- **Merck Ethics Advisory Panel**
- **Digital Ethics Advisory Panel**
- **Fruitful strategic partnership**
- **Promoting the circular economy**

Communities

Discussion and information forums for residents in the vicinity of our sites

- **Roundtables and informational forums**

Healthcare systems

Collaborating with health authorities and other stakeholders as well as event series and network meetings

- **Engaging stakeholders**
- **Collaborating with patient advocacy groups**
- **Close dialogue with patients and advocacy groups**

Associations/Politics

Collaboration in working groups

- **Advocacy groups and industry coalitions**

Suppliers

Supplier surveys

- **Supply chain assessments and audits**
- **Auditing our mica supply chain**

Knowledge sharing

- **Ambassadors for sustainable procurement**

Shareholders

Annual General Meeting

- **Investor Relations**

Events for investors

- **Capital markets days**

Public authorities

Subject-specific cooperation

- **Pharmacovigilance in Access to Health**
- **Inspections and audits for drug safety monitoring**

Further information on stakeholder dialogues can be found in the individual report chapters.

Roundtables and informational forums

We hold roundtable discussions and informational forums for local residents at our major sites. Since 1994, we have been holding an annual public planning forum in Darmstadt to discuss the development of our site with members of the city council, local authorities and the community.

Involvement in initiatives

We collaborate with an array of civic organizations such as the World Environment Center (**WEC**) and also participate in other **initiatives** that share our commitment to responsible corporate conduct, such as **Chemie³** and **Responsible Care®**.

Advocacy groups and industry coalitions

We actively participate in the **political process** and advocate our positions and views by engaging policymakers in a direct dialogue as well as through our work with industry coalitions. The major national and international industry associations in which we are members and also hold positions include:

- The German Federation of Chemical Employers' Associations (**BAVC**)
- The European Federation of Pharmaceutical Industries and Associations (**EFPIA**)
- The International Federation of Pharmaceutical Manufacturers & Associations (**IFPMA**)
- The German Chemical Industry Association e. V. (**VCI**)
- The European Chemical Industry Council (**Cefic**)
- National Association of Manufacturers (**NAM**)
- United States Chamber of Commerce (**USCC**)
- Association of International Chemical Manufacturers (**AICM**)

Political contributions

Our interactions with actors in the political sphere focus on political dialogue, information exchange and open and transparent knowledge sharing. Our guidelines stipulate that our interactions and contributions must comply with all applicable laws and must never aim to inappropriately influence or compensate officials for political favors. Even if permitted by local law, we do not make contributions in the form of donations to or sponsorships of political parties or related organizations. Furthermore, we do not make donations to or sponsor holders of public office or candidates for such, nor do we make other types of financial contributions.

In the United States, political action committees (PACs) have been set up through which our employees can donate money to support political candidates and organizations. These are not donations made by our company, but rather contributions made by employees. The contributions donated are reported to the U.S. Federal Election Commission and are fully disclosed.

Materiality analysis

With our annual materiality analysis, we identify the social, economic and environmental issues that are of special importance to us and our stakeholders. In 2022, we broadened this materiality analysis to show to the extent to which our business activities impact these issues, both positively and negatively.

Identifying the material issues

Materiality analyses help us define and verify the focus of our sustainability management efforts and the contents of our reporting. In 2022, we adapted our material analysis to the new requirements of the Global Reporting Initiative (**GRI**) reporting standards. In the analysis, we focused on actual and potentially positive and negative environmental, economic and social impacts of our business activities.

Based on the set of topics included in our **most recent materiality analysis**, we have already made an initial comparison with the potential topics of the EU Corporate Sustainability Reporting Directive (CSRD), which is expected to apply to our company as of the 2024 reporting year. In addition, we drew on internal data and secondary sources such as specialist literature, databases and publicly available ESG indices to investigate the ecological and social impacts of our work. In doing so, we looked not only at our own activities, but also at the impacts within our upstream and downstream value chain.

This data provided us with a basis for a quantitative assessment of the actual and potentially positive and negative impacts across the entire value chain, which we then used to derive a net assessment. We classified the negative impacts into four categories: low, moderate, significant, and critical. Similarly, we categorized the positive impacts as follows: low, moderate, significant, or substantial.

Internal subject matter experts validated the results in three topic workshops.

The following list of topics provides an overview of our actual and potentially positive and negative impacts. A topic was classified as being material if a positive or negative impact was at least categorized as “moderate”. A checkmark is used in the table to indicate this.

Compliance

(incl. anti-corruption, anti-competitive behavior, data protection and privacy, interactions with health systems, responsible marketing)

Negative impacts along the value chain ✓

Positive impacts along the value chain

Chapter:

- Compliance management
- Data protection & cyber security
- Interactions with health systems

Due to the nature of our business activities, there is always the possibility of compliance-related risks resulting in potentially moderate negative impacts. In response, our company aims to ensure that all business activities adhere to the relevant laws, regulations and ethical standards. In addition, we do not limit our compliance management to the boundaries of our own company; we also include suppliers and our interactions with sales parties such as commercial agents, distributors and dealers.

Through our compliance policies, standards and procedures, we have comprehensive mitigation measures in place. We believe that there are no additional positive impacts that exceed the regulatory requirements for compliance management systems. Nevertheless, further efforts and continuous improvements are always analyzed and implemented to elevate the quality and effectiveness of our Compliance function.

Supply chain management

(incl. working conditions, equal opportunities, other work-related rights)

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Supply chain management
- Mica supply chain

Due to the nature of our business, we believe the potential negative impact regarding sustainable supply chain management to be significant. We have guidelines and measures in place to improve working conditions in the supply chain, in addition to careful monitoring through regular assessments and audits. These measures reduce the potential for negative impacts within our supply chain. At the same time, the possibility for us to influence external organizations is more limited than within our own company.

We actively contribute to a moderately positive impact in our supply chain by implementing measures beyond compliance.

Human rights

Negative impacts along the value chain ✓

Positive impacts along the value chain

Chapter:

- Human rights

When it comes to our global supply chains, we pay close attention to human rights risks. We expect our suppliers to exercise the greatest care in dealing with human rights. Unlike in our own business activities, we can often only have an indirect influence along our supply chain to prevent negative impacts. Our principles have been set out in Group-wide policies, which we use to derive measures to avoid negative impacts. We classify our overall negative impacts with regard to human rights as moderate.

We aim to increase the awareness of our employees and suppliers on the topic of human rights and the associated due diligence obligations. To this end, we use various communication formats and offer training. In addition, we are active in various initiatives. Through these efforts, we make a positive contribution to the protection of human rights. Nevertheless, we assess our positive impacts on the protection of human rights outside our company as low.

Clinical studies

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Clinical studies

Our company is conducting clinical trials of its products. We address the potential risks of non-compliance and non-adherence with international laws through measures such as implementing strict standards, policies, audits and country selections. We therefore assess our potential negative impacts as moderate.

We conduct our clinical studies adhering to the highest ethical and scientific standards, going beyond the minimum legal requirements and implementing patient-focused drug development that more actively involves patients, caregivers, and their advocates. These activities ultimately improve the healthcare people receive and enable the delivery of new treatments for people worldwide. In addition, we make our research studies available to the public and other institutions to enhance the efficiency and effectiveness of medicine and treatments globally. Therefore, we believe the positive impact of our ethical conduct in the field of clinical studies to be significant.

Animal welfare

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Animal welfare

The use of animals is often a legal and regulatory requirement across many areas of our business to ensure the quality, safety and efficacy of our products and processes. Consequently, our use of animals inevitably creates a negative impact. However, we have implemented the 4Rs for animal-based research (replacement, reduction, refinement, and responsibility) and have set ourselves an ambitious goal of phasing out animal use and replacing animals with better alternatives on a long term basis. Until we achieve this goal, we accept the ethical standards as defined in our quality documents in animal science and welfare. We believe that through our strong mitigation measures, our negative impact on animal welfare is moderate.

We are developing and commercializing various technologies and systems in order to replace the use of animals by alternatives step-by-step, and eventually entirely. We also engage in external partnerships to promote animal welfare beyond our own company and contract research organizations and foster transparency in animal research communication. Additionally, we are involved in developing sustainable technologies, such as cultured meat, which could eventually support a global transition towards more sustainable nutrition systems and reduced meat consumption (and interlinked health and environmental impacts). Furthermore, we are working to replace fetal bovine serum and other animal-derived products in cell culture with animal-free alternatives. Therefore, we believe our positive impacts on animal welfare to be moderate.

Bioethics

Negative impacts along the value chain

Positive impacts along the value chain ✓

Chapter:

- Bioethics

Our company is committed to ethical research. When we advise on innovations from a bioethical perspective, questions may well arise that go far beyond the applicable legislation. Such issues often only come to light after an in-depth ethical analysis. Therefore, there is a risk that we may not always behave in a bioethically correct manner along our value chain. Our goal is to minimize these potential negative impacts by developing clear guidelines and establishing regulations for bioethical issues. Thus, we consider the company-specific negative impacts on society to be low.

The Merck Ethics Advisory Panel for Science and Technology enables our various business units to adequately address (bio)ethical issues that arise in connection with our scientific and technological innovations. Through our work, we demonstrate how bioethical principles and guidelines can be considered and integrated in scientific and technological progress in a corporate context. The MEAP provides ethically sound guidance – especially for cases of scientific and technological progress that are not yet covered by existing guidelines. With guidelines such as the Genome Editing Principle or the Stem Cell Principle, we help to establish ethical positions

beyond the boundaries of our company and thus assess our positive impacts on responsible research as moderate.

Digital ethics

Negative impacts along the value chain

Positive impacts along the value chain ✓

Chapter:

- Digital ethics

Non-compliance with digital-ethical standards poses risks for people and the environment. We use various initiatives to support digital ethics and assess negative impacts attributable to our company as low.

Through our CoDE and the Digital Ethics Advisory Panel (DEAP), we address ethical issues resulting in the area of data & digital. We thus have a positive cross-border impact, which sets an example for the further development of ethical standards beyond the border of our company. Overall, we classify our positive impacts as moderate.

Sustainable products

(incl. product design, packaging, innovation and R&D)

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Sustainable innovation & technology
- Products & packaging

Manufacturing our products creates a negative environmental footprint owing to the use of a large variety of resources. We reduce this impact through internal measures, such as utilizing more sustainable raw materials and packaging and by researching innovative and sustainable materials. Additionally, we have launched several initiatives to foster sustainable resource use and develop and implement sustainable product alternatives. Therefore, we believe we have only a moderately negative impact on this topic.

We expect to see the largest potential positive impacts from a project that strategically incorporates sustainability criteria into our product development. However, we will only realize the positive impacts of these actions in the future. In the short-term, we aim to create a positive impact by implementing the SMASH packaging strategy, which can directly contribute to more sustainable products and packaging design. We recognize that most of these activities will mitigate negative impacts but will not result in a positive impact overall. However, one particular initiative that generates a positive impact is our DOZN™ tool, which enables our customers to identify toxic or hazardous materials and suggests sustainable alternatives. Additionally, the investment activities of M Ventures may contribute to more sustainable production processes and products while supporting innovative business ideas. Partnerships with customers also help to develop more sustainable products and enable other industry players to act more sustainably. Therefore, our current positive impact on the topic of sustainable products can be classified as moderate.

Health for all

(incl. access to health, prices of medicines, health awareness)

Negative impacts along the value chain

Positive impacts along the value chain ✓

Chapter:

- Global health
- Innovation sharing
- Prices of medicines
- Health capacity & awareness

We strive to make health solutions affordable and accessible and collaboratively work with partners and stakeholders to speed up access to quality health solutions for all – focusing on low-and middle-income countries. As part of these efforts, we have implemented patient access programs and our equitable pricing policy to enable more patients to afford our product portfolio. We have also invested in initiatives to strengthen health systems and improve access to health. Our efforts have been recognized by external assessments and rankings. When taking our measures and projects into account, we believe to have a low negative impact on the topic of health for all.

We address unmet global health challenges. For example, we make substantial investments to eliminate schistosomiasis as a public health problem. Furthermore, we embed initiatives to define new models to ensure equitable and sustainable access to our innovations for neglected tropical diseases. We are also engaged in the fight against malaria, developing and providing access to new drugs and tools supporting its prevention, control and elimination. We also implement capacity and awareness-building initiatives. Therefore, we believe that we have a substantial positive impact on health for all.

Chemical product safety

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Chemical product safety

To mitigate potential negative impacts of hazardous chemicals, we have strict guidelines and measures in place that ensure safe working conditions. Some uncertainty exists regarding the state of chemical product safety at the supplier level. For users of our products, we provide the necessary information for dealing with hazardous substances safely. Therefore, the potential negative impact is classified as **moderate**.

Our commitment to chemical product safety is one of the cornerstones of our business as we process and handle hundreds of thousands of hazardous chemicals. We continuously improve our activities around product safety, thus benefitting the environment as well as our customers and employees. In addition, we proactively and regularly develop, assess and implement new safety-related data and information and adapt our risk mitigation measures accordingly. Consequently, our positive impact is classified as **substantial**.

Patient safety

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Patient safety

Patient safety is fundamental to delivering quality health services and therefore has high relevance throughout the Healthcare business sector. Our company follows international guidance, standard procedures and all relevant pharmacovigilance regulations to mitigate the potential negative impacts on patient safety. We believe our negative impact on the topic of patient safety to be moderate.

We collaborate with health authorities in low- and middle-income countries to help improve their pharmacovigilance systems and operating environments. The measures are widely implemented and benefit patients around the world. In 2022, we included the topic of patient safety in the update of our Supplier Code of Conduct, which we will publish in 2023. Therefore, we believe our positive impact on the topic to be substantial.

Product-related crime

Negative impacts along the value chain ✓

Positive impacts along the value chain ✓

Chapter:

- Product-related crime

Illegal, counterfeit and substandard medicines pose a significant risk to public health, and chemicals may be misused for criminal purposes such as manufacturing illicit drugs. Therefore, we have enacted various measures to mitigate the risk of product-related crime, reducing the potential negative impact to moderate.

In addition, our actions and initiatives to reduce the risks associated with product-related crime often exceed the minimum legal requirements. For example, we support authorities in detecting and resolving cases of product-related crime. We also provide training for employees and business partners to strengthen their competencies in detecting product-related crime. Overall, we assess our positive impacts as significant.

Attractive employer

(incl. attracting employees, recruiting and retaining employees)

Negative impacts along the value chain

Positive impacts along the value chain 

Chapter:

- Career with us
- Corporate culture

A negative working environment can negatively impact quality and productivity and poor work-life balance may be detrimental to employees' physical, mental and emotional well-being. For this reason, we have implemented several charters, policies and standards to create an attractive and healthy working environment for all employees. We believe the negative impact on the topic of attractive employer to be low.

In addition, we are enhancing our attractiveness as an employer, for instance by creating flexible working environments and taking beneficial measures for our employees extending well beyond compliance with national laws worldwide. Therefore, we believe our positive impact on the topic of attractive employer to be significant.

Employee development

(incl. employee training and education, good leadership)

Negative impacts along the value chain

Positive impacts along the value chain 

Chapter:

- Career with us
- Corporate culture

Employee development and vocational training play a crucial role in enabling us to improve our employees' skills. We have a variety of leadership measures in place to mitigate potential monetary and non-monetary consequences that could be caused by deviant behaviors, stress, anxiety, turnover intentions, or poor organizational performance. Therefore, we believe the potential negative impact on the topic employee development to be low.

In many cases, we go beyond compliance with our employee development and vocational training approaches. We believe we have a significantly positive impact on the topic of employee development as a result of building social capital through our employee training and personal development opportunities.

Diversity and inclusion

(incl. equal opportunity, non-discrimination, inclusive culture)

Negative impacts along the value chain

Positive impacts along the value chain 

Chapter:

- Diversity, equity & inclusion

Disrespecting equal opportunities and non-discrimination can lead to human rights violations in the workplace and therefore have potential negative impacts on humans and society. Our efforts to promote and support diversity, equity, inclusion, non-discrimination, and LGBTQI+ rights are extensive, which is why we believe our negative impact on diversity, equity and inclusion to be low.

Our aspiration to build an inclusive culture in which employees feel welcome and valued extends well beyond compliance with existing laws and regulations. For example, we have more than 60 internal DE&I employee groups and networks worldwide that actively contribute to our DE&I strategy. Therefore, we believe our positive impact on DE&I is significant.

Occupational health and safety

Negative impacts along the value chain

Positive impacts along the value chain 

Chapter:

- Health & safety

Health and safety aspects play a major role in the manufacture of chemical and pharmaceutical products – especially for employees working in research and production. To reduce health and safety risks for our employees globally, we have introduced Group-wide standards, initiatives and training programs. We therefore estimate negative impacts on health and safety to be low.

Our activities aim to ensure the safety of the people who work for us since we continuously assess and reduce safety risks. Through training measures, we are also raising awareness both of occupational hazards and behaviors that promote health and safety. By taking various measures, we encourage our employees to live a healthy lifestyle. These measures go beyond compliance with regulations and mitigating negative impacts. Thus, we believe our positive impacts to be moderate.

Non-GHG emissions

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Environmental protection

Manufacturing processes can release emissions into the air, water or soil. Where needed, we install exhaust air purification systems or wastewater treatment plants to reduce or avoid emissions. Despite these measures such emissions can still be unintentionally released. Additionally, our customers may incorrectly dispose of our products. This could potentially lead, for example, to a build-up of pharmaceuticals or other chemicals in the environment and leave traces of active pharmaceutical ingredients in water. In response, we have taken various measures to mitigate these risks so that we believe our negative impacts of our non-GHG emissions to be moderate.

In the area of non-GHG emissions, we have various mitigating measures in place. Beyond this, we could not identify any additional positive impacts on society or the environment.

Biodiversity

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Environmental protection

Our production sites are predominantly located in industrial areas with low biodiversity value. Nevertheless, unintentional chemical leakages can contaminate soil or water resources and damage ecosystems. Therefore, we have technical and organizational measures in place to prevent the release of substances into the environment. For example, we are sealing relevant surfaces at our sites to protect soil, groundwater and the associated ecosystems from chemical spillages. These efforts may impact habitats and animals that potentially live in unsealed surfaces. Water use and the release of greenhouse gases are also linked to biodiversity loss. In addition, as a manufacturer, we use various raw materials and understand that their extraction and processing can negatively impact biodiversity. Overall, due to our technical and organizational measures that are in place, we classify our negative impact on biodiversity as moderate.

Some of our sites are biodiversity-certified and assessed annually. These assessments show that biodiversity at these sites is increasing. In addition, various other sites are making efforts to foster biodiversity. Therefore, we believe to have a low positive impact on biodiversity.

Climate action

(incl. GHG-emissions, energy efficiency, renewable energies)

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Climate action

Company-specific GHG emissions (Scope 1 and 2) contribute to global environmental degradation. Overall, the GHG emissions associated with our purchased goods and services (part of Scope 3) represent the largest share of our total carbon footprint. We believe our negative impact on the topic of climate change to be significant.

We are in the early stages of a long carbon-reduction journey. Therefore, we are investigating and implementing a variety of mitigation measures to significantly reduce our carbon footprint. We also aim to generate value for the environment via initiatives such as signing Virtual Power Purchase Agreements (VPPAs) that bring additional renewable electricity to the grid. Overall, we classify our positive impact regarding GHG emissions as low.

Water management

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Water management

As a manufacturer of chemical and pharmaceutical products, we require significant volumes of water. The extraction of water reduces its availability in the natural environment and for other water users. Additionally, there is always a risk of negatively impacting the health and viability of ecosystems due to wastewater discharge and the potential pollution of water and soil. We have many initiatives in place to reduce our impact on water quality and availability. For example, we have implemented strict global standards and requirements at all of our manufacturing sites for wastewater treatment. Some of these requirements also exceed our own business, such as the Responsible Minerals Sourcing Charter, which requires suppliers to have wastewater management systems and processes in place. These activities mitigate our negative impacts; therefore, we believe our overall negative impacts on water to be moderate.

With respect to our water management activities, we have strong mitigating measures in place. These are primarily aimed at complying with regulations. Beyond this, we could not identify any additional positive impacts on society or the environment.

Waste & recycling

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Waste & recycling

The use of chemical and pharmaceutical products is characterized with a high risk of improper use, wrong disposal and particularly in developing countries with weak waste management systems. For waste generated within our own operations, we mitigate negative impacts by adhering to regulations as well as fostering education, waste reduction and recycling initiatives. We classify our overall negative impacts to be moderate.

Regarding waste and recycling, we have strong mitigating measures in place. As these activities concentrate on compliance and the mitigation of negative impacts and do not specifically aim at generating value for environment or society beyond our own scope, we did not identify positive impacts.

Plant, process and transport safety

Negative impacts along the value chain ✓ **Positive impacts along the value chain**

Chapter:

- Plant, process & transport safety

The pharmaceutical and chemical sector is associated with a particular risk of pollutions to air, soil, and water through chemical spills. We have implemented strong standards and safe manufacturing practices at all sites worldwide to significantly reduce the risk of a leakage into the environment at manufacturing locations, during storage and transportation. Therefore, we believe the potential negative impact of our company is moderate.

Our regulations and measures do not only fulfill local legal requirements but go beyond these. We believe our positive impact on the topic plant, process and transport safety to be low.

The set of topics covered by the materiality analysis did not change in comparison with 2021. In the analysis, “Tax Governance” once again fell below the materiality threshold. Nevertheless, we have included the relevant information in this report as we expect that tax matters will become increasingly important to our stakeholders in the future. In addition, we report on the topic of “Community Engagement” as we have been supporting and running a wide range of activities and campaigns for many years now. We would like to continue to play an active role in the community and to continue reporting on our outreach efforts.

Section 289c (3) of the German Commercial Code requires us to report on topics of double materiality in a combined **non-financial statement**. Pursuant to section 289c (3) of the German Commercial Code, the principle of double materiality requires companies to disclose non-financial information when the following two criteria are met: First, the information makes it possible to understand how the company’s business activities affect non-financial aspects. And second, the information is necessary to understand the company’s course of business, results of operations and economic position.

BUSINESS ETHICS

Corporate governance

Governance

For more than 350 years, responsibility has been an integral part of our corporate identity. It is one of our six company values, alongside courage, achievement, respect, integrity, and transparency. We seek to balance environmental, social and governance aspects and find solutions for the world of tomorrow. Our actions serve all people who need our medicines or medical treatment, the companies we supply and the people or partner firms we collaborate with.

Our approach to responsible governance

The requirements we place on responsible corporate governance are derived from our **company values** on the one hand and from the regulations, external initiatives, and international guidelines to which we are committed on the other hand. We integrate requirements such as these into our **sustainability strategy** and our **Group-wide guidelines**. These guidelines comprise **charters and principles** that are valid for the entire company as well as specific standards and procedures for individual business sectors and sites.

Some examples: Our **Human Rights Charter** aligns with the **UN Guiding Principles** for Business and Human Rights. Our Group-wide **Social and Labor Standards Policy** reflects the labor standards of the International Labour Organization (**ILO**). Our **EHS Policy** (Corporate Environment, Health and Safety Policy) for environmental impact mitigation and health and safety forms the basis for implementing the chemical industry's **Responsible Care® Global Charter** within our company. Our standard entitled Corporate Chemicals Regulations Governance describes the processes and management structures required to ensure global complianc with the pertinent chemical and product safety regulations.

We comply with all applicable laws as a matter of principle. Where necessary, we review our internal guidelines, standards and instruction manuals on compliant behavior and adapt them to reflect changes in the regulatory landscape.

Roles and responsibilities

Based on the requirements set forth in charters, principles and policies, our internal standards give specific guidance for operational processes. They are constantly updated by the relevant departments and are available on our intranet. Our managers implement these standards in their respective areas of responsibility and ensure that they are adhered to. In addition, we educate and train our employees on all guidelines that apply to them.

We use **management systems** to steer processes as well as define goals, actions and responsibilities. These systems are based on standards such as the internationally recognized quality management standard ISO 9001, good working practices (GxP) in the pharmaceutical industry, and ISO 14001 for environmental management. Our company regularly undergoes **ISO 14001** and **ISO 9001** certification, which is conducted by an independent auditing firm. We hold group certificates for both standards.

We support the following responsible governance initiatives:

- We have been a participant in the **United Nations Global Compact** since 2005 and are committed to complying with its principles.
- As a signatory to the chemical industry's **Responsible Care® Global Charter**, we voluntarily go above and beyond what is required by law and have adopted mandatory standards for product responsibility, environmental impact mitigation and health and safety.
- As a member of the **Together for Sustainability** (**TfS**) network, we are dedicated to improving the supply chain with respect to environmental, compliance and social standards.
- We are a member of the Pharmaceutical Supply Chain Initiative (**PSCI**), which aims to continuously improve health, safety and environmental aspects throughout the supply chain.
- We are also a member of **Initiative Chemie**[3], a collaboration between the German Chemical Industry Association (**VCI**), the German Employers' Federation of the Chemical Industry (**BAVC**), and the German Mining, Chemical and Energy Industrial Union (**IG BCE**). The partners involved this globally unique alliance seek to make sustainability a core part of the chemical industry's guiding principles and to jointly drive the sector's position within the German economy as a key contributor to sustainable development.

Compliance management

Responsible entrepreneurship starts with compliance. We aim to ensure that all our activities adhere to relevant laws, regulations and ethical standards around the world. This also helps us to protect our reputation as an employer and business partner.

Our approach to compliance

As a global company, we have stringent requirements for effective compliance management. Importantly, we seek to emphasize compliance by acting in line with our **company values** and believe that profitable business operations should go hand in hand with the highest ethical standards.

Roles and responsibilities

Our Group Compliance function is responsible for the framework of the following core topics: the Merck Code of Conduct, anti-corruption and anti-bribery (including healthcare compliance, third-party due diligence, transparency reporting), anti-money laundering, antitrust, and conflicts of interest.

To cover these topics, we have **Group-wide policies, standards** and procedures in place that ensure our business activities comply with the relevant laws, regulations and international ethical standards. Other compliance-related issues, including the respective internal regulations and guidelines, such as Pharmacovigilance, Export and Import Controls, and **Environment, Health, Safety, Security, Quality**, are managed by the responsible functions.

Our Group Compliance function is responsible for our **compliance portfolio**, which consists of the following elements:

- **Risk Assessment:** Identifying internal and external critical risks in regular business operations
- **Policies & Procedures:** Global policies, procedures and standards to mitigate identified risks (see the **Our commitment: guidelines and standards** section for more details)
- **Compliance Committee/Forums:** Platform for compliance-related discussion and decision making, including relevant key functions
- **Training & Awareness:** Appropriate training and additional measures to educate and keep awareness high
- **Programs & Tools:** Comprehensive compliance programs and supporting tools contributing to internal controls and overall governance
- **Monitoring & Reporting:** Tracking of compliance-related data; perform internal and external reporting
- **Case Management:** Timely response to reports of misconduct and implementation of corrective actions
- **Continuous Improvement:** Based on and applicable to all compliance program elements

We continuously review our compliance portfolio and update our initiatives and programs where necessary. This approach reflects new requirements as well as internal and external risks, such as those resulting from amendments to legislation, relevant industry codes or changes affecting our company. We discuss current compliance matters, trends and goals with our stakeholders, both internally within our compliance organization and externally. We keep the focus on **our people** by ensuring the availability of appropriate resources and skills, maintaining clear roles and responsibilities and based on employee feedback, setting aligned and harmonized goals. We also ensure that our organizational structure is up to date and meets business needs.

Our Chief Compliance Officer reports on the status of our compliance activities, potential risks and serious compliance violations to the Executive Board and Supervisory Board twice a year at a minimum. As part of our regular reporting processes, we compile a comprehensive **compliance and data privacy report** annually for the Executive Board. This includes the status of our compliance program, continuous improvement initiatives and key figures on compliance and data privacy cases. Additionally, we prepare a mid-year update to highlight ongoing developments and the status of relevant projects and initiatives.

Our Chief Compliance Officer oversees all Compliance departments and the underlying Compliance Officers and Compliance experts around the world. The Compliance Officers implement our compliance program within their respective areas of responsibility (adapting to local regulations) and receive guidance from our Group Compliance Center of Expertise. This is a centralized body that drives the design and evolution of our compliance program across all business sectors and Group functions.

As part of the Group Compliance Center of Expertise, our global team for coordinating transparency reporting is responsible for implementing current and upcoming transparency **reporting requirements in the Healthcare business sector** – including those of the European Federation of Pharmaceutical Industries and Associations (**EFPIA**) and the United States Physician Payments Sunshine Act. More information on our Healthcare governance and compliance activities can be found in the **Responsible interactions with health systems** section.

Our commitment: Guidelines and standards

Our compliance program builds on our company values and integrates these into our compliance framework, which consists of Group-wide **policies, standards and procedures** for entrepreneurial conduct. The following are mandatory for all our employees:

- The **Merck Code of Conduct** guides our people in conducting business ethically – in line with our values and the law. It is available to all employees worldwide in 22 languages.
- Our **Human Rights Charter** supplements our Code of Conduct with globally recognized principles on human rights.
- Our **Anti-Corruption Standard** stipulates that all business activities must be conducted in line with applicable anti-corruption regulations and standards. All forms of bribery are strictly prohibited.
- Our global **Anti-Money Laundering Group Standard** defines and describes the internal global process and assurance measures to protect our company from being misused by third parties for money laundering or terrorist financing activities.
- Our **Conflict of Interest Policy** sets a framework to explain the nature of a Conflict of Interest and the related risks. It advises how to prevent these kinds of situations or how to set rules for identifying, disclosing, mitigating and managing the risks that could arise from such situations**.**
- Our Group-wide **Antitrust and Competition Law Policy** states that all business activities across the Group must be conducted in compliance with applicable competition regulations at all times. We acknowledge the importance of fair competition and expect the same of parties acting on our behalf.
- Our **Compliance Reporting and Investigation Policy** includes the basic steps for an internal compliance investigation. Its purpose is to ensure an appropriate, timely and thorough response to compliance-related reports of potential misconduct pertaining to any kind of internal or external regulations or policies.
- Our **Dawn Raid Policy** defines courses of action, sets out general rules of conduct, and advises on rights and obligations during unannounced investigations, searches and seizures by authorities on our premises.
- Our **Standard on Local Compliance Standards** implements a review and approval process for local governance documents in areas under the responsibility of the Group Compliance function. In this way, our local teams can adhere to our compliance principles and guidance while implementing **specific local policies or procedures** that comply with local regulations.
- Furthermore, we developed a new **Supplier Code of Conduct** (SCoC) in 2022. It took effect in and is implemented as of January 2023, thus replacing our Responsible Sourcing Principles. The SCoC will lay out the minimum standards our suppliers and business partners are expected to fulfill regarding human rights, health and safety, business integrity, environmental protection, continuous improvement, and management of their respective suppliers.

To maintain compliance, we annually review and compile a list of changes to the applicable laws and regulations and update the policies, standards and procedures accordingly. While for major countries we rely on external legal counsel to stay abreast of these changes, for other countries, we rely on our Compliance Officers. Our annual reviews also identify whether any corrective actions from investigations or internal audits require us to update our policies, standards or procedures.

Risk assessment

Proper compliance risk management is crucial to identify undetected risks and ensure our company remains protected. For this purpose, we are implementing a compliance risk identification process. We started this initiative by launching a global compliance risk process for all our business sectors to improve objectivity and enable a more data-driven risk approach. In addition, we established a **comprehensive risk matrix** that focuses on bribery and corruption risks, illustrated through in-depth risk categorization and risk scenarios. As a next step, in 2022, we started conducting country-based risk assessments. This approach considers gross and net risks while looking at tangible risk scenarios for the respective business. During this process, Group Compliance works closely with the businesses to enhance their risk awareness and create a better understanding of compliance risks. The first round of this process includes high-risk countries.

Furthermore, in 2022, we updated our **country risk segmentation** approach. With it, we determine the risk exposure of the countries where our company is actively operating. The primary aim of this analysis is to classify countries in terms of their risk exposure relating to bribery and corruption by applying objective and consistent criteria. We then use the resulting outcome as a basic model to prioritize projects and initiatives and support or intensify activities in countries with specific risk levels.

Conflicts of interest

We take all potential conflicts of interest seriously. Employees must avoid situations where their professional judgment may come into conflict with their personal interests. They must also disclose every potential conflict of interest to their supervisor and document the disclosure. Such issues are typically resolved directly between the employee and the supervisor but can also be routed to Human Resources, Legal, Compliance, or other relevant functions.

In 2022, we further raised employee awareness of conflicts of interest by establishing a **dedicated global e-learning course** and enhancing our communication.

In addition, as described in the Annual Report under **Avoidance of conflicts of interest**, Executive Board and Supervisory Board members are exclusively committed to the company’s objectives and neither pursue personal interests nor grant unjustified advantages to third parties.

Management and requirements of third parties

For compliance management to be effective, it must not be restricted to the boundaries of our own company. While our **supplier management processes** focus on vendor compliance with our standards, our **global Third Party Risk Management** process governs interactions with sales parties, such as commercial agents, distributors and dealers. We expect our third parties worldwide to adhere to our compliance principles. We collaborate only with parties who pledge to comply with relevant laws, reject all forms of bribery, and adhere to environmental, health and safety guidelines.

We apply a risk-based approach to select the third parties with whom we do business. The greater the estimated risk regarding a particular country, region, or type of service, the more in-depth we examine the third party before entering into a business relationship. We also explore background information from various databases and information reported by third parties.

If we encounter compliance concerns, we further analyze and verify the relevant information. Based on the outcome, we decide whether to reject the potential third party, impose conditions to mitigate identified risks or terminate the existing relationship.

Compliance training

We provide regular compliance classroom and online training courses on our Code of Conduct, anti-corruption, antitrust, data privacy, anti-money laundering, and healthcare compliance standards. We require employees to take these courses based on their exposure to risk. Some courses also apply to independent contractors and supervised workers, such as temporary employees.

We introduced a new Conflicts of Interest e-learning module that explains what conflicts of interests are and how these should be managed within our company. The course is available in nine languages. Furthermore, we launched a new e-learning course to provide an overview of our Third-Party Risk Management and to emphasize the importance of Third-Party Risk Assessments.

We also regularly update our training curricula and adapt it to new developments. These ongoing efforts ensure we continuously educate our employees on existing and new compliance requirements, guidelines and projects.

As part of our targeted awareness campaigns, our two Anti-Money Laundering and Anti-Corruption standards were rolled out to senior management in 2022 via our internal communication channels.

Anti-money laundering

We have implemented a global **anti-money laundering** (AML) program consisting of a global Anti-Money Laundering Group Standard, training and a dedicated process to report and investigate red flags as well as any high-risk transactions. Suspicious transactions are reported to the German Financial Intelligence Unit or other authorities as required.

We aim to continuously improve our AML program. Following a worldwide risk assessment in 2021 to identify jurisdictions imposing the strictest legal and regulatory frameworks applicable to our businesses, we initiated in-depth AML risk assessments for higher-risk jurisdictions. Based on these assessments and constant review of changes in the legal environment, we are implementing stricter local AML programs where required.

Reporting potential compliance violations

We encourage all employees worldwide to report potential compliance violations to their supervisors, Legal, HR or other relevant departments. Globally, they can also use our central whistleblowing compliance hotline **free of charge and anonymously** to report violations in their local language by telephone or via a web-based application. Reports of potential compliance violations that we receive via our compliance hotline are reviewed by the Compliance Investigations and Case Management team.

Cases with a certain risk profile are presented to the Compliance Case Committee, which comprises senior representatives from our Compliance, Corporate Security, Data Privacy, Human Resources, Internal Auditing, and Legal departments. The Committee’s duties include assessing and classifying certain compliance issues, investigating their background, and addressing these issues using appropriate measures.

Based on the investigation outcome and recommendations from the compliance investigation team or the Compliance Case Committee, appropriate disciplinary action may be taken against employees who have committed a compliance violation. If, during the investigation, a root cause is identified that could lead to the risk of further **compliance violations**, we take preventive and corrective actions.

The compliance hotline is also available to external stakeholders. The relevant information can be found in the Compliance and Ethics section of our **website**.

The number of suspected compliance violations reported remained stable compared with the previous year, while the number of confirmed compliance violations decreased. In 2022, we received 79 compliance-related reports via the compliance hotline and other channels that were processed as cases. 28 violations of the Code of Conduct or other internal and external rules were confirmed.

Compliance audits

Compliance is ensured by Group Compliance and Group Internal Auditing as the second and third lines of defense. As part of the audits, Group Internal Auditing regularly reviews functions, processes and legal entities worldwide. These reviews include an assessment of the **effectiveness of the respective compliance guidelines**, processes and structures in place. The units also check for violations of our Code of Conduct and our Anti-Corruption Standard.

Our audit planning aims to provide **comprehensive risk assurance** through the best possible audit coverage of our processes. We take a risk-based approach to our annual audit planning process, considering factors such as sales, employee headcount, systematic stakeholder feedback and the Corruption Perceptions Index (**CPI**) published by the non-governmental organization **Transparency International**. If an internal audit gives rise to recommendations, Group Internal Auditing performs a systematic follow-up and monitors the implementation of the recommended corrective actions. In 2022, Group Internal Auditing conducted 79 internal audits involving bribery and corruption-related risks, including 52 operational and 24 IT audits and 3 special audits which may, for example, be initiated as part of incident-specific internal investigations.

Engaging stakeholders

We are members of various organizations, including the German Chemical Industry Association (**VCI**), the German Institute for Compliance (**DICO**), the European Federation of Pharmaceutical Industries and Associations (**EFPIA**), the German Association of Voluntary Self-Regulation for the Pharmaceutical Industry (FSA), the International Federation of Pharmaceutical Manufacturers and Associations (**IFPMA**), the **Alliance for Integrity**, the German Association for Supply Chain Management, Procurement and Logistics (**BME**), and the International Association of Privacy Professionals (**IAPP**).

Data protection & cyber security

Compliant handling of information is highly important for a leading innovative, science- and technology-driven company. When using personal data, the individuals' rights must be appropriately protected. We strive to safeguard the rights of any person whose data we process, including but not limited to our employees, patients, customers, and healthcare professionals. When it comes to cyber security, our company understands the importance of protecting our business from cybercrime and ensuring our information is secure from any associated internal and external risks.

Our approach to data privacy

The mandate and goal of our Group Data Privacy unit is to mitigate risks and create a global framework for **data privacy-compliant business operations**. This unit helps to train our employees to handle data responsibly and with clear accountability. It safeguards our company by providing data privacy risk assurance and ensuring compliance with relevant data privacy laws globally. Group Data Privacy also contributes to creating value for the development of digital business models.

Our approach to cyber security

It is of critical importance for our business that we protect our information systems, their contents, and our communication channels against any criminal or unwanted activities. These include e-crime and cyberattacks, such as unauthorized access, information leakage and misuse of data or systems.

Roles and responsibilities

Group Data Privacy is an independent function, organizationally integrated into Group Compliance and Data Privacy. We have a Group Data Privacy Officer and a network of local Data Privacy Officers at various sites Group-wide. In line with external regulations, the Data Privacy Officers and their respective teams act independently and without receiving internal or external instructions. Group Data Privacy regularly prepares **data privacy updates** and a comprehensive data privacy report. This report is submitted to the Executive Board and the Supervisory Board.

Cyber Security is part of our Group Corporate Security Office. In addition, we have a Group Chief Information Security Officer and a network of Information Security Officers within the business sectors, each in turn supported by dedicated networks. The individual sectors hold risk ownership and act as our first line of cyber security defense. Our Global Cyber Security function acts as a second line of defense and has responsibilities regarding cyber security risk governance and oversight. Our third line of defense comprises internal audits.

Our Data Privacy Management System

Our goal is to complete the implementation of a global and consistent data privacy management system (DPMS) by mid-2023. Our DPMS applies similar elements as the **compliance portfolio** but adapted to the needs of data privacy. These include policies and procedures, risk assessment and documentation, training and awareness, programs and tools, individual requests, monitoring and reporting, incident management, and continuous improvement.

New Cyber Security organization

At the beginning of 2022, we created a new Cyber Security organization with a mandate to improve trust and strengthen resilience against cyberattacks and data breaches.

Our Cyber Security team defines policies and standards for cyber security (including data security) while providing oversight, tools and systems to manage and monitor our overall cyber security risk exposure. The team is also responsible for providing 24/7 cyber security monitoring and incident response capabilities across the entire company environment as well as training employees across the organization on how to protect data appropriately.

Our commitment: Guidelines and standards

Data Privacy Framework

Our Data Privacy Policy and the corresponding standards and procedures define our principles for processing personal data. This approach allows us to achieve a **high level of data protection** for our employees, contract partners, customers, and suppliers as well as patients and participants in clinical studies. Our Group-wide understanding of data privacy is based on European legislation, in particular the European Union General Data Protection Regulation (EU GDPR). We are also taking steps to meet local data privacy requirements, where these are stricter than our Group-wide standards.

Cyber Security Framework

Our Group Cyber Security governance framework comprises organizational, process-related and technical information security countermeasures based on recognized international standards. In addition, we **apply harmonized electronic and physical security controls** (e.g. access control and security monitoring) to bolster our ability to handle sensitive data, such as trade secrets.

Data privacy training

In line with the EU GDPR and our global approach to data privacy, we regularly conduct **e-learning training courses** in ten languages. In 2022, the completion rate for our e-learning courses was 98%. Additionally, Local Data Privacy Officers support the execution of our Group-wide training plan by conducting training for specific target groups on request.

IT tools for documentation

We maintain a central IT tool to provide a single source for data privacy processes, such as registering data processing activities and reporting potential data privacy incidents. In 2022, we rolled out a new data privacy tool. Additionally, we use our corporate intranet for further communication, including answering data privacy questions and providing standardized templates. In 2022, we registered **no sanctioned complaints** or incidents concerning breaches of customer privacy, data leaks, theft, or loss of customer data. In three out of 57 cases, minor personal data breaches were reported to the supervisory authority. These were not sanctioned.

Cyber Security Awareness

The Cyber Security organization has established multiple campaigns – in addition to the mandatory IT Security Awareness e-learning training – to ensure a high level of awareness among internal and external employees. One example is the **cyber hero campaign**, which features a series of videos demonstrating how to apply information security effectively through real-life examples. In addition, all employees receive monthly phishing e-mail simulations to learn how to identify and report potential attempted breaches in an interactive way.

Responsible interactions with health systems

It is important that healthcare stakeholders, such as research institutes, healthcare professionals and patient advocacy groups, have access to up-to-date information on diseases and treatments while safeguarding their independence at the same time. We help to facilitate this access. We also support cutting-edge research projects.

Our approach to interacting with health systems

We support health systems by providing information to our healthcare stakeholders, such as professional medical associations, patient advocacy groups, university clinics and other institutions that provide healthcare. We follow clearly defined **internal approval requirements** and procedures for each type of interaction, in line with applicable laws and codes. In countries with statutory or industry obligations on the disclosure of transfers of value to healthcare stakeholders, we aim to comply with these obligations.

We are committed to adhering to all regulations concerning the promotion of pharmaceutical products. In most markets, pharmaceutical companies are permitted to advertise prescription medicines only to healthcare professionals, such as physicians and pharmacists. These promotional activities must always disclose the active ingredient, potential adverse effects and contraindications of the medicine. Our internal governance documents on the promotion of pharmaceutical products are part of our Group-wide program, which requires us to conduct business in compliance with the law and industry obligations. Our aim is to apply **high ethical standards**. Our internal governance documents on the promotion of pharmaceutical products are part of our Group-wide program, which requires us to conduct business in compliance with the law, industry obligations and in line with the highest standards We regularly review all our internal governance documents and revise them as required in response to any new developments.

We clearly differentiate between information-sharing activities and promotional activities. The former are activities where we share scientific information but have no intention of promoting or increasing the sales of pharmaceutical products. The latter are activities with a clear intention to promote or increase sales of pharmaceutical products. The differentiation is critical for various internal policies and standard operating procedures, responsible functions, and levels of review and approval.

Direct-to-consumer advertising only in certain countries

Direct-to-consumer (DTC) advertising for prescription medicines is permitted in some countries, such as the United States. In line with applicable local laws, we use DTC advertising in these countries to help increase people’s awareness of certain diseases and the available therapies. In doing so, we empower patients to **make informed decisions** about their own treatment.

Roles and responsibilities

For all interactions with healthcare stakeholders, we have established internal policies and **review processes and tools,** such as record-keeping systems, to ensure adherence to statutory requirements and transparency obligations.

Our Global Regulatory Affairs unit has established a dedicated standard and corresponding process document on the review and approval of our promotional materials for our Healthcare business sector. At the operational level, the relevant business and all employees involved in our sales and marketing activities must adhere to our internal policies, standards and procedures.

To ensure that all promotional materials meet our standards as well as local regulations end-to-end, we apply a harmonized **Group-wide review and approval system**. In our Healthcare business sector, we use a single global software tool. This has enabled us to unify, simplify and monitor the review and approval process for promotional materials and monitor that process in accordance with the dual-control principle. If the material has promotional intent and is product-related, a review is conducted by our Medical, Legal and Regulatory functions. This also helps us identify opportunities for improvement. All employees involved in creating, reviewing and approving promotional materials undergo training on the current process for reviewing, approving and decommissioning promotional materials based on our principles and standards.

Our commitment: Group-wide guidelines and industry standards

In addition to applicable laws and our own internal standards, we comply with the codes of conduct of various international industry organizations, such as the **Code of Practice** published by the International Federation of Pharmaceutical Manufacturers & Associations (**IFPMA**) and the Code of Practice of the European Federation of Pharmaceutical Industries and Associations (**EFPIA**).

We are also members of various local industry associations, such as the German Association of Voluntary Self-Regulation for the Pharmaceutical Industry (FSA) and the U.S. Pharmaceutical Research and Manufacturers of America (**PhRMA**). Our activities adhere to the associations' codes for collaboration between healthcare professionals and the pharmaceutical industry.

Our Group-wide Pharma Code for Conducting Pharmaceutical Business and Pharmaceutical Operations (Pharma Code) defines the general compliance for our activities in the Healthcare sector. It provides high-level and overarching principles that govern our interactions with physicians, medical institutions, and patient advocacy groups, along with our promotional practices.

Our **Healthcare Ethical Guiding Principles** supplement the Pharma Code and guide our Healthcare employees with six ethical principles for decisions and activities specific to the particular challenges and responsibilities of this business sector.

Under the umbrella of our Pharma Code and Healthcare Ethical Guiding Principles, we have specific governance documents, procedures and tools for different types of interactions with healthcare stakeholders, covering topics such as service engagements, hospitality, payments (at fair market value), donations and sponsorships to participate in events.

Our **Standard on Medical Activities** provides the general principles and requirements that must be respected in all medical activities, including interactions with healthcare providers. The specific governance for the different types of activities and interactions is detailed in further policies and standards, standard operational procedures and other governance documents.

Collaborating with patient advocacy groups

Our Policy on Interactions with Patients, Patient Opinion Leaders and Patient Organizations provides a comprehensive framework for our interactions with these key stakeholders. Our guideline entitled Good Practice and Process Guidance: Engagement with Patients, Patient Opinion Leaders and Patient Organizations provides additional guidance for our interactions with these stakeholders. It reflects our commitment to prioritizing patient well-being and guides appropriate patient/caregiver engagement that enables our patient-directed approach. Through this policy, the supplementary guideline and specific local policies, we provide a robust guidance structure to support our employees in remaining compliant throughout their interactions with patients, patient opinion leaders and patient organizations.

We seek to improve patients' quality of life, which is why we support the work of patient advocacy groups. In turn, these groups provide patients, family members and caregivers with information on disease management and educational and advocacy resources.

Supporting medical education

To contribute to medical advances that benefit patients, we organize non-promotional medical education programs worldwide through our Global Medical Education and Academic Organization Relations department. We offer an Integrated Medical Education Portfolio by funding independent third-party medical education providers such as medical societies and academic organizations. We also offer company-led medical education programs. We take an **ethical, transparent and responsible approach**, providing fair and balanced content that allows the expression of a diverse range of theories and recognized opinions.

All requests for medical education funding are subject to an approval process through our R&D and Compliance functions, in line with our Standard on Medical Education Funding and Policy on Company Programs. This process ensures all funds granted for medical education programs comply with our internal guidelines and criteria as well as all applicable laws and industry codes.

In addition, we partner with industry associations, such as the Global Alliance for Medical Education (GAME) and the International Alliance for Continuing Medical Education (iPACME). We are also an active member of the relevant working groups established by the European Federation of Pharmaceutical Industries and Associations (EFPIA) and the Medical Affairs Professional Society (MAPS). Together with these associations, we discuss ways to harmonize and improve quality standards for medical education.

Transparent reporting

We publish the financial and non-financial contributions we make to healthcare stakeholders in the healthcare industry, such as healthcare professionals and healthcare organizations, as appropriate and in accordance with local laws and codes. The published information includes the names of individual recipients, their addresses, the purpose, and the contributed amount or value as required by the applicable laws and codes. In addition, before publishing, we secure all necessary informed consent forms, as required by the applicable data privacy regulations.

In addition to disclosing monetary transfers of value on an individual level, we continue to **publish overall spending** on our **research and development** activities, as required.

Apart from disclosing transfers of value to healthcare professionals and healthcare organizations as required, we ensure transparency on our voluntary unsolicited donations to European patient organizations by publishing the contribution details on our **website**. The report is updated annually and includes all amounts, recipients and the purpose of each transfer of value, thus also meeting **our obligation** as an **EFPIA** member.

Regular employee training

We are continuing our Code of Conduct training curriculum on managing **dilemmas in sector-specific situations**. This comprehensive and interactive training course seeks to improve participants' awareness and understanding of relevant dilemmas, such as overhearing a conversation that may or may not constitute attempted bribery. We plan to further implement this training program in all countries in which our Healthcare business sector operates. In addition, the success of this program has prompted us to further implement the program in our Life Science and Electronics business sectors.

Employees who are responsible for the promotion of our pharmaceutical products receive regular training on current guidelines. This applies to individuals in sales, marketing and functions who work directly with healthcare providers. We conduct these seminars either locally in a classroom setting or as e-learning courses.

Depending on their roles and responsibilities, new employees, participate in **onboarding training** dealing with the review and approval of promotional materials. Additionally, employees in charge of marketing and promotion of pharmaceutical products can also access our respective guidelines on our corporate intranet.

Based on their roles and responsibilities and to remain up-to-date, employees participate in mandatory e-learning courses and classroom training on our policies and guidelines, as well as important changes to the reporting requirements for transfers of value.

Tax governance

Our company operates in a complex legal environment and is subject to various tax obligations due to its domestic and foreign business activities. It is our responsibility to ensure compliance with tax legislation in all countries in which we operate and to be transparent. To this end, we have a tax organization in place that clearly defines responsibilities, processes and controls.

Our approach to taxes

We believe that fair taxation serves as a backbone of any functioning society. Therefore, we expect public authorities to take transparency, predictability and non-discrimination into consideration when implementing taxation measures. We understand that tax is embedded in almost every aspect of commercial operations and our company therefore acts as a **responsible taxpayer** with respect to the following objectives:

- Ensuring timely and proper execution of tax obligations;
- Securing material correctness of tax positions determined in the annual financial statements and tax declarations;
- Ensuring effective tax **risk management** and tax monitoring;
- Avoiding inappropriate structuring leading to benefits not provided for by tax law.

Roles and responsibilities

Taxes are managed in different units. Group Tax is generally responsible for tax matters of Merck KGaA and provides tax standards for the Merck Group – with the exception of customs, consumption tax and wage tax. The Export Control and Customs Regulations unit within the Corporate Sustainability, Quality and Trade Compliance (SQ) function is responsible for customs and consumption tax. Human Resources is responsible for wage tax.

The Group Chief Financial Officer (CFO) is responsible for the Group Tax function. He delegates his tasks related to tax matters to the Head of Group Tax. The Head of Group Tax is also responsible for defining the organizational structure of the function, for monitoring it on an ongoing basis and for adapting it if necessary. In addition, the local tax unit in the United States reports directly to the Head of Group Tax.

At the subsidiary level, the local CFO is generally responsible for tax matters, managed either by local tax units, by external advisors, or, for Germany and our U.S. subsidiaries, by Group Tax. The local CFOs report to the regional CFO. The regional CFOs ultimately report to the Head of Merck Business Services, who reports to the Group CFO. If no local CFO is assigned, the tasks are undertaken by a designated employee in the Finance unit.

Tax-related compliance topics can also be reported through our **compliance hotline**, our Group-wide whistleblowing system.

Our commitment: a tax principle

Our **Tax Principle** is part of our tax **internal control system**. It represents the framework and minimum requirements for all tax-relevant processes, methods and structures within our company. This principle

- outlines the tax compliance culture within the Group;
- defines our tax compliance objectives;
- specifies the organizational framework for tasks, roles and responsibilities, which ensures compliance with tax rules within the Group;
- establishes basic rules for the exchange of tax-relevant information.

The Tax Principle is issued by Group Tax and applies to the entire Group. It is reviewed it at least once a year and modified if necessary. Should extraordinary events occur, such as changes to the business strategy, organizational structures or risk management processes, the principle is reviewed on an ad hoc basis and adapted as appropriate. The Head of Group Tax is responsible for annual and ad hoc reviews as well as modifications to the principle. Any material modifications are discussed and coordinated with the Group CFO.

Suppliers

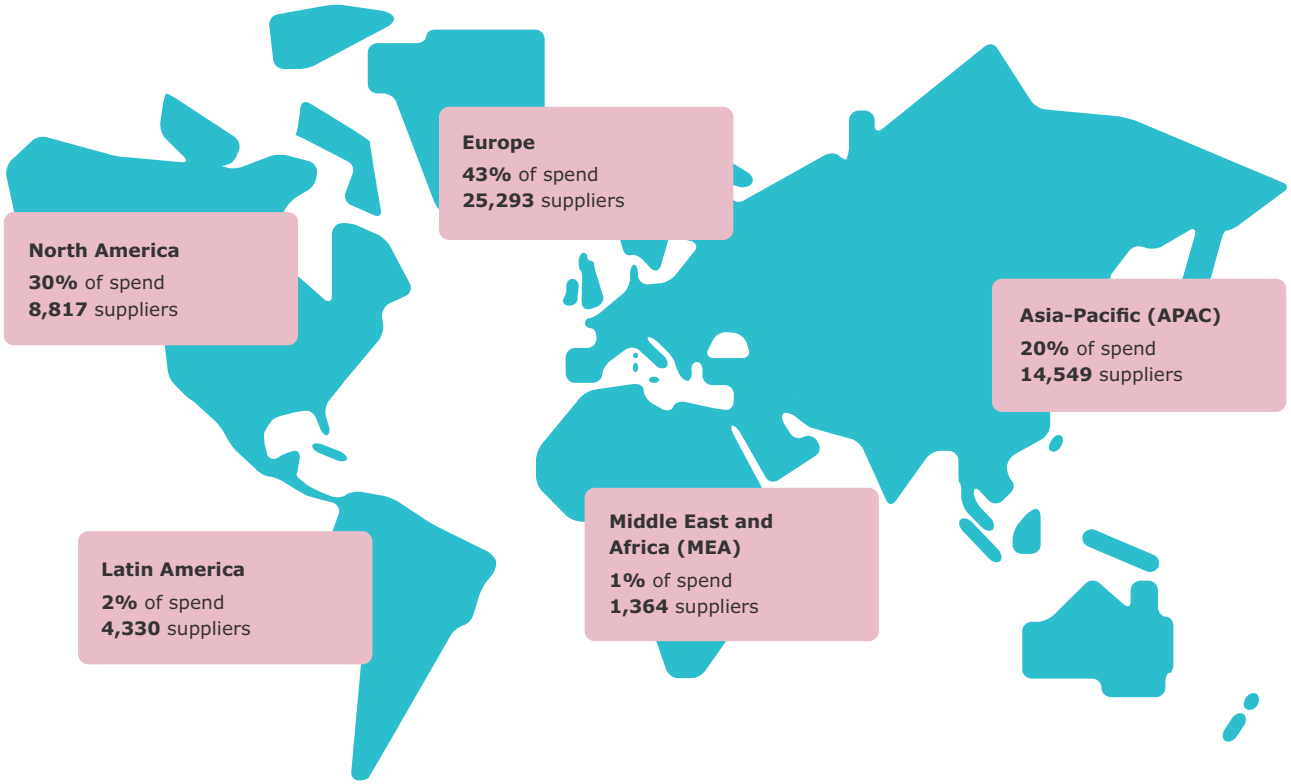
Sustainable supply chain management

Our company procures many raw and packaging materials, technical products, components, and services from around the world. We aim to promote supply chain stability while providing our customers with high-quality products and services. We expect our suppliers to respect our ethical, social and compliance standards and apply these to their own supply chains.

Our approach to sustainable procurement

In 2022, the total value of the goods and services we purchased from around **54,000 suppliers** in more than 140 countries was approximately € 10.2 billion, compared with approximately € 8.6 billion in 2021, representing an increase of 18.5%.

Supplier spend and suppliers per region – 2022[1]



[1] For data processing reasons, 2% of our suppliers (1,203 suppliers) are currently not assigned to any purchase region. This equates to 4% of our supplier spend.

With our supplier management endeavors, we aim for **compliance with fundamental environmental and social standards** in addition to high quality, reliable delivery and competitive prices. Therefore, we have introduced relevant strategies, processes and guidelines to prevent violations of supply chain standards and continuously improving our sustainability performance. Unless stated otherwise, the approaches presented apply to direct suppliers. Furthermore, our supplier management activities include special measures particularly for indirect suppliers working in the area of conflict minerals.

To achieve our **sustainability goals**, our Group Procurement team is working closely with our suppliers. We aim to create transparency in all our sourcing regions and fully integrate sustainability into all our value chains. To this end, we have defined two key indicators to measure our journey towards increasing this transparency by evaluating the **sustainability performance of our relevant suppliers** with valid sustainability assessments. Our definition of valid sustainability assessment includes assessments carried out over the last three years and performed by a reliable, approved source. Relevant suppliers either indicate a specific country and industry risk or contribute to a significant percentage of our supplier spend (at least 50%). For the risk evaluation, we previously used the risk data provided by **EcoVadis**. For the country risk, we have developed our own more comprehensive country risk score in 2022.

In 2022, 46% (2021: 33%) of our relevant suppliers were covered by a valid **sustainability assessment**; 82% (2021: 74%) of our spend generated from these suppliers were covered by suppliers with a valid sustainability assessment. To achieve comparability of our key indicators over the years, we applied this new country risk score also retrospectively for 2021 data, the starting point of our measurement.

We view our approach to supply chain sustainability as a journey and continuously work to improve and develop our policies and processes. While doing so, we consider all applicable legal requirements and initiate corresponding measures where necessary. For this purpose, in 2022, we implemented measures to operate compliant with the **German Supply Chain Due Diligence Act**. Among other things, the Head of Corporate Sustainability, Quality and Trade Compliance has been appointed as Human Rights Officer.

Our Supplier Decarbonization Program is a key element of achieving our **Science Based Target**. Through the program, we aim to **reduce greenhouse gas emissions** associated with purchased goods and services as well as capital goods. More details on this program can be found **here**; more information on our climate-related targets can be found in the **Climate action chapter**.

Risk management process

To ensure security of supply, we select our suppliers based on criteria such as country risk, material risk, supplier risk, and their strategic importance to the business. This process helps our sourcing managers identify potential mitigation actions with relevant suppliers and supports them in making improvements. The approach towards our **strategic suppliers which account for approximately 49% of our total supplier spend** includes the identification, monitoring and assessment of supply **security risks**. It comprises four main elements:

- **Supplier Risk Assessments:** to capture the overarching risks at the supplier level, considering multiple risk domains.
- **Alert system:** to notify our Procurement organization about risk events arising with any of our suppliers.
- **Material Risk Assessments:** to identify and mitigate the risks of the materials used in our most significant finished products.
- **Risk Response Tracker:** a system to create and monitor risk mitigation activities in inter-disciplinary teams.

We calculate risk factors for suppliers and raw materials by multiplying risk probability and risk impact. We have simplified our risk methodology to focus on the ten most relevant risk categories - including but not limited to

economic freedom, social unrest, unfair business practices, and poor labor practices - grouped into three risk domains. We also include criteria for identifying supplier relationships impacted by **key sustainability risks,** such as mineral sourcing and animal welfare. In 2022, numerous initiatives were developed to ensure our supply continuity including second source qualifications, regionalization of supply and financial support to suppliers under special circumstances, among others.

Due diligence process for responsible sourcing of minerals

We source and sell products that contain minerals commonly referred to as “3TG” (tin, tungsten, tantalum, gold – collectively also known as conflict minerals). These minerals involve the risk of being extracted, traded, handled, and exported from conflict-affected and high-risk areas (CAHRAs) where human rights are not always respected and violations thereof need to be prevented.

Our company operates in global and complex supply chains, in many cases with several tiers of suppliers between us and the original sources of the minerals used in our products. To address the risk of this complexity, we are a member of the Responsible Minerals Initiative (RMI). RMI provides us with tools and resources to make sourcing decisions that improve regulatory compliance and support responsible sourcing of minerals from CAHRAs.

Our aim is to source materials in a responsible and conflict-free manner and not to contribute to adverse impacts through our activities. Therefore, we have a due diligence program that applies across all our business sectors and is in line with applicable laws and international standards.

In order to continuously improve our due diligence practices, we have a system to store and maintain supplier information across our business sectors. This system supports increased transparency of our supply chain. In addition, we are working on the integration of further control mechanisms into our due diligence framework for high-risk suppliers. Furthermore, we are in constant exchange with suppliers, industry peers and cross-company collaborations to enhance regulatory compliance.

Roles and responsibilities

Group Procurement is responsible for integrating sustainability requirements into the relevant stages of our sourcing and supplier management processes. Our Center of Excellence for Supply Security coordinates the relevant measures, such as updating our guidelines where necessary, examining processes and coordinating our participation in external initiatives. Sourcing managers responsible for selecting and contracting suppliers are made aware of and regularly updated on our **guidelines and sustainability requirements** through internal communication channels and training.

Our commitment: Guidelines and standards

We expect all our suppliers and service providers to comply with our environmental and social standards, which are primarily derived from the **core labor standards** of the International Labour Organization (**ILO**) and the **UN Global Compact**. We expect our suppliers to ensure that their subcontractors respect the same rules. In the reporting year, we have developed a **Supplier Code of Conduct** which details our expectations towards suppliers and business partners regarding human rights, health and safety, business integrity, environmental protection, continuous improvement, and management of their respective suppliers more comprehensively. It replaces our Responsible Sourcing Principles as of January 2023.

Our **Responsible Minerals Sourcing Charter** demonstrates our commitment to responsible sourcing of minerals from conflict-affected and high-risk areas. It applies to all our legal entities and subsidiaries worldwide. The charter complements the requirements set out in our Supplier Code of Conduct.

To ensure that 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. For example, we are a member of Together for Sustainability (**TfS**), the Pharma Supply Chain Initiative (**PSCI**), the Responsible Mica Initiative, and the Responsible Minerals Initiative (**RMI**). We call on our suppliers to let us or trusted partners conduct assessments or audits to increase our supply chain transparency and identify fields of activity to improve sustainability performance or mitigate infringement risks. Regarding our **mica supply chain**, we engage with a global consultancy firm to conduct audits and the Indian organization **IGEP** to conduct inspections.

Supply chain assessments and audits

Together for Sustainability supplier assessments and audits

Through the TfS initiative, suppliers are assessed either based on information obtained during audits or based on self-reported and publicly accessible information provided by **EcoVadis**, an independent rating agency. EcoVadis assesses suppliers from more than 160 countries and 200 sectors across the four categories of **Environment, Labor and Human Rights, Ethics, and Sustainable Procurement**. On top of the assessments, suppliers are also monitored through a 360-degree news watch. The results are shared among TfS member companies in compliance with all restrictions stipulated by antitrust law.

Through the TfS initiative alone, we have access to more than 1,700 valid scorecards on the **assessment** of our suppliers, more than 1,100 of which completed a new assessment or re-assessment in 2022. In some cases, these were initiated by us and in other cases by other TfS members.

In 2022, we collaborated closely with member companies in TfS workstreams focusing on sustainability **capacity building and supplier decarbonization**. We supported the development of a capability-building concept and deployed the TfS Academy. This training platform offers sourcing managers, interested employees and suppliers of TfS member companies 165 courses in up to nine languages on topics such as sustainable procurement, environment, health and safety, as well as labor and human rights. We also contributed to several best practice sharing and collaboration formats such as the TfS Talks as well as TfS Coordinator Roundtable. Furthermore, we supported the development and launch of the **TfS Product Carbon Footprint (PCF) Guideline**, which harmonizes PCF calculation methodology across the industry, and led the development of decarbonization training materials for TfS member companies and their suppliers.

Supplier Decarbonization Program

Our cross-functional Supplier Decarbonization Program team within Group Procurement is driving the execution of a ten-year program as part of the decarbonization strategy that was defined in 2021. In 2022, we continued to provide **training sessions and materials** for procurement managers and sourcing teams and engaged further with suppliers by sharing information about our climate targets. Follow-up discussions were again held regarding the supplier decarbonization questionnaire to assess the current decarbonization status and progress made since last year. This allows our sourcing managers to collate relevant supplier data in a global monitoring database.

We have also developed an **automated carbon accounting tool** to manage the large quantities of data on the CO_2 emissions of our suppliers. It has been available since the beginning of 2022 and we will continue adding new functionalities in the coming years.

Supplier diversity

In the United States, we have specific supplier diversity programs in place to comply with local legislation. We are focusing our efforts in the United States on enhancing our current **supplier locator tool** by broadening the rollout among sourcing managers to improve our ability to connect with and potentially award business to a wide range of vendors. Additionally, we continue to work on internal awareness campaigns and training seminars for our sourcing managers and are investing in tools to expand our database of small and diverse vendors. Starting in 2023, we plan to expand these efforts beyond the current focus on the sourcing category marketing & sales.

Ambassadors for sustainable procurement

We are active participants and contributors to the **Sustainable Procurement Pledge**, a TfS initiative established out of the social network LinkedIn in 2019. Since then, it has evolved to become a knowledge exchange platform for procurement professionals, academics and other **stakeholders**, hosting various online best practice exchange events.

Mica supply chain

Mica is an important raw material for our effect pigments, which are used in automotive, cosmetic and industrial coatings as well as plastics. We procure the majority of our mica from the Indian states of Jharkhand and Bihar. We have special measures in place to comply with high social and environmental standards in our mica supply chain.

Our approach to responsibility in the mica supply chain

By procuring mica from the Indian states of Jharkhand and Bihar, where social and economic factors contribute to poor working conditions, including child labor, we are supporting this region by safeguarding local employment and livelihoods. We source the raw material only from suppliers operating in formal working environments and we monitor compliance with our standards, including the prohibition of child labor.

Our mica suppliers are informed of our standards and have confirmed that they adhere to the principles of our **Human Rights Charter** as well as the requirements of our **Supplier Code of Conduct** (formerly Responsible Sourcing Principles). In the event of non-compliance with our standards, we work with suppliers to ensure the appropriate implementation of corrective measures.

We do not tolerate child labor and contractually prohibit our suppliers from employing children. If one of our suppliers were found to be using child labor, we would terminate the business relationship immediately. We are driving initiatives and taking measures to improve the conditions of mica sourcing based on our high standards. We continuously review our monitoring processes to improve their effectiveness.

Roles and responsibilities

Group Procurement has overall responsibility for sourcing mica. A steering committee is in place to involve the relevant functions and inform the respective Board members about significant developments.

We have direct business relationships with suppliers for our mica supply chain in India in place. Our procurement unit is in direct contact with suppliers to reiterate the importance we place on ethical, social and environmental standards.

Our commitment: Compliance with guidelines and standards

As a signatory to the **United Nations Global Compact**, we are actively involved in working to abolish child labor. Our **Human Rights Charter** underscores this commitment. In our **Supplier Code of Conduct** (formerly Responsible Sourcing Principles), we set out our expectations for our suppliers in terms of sustainability and human rights, including prohibition of child labor. Our Responsible Sourcing Principles are also an integral part of our supplier contracts.

Auditing our mica supply chain

We have implemented a series of oversight mechanisms using a system that monitors and audits conformity with our social and environmental standards. In addition to visits by our company’s employees, regular inspections are conducted by third parties, who conduct comprehensive announced audits as well as frequent, unannounced verification visits.

External audits

Environmental Resources Management (**ERM**), a leading global provider of environmental, health, safety, risk, and social consulting services, conducts external audits of mines and processing plants, investigating working conditions as well as **environmental, health and safety issues**. The audit reports document any identified shortcomings in this respect and propose corrective actions. Findings concerning the ventilation of workplaces and fire prevention were successfully addressed. Our employees in Kolkata (India) and Darmstadt (Germany) take action to address any identified issues. If the corrective measures are not respected, we may suspend or even terminate our business relationship.

Unannounced inspections

Since 2013, IGEP Consult, an Indian non-governmental organization, has conducted regular unannounced inspections to review labor standards throughout our supply chain. During these visits, IGEP officials monitor occupational safety and **compliance with laws preventing child labor**. In 2022, its inspections focused on checking the availability of physical examinations for workers and conducting mock fire drills. Additionally, we regularly optimize the escalation process together with IGEP, which holds bi-weekly review meetings with representatives of our company to assess suppliers. These meetings help to identify any required actions, which our sourcing teams then discuss and implement with our suppliers. As a result, our suppliers have successfully improved the working conditions at these sites.

Evaluating and tracking mica sources

We use a tracking system to help ensure that the mica we purchase is derived from sources **qualified by our company.** We also use this tracking system to monitor productivity of our mica sources. Based on written records of the daily extraction quantities, we review the volumes of mica reported and supplied to the processing facilities. Furthermore, we use a digital traceability solution to increase transparency in the mica supply chain.

To maintain accuracy, our processes undergo constant review and improvement. We are also evaluating other mica sources in accordance with our quality, social and environmental standards, both in India and other regions. For example, in 2022, we sourced a considerable amount of mica in Brazil, where we have also established oversight mechanisms to monitor and audit adherence to these standards.

Community outreach in the mica supply chain

We are working to improve the **living conditions of the families** in mica mining areas. Since 2012, our educational efforts in Jharkhand include funding three schools with currently around 500 students as well as five vocational training centers, all run by our local partner, the NGO IGEP. At a fourth school operated by one of our mica suppliers, we provide on an annual basis scholarship for 200 children out of the 450 enrolled at the school.

In addition to our support for education, we are also helping to improve **access to healthcare**. For example, we are fully funding an IGEP-operated health center in Sapahi, Bihar, that serves approximately 20,000 residents in the local region.

Stronger together: Joint action in the mica supply chain

We are also a founding member of the multi-stakeholder group Responsible Mica Initiative (**RMI**). Since 2017, we have held the presidency of the organization. The initiative aims to eradicate child labor and unacceptable working conditions in the Indian mica supply chain by **joining forces across industries**.

During the reporting year, we continued to support the RMI's work, as described below.

Responsible workplace standards:

- The RMI conducted training sessions with supervisors and workers in several Mica processing units.

Community empowerment:

- The RMI has further expanded its programs to include 50 additional villages. The scope now comprises 180 villages, reaching more than 16,000 households in 2022. The RMI's goal is to address the root causes of child labor and improve livelihoods within local communities.
- In 2022, an external and independent impact assessment of RMI's Community Empowerment Program has assessed the conditions in 40 villages, which have received support over the last 3 years. The vast majority of families in these villages have reported increased school attendance.

Human rights

As an international corporate group, we have a duty to respect human rights worldwide within our respective sphere of influence and to ensure that our business activities do not infringe upon these rights. By fulfilling our human rights due diligence obligations, we meet our responsibility to society. At the same time, this enables us to remain competitive over the long term.

Our approach to human rights due diligence

We are committed to upholding human rights, which is why we became a signatory to the UN **Global Compact** back in 2005. We endeavor to prevent the risk of human rights violations as far as possible, not only at our own sites but also along our entire supply chain. That is why we integrate human rights due diligence into our business processes. Our approach to human rights due diligence encompasses six main components.

Our human rights due diligence process

We view our human rights due diligence as a **continuous process**, which we constantly adapt and improve. This also prompts us to continually review our approach. We closely monitor regulatory developments – for example, the planned EU directive on human rights due diligence.

Roles and responsibilities

Our Executive Board has ultimate responsibility for human rights within our sphere of influence. The Executive Board exercises this responsibility by requiring our Managing Directors to respect human rights.

Our Group Corporate Sustainability unit is responsible for coordinating all human rights due diligence activities across the Group. The persons responsible for these issues in the respective Group functions, business sectors and local units implement the specific measures, for instance by integrating human rights due diligence into existing processes.

The cross-sectoral human rights working group exchanges information on activities and the latest developments in the areas of business and human rights. In 2022, two meetings were held.

Within the **UN Global Compact Network Germany**, we are a member of the **Business & Human Rights Peer Learning Group**. In this context, we discuss challenges, current issues, experiences, and successful approaches in exercising human rights due diligence with other companies.

Our commitment: Guiding principles, charters and laws

Our **Human Rights Charter** aligns with the **UN Guiding Principles for Business and Human Rights**. It is our overarching human rights governance document and defines the relevant requirements for our company. These requirements cover a broad range of topics related to human rights, including, for instance, product safety, clinical studies, occupational health and safety, equal opportunity, fair pay, freedom of association and collective bargaining as well as the exclusion of child and forced labor. The charter interlinks and complements our existing rules and regulations pertaining to human rights. These include, for example,

- our **Code of Conduct**,
- our **Social and Labor Standards Policy**,
- our **EHS Policy** (Corporate Environment, Health and Safety Policy),
- our **Supplier Code of Conduct** (formerly Responsible Sourcing Principles),
- our **Responsible Minerals Sourcing Charter**, and
- our **Charter on Access to Health in Developing Countries**.

We expect our employees as well as our suppliers and all companies with which we have business ties to comply with this charter.

In 2022, we further developed our existing approach to human rights due diligence, prompted by the specific requirements of the new German Supply Chain Due Diligence Act. We strengthened the existing processes for risk identification in order to fulfill our due diligence obligations even better. Among other things, we appointed the Head of Corporate Sustainability, Quality and Trade Compliance as human rights officer to monitor compliance with human rights due diligence requirements and the implementation of processes throughout the Group in the future.

Identifying actual and potential impacts on human rights

We perform **risk assessments** to understand the potential impacts our operations and business relationships could have on human rights. For instance, we investigate human rights risks at our sites as well as risks related to product and service sourcing. These risk assessments enable us to derive the corresponding strategies and measures. We track human rights risks through our strategic supplier risk process. More information on how we engage with suppliers can be found under **Sustainable Supply Chain Management**.

We also meet our human rights due diligence obligations when **deploying new technologies**. Our **Code of Digital Ethics** defines digital ethics principles and forms the basis for the work of the Digital Ethics Advisory Panel. More information can be found under **Digital Ethics**.

Measures to protect human rights

Auditing our sites and suppliers

Our **Global Social and Labor Standards Policy** stipulates the social and labor standards at our sites. We regularly check compliance with the requirements using a risk-based approach. Among other things, this takes into account risks that may arise if relevant laws and regulations change or if there are violations of internationally recognized labor rights by governments and companies, as assessed by the **International Trade Union Confederation** and documented in the annual ITUC Global Rights Index. If we identify a violation during the audit, we define remedial actions together with the responsible Managing Director and/or local HR staff.

In addition, we review human rights aspects at our sites through security audits. The audits are one control mechanism of our security governance framework. Increased risk transparency and centralized CAPA tracking allows us to ensure that our sites meet **security-relevant human rights aspects**.

Through the **Together for Sustainability** (TfS) initiative, we determine whether our strategically important suppliers comply with human rights standards.

Human rights and investment decisions

When projects exceed a certain cost threshold, our Investment Committee must approve the expenditure. In its decision, the committee considers various aspects related to the project, including environmental impact and health and safety. Furthermore, our Code of Conduct is binding where investment decisions are concerned. We also integrate human rights topics into our decision-making processes regarding mergers and acquisitions.

Creating awareness among our employees

To train our Managing Directors and senior management, we offer an **e-learning course** on implementing the requirements of our Social and Labor Standards Policy in their areas of responsibility. Our **onboarding training** for all new EHS managers continues to cover the topic of human rights, with a particular focus on the issue of modern slavery. In addition, the Supervisory Board received training on the requirements and implementation of the new German Supply Chain Due Diligence Act in 2022.

To embed respect for human rights even more strongly throughout the Group, we are continuously expanding our internal communication and awareness training on human rights and modern slavery. Through our global sustainability network, for example, we held a webinar on human rights in the corporate context in 2022. In addition, **virtual information events on the implementation of the German Supply Chain Due Diligence Act** were offered to selected target groups.

Training courses for our suppliers

Together with TfS, we rolled out the TfS Academy training platform in 2022. The platform offers employees of TfS member companies and their suppliers 165 courses in up to nine languages. The module on human rights due diligence, for instance, covers the topics of child labor, forced labor, human trafficking, discrimination, and harassment. We also participated in the #TfSTalks, an interactive webinar series.

Our reporting practices

We inform the public about our approaches, measures and results of human rights due diligence. We provide information on this annually in our Sustainability Report. Additionally, legislation in Australia and the United Kingdom requires us to publish the steps we are taking to counter forced labor and human trafficking. Apart from the **UK Modern Slavery Statement**, we also published our **Merck Australia Modern Slavery Statement** in 2022. Both have been signed by the Chair of the Executive Board and published on our website.

Our complaint mechanisms

Our compliance hotline is the most important channel for reporting complaints about potential human rights violations. Our employees as well as external stakeholders can report suspected cases via this Group-wide whistleblowing system in their respective national language, free of charge and anonymously, either by telephone or a web-based application. We thoroughly investigate all complaints that we receive and take countermeasures if necessary. More information on the compliance hotline can be found under **compliance management**.

In 2022, there were **no indications** from our compliance hotline of child or forced labor or violations of the right to collective bargaining or freedom of association within our own global business operations. Regarding forced labor, we were informed that we offered rubber gloves for which a manufacturer is accused of labor abuses including forced labor in Malaysia. The matter is being investigated further. Our supplier has already terminated business relations with the manufacturer. Consequently, our company also no longer has any business ties to the manufacturer in the affected supply chain.

Clinical studies

Before obtaining regulatory approval for our medicines, we conduct clinical studies with patients and, if necessary, also with healthy volunteers to investigate the safety and effectiveness of our products. We also perform extensive preclinical research, including animal testing, to demonstrate that our treatments pose no unacceptable risks to humans.

Our approach to safe and transparent clinical studies

Our aim is to conduct high-caliber clinical research that always is in compliance with applicable laws and regulations. As a responsible company, we set Group wide requirements to ensure that the **highest ethical and scientific standards** worldwide are met when conducting clinical trials.

We only conduct clinical studies to investigate issues that are relevant to patients, healthcare professionals or society, and only when the medicines being tested show significant therapeutic promise and have a **positive benefit-risk ratio**. In addition, a sound, established scientific methodology must be available to investigate these scientific or medical questions. We only enroll the specific number of participants required to answer each of these questions.

Protecting the safety, well-being, dignity and rights of the patients and healthy volunteers participating in our clinical studies is of utmost importance to us. We do not intentionally expose study participants to undue risk or irreversible harm. **Personal data privacy** is also very important to us, and we maintain a strong focus on data protection and confidentiality in compliance with statutory regulations.

Based on our **Standard on Human Research** we aim to design and plan our studies to ensure that diverse patient populations who are expected to use a product when approved are adequately represented. Study participants shall not be discriminated against due to e.g. gender, ethnic origin, religion, disabilities, sexual orientation or socio-economic status.

Patient-focused drug development

We are improving our approach to research and development by committing to patient-focused drug development that more actively involves patients, caregivers, and their advocates in our work. Their **valuable insights into disease and treatment management** will help us make more informed decisions at each stage of the medicine development process. We aim to make our studies easy for patients to understand while ensuring all participants have positive experiences as they contribute to our understanding of the particular disease and its treatment. At every level of our organization, we are additionally educating staff about the value of a close, more consistent patient interaction and the requirements to protect our patients' independence and privacy.

Clinical studies in low- and middle-income countries

We conduct all our clinical studies in accordance with local laws and regulations, and we adhere to all **relevant international scientific and ethical standards**, irrespective of the region or country. We are deliberately expanding our medicinal product development to more diverse markets in order to address pressing healthcare needs in low- and middle-income countries and support the development of their healthcare systems.

When performing clinical studies in low- and middle-income countries, where there is usually a lower level of healthcare and limited healthcare infrastructure, the following also applies:

- We only do so in an environment in which the principles of Good Clinical Practice can be upheld.
- We only investigate diseases and innovative medicines that are relevant to the local population.
- We only conduct clinical studies in countries where we expect that the drug being tested will be submitted for marketing authorization and made available to patients after we have proven its efficacy and safety.

Roles and responsibilities

Clinical drug development, including clinical studies and the related governance process, are the responsibility of our Global Development unit. The Head of Global Research & Development reports to the CEO Healthcare, who is a member of the Executive Board.

We review the progress of new drug development at defined milestones, and make decisions about the continuation, modification or discontinuation of development, depending on the results of clinical studies.

We have established two internal committees to oversee our clinical studies. The Integrated Protocol Review Committee is responsible for the studies performed by the company on medicines that are under clinical development, while the Global Medical Decision Board is responsible for our own studies with approved medicines, as well as for all studies performed by independent investigators and supported by us (so-called investigator-sponsored studies). Both bodies consist of medical-scientific **experts and executives with long-standing experience** in clinical research. Our development and study teams present clinical study concepts to the appropriate committee. Each committee meets regularly to conduct a comprehensive review of the proposed concepts and ascertains that our studies are scientifically sound, have a legitimate scientific purpose, and are performed in accordance with the latest standards and best practices.

Before administering a new drug to humans, there must be sufficient evidence that it offers a potential **therapeutic benefit**, is sufficiently safe for use in humans and has a positive benefit-risk ratio. We only take the critical step of a first-in-human clinical trial after diligently conducting extensive preclinical testing. The decision lies with a separate committee, the Human Exposure Group, chaired by our Global Chief Medical Officer.

We continuously analyze potential **risks for study participants** before and during our clinical studies. Our Medical Safety and Ethics Board (MSEB) oversees the safety of the participants in our clinical studies and, as necessary, reviews the benefit-risk profiles of investigational drugs. You can find further information on the MSEB under **Patient safety**.

Issues may be submitted to the relevant committees by product teams or other committees (as defined in relevant standard operating procedures or committee charters). If individual employees wish to seek advice or report concerns on ethical questions, they can contact the members of a committee directly.

Our commitment: International guidelines and requirements

Our Human Subjects Research and Development Policy provides the framework for conducting clinical studies and helps ensure that we adhere to all applicable **legal, ethical and scientific standards**. In addition to the relevant national laws and regulations, these standards also include:

- The **Good Clinical Practice** (GCP) guidelines of the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (**ICH**)
- **The Declaration of Helsinki**, published by the World Medical Association
- **The Belmont Report** by the U.S. **Office for Human Research Protections**
- Good Pharmacovigilance/Laboratory/Manufacturing/Distribution Practices (GVP/GLP/GMP/GDP)
- The **International Ethical Guidelines for Health-related Research Involving Humans**, published by the Council for International Organizations of Medical Sciences (**CIOMS**)
- The **Joint Position on the Disclosure of Clinical Trial Information via Clinical Trial Registries and Databases** and the **Joint Position on the Publication of Clinical Trial Results in the Scientific Literature**, published by the International Federation of Pharmaceutical Manufacturers & Associations (**IFPMA**), the European Federation of Pharmaceutical Industries and Associations (**EFPIA**), the Japan Pharmaceutical Manufacturers Association (**JPMA**), and the Pharmaceutical Research and Manufacturers of America (**PhRMA**)
- The **Principles for Responsible Clinical Trial Data Sharing**, published by EFPIA and PhRMA, and the IFPMA Principles for Responsible Clinical Trial Data Sharing

Regular supervision of clinical studies

Our clinical study processes and procedures are regularly inspected by relevant regulatory authorities to verify their compliance with applicable laws and guidelines.

The Research & Development Quality unit applies a risk-based identification strategy to determine areas that need to be audited. **Quality assurance audits** are performed internally within Healthcare R&D (for example, process audits) and externally (for example, at vendors' sites and investigational sites). We respond immediately to observations during audits by investigating their root causes and, according to their criticality, defining and implementing corrective and preventive actions to improve processes, prevent reoccurrence of irregularities and ensure compliance.

A hybrid auditing approach combining remote and on-site audits was successfully implemented and most of the audits of the Annual Audit Plan 2022 were completed as planned.

Conducting clinical studies responsibly

Prior to enrolling participants, every clinical trial must first be assessed and approved by a qualified **independent ethics committee**. Furthermore, all regulatory authorizations required in the respective country must be obtained. In accordance with Good Clinical Practice guidelines (ICH-GCP), all study participants must give their explicit informed consent before enrolling in a clinical study. Participants are fully informed about all aspects of the clinical trial in a language that they understand. This includes the potential risks and benefits from participating in the study and the opportunity to inquire about details. As far as possible, non-interventional (observational) studies are also assessed by an ethics committee.

Every clinical study follows defined procedures to ensure it is conducted to the **highest quality standards** in line with good working practices (GxP) for the development and manufacturing of drugs, the ethical principles of the **Declaration of Helsinki** and other international guidelines and regulations. In 2022, regulatory authority inspections did not unveil issues which had a significant impact on patient rights, patient safety, or the data integrity of a study.

We continuously collect and communicate **safety data on our investigational drugs** and promptly provide clinical investigators with important new findings relevant to the safety of the study participants. In this way, we help to ensure the safe use of our medicines. Potential adverse effects and risks are taken into consideration to evaluate the benefit-risk ratio of our products and manage any risk. Product information, including the investigator's brochure and information for study participants, is updated accordingly. More information is available under **Patient safety**.

Conducting clinical trials in vulnerable populations

The implementation of clinical studies in vulnerable populations, such as children or people with disabilities, requires **special attention and care** to comply with the highest ethical and scientific standards. The well-being of the individual is our highest priority. For this reason, we only conduct studies with participants from vulnerable population groups if scientifically justified and if there is no other way to achieve conclusive results. When performing such studies, especially when informing study participants and obtaining their consent, we take statutory regulations into account.

Teaming up to get results

The clinical trial investigators participating in our clinical studies by enrolling and caring for patients are critical to the successful development of new medicines. Furthermore, to achieve a broad, in-depth basis for the development of new treatments, we seek advice from medical-scientific advisory boards and frequently conduct clinical studies in collaboration with external **partners in academia and industry**. We also rely on the support of contract research organizations (CROs) and other service providers and vendors. We expect from our partners that they apply the same high standards in terms of ethical conduct and quality in clinical research.

As a member of **TransCelerate**, a consortium of 20 pharmaceutical companies, we are currently collaborating on several initiatives to improve the health of people around the world by accelerating and simplifying the research and development of innovative new therapies.

Close dialogue with patients and advocacy groups

We want to ensure that the voices and **needs of patients and their caregivers** are adequately heard and taken into consideration through the entire lifecycle of our medicines. We have a strong internal policy as well as compliance guidance documents, which provide a clear frame to ensure that such engagements take place within an ethical framework. In addition, we established the Patient Advisory Boards (PAB) as one of our crucial communication channels. Our PAB Charter describes how to involve patients and caregivers in our clinical research process. During Advisory Board meetings, patients, caregivers and representatives from patient advocacy groups are invited to share their experiences related to clinical trials. We use this opportunity to discuss multiple aspects of the drug development process, including but not limited to protocol design, educational materials, technology and innovative approaches to clinical trials.

Furthermore, we are involved in multiple activities that focus on this relevant aspect of **patient centricity in clinical studies**. For example, in the United States, we are an active member of the Clinical Trials Transformation Initiative (**CTTI**), which focuses on quality and efficiency in clinical trials.

Responsible data sharing

We support professional circles in advancing **medical and scientific knowledge**, thereby enabling informed healthcare decisions for the benefit of patients. Upon request, we provide qualified researchers with study protocols, anonymized individual patient data, study data, and clinical study reports. We share data and information in a manner that is consistent with the joint **Principles for Responsible Clinical Trial Data Sharing** of the **EFPIA** and **PhRMA**:

- Safeguarding the privacy of patients
- Respecting the integrity of national regulatory systems
- Maintaining incentives for investment in biomedical research

Disclosure of clinical studies and publication of results

We are obligated to disclose findings from our clinical studies. We do this publicly in a complete, accurate, balanced, transparent, and timely manner as laid out in our Clinical Trial Disclosure Policy. Our clinical study designs and results are made public in the international **ClinicalTrials.gov** database run by the U.S. National Institutes of Health (**NIH**), which can also be accessed via the World Health Organization's International Clinical Trials Registry Platform (**ICTRP**). Furthermore, in accordance with EU regulations, we publish results from our clinical studies in the EU Drug Regulating Authorities Clinical Trials (**EudraCT**) database, which is run by the European Medicines Agency (**EMA**). If required by local laws and regulations, we publish study results on other publicly accessible platforms. We provide clinical study report synopses and summaries of study results in plain language on our **clinical trials website**.

We publish results from our clinical studies in **medical journals** in line with applicable laws and industry codes. In this way, we adhere in particular to the current version of the Good Publication Practice (**GPP3**) and follow the recommendations of the International Committee of Medical Journal Editors (**ICMJE**). Our Medical Publications Policy ensures that we consider relevant standards, and we use defined standard procedures for scientific publications on our products. In addition, we reference our clinical trial publications on our **website**. Our **Standard on Clinical Trial Data Transparency** underscores our strong commitment in this matter.

These ongoing efforts to increase the transparency of our clinical studies have received credit from **Bioethics International**. The organization ranks bio-pharmaceutical companies and new drugs based on ethics and public health performance criteria, focusing on issues that are critical to patients. In 2021, we ranked in equal first place among seven of the 42 pharmaceutical companies that were rated.

Enabling early access to new medicines

Not all patients have the opportunity to take part in a clinical study and must therefore wait for a new pharmaceutical product to be approved. Through our **Early Access Program**, we can, under specific circumstances, enable patients to gain early access to new, potentially life-saving medicines. The offer is aimed at people with serious conditions who have already received all available therapies without success. It allows them to be treated with medicines that have already been clinically tested but have not yet been approved. Furthermore, we offer patients who participated in one of our clinical studies post-study access to the investigational product, provided that certain conditions are met. Here, too, we meet stringent statutory, ethical and scientific standards. By performing a thorough assessment of all available data, we ensure that the potential benefits outweigh the potential risks for patients. **Position papers** on **early access** and **post-study access** are available on our website.

Supporting independent human subject research

In addition to conducting our own clinical research programs and studies, we also support studies proposed by independent investigators, so-called investigator-sponsored studies (ISS). Our **ISS Principle** defines ISS as unsolicited request for funding and/or supply of an investigational or marketed product by independent investigator/institution that initiates and conducts a scientific investigation as the regulatory sponsor. By granting **financial or material support** for independent human subject research, we seek to stimulate the advancement of clinical and medical knowledge and patient care in our therapeutic areas of interest and support the safe and effective use of our products. We give priority to research that is innovative and has the potential to address specific unmet medical or scientific needs. Our principles, framework and standards for granting support for ISS and our collaboration with independent investigators are specified in our ISS Principle, which is available on our **website** and in our corresponding policy and standard operating procedure.

Animal welfare

International and national legislation mandate animal testing of medicinal compounds and chemicals during their development and prior to their approval for commercial use. In addition, from an ethical and scientific perspective, animal research is indispensable based on the current state of knowledge. We perform animal-using activities in all three of our business sectors.

Our approach to animal welfare

Our long-term aspiration is to be a pioneer in phasing out animal use and replacing animal work with better, cutting-edge alternatives. We aim to outperform as the leader in non-animal-derived products and testing in the life science and healthcare industries. Our business sectors develop individual strategic roadmaps, priorities and timelines towards this aspiration.

Animal testing will be an unavoidable necessity for many more years, especially in drug development to ensure the safety and efficacy of medical devices, medicines and vaccines. As long as animal usage cannot be completely avoided, we are committed to applying the **highest ethical and animal welfare standards** related to the housing, husbandry and veterinary care of all animals involved in our work. We ensure comprehensive **transparency** and ongoing assessment, monitoring, auditing, and improvement of all work involving the use of animals by our company and by trusted third parties. We continuously improve our animal testing processes, striving to enhance the animals' quality of life. We always use as few animals as possible and replace their use whenever feasible with alternative methods. In addition, we advocate for the global acceptance of replacement methods. To this end, we join forces with industry and academia.

We subscribe to the internationally recognized **3Rs for animal-based research** and have added **Responsibility** as our fourth animal welfare principle in line with the ethical considerations published in 2019 by David DeGrazia and Tom Beauchamp in **Principles of Animal Research Ethics**:

- **Replacement** – replacing animal studies with non-animal systems
- **Reduction** – using the minimum number of animals required
- **Refinement** – minimizing distress or discomfort before, during and after testing
- **Responsibility** – accepting responsibility for all animals in our reach internally and among our business partners

Within our **Life Science** business sector, animal activities include required regulatory safety testing of our own products and on behalf of customers. The Life Science product portfolio also includes various materials needed for research that are derived from animals or by-products from food production, such as blood, plasma, or serum, or items specifically produced in animals, such as antibodies. Our **Healthcare** business sector conducts animal testing as a mandatory part of the drug and medical devices development process and conducts biological quality control in animals. Our **Electronics** business sector conducts animal tests as required by applicable chemical regulations. In line with the EU Cosmetics Regulation, no animal tests are conducted for cosmetic ingredients.

Roles and responsibilities

Our Corporate Animal Affairs unit governs the implementation of the Corporate Animal Welfare strategy. The unit acts globally and locally, setting and overseeing guardrails for the use of laboratory animals based on four pillars:

- Animal Welfare
- Animal Using Vendor Management
- Merck Vivarium Oversight
- The 4R principle

Our **Group Animal Welfare Council**, sponsored by the CEO of our company, comprises representatives from all business sectors and meets quarterly. The council acts as sounding and advisory board, assessing which of our services and product innovations can help to avoid animal testing in the future. Moreover, it consults on business-critical issues, adopts key indicators and serves as an escalation body.

In 2022, we established the Merck Animal Usage Review (MAUR) boards in Europe by utilizing existing internal decision-making animal welfare bodies that review and approve all internal animal work conducted by our vivaria, where available. In the United States and Israel, these tasks are performed by already existing comparable company-owned boards such as the Institutional Animal Care and Use Committees (IACUC, in accordance with the **U.S. ILAR Guide**). In addition, these global MAUR / IACUC boards now also review and approve any animal-based activities at all our vendors, contract research organizations and academic partners.

Global and local **animal welfare officers** supporting the local business report directly to Corporate Animal Affairs and are advocates of the animals. Their tasks entail animal science and welfare management as well as acknowledging the individual skills and abilities of all personnel working with animals. Furthermore, they regularly inspect the animal facilities as well as review and approve protocols.

The **Animal Using Vendor Management** unit qualifies our suppliers with regard to animal science and welfare. The group also continuously monitors our contract research organizations, suppliers and business partners.

If employees identify an issue regarding animal welfare, they can report it directly to Corporate Animal Affairs, to local and global animal welfare officers or via our compliance hotline.

The **4R team** and cross-functional workstreams develop and guide projects to implement our 4R principles. The 4R team regularly reports progress made with the 4Rs to the Group Animal Welfare Council. It also coordinates the 4R Award, with which we recognize contributions to the Replacement, Reduction, Refinement of, and Responsibility for our animal work.

Comprehensive employee training

With our new Animal Affairs Academy, we define a holistic training concept for our entire company, provide training sessions on animal welfare, and oversee and provide staff training on practical work, rules and regulations. All employees involved in animal activities receive appropriate training and continuing education. For example, through our Vivarium Rotation Program, employees of each of our vivaria visit another vivarium every year to exchange knowledge and share best practices. The program has been successful, and the University of Heidelberg in Germany has expressed its interest in collaboration.

Additionally, our employees regularly participate in external **continuing education** programs.

Work with committees and associations

As part of our efforts to improve animal welfare, we are involved in several organizations and initiatives, including the European Federation of Pharmaceutical Industries and Associations (**EFPIA**) and **Interpharma**, a federation of research-based pharmaceutical companies in Switzerland. Interpharma conducts audits at contract research organizations and animal breeders together with selected member companies.

We are a member of the European Animal Research Association (**EARA**), a communications and advocacy organization representing both public and private institutions in the biomedical sector. We are also involved with the Association for Assessment and Accreditation of Laboratory Animal Care International (**AAALAC**). This private, nonprofit organization promotes the humane treatment of animals in science through voluntary accreditation and assessment programs. In 2022, one of our employees served as the chair of the AAALAC International Board of Directors.

Our commitment: Group-wide standards

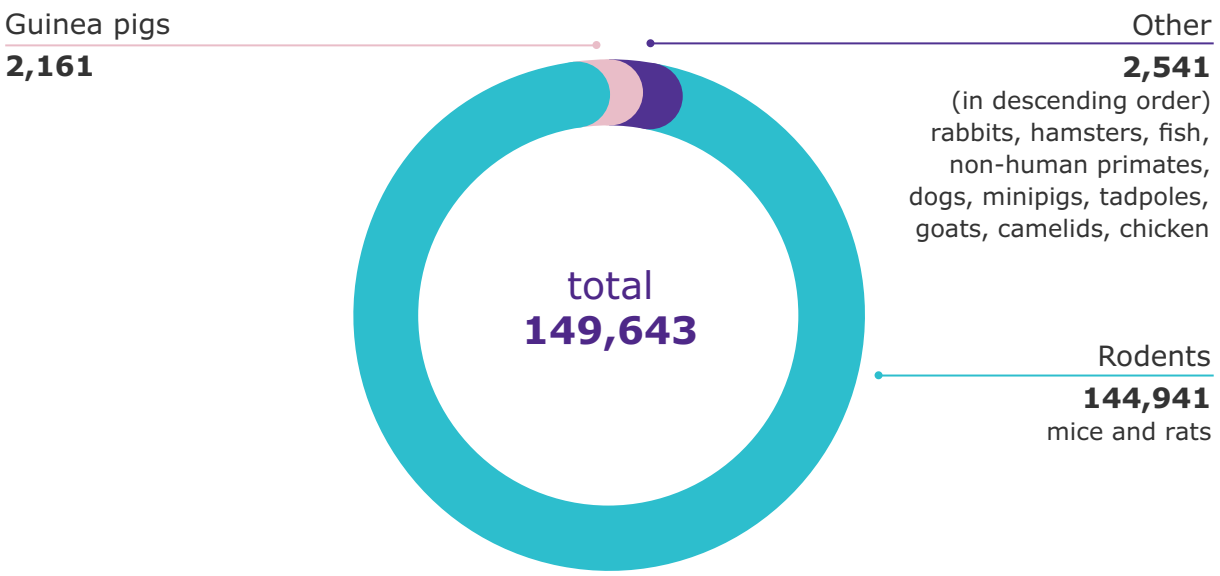
Beyond compliance with all applicable laws and regulations, we are committed to our own set of internal guidelines. Our **Animal Affairs Policy**, our Group animal welfare standards and our procedures for animal testing conducted internally and by trusted third parties corroborate a comprehensive and stringent governance framework based on our four pillars of animal use governance.

Our standards and procedures entail, for example, the housing and husbandry standards that also apply to external partners, and how we monitor them, including audit procedures. The Animal Using Vendor Management standard describes the requirements for the approval of contract research organizations and suppliers. Further documents, including guidance for our 4R efforts, incident reporting and risk management, augment the governance framework. In 2022, we implemented further company-wide standards such as the Global Blood Sampling Standard (GBSS), which defines parameters and methods for blood collection, maximum blood sampling frequencies and volumes in a given time frame. We are convinced that the right level of **transparency** has the potential to improve the scientific outcome and value of animal testing and creates benefits for society, patients and animal well-being. After joining the German Transparency Initiative in 2021, we were awarded the Seal of Quality for Best Practice in Animal Research communication particularly for our achievements in communicating transparent and open about animal experiments in research.

Number of laboratory animals used for medical study purposes

In 2022, a total of 149,643 animals were used within the scope of our business activities, either in our own vivaria or on the premises of organizations contracted on our behalf. This represents an overall decrease of 17% compared with 2021. Rodents (mice or rats) comprised 144,941 of all animals used in 2022, compared to 175,522 in 2021. Regulatory agencies sometimes require studies of the safety of investigational drugs in non-rodent species. This allows researchers to identify potential adverse effects accurately and include them in the risk assessment of a substance.

Animal types



Collaborating with partners and suppliers

We perform the majority (94%) of our animal studies ourselves and procure the required animals from specialized breeders. We also commission contract research organizations to conduct animal studies on our behalf. Furthermore, we work with academic institutions. Whenever we collaborate with such organizations, we require them to comply with our standards.

Conducting animal welfare audits

Corporate Animal Affairs conducts an audit of each of our vivaria every three years. In 2022, two vivaria were audited. Furthermore, we **improved Corporate Animal Affairs' oversight** of internal animal work regarding aspects such as animal usage, purpose and incidents. In the reporting year, we implemented a digital solution that monitors our key indicators.

An integral part of our strategy is the qualification of all animal-using vendors we conduct business with. We completed the implementation of an auditing strategy and developed procedures to identify and train auditors. In 2022, a total of 45 vendor audits were performed, 38 of them on-site and 7 virtually due to the Covid-19 pandemic.

4R Award for animal welfare

We aim to motivate all our employees to contribute to the 4R principle. Therefore, with our biannual 4R Award, we recognize best practices in animal work, such as pioneering better solutions to **Reduce, Replace or Refine** or leading by example in **Responsibility**.

Our annual 4R Day in 2022 focused on the new Corporate Animal Welfare strategy and gave an overview of current 4R activities, highlighting company-wide project submissions representing each of the 4R categories. The grand prize was split evenly between two outstanding projects representing the Replacement and Reduction categories.

Bioethics

Scientific advances can spark controversial debates over bioethical issues. We want to make responsible use of the growing potential of the life sciences to create maximum benefit for both humankind and other living beings. For us, it is important to adopt our own position on bioethical issues.

Our approach to ethical conduct

As a global company, it is critically important for us to identify and address emerging bioethical topics and issues early on so that we can define our own position. Although we do align all our operations with international and national laws, many discussions on bioethics pose questions that extend far beyond the framework set forth by current legislation. We therefore also seek advice from external experts.

In our work, we encounter various bioethical issues, including animal testing and clinical research, stem cell use, the use of genetically modified microorganisms, and the potential impact of new genome editing techniques such as CRISPR/Cas. Our goal is to conduct research in an ethically responsible manner and to develop ethical frameworks that guide us in making forward-looking business decisions. **Patient benefit and well-being** are always our top priority, whether in clinical studies, treatment with our medicines, or the distribution of our products to academic researchers and the biopharmaceutical industry. We carefully evaluate our positions when it comes to controversial topics.

Roles and responsibilities

Since 2010, the Merck Ethics Advisory Panel for Science and Technology (MEAP) has been issuing clear recommendations on scientific and technology topics involving ethical questions as well as issues extending beyond pure bioethics, in line with our transformation into a science and technology company. Co-chaired by two of our leading scientific experts from our senior management team, the MEAP provides recommendations that guide our actions and business activities. In addition to renowned international experts from the fields of **bioethics, medicine, philosophy, law, and the natural sciences**, the panel also consists of **technology and sustainability** experts. The MEAP receives its mandate from the Executive Board.

The MEAP meets multiple times a year and can also be convened on an ad-hoc basis in response to emerging urgent ethical issues. The meeting minutes can be accessed on our intranet, along with the recommendations issued by the MEAP. Our employees can also submit topics for discussion to the panel. In addition, they may report ethical concerns through our **compliance hotline** or by reaching out to our Bioethics team.

Our Stem Cell Oversight Committee (SCROC) was established on the recommendation of the MEAP back in 2011. This committee reviews and approves all planned in-house research activities involving the use of **human stem cells**, and ensures to compliance with legal requirements as well as our ethical guidelines. This also includes joint projects with external partners. The committee consists of internal experts from our business sectors as well as external professionals from the fields of bioethics, medicine and law.

In 2022, we expanded the range of consulting services on ethics issues. Our goal is to also take ethics perspectives into account when making forward-looking business decisions. To this end, we launched the Ethics Foresight project, in which external experts and selected MEAP members support our employees from the business units on strategically relevant ethical issues. In contrast to the MEAP, the experts will not develop concrete recommendations in the future but will determine the respective ethical risk for various scenarios and map several decision paths instead.

Our commitment: Guidelines and standards

Our **Genome Editing Principle** provides a mandatory ethical and operational framework for our employees. It sets clear boundaries for us both as a supplier of customized nucleases and genetically modified cell lines, and as a user of genome editing technologies for scientific research. This principle includes background information on the topic and explains our position on genome editing. Moreover, it specifically addresses the subject of human germline editing.

This is complemented by additional guidelines that define how we conduct research and business in an ethical manner. Our **Stem Cell Principle** sets the ethical boundaries for the use of human stem cells in our research. Our **Fertility Principle** regulates our research in fertility treatment and in-vitro fertilization. It sets a clear framework for practices that reflect the most rigorous ethical standards. Our principles on whether information on the off-label use of medicines may be passed on are based on Group-wide guidelines.

Biological samples obtained from patients during clinical studies are indispensable to the development of new targeted treatments and advanced diagnostic methods. We have defined our approach to managing human biospecimens in our Fertility Principle and in standard operating procedures. Accordingly, we handle these samples in a responsible and ethical manner; in doing so, we adhere to all regulatory requirements and abide by the consent given by patients for the use of their samples. This may include an optional consent that provides permission to use the biospecimens for **further medical research beyond the clinical study**.

Topics currently being discussed by the MEAP

The MEAP last convened in May 2022 and dealt with ethical issues surrounding cell culture media that could be used in the fertility sector. In addition, the panel completed the revisions of the Stem Cell Principle, the Genome Editing Principle and the Fertility Principle, thus harmonizing them with the Guidelines of the International Society for Stem Cell Research (**ISSCR**), which were updated in 2021. These address scientific advances and the related ethical, social and political changes since 2016. The basic tenets of our positions remain unchanged, with some details now adapted to the new guidelines. In addition, we marked the tenth anniversary of MEAP with a symposium in 2022. To mark this occasion, MEAP members produced a commemorative publication; the contributions contained therein discuss both past and future bioethical issues and their significance for science and practice.

MEAP members

Yimtubezinash Woldeamanuel Mulate

Microbiology
Addis Ababa University
Board member and Secretary of Pan-African Bioethics Initiative

Jeremy Sugarman

Bioethics, Medicine
Johns Hopkins University

Jochen Taupitz

Medical law, bioethics
Former Vice-Chair German Ethics Council

Jeanne Loring

Molecuar Biology, Stem Cells
Formerly Scripps Research Institute La Jolla (Advisor)

Nikolaus Knoepffler

Philosophy, Theology, Ethics
University Jena

Daniel Fu-Chang Tsai

Bioethics, Medicine
National Taiwan University

Christoph Rehmann-Sutter

Philosophy, Ethics, Biology
University Lübeck
Former Chair Swiss National Advisory Commission on Biomedical Ethics

Rafaela Hillerbrand

Philosophy, Physics, Technic ethics
Karlsruher Institute for Technology

Biotechnology and genetic engineering

Within the Group, we manufacture our biotech products in accordance with rigorous standards at all sites. All these activities are subject to strict statutory regulations worldwide, and compliance with these regulations is monitored by our **biological safety officers**. We continuously track local regulatory changes that relate to biotech products and adapt our processes accordingly, thus ensuring compliance with all statutory requirements.

Using genome-editing techniques

We are a leading supplier of technologies such as CRISPR/Cas9, which can be used to target and modify specific genes, a process known as **genome editing**. CRISPR/Cas9 opens up new possibilities in genetic engineering research that could bring about major advances in the treatment of serious diseases. Laws in different countries allow for a varying degree of latitude in applying this technique. Bioethical positions on germline editing have been evolving for years through academic and social discourse. Our position on human **germline** editing is as follows:

“In accordance with the German Embryo Protection Act, we do not support the use of genome editing in human embryos and clinical applications of germline interventions in humans. We recognize that there may be value in responsibly conducted related research.”

Stem cell research

We neither participate in clinical programs that utilize human embryonic stem cells or cloned **human cells** for the treatment of diseases, nor do we pursue such approaches ourselves. However, we use human embryonic stem cells in our research and offer our customers several select stem cell lines. In both applications, we only allow the use of human embryonic stem cells if clearly defined conditions have been met. For instance, we only utilize stem cells for research purposes if our SCROC has reviewed the respective project and given approval. In 2022, review and approval were granted in one case. We exclusively make use of cell lines that have been approved by the United States National Institutes of Health (**NIH**) and are allowed under the German Embryo Protection Act as well as the German Stem Cell Law.

Digital ethics

People, machines, data, and processes are becoming increasingly interlinked, with technological advances transforming our society and posing new ethical challenges. Our digital ethics activities describe how we responsibly handle data and algorithms.

Our approach to corporate digital responsibility

As it is our aim to develop and use **new digital technologies** responsibly, we promptly identify any ethical issues that may arise from algorithm-driven and data-based business models. Since 2021, the **Merck Digital Ethics Advisory Panel (DEAP)** has been focusing on complex ethical issues surrounding digital technologies and supports that our digital business model follows a holistic, ethical approach.

Roles and responsibilities

The DEAP discusses **ethical issues** arising from our digital applications and business activities, especially in the healthcare sector. One of its main tasks is to help ensure that we develop digital innovations responsibly while addressing potential digital ethics questions that could result from collecting and processing data as well as from the use of these digital technologies.

The panel, which issues recommendations on our actions as a company, consists of external international science and industry experts from the fields of **digital ethics, law, Big Data technologies, digital health, medicine,** and **data governance**. In addition, we involve bioethics experts as well as representatives from patient organizations as needed. The DEAP receives its mandate from the Executive Board and our employees may submit topics for the panel to discuss. Summary minutes of DEAP meetings and the recommendations made will be available on our intranet from 2023 onwards, provided that they do not contain any confidential business information. The panel held four meetings in 2022, focusing on ethical challenges that could result from our business model for bioelectronics.

Our commitment: Guidelines and standards

As a company, we want to position ourselves with respect to digital ethics. We are therefore developing clear ethical standards in this new field, primarily for critical areas, for instance handling health data, doing so in collaboration with various stakeholders and experts.

Together with the DEAP, we apply our Code of Digital Ethics (**CoDE**), in order to address issues pertaining to the **ethical use of data and algorithms**. The CoDE serves as a guideline for our digital business models, a tool for analyzing ethical challenges and a basis for practical DEAP recommendations.

It is based on five core principles: **justice, autonomy, beneficence, non-maleficence,** and **transparency**. These principles in turn provide a clear structure for assessing ethical issues. Moreover, they support our business sectors and individual employees in difficult situations for which laws or other types of regulations do not (yet) exist. The CoDE not only helps us to assess the ethical risks posed by existing activities, but also enables us to evaluate the ethical aspects of newly emerging digital solutions. We have already tested this in initial application areas.

As one of our overarching governance documents, the CoDE applies to all employees and is publicly accessible. In 2022, we developed an employee training course on the CoDE, which we plan to roll out in 2023. The CoDE was developed together with a scientific partner as part of a structured process. In 2022, we published articles on the scientific development process and the legal implications of the CoDE in the journals **AI & Society** and RDi - Recht Digital.

Strategic partnership for innovative therapeutic solutions

In 2022, the DEAP mainly addressed questions arising from **Syntropy**, a digital joint venture between our company and **Palantir Technologies**. This partnership aims to leverage patient data to advance the discovery of medicines to treat cancer and other diseases. Syntropy makes it possible to collect and process these data in a secure environment in order to develop new insights from them.Â At the same time, Syntropy ensures that the ownership of the data remains with the institutions from which they originated. This partnership allows the scientific community to collaborate in new ways and achieve shared objectives in cancer research.

Identifying risks

Since the end of 2022, our Life Science Data Intelligence and Analytics unit ACE has been working to record the potential ethical risk of projects in a structured way. It analyzes data from the Life Science business sector in order to obtain insights for our business.

The tool, which is currently under development, is expected to enable the **early identification of ethical risks**. To this end, a scoring system has been developed to generate a risk assessment for each project. The risk score has implications for product development. The ACE unit is currently working on 700 projects, reviewing them for ethical risks at all decision-making points throughout the product life cycle.

PRODUCTS

Sustainable innovation & technology

We are committed to creating solutions that positively impact people and the environment. To this end, we are determined to make discoveries that change the landscape of entire industries and drive technological as well as scientific innovation to solve the most critical issues of today and tomorrow. Customers, investors and regulators across our markets are increasingly seeking sustainable product solutions.

Our approach to creating sustainable innovation and technology

The sustainable innovation that we envision or drive forward must align with and support the **three goals** of our sustainability strategy. We define sustainable innovation as new or improved products, services, technologies, or processes that generate economic benefits and have positive environmental and social impacts. Therefore, we develop **long-term solutions** for our innovation and research activities that consider the entire value chain and evaluate each product's impact over its lifecycle.

Today, our products already have a positive impact on human progress and global health, namely our medicines and our biological and chemical innovations that utilize the latest technologies. We want to continuously improve the way we measure our progress by adapting and integrating sustainability criteria into our product development processes across the business sectors.

In 2022, we continued our partnership with the well-established patent information platform LexisNexis® PatentSight®. In this context, we created a framework to evaluate the sustainability impact of our intellectual property. For 2022, we evaluated the baseline for the first time and identified that 27% of our patent families published that year have a positive sustainability impact based on LexisNexis® PatentSight®.

To develop pioneering solutions that have a **positive impact on society** and support organic growth, we are exploring transformative technologies beyond our core products and markets. At the same time, we maintain strategic proximity to our business sectors to leverage our existing assets and capabilities. Business model innovation, including digital business models, is one approach we use to generate value for our business and stakeholders.

We fuel transformative technologies through internal incubation, partnerships or strategic investments and collaboration with academia. In addition, we continually seek to foster and encourage **open innovation**.

Roles and responsibilities

The organizational set-up of our R&D activities reflects the overall structure of our company. All three of our business sectors operate independent R&D units that pursue their own innovation strategies. **Group Corporate Sustainability** supports our business sectors and Group functions to advance and integrate sustainability within the R&D and innovation processes in line with our shared goals. We developed a methodology for creating a Group-wide overview of the potential contribution of our R&D portfolio towards sustainable solutions that went live in December 2022.

Our **Group Science & Technology Office** leads the implementation of our combined strategy for innovation, data and digital, enabling innovation across our business sectors while harnessing the power of advanced data and digital capacities. It aims to identify and integrate transformative, strategically relevant technology trends into our business sectors while maintaining a Group-wide view of our tech roadmap and innovation portfolio. Fostering data and digital capacities is key to accelerating sustainable innovation and enabling rapid action and personalized offerings. Innovation projects are incubated either through our corporate innovation teams or in the business sectors.

Our venture capital fund, M Ventures, prioritizes sustainable innovations through equity investments. The fund's mandate is to invest in innovative technologies and products that have the potential to significantly impact our core business areas. In addition, the fund focuses on investments in two areas of high strategic relevance to our company: digital technology and sustainability.

M Ventures' sustainability investment strategy follows two fundamental approaches. First, it invests in sustainable solutions relevant to our three business sectors, such as novel solutions for reducing emissions and waste, green life science technologies and green electronics technologies. These solutions may be more energy- or resource-efficient or may create products designed for circularity or with a lower carbon footprint. As many of these technologies are still in their early stages, M Ventures is partnering with **SEMI.org** along with the leading corporate venture capital funds to help accelerate the innovation and adoption of potential sustainable semiconductor solutions.

The second approach involves making investments that leverage our core competencies to drive sustainability in other markets. These may include start-ups addressing sustainable foods, bio-manufacturing, or carbon capture and utilization.

Our commitment: Aiming for circularity

Within our R&D processes, we are committed to continuously improving and integrating sustainability and circular economy criteria to assess the **sustainability performance of our products and portfolio**. For example, our Life Science business sector developed Design for Sustainability (**DfS**) and the **DOZN**™ tool to create more sustainable products for our customers. In 2022, we tailored and rolled out the DfS concept to our two other business sectors and integrated an overarching company dashboard. In 2023, we aim to generate an understanding of our R&D portfolio and use the insights to steer future R&D activities. Therefore, we have developed an indicator to track our progress.

Furthermore, the Electronics business sector launched a web-based application to automatically extract process and reaction data from research, development and manufacturing databases to calculate and evaluate carbon footprint of our operations. This allows sustainable decision making to reduce resource consumption as well as direct and indirect CO_2 emissions from chemical processes. The app has been launched in September of 2022.

In addition, we have dedicated corporate resources for our **circular economy strategy** and we are driving several circular economy pilots and initiatives throughout the organization.

More information on sustainable product design can be found in the **Sustainable products & packaging** chapter.

Accelerating the future of food: Cultured meat

Our Cultured Meat Innovation Field focuses on the biotechnology required to grow real meat in vitro. These research and commercial efforts aim to enable animal protein production that is healthier, more ethical and environmentally sustainable. As a **technology enabler**, we are leveraging our vast life science expertise to realize our vision of providing fit-for-purpose bioprocessing products and services for cultured meat production. In addition to building strong connections and partnerships with start-ups, academia and leading organizations, we are working on innovation projects to address specific technology challenges, such as cell culture media and bioreactor designs that are cost-effective and suitable for this emerging field.

To achieve production at scale, the cell culture media must be cost-efficient, produced from a robust food-grade raw material supply chain, suitable for effective growth and differentiation into specific cell types, and free of any animal-derived material such as fetal bovine serum. Our flagship project **MeatDia** aims to build a food-grade raw material supply chain via performance testing in research labs and qualification in one of our production facilities to manufacture the required media formulations. In addition, we have established multiple **partnerships with leading start-ups** that are building pilot-scale manufacturing facilities. We are supplying dry powdered cell culture media, to these customers, who are bringing the first cultured meat products to market.

Another technological challenge is the need for suitable bioreactor designs to efficiently produce structured cuts of meat rather than lesser-value ground meat. CraftRidge is our flagship bioreactor project focused on delivering an edible hollow fiber bioreactor system that can produce entire cuts of meat cost-effectively. In parallel, we are collaborating with **two leading academic labs**. Together with a team at Tufts University in Massachusetts, USA, we aim to enable the production of whole-muscle cultured meat through textile bioengineering. At the same time, we will apply industrial rapid printing technology to **create complex meat structures** in collaboration with a team at the Technical University of Darmstadt (TU Darmstadt) in Germany.

Our M Ventures portfolio includes Mosa Meat, a pioneer in cultured meat, and Formo, a company focused on making cultured cheeses using recombinant protein synthesis.

Fruitful strategic partnership

Our long-term commitment to academic research partnerships reflects our strong ambition to find sustainable solutions to pressing problems. In the framework of the **Sustainability Hub**, which was established in 2021, we continued our strategic collaboration with the TU Darmstadt in multidisciplinary fundamental research projects. The projects cover basic challenges of life cycle modelling, 3D liver tissue model, biodegradation of plastics and the simulation of neuromorphic computing architectures. The ongoing research continues to increase our understanding of product sustainability assessment, toxicological testing of drugs, circular material flows and energy efficient computing, respectively.

Promoting visionary research

The **2022 Future Insight Prize** recognized achievements in energy technologies that help reverse the effects of climate change. The € 1 million prize was awarded to Professor Tobias Erb, Director at the Max Planck Institute for Terrestrial Microbiology in Marburg, Germany. His research enables solutions that make it possible to **convert CO_2** into valuable chemical products, which can then be used as feedstock for fuel.

In 2022, we again offered sustainability research grants to the scientific community to stimulate innovative research and sponsored two research grants: Sustainability in Healthcare R&D and Innovation within Green Chemistry. In total, we received more than 200 research proposals from around the world. Selected projects will receive funding in 2023.

We also entered into a cooperation agreement with Esy-Labs GmbH, the winner of one of our research grants in 2021. In addition to funding research activities through the grant, we initiated long-term collaboration by hosting the research activities of this company at the emerging GreenTech Park FLUXUM in Gernsheim, Germany.

Sustainable products & packaging

We believe it is our duty to consider the sustainability performance of our products throughout their life cycle, starting with the development stage. This also allows us to help our customers to improve the sustainability of their products. To this end, we are in the process of aligning our approaches across our business sectors.

Our approach to sustainable product design

Life Science

In our Life Science business sector, we work to reduce the adverse impacts of our products on health and the environment. This applies to **the entire life cycle**, from manufacture and use to end of life. At the same time, we seek to make our products more efficient and user-friendly, asking ourselves from the start of product development how to best reconcile these requirements.

Through our Design for Sustainability (DfS) framework, we follow a comprehensive approach to increasing the sustainability of our Life Science products. The DfS: Development pillar provides our product developers with a **systematic approach** that enables them to analyze product impacts in terms of materials used, energy and emissions, water, packaging, usability, innovation, and circular economy as well as supplier- and manufacturing-related issues. We have developed sustainability criteria that can be used to rank a product's performance in each of these areas. When developing a new product, our aim is to improve on as many of these criteria scores as possible.

To understand the potential environmental impacts throughout the product life cycle, we conduct streamlined product life cycle analyses. The findings from these analyses help us to improve our products and are incorporated into subsequent development stages. Experts from Research and Development (R&D), Product Management, Quality, Procurement, and other departments collaborate along every step of the process.

In 2022, we implemented a **new version** of our DfS: Development pillar within our enterprise product development processes. The new framework introduces data-driven deliverables at each phase of our product development process to ensure we consider sustainability factors in all newly developed products. It also comprises a new scorecard system that helps our development teams address and minimize negative product- and supply chain-related factors and improves our communication of product sustainability credentials to our customers.

Healthcare

In our Healthcare business sector, we aim to reduce any adverse impacts our medicines may have on the environment during their development, manufacture, transportation, use, and disposal. We are developing an **overarching strategy** to make our medicines, our medical devices and their packaging more ecologically sustainable and user-friendly.

At the same time, we are working on advancing environmental compatibility in different phases of the healthcare value chain. In the area of pharmaceutical development, we have defined an ecotoxicological testing strategy that involves identifying environmental properties of drug candidates early in development. Ideally, we would then be able to use this knowledge to avoid emissions into the air and water.

In 2022, we started to implement the Design for Sustainability framework in our Healthcare R&D approach. We will also establish a governance framework to integrate sustainability and define **sustainability criteria** for qualitative and quantitative scorecards that can be used to measure sustainability impacts.

Our newly launched Green Biotech program helps to integrate sustainable innovation and state-of-the-art technology into our development processes and products along the clinical manufacturing value chain. This program is aligned with our Healthcare sustainability strategy to drive progress for more than one billion people through sustainable science and technology and is linked to other sustainability projects aimed at helping us achieve climate neutrality by 2040.

Electronics

In our Electronics business sector, we aim to reduce any potential adverse environmental impacts caused by the manufacture, packaging, transportation, use, and disposal of our products.

We view sustainability as a competitive advantage, and we proactively engage in partnerships with our customers to collectively drive more sustainable value creation.

According to our new principle, highly hazardous materials are to be avoided in our product development process wherever possible. Therefore, we have also prioritized new green and innovative materials that deliver sustainable value to our customers. We are committed to a holistic approach comprising:

- **Sourced responsibly**: We use our membership in the **Responsible Minerals Initiative** to support the responsible sourcing of minerals, such as tantalum, tin, tungsten, gold, and cobalt, so that their supply chains make positive contributions to global, social and economic development.
- **R&D**: In 2022, we developed and launched a scorecard focusing on sustainable criteria in the development of new products and solutions. The scorecard is a tool for fostering a sustainability culture in our R&D by identifying opportunities and risks at early stages and acting accordingly. The tool also makes the R&D team’s contribution to our global sustainability goals more transparent.
- **Process development**: We started a project to automatically calculate key sustainability performance indicators, such as process mass intensity, solvent and water intensity, as well as an estimate of the carbon footprint to improve the sustainability of chemicals and related manufacturing processes.
- **Assessment of the current product portfolio:** In 2022, we started to review our current product portfolio in order to understand the current sustainability profile and determine whether greener and equally effective chemistry alternatives are available. A multi-functional team is working to establish a process that puts greater emphasis on the sustainability and green chemistry aspects of our product portfolios. In addition, a Product Sustainability Committee was established in 2022 to oversee the portfolio sustainability assessment process and results.
- **Contributing to the sustainability goals of our customers:** We seek to establish partnerships with our customers to optimally understand how our products and activities can contribute to their sustainability goals. In 2022, we established a partnership with one of our customers to develop and eventually produce gas solutions with a low global warming potential; these are currently in a practical testing phase.

Our approaches to sustainable packaging

We work to deliver our products in packaging that is safe and easy for customers to handle, while also working to improve the sustainability characteristics of our material choices.

Life Science

With more than 300,000 products in our Life Science portfolio – ranging from antibodies and lab chemicals to filtration materials, systems and instruments – we face a variety of packaging challenges. We work to improve the sustainability characteristics of this packaging to reduce its environmental impact. Our **SMASH Packaging** strategy for Life Science is built upon three pillars: optimizing resources, using more sustainable materials and designing for a **circular economy**. We have set four goals that support these pillars:

- **Shrink**: reduce the amount of packaging
- **Secure**: achieve zero deforestation
- **Switch**: improve plastic sustainability characteristics
- **Save**: maximize recycling

In our efforts to achieve our 2022 targets, we also worked to define the future priorities and goals for our SMASH Packaging strategy as we want to continue to improve the sustainability characteristics of our new product packaging as well as our existing product and distribution packaging. New product packaging is where we can achieve the greatest impact. Our approach consists of implementing **new standards and guidelines** that development teams can apply to create more sustainable packaging. Going forward, we will assess the sustainability characteristics of new product packaging based on our upgraded Design for Sustainability scorecard.

Healthcare

In 2022, our Healthcare business sector launched a sustainable packaging initiative called MPact, which pursues the same four pillars as the Life Science SMASH program: Shrink, Secure, Switch, and Save. This initiative investigates product packaging solutions to reduce the overall environmental impact.

We are in the process of aligning the goals of all three pillars. Meanwhile, we are continuing to implementing various initiatives to reduce our product packaging, switch to more sustainable materials and promote recycling and circularity. We also intend to adjust packaging requirements for intermediate materials where feasible.

Electronics

Our process for introducing new packaging includes a safety review that evaluates package specifications and sizes, shipment frequency, route, carriers, emergency response capabilities, and elements of safety in the supply chain. All product containers undergo a review for chemical compatibility, purity, leak-tightness, and regulatory compliance. The presence of specific hazards and specific container sizes can necessitate a more detailed risk assessment. Furthermore, in our specialty gas and thin films businesses, for example, we focus on product packaging that performs well in terms of transportation and handling safety.

Roles and responsibilities

Life Science

The Life Science business sector works across its business units to drive holistic sustainability of operations, products and culture. Our structure helps us to implement an ambitious and coordinated sustainability strategy to formalize our processes, governance and goals – helping to embed the strategy into our business and becoming a sustainability multiplier for our customers.

Our sustainability governance structures are as follows:

The Sustainability and Social Business Innovation team within Life Science drives the setting of KPI and targets as well as the planning and execution of our strategy as well as monitoring and reporting activities.

Healthcare

Our Healthcare business sector has integrated sustainability across its R&D and operating units. The implementation of its sustainability strategy is steered by the Healthcare Executive Committee. Any decisions made regarding sustainability objectives are cascaded to the corresponding units, which are responsible for implementing measures to achieve these objectives.

Electronics

We have implemented a process to structure the sustainability governance of our Electronics business sector. This structure helps us to implement a coordinated sustainability strategy across the business units, manage goals and processes, strengthen our customer relations, and ensure overall accountability within our ESG approaches.

Our sustainability governance structures are as follows: In 2022, a new organizational structure within Electronics was introduced to ensure that our sustainability strategy is implemented across all business units. The Electronics Sustainability Council acts as a cross-functional executive committee that oversees and signs off on relevant initiatives within Electronics sustainability programs. In addition, a dedicated team coordinates business-related sustainability activities.

In 2022, we assessed the core responsibilities and defined key activities to improve the structure of our sustainability commitments. New responsibilities include a monitoring role as well as driving initiatives that contribute to the scope and targets of our **sustainability strategy**. Furthermore, dedicated working groups within the business units are responsible for developing individual targets for their business units and implementing corresponding projects.

Our commitment: Chemicals and product policies

In order to meet the product safety regulations relevant to our company, our Regulatory Affairs Group Policy details **Group-wide processes** for managing and implementing **product safety**, including the necessary management structures.

Life Science

Within our Life Science business sector, our strategic platform is founded on a **data-driven approach to** help our experts drive sustainability improvement during the development of products and packaging. Our Design for Sustainability (**DfS**) framework is a comprehensive approach aimed at increasing the sustainability of our products, focusing on three areas:

Our **DfS: Development** pillar focuses on embedding sustainability at the beginning of the R&D process.

Our **DfS: Consulting** pillar focuses on working with our customers to solve specific sustainability and/or Green Chemistry challenges they face.

Our **DfS: Re-Engineering** pillar focuses on our established portfolio of products and evaluating how we can quantify and improve the environmental footprint of these products by applying the 12 Principles of Green Chemistry in our process.

As of December 2022, about 1,860 greener alternative products had been made available on our platform.

Healthcare

Within our Healthcare business sector, chemical product safety is a key sustainability aspect when developing, producing and distributing products. We strive to comply with all relevant legal requirements regarding chemicals regulations, hazard communication and local and regional chemical registration activities.

Our Group-wide policy also incorporates legal norms concerning the transport of hazardous chemicals, biocides, cosmetic ingredients, and products used in food and animal feed. Our Group Label Standard provides a consistent framework for labeling products according to GHS requirements.

More information can be found under **Chemical product safety**.

Electronics

Product safety is one of our highest priorities. Starting at the development stage, we investigate the potential adverse impacts chemical substances may have. We intend to meet all statutory requirements along the entire value chain for our chemicals, with our Regulatory Affairs organization ensuring regulatory compliance.

Within our Surface Solutions business unit, we aim to meet the strict standards of the EU Cosmetics Regulation for all our raw materials intended for the cosmetics industry. In addition, these raw materials should be produced in line with Good Manufacturing Practices for Cosmetic Ingredients (**EFfCI** GMP).

Adhering to the Convention on Biological Diversity

We support the general principles laid out in the Convention on Biological Diversity, especially the third objective: the fair and equitable sharing of benefits arising from the use of genetic resources and traditional knowledge in accordance with the terms and conditions of the Nagoya Protocol. This is an international supplementary agreement to the CBD. A key element of this principle is access and benefit-sharing, which ensures that countries providing genetic resources and traditional knowledge also benefit from their use.

We apply a Group-wide standard entitled “Access to Genetic Resources”, the objective of which is to define **requirements, roles and responsibilities** to ensure compliance with the Nagoya Protocol, even in countries that are not party to the Protocol. In addition, each business sector defines specific procedures to help ensure they meet the requirements of our Group-wide standard.

We have established an internal exchange across our business sectors for aligning and sharing information on initiatives related to access and benefit sharing. In 2022, we successfully filed a due diligence declaration for two product developments with a genetic resource to the German Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN) in accordance with current EU regulations. This achievement was also mentioned in the BfN’s “Newsletter zum Nagoya-Protokoll” in February 2022.

Wide range of solutions

Life Science: Green chemistry assessment tool

Our proprietary, web-based tool, **DOZN™**, enables us to evaluate various products and/or processes to identify opportunities for sustainability improvements and provide transparency to our customers. DOZN™ industrializes the 12 Principles of Green Chemistry, a previously theoretical framework, and **rates products** in three stewardship categories of “Improved resource use”, “Increased energy efficiency”, and “Reduced human and environmental hazards”. DOZN™ 2.0 is the tool’s external interface, allowing our customers and other scientists to make **more ecologically sustainable choices** in their development processes. In 2022, we counted approximately 1,500 users of DOZN™ from 60 countries.

In 2022, we worked to establish new partnerships with universities in the United Kingdom and Germany in addition to our existing partnerships with universities in Canada, France, India, Switzerland, and the United States. These partnerships apply the DOZN™ tool in both virtual and in-lab chemistry curricula. Using DOZN™ in an academic setting yields many benefits. Firstly, it increases the overall accessibility and tangibility of Green Chemistry and its principles. Secondly, it provides a practical opportunity to calculate scores for chemical products and processes and reinforces learning while highlighting the importance of sustainability to future scientists.

Life Science: Greener solvents

Switching to bio-based solvents, such as our alternative, more environmentally compatible solvent **Cyrene™**, helps our customers reduce their carbon footprint. We are a member of the EU Horizon 2020 project, ReSolute, which started the construction of a new Cyrene™ production facility in 2021. Located in France, the site is scheduled to open in the second half of 2023 and will produce 1,000 metric tons of Cyrene per year to help us meet the growing demand for greener solvents.

In 2022, we also launched Cyrene™ blends, a greener solvent system that extends applications for organic synthesis. We published our results in **The Royal Society of Chemistry’s** Green Chemistry journal.

In 2022, we worked to expand our selection of bio-based laboratory chemicals included in the BioPreferred® program of the U.S. Department of Agriculture (**USDA**) program. These chemicals are certified by the USDA to be derived from plants and other renewable agricultural, marine and forestry materials and provide an alternative to conventional petroleum-derived products. These chemicals include sustainable solvents such as bio-renewable acetone.

Life Science: Sustainable laboratory water use

Our most recent Milli-Q® IQ and IX series ultrapure and pure water purification systems use innovative, mercury-free UV oxidation and/or bactericidal lamps. Their optimized components, processes and hibernation modes reduce electricity consumption by 18% to 41% compared with previous systems while preserving system water quality. The systems also reduce water consumption by between 2% and 13%.

Life Science: Less plastic in cell culture creation

Our greener alternative to our Stericup® sterile filtration system, the Stericup® E, allows our customers to connect the bottle containing the sample being filtered directly to the Stericup® E filtration unit, thus avoiding the use of a plastic funnel. Depending on the product version, the Stericup® E can **reduce the amount of plastic** used by up to 48% and the volume and weight of packaging by up to 69%. The unit of sale is then lighter and smaller, which leads to a reduction of CO_2 emissions during transportation. It also takes less space to store the product at our distribution centers or at customers' facilities, while further reducing the volume and cost of waste disposal (including biohazardous waste) for our customers. Taking the entire life cycle into consideration, this approach can reduce the global warming potential of the sterile filtration unit by up to 46%. Across all product versions since their launch, we have prevented 3,2 metric tons of plastic and corrugated cardboard from entering our customers' laboratories across all product versions.

Life Science: Expanding product recycling

We have continued expanding the biopharma recycling program that we kicked off in 2015, in which single-use plastic product waste is collected from biopharmaceutical manufacturing operations and **recycled into plastic lumber**. This material can be used in many industries, such as landscaping, transportation and marine construction. The program now serves 23 major biopharma manufacturing customers. Since its launch in 2015, it has recycled more than 8,700 metric tons of plastic waste.

This program continues to expand throughout the United States as we simultaneously explore new options and recycling technologies in other regions, such as Europe and Asia. By assessing advanced recycling technologies and collaborating across multiple industries, we will develop innovative **circular economy** programs.

Electronics: Sustainable product design

In 2021, we started to systematically incorporate sustainability into our portfolio management process. In 2022, for example, one project defined and incorporated sustainability criteria focusing on product design into the product development process. This initiative enables us to understand the sustainability impact of our new products across the entire value chain and create improvements early in the R&D phase. In addition, we perform sustainability assessments for every R&D program within Electronics, giving us a baseline to create a more sustainable product portfolio and sustainable innovations for our customers.

Electronics: Colloidal silica

Over the past decade, our semiconductor materials customers have increased their efforts to use more environmentally sustainable materials in their chip manufacturing and improve the performance of their computer chips while lowering costs. We have responded to this challenge in 2017 by developing **next-generation colloidal silica products** using at least 30% less colloidal silica. This advancement reduces the volume of product needed, which in turn shrinks our environmental footprint. Customer feedback on the products is promising. Together, we are working to improve production efficiencies and reduce the use of colloidal silica even further.

Electronics: NMP-free removers

The production process for semiconductor devices requires numerous cleaning steps to remove the photoresists used to pattern the circuit design. These cleaning methods require complex solvent chemistries that selectively remove these photoresists without damaging the sensitive electronic components.

However, the most effective solvents pose a significant environmental hazard. For example, NMP, a mainstream solvent common in wafer cleaning processes, is highly toxic and is classified as an SVHC (Substance of Very High Concern) under the European Union's REACH regulation. Therefore, we are continuously working to develop new cleaning chemistries. In 2022, we began launching a series of **green cleaning solvents** that are TMAH- and DMSO-free while still being effective in removing thick photoresist (both liquid and dry) film, for example AZ® Remover 910 and Dynastrip 5008, Dynastrip 8889, and Dynastrip 8070T.

Electronics: PFAS replacement program

PFAS (per- and polyfluoroalkyl substances) have unique chemical properties and are widely used in our daily lives. However, there is strong evidence that exposure to PFAS can lead to adverse health outcomes in humans. Therefore, over the last decade, international regulations have started focusing on PFAS as chemicals of concern. They have become known as "forever chemicals" due to their extremely long lifespans.

Chemical products containing PFAS are essential in today's electronics manufacturing processes. Therefore, PFAS pose a serious dilemma for the electronics industry as emerging global regulations trend towards restricting the use of PFAS in the future.

We are committed to intensifying our R&D efforts to actively drive a PFAS-related substance replacement program. As a trusted partner in the electronics industry, we are working closely with our customers and providing information throughout this process.

Electronics: Dynamic liquid crystal glazing

Liquid crystal dynamic window glazing adjusts its tint level within seconds according to the weather conditions. The self-darkening glazing effectively regulates glare and solar heat gain without blocking the view. As a result, it increases the occupants' visual and thermal comfort while simultaneously lowering air conditioning and lighting energy consumption by up to 10% compared with conventional shading. We offer these products under the **eyrise®** brand. Many real estate investors regard eyrise® as an important building feature for delivering on their ESG targets. One company installed 3,000 m^2 of our product in its new flagship building in Zurich, Switzerland.

Electronics: Shifting to more natural cosmetic ingredients

We are working closely with our partners in the cosmetics industry to find solutions for more naturally based cosmetic ingredients. The resulting cosmetic formulations comply with strict criteria. At the end of 2022, 84 of our cosmetic pigments and active ingredients had been confirmed as being compliant with Ecocert's COSMOS standard for organic and natural cosmetics. We have also obtained **halal certificates** for all our cosmetic ingredients.

Electronics: Vegan cosmetic products

A growing number of consumers view the use of non-animal and non-animal derived ingredients, i.e. vegan and plant-based raw materials, as a critical product attribute. Therefore, the majority of our cosmetic raw materials, including our special effect pigments and functional fillers, contain no components of animal origin, by-products or derivatives and are thus suitable for vegan cosmetics.

Making product packaging more sustainable: Life Science

Within the scope of our SMASH Packaging sustainable packaging strategy, we are pursuing a number of projects for the Life Science business sector:

How product design affects packaging: ZooMAb®

Most traditional antibody products need to be shipped at temperatures between 2 °C and 8 °C, using specific insulated shipping containers with wet ice bricks. This results in high packaging material consumption and transport emissions. Our **ZooMAb®** antibodies were developed as a freeze-dried product, giving them improved storage stability and allowing them to be shipped at ambient temperatures. This makes it possible to eliminate the use of expanded polystyrene (EPS) coolers and ice bricks, resulting in significant packaging weight reductions for product shipments. In 2022, it allowed us to avoid the emissions of around 12 metric tons of CO_2eq.

Shrink: How we minimize the amount of packaging

We seek **eco-friendly alternatives** for shipping our products safely, which is why we partnered with a biotech company a few years ago and jointly developed a more sustainable bulk packaging design for transporting our **Millistak+®** Pod Disposable Depth Filters. We also expanded this approach to a subset of our Durapore® and Millipore Express® filter cartridges. These products are dedicated to high-volume clients and deliver both environmental and economic benefits to our customers compared with traditional individual or multipack packaging.

For example, changing from a three-pack to the new bulk packaging for our ten-inch filter cartridges reduces the amount of corrugated cardboard required by 55%. This corresponds to a 49% decrease in greenhouse gas (GHG) emissions throughout the life cycle of these packaging materials. In addition, our customers spend approximately 50% less time unpacking, reducing labor costs. In 2022, these bulk packaging solutions allowed us to save around 19 metric tons of corrugated cardboard and we continued working on developing similar solutions for additional products.

Shrink: Packaging for Smalls

In 2022, we developed and implemented new packaging solutions that significantly reduced the air space and material consumption associated with the shipment of small products from some of our U.S. and European distribution centers. Through these measures, we will be able to achieve around 50% air space reduction for 1,150+ shipments daily, leading to a reduction of 65 metric tons of packaging materials annually.

Secure: How we are moving towards zero deforestation

A large proportion of our packaging consists of fiber derived from wood. As part of our SMASH Packaging strategy, we have set ourselves the objective of ensuring that none of our wood or fiber-based packaging materials contribute to deforestation.

We assess the practices of our suppliers and the characteristics of our packaging annually in order to measure our progress towards our zero deforestation ambitions. This also enables us to identify opportunities to increase the volume of recycled material and the percentage of packaging we use with **sustainable forestry certifications,** which are awarded in line with sustainability standards developed by the Forest Stewardship Council (**FSC**), the Program for the Endorsement of Forest Certification Schemes (**PEFC**) and the Sustainable Forestry Initiative (**SFI**).

Switch: How we substitute plastics

In the past, we used insulated containers made of expanded polystyrene (EPS) for the shipment of our chemicals in glass bottles and our temperature-controlled products. While EPS offers good insulation and cushioning properties, it is a petroleum-based material that takes hundreds of years to decompose. As the options for recycling EPS are limited, it is generally incinerated or sent to landfill.

Wherever possible, we are replacing EPS with molded **components made of cellulose and recycled paper pulp**. Our molded pulp components can be easily recycled with other paper materials and **compacted together** for storage and transport. We use molded pulp inserts to pack a variety of liter bottle configurations in shipping boxes, thereby replacing around three million EPS parts per year.

In 2022, we completed the validation and pilot implementation of our new greener coolers at one of our U.S. distribution centers to replace EPS in our cold-chain shipment. The greener cooler is made from renewable resources and is certified recyclable with corrugated materials. We will roll out these **greener coolers** at our major U.S. distribution centers in early 2023 for wet ice shipments. At the same time, we continued investigating solutions to expand the use of greener coolers for dry ice shipments. We also initiated a project to develop a greener cooler solution that meets the requirements of our European market.

Aqueous solutions are usually supplied in plastic bottles. We use Titripac® because it offers an **ecologically sustainable alternative**. The cardboard carton and plastic liner with an integrated withdrawal tap have made the packaging lighter and more recyclable. Since the withdrawal tap protects the product against contamination, customers can now use the entire contents and reduce chemical waste. In 2022, our products sold in Titripac® 10L packaging configurations avoided non-renewable packaging materials by 14 metric tons, resulting in a reduction of 66 metric tons of CO_2eq emissions across the life cycle of the packaging compared with 1L plastic bottles.

Save: Reusing wooden pallets

At our site in Darmstadt, Germany, we implemented a new process for reusing wooden pallets employed in the delivery of raw materials. Instead of recycling the pallets after one use, we now reuse them for an expected average of three cycles until they show signs of damage. This initiative eliminates around 1,000 metric tons of wood pallets sourced annually, leading to a reduction of about 330 metric tons of CO_2eq.

Making product packaging more sustainable: Healthcare

We launched our MPact sustainable packaging initiative in 2022. Our solutions will ensure the safe and secure delivery of products to our customers while decreasing the environmental footprint of our packaging.

Slim packaging solutions

Our new packaging for Pergoveris®, Gonal-f® and Ovidrel® fertility pens is **decreasing the adverse impact** on sustainability by reducing the pack size by 40% and eliminating plastic pollution by replacing plastic inserts with paper-based materials.

It is estimated that the new pack will also reduce our carbon emissions in the supply chain, as it requires less cold storage space, thereby allowing more products to be transported in each shipment.

Making product packaging more sustainable: Electronics

Our Electronics business sector uses a variety of packaging types, each tailored to the specific needs of the individual business fields and with its own unique sustainability characteristics.

Efficient packaging

In 2022, we launched a **new packaging solution** for cosmetics and skincare products in collaboration with five other companies. This packaging consists of new lightweight tubes that require 37% less material. It is produced with mono-materials for easy recycling and is designed for easy waste separation. We provide Colorstream® effect pigments for packaging, Iriotec® laser-sensitive pigments for durable laser marking and Ronastar® pigments that veil shower gel in liquid shimmer.

Reusable packaging

The packaging for our specialty gas, thin films and some patterning products – manufactured in semiconductor technology – is designed to be reused. Our reusable packaging types include various sizes of cylinders and tube trailers for bulk specialty gases, smaller stainless steel and quartz containers for thin films and totes and drums made of high-density polyethylene for patterning.

Once our customers have used the product within the container, the used containers are returned to our production facility for cleaning, refurbishment and refilling. This cycle greatly reduces the number of containers

to be disposed of. It reduces the demand for construction of new containers and the associated resource requirements, thus moving us **closer to a circular economy**.

Recyclable packaging

For large quantities of products in our patterning and planarization business, we use totes for packaging. Totes are typically made of high-density polyethylene. One of our main tote suppliers has a recycling program in place that our customers can also use. Each tote from this supplier has a return ticket attached to it and the supplier picks up the used tote so that its parts can be reused or recycled.

Redesign packaging labeling approach

Plastic packaging generates almost half of the world’s plastic waste. With Iriotec® 8000 pigments, we enable inkless printing with contact-free and durable laser marking technology, making it possible to label plastics, which in turn, can be traced and **recycled more easily** afterwards, thus restoring value to the used plastic packaging.

The laser marking provides a unique identifier and, as a digital product passport, serves as the link between the product and the database. It can replace ink and labels, thus further increasing recyclability. Laser marking is a unique, sustainable, reliable, durable, and economic way to achieve an individual mark for any plastic product and can be used for plastic packaging, automotive components, cables, and electronic devices.

Health for all

Global Health

Half of the world's population lacks access to essential health services. Therefore, we are striving to innovate, make health solutions affordable and accessible, raise awareness about diseases, and help people learn how to manage them. We work with partners to tackle these complex challenges.

Our approach to improving health for all

Our overarching aim is to create a healthier future for all. We are committed to advancing global health and to using our scientific and technological innovation to improve the health of underserved populations in low- and middle-income countries.

Our **Global Health strategy** aims to develop and provide access to health solutions in low-and middle-income countries by creating equitable and **sustainable access mechanisms** for patients and society. Besides enabling access to our healthcare portfolio, our strategy focuses on diseases that disproportionally impact underserved populations. These include the **neglected tropical disease** (NTD) **schistosomiasis**, which is largely unknown in industrialized nations and attracts little attention or funding, and **malaria**. Specifically, the goals of this strategy are:

- To expand access to our healthcare portfolio of products and technologies to patients in low- and middle-income countries.
- To eliminate **schistosomiasis** as a public health problem.
- To catalyze innovative solutions for global health challenges, primarily targeting schistosomiasis and malaria. We strive to particularly reach those who are most vulnerable: **women** and **children**.

Three core operating principles drive the execution of our Global Health strategy:

- **Creating sustainable business models and opportunities:** We strive to increase our company's value and competitiveness by solving unmet health needs of underserved populations with our products and technologies.
- **Engaging with cross-sector partners:** We participate in multi-stakeholder global health platforms to help achieve our goals and support the United Nations (UN) Sustainable Development Goals. We use access alliances and create partnerships to implement treatment programs on the ground and for research and development projects.
- **Developing innovative solutions:** We develop new medicines, diagnostics and vector control solutions for schistosomiasis and malaria through our integrated science and technology approach.

We also engage in **building capacity and expertise** across the value chain to strengthen health systems and make them more resilient to health crises.

Our Access to Medicine approach

Our access strategy for low- and middle-income countries is a core part of our broader sustainability strategy. In these countries, we aim to accelerate and expand access to our portfolio of products, for example for cancer indications and neurological as well as immunological disorders.

Our strategy is also designed to help reduce launch delays by taking low- and middle-income countries into special consideration in our integrated development plans. With this approach, we also aim

- to ensure wider availability by registering our products across a greater number of countries, particularly those with a high disease burden;
- to improve affordability (further details can be found under **Prices of Medicines**);
- to extend faster accessibility of our medicines through global health partnerships and shared value initiatives that address health system barriers to access.

Eliminating schistosomiasis as a public health problem

Schistosomiasis, also known as bilharzia, is a tropical disease caused by parasitic worms. The disease affects **almost 240 million people** worldwide and **kills an estimated 200,000 people** every year. More than 90% of cases are in sub-Saharan Africa, significantly burdening public health systems and local economies.

The ultimate aim of our schistosomiasis-related work is to eliminate the disease as a public health problem in line with the World Health Organization (WHO) **NTD Roadmap 2021-2030**. We are committed to the objectives of the **Kigali Declaration** on NTDs, in which participating companies, governments and private organizations commit to helping control and ultimately eliminating the 20 most prevalent NTDs, including schistosomiasis.

To achieve the elimination of schistosomiasis, we have adopted an integrated strategy, which we are implementing in close collaboration with multiple partners worldwide. The approach focuses on four pillars:

- **Treatment:** We donate up to 250 million tablets of praziquantel to endemic countries every year in partnership with **WHO**. Nearly 50 years after its development, praziquantel remains the standard of care for the effective treatment of schistosomiasis around the world.
- **Research and Development (R&D):** We advance R&D to support the global fight against schistosomiasis. In particular, we drive collaborative programs for a next generation of drugs, for the development of arpraziquantel, a potential new treatment option for children aged six and under, and for new and more sensitive diagnostics. We are also building **research expertise and capacity** through our collaborations with institutions in endemic countries.
- **Health education & WASH** (water, sanitation and hygiene): We believe prevention is the most effective health intervention. Therefore, we invest in behavior change initiatives to raise awareness of the causes and dangers of schistosomiasis and teach people how to prevent it. Since the disease is transmitted through contaminated water, we also support WASH projects that aim to prevent transmission of the disease by providing sanitary infrastructures and access to clean water.
- **Advocacy and partnerships:** We are accelerating the progress towards schistosomiasis elimination through partnerships as well as through the dialogue with the wider stakeholder community, for example via the Global Schistosomiasis Alliance (**GSA**).

Preventing and fighting malaria to support elimination

According to WHO's estimates, nearly half of the world's population is at risk of contracting malaria. In 2020, more than **200 million cases of malaria** and over 600,000 related deaths were recorded, with about 80% occurring in children under the age of five. 95% of cases and 96% of deaths occur in Africa. The numbers continue to increase as the focus in many endemic countries has shifted to controlling the Covid-19 pandemic.

There is a need for new products to overcome the problem of increasing drug resistance and to achieve the goal of elimination. Through our **As One Against Malaria program**, we help to deliver integrated and sustainable health solutions involving treatments, diagnostics and preventive measures to fight malaria.

Roles and responsibilities

Our Global Health organization is responsible for Group-wide initiatives, programs and sponsorships. It embeds initiatives to strengthen capacity in low- and middle-income countries. Our experts collaborate closely with the Life Science, Healthcare and Electronics business sectors to leverage our common strengths and competencies. Our Global Health organization also facilitates access to health in underserved populations and leads the implementation of our strategy to eliminate schistosomiasis as well as the development of innovative solutions for infectious diseases including malaria.

Our Access to Health unit enables access to our company's healthcare portfolio in low- and middle-income countries through a strategic access approach and shared value initiatives that we implement in collaboration with our global and country teams.

Our **Schistosomiasis Elimination Program** implements our efforts to eliminate schistosomiasis in **close collaboration with external partners,** such as WHO.

Our **Global Health Institute** catalyzes innovations for global health challenges by translating science, technology and digital approaches into transformative, integrated health solutions (treatments, diagnostics, technologies, preventive measures) to support control and elimination programs related to infectious diseases – mainly schistosomiasis and malaria.

Our commitment: Providing a solid basis for access to health

Our commitment to expanding health access is summarized in our **Access to Health Charter**. It sets out the following guidelines on:

- **Our approach**
- **Pharmaceutical product donations and philanthropic activities**
- **Falsified medicines**
- **R&D for infectious diseases**
- **Equitable pricing in low- and middle-income countries**
- **Intellectual property rights**
- **Sustainable supply chains**

Every two years, the **Access to Medicine Foundation** publishes the **Access to Medicine Index**. The Index benchmarks 20 of the world's largest research-based pharmaceutical companies on activities and initiatives that experts consider most relevant for access to medicine in low- and middle-income countries. These initiatives

range from research & development and intellectual property sharing to capacity building and donations. We use the results of this benchmarking to inform and guide our access to health strategy.

The latest Index was published in November 2022. We **ranked fifth**, moving up from the eighth position in the 2020/2021 ranking. Our ranking is mainly attributable to our strong performance in the areas of research and development, intellectual property and capacity building.

Sustainable access to medicines in low- and middle-income countries

We apply access models in global health, which include donations (e.g. praziquantel), and work with partners to explore new models such as at cost procurement mechanisms for upcoming innovations for NTDs (e.g. arpraziquantel, rapid diagnostic tests).

To prevent and control high-burden, non-communicable diseases (NCDs), we significantly invest in access initiatives that address health system gaps in low- and middle-income countries. We adopt a partnership approach to maximize our impact in this complex and challenging environment.

This includes our shared value program, which supports our teams in low- and middle-income countries in implementing initiatives to address health systems barriers to patient access through capacity building and training for healthcare professionals. For example, in the context of the shared value program, the team in Argentina carried out a series of activities to raise awareness about the importance of early detection of head and neck cancer, reaching 4.6 million people across the country. To date, our shared value initiatives have reached 28 million patients via screening and awareness and trained around 15,000 healthcare professionals.

Our **collaborations in Africa** to establish robust and sustainable supply chains are also crucial for ensuring safe, effective and continuous healthcare delivery. Our Access Mentorship program, where expert volunteers from our Global Supply Network Organization share knowledge with local African distributors, demonstrates our commitment to improving supply chain operations and increasing access to healthcare.

In 2022, we also initiated the Access to Health pitch competition to engage with start-ups in Indonesia, Vietnam and the Philippines. This initiative aims to identify innovative solutions that address health system gaps and make our products more accessible to underserved populations.

We have also developed an evaluation tool to track the impact of our access programs on patients, healthcare providers and health systems. This tool will enable us to monitor our progress over time and to continue integrating recommendations from the Access to Medicine Index into our strategy.

Eliminating schistosomiasis: Four pillars

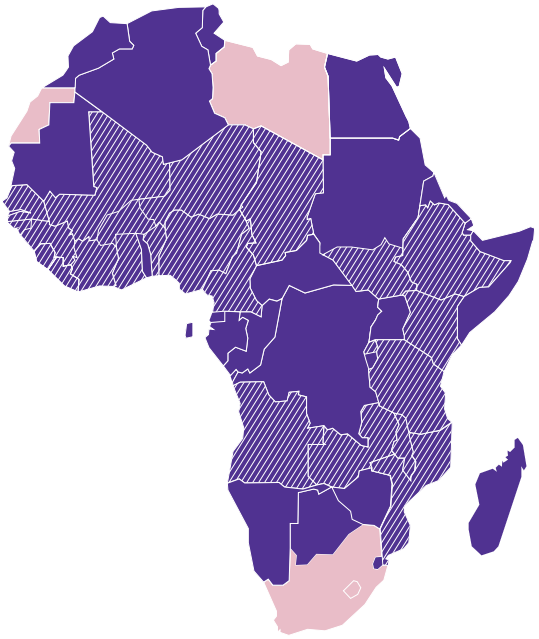
To support the elimination of schistosomiasis, we have adopted an integrated approach based on four pillars: treatment, research & development, health education & WASH, and advocacy & partnerships.

Treatment

As part of our long-standing partnership with WHO, we are committed to producing and donating up to 250 million praziquantel tablets every year. This initiative is a major part of our integrated and coordinated approach to treating and eliminating schistosomiasis as a public health problem. Since 2007, we have donated **1.7 billion tablets** to WHO to combat this disease. They have been **distributed in 47 endemic African countries**, primarily to treat school-aged children. In 2022, we donated more than 200 million tablets for distribution in 27 countries, 24 of which are in sub-Saharan Africa. Due to Covid-19, demand and implementation at country level was severely impacted.

Countries that have received donations of praziquantel tablets

Since 2007, we have donated over **1.7 billion** tablets of praziquantel, which is enough to treat around 680 million school-aged children.



African countries that have been receiving tablet donations from us since 2007*.

African countries to which we also donated tablets in 2022.

Countries that have received no donated tablets to date.

* Launch of our Praziquantel Donation Program.

To improve transparency of the supply chain for NTD medicine donations, including praziquantel, we use NTDeliver, a digital tool. We work with multiple partners to optimize efficiencies and timelines from the manufacturing site to the national warehouse, and from there to the delivery of treatments. In Kenya, a tailored tracking system has been implemented to capture real-time data up to the distribution level, reporting the number of tablets used and any remaining stock. In 2022, this digital last-mile tracking system was rolled out in six Kenyan counties.

Research and development

In partnership with the **Pediatric Praziquantel Consortium**, we have developed a **potential new treatment** option, arpraziquantel, for preschool children aged six and below who are infected with schistosomiasis. The clinical development program was completed with positive results from the pivotal **Phase III trial** performed in Côte d'Ivoire and Kenya. In November 2022, we submitted the regulatory application to the European Medicines Agency (EMA), which started its review process. A scientific opinion from EMA is expected in late 2023. This will facilitate WHO pre-qualification and local registrations in African countries. We plan to start the launch phase in 2024 and to provide the drug through a new procurement mechanism currently under development to ensure equitable and affordable access to this new treatment option. Furthermore, the ongoing ADOPT implementation research program is collecting data and best practices that will pave the way for future large-scale delivery in endemic countries.

In 2022, we also progressed with the development of new drugs to prevent and cure schistosomiasis. A promising candidate is currently in pre-clinical development.

To support drug discovery, we have introduced innovative artificial intelligence and epidemiology modeling for targeted treatments and started to develop new medical device technologies to diagnose schistosomiasis, including **female genital schistosomiasis**.

In this context, there is still a critical need for more **sensitive diagnostics** to detect cases in low-endemicity settings for the effective management and surveillance of schistosomiasis and as tools to eliminate the disease. Therefore, we continued our collaboration with the Foundation for Innovative New Diagnostics (**FIND**) and a consortium of partners to develop a sensitive rapid diagnostic test to improve schistosomiasis mapping and case detection.

All our research & development programs integrate and invest in scientific, educational and training initiatives to enhance expertise and capacity in low- and middle-income countries. More information can be found under **Building health capacity and awareness**.

Health education and WASH

Our health education project with the **NALA** (Neglected Tropical Disease Advocacy, Learning, Action) Foundation focuses on southwestern Ethiopia. It includes WASH activities and aims to promote **long-term sustainable behavioral change** via a community-based approach to eliminate schistosomiasis and other neglected tropical diseases. In 2022, we launched two research projects to serve as proof of concept: community-based schistosomiasis snail mapping, and operational research. This research compares two districts to evaluate the effectiveness of behavioral change in combination with mass drug administration versus mass drug administration alone. Results are expected in 2023.

Despite the challenges, including the Covid-19 pandemic, security issues and political instability, the NALA Foundation was able to continue the implementation of school-, community- and WASH-based interventions. An impact evaluation in two of the target districts showed a meaningful decrease in the prevalence of schistosomiasis since the start of the program in 2017.

In Ghana, we implemented our collaborative access to water program to improve WASH in communities, including schools and healthcare facilities, to combat waterborne infectious diseases such as schistosomiasis. We also trained health workers in schistosomiasis case management. Performed in partnership with World Vision, the program includes an implementation research study that analyzes WASH in healthcare facilities and water quality in selected districts. The results show that only 17% of the healthcare facilities have access to improved water supply within the premises; to address this challenge, we are partnering to provide WASH to 15 institutions by July 2023, with an estimated outreach of about 24,000 people.

More information can be found under **Building health capacity and awareness**.

Advocacy and partnerships

We work with international and local partners to advance schistosomiasis control and elimination. We continue to support the Global Schistosomiasis Alliance (**GSA**), a coordinated, multi-sectoral effort to combat the complex disease. The role of the GSA as central platform in all matters concerning schistosomiasis has been considerably strengthened over the past few years. In 2022, the GSA developed a new four-year strategy, which lays out the agenda for the global schistosomiasis community on the road to elimination.

Malaria: Treatment and prevention

Developing new therapeutic solutions

As part of our "**As One Against Malaria" program**, we are developing a new drug (M5717) with the potential to be a promising treatment and preventive option for malaria due to its activity in several **different stages** of the parasite's life cycle. The drug has successfully completed two clinical Phase I studies as a single agent for cure and prevention, and we published the results in peer-reviewed scientific journals (e.g. **The Lancet Infectious Diseases**). In 2022, we joined the PAMAfrica Consortium and are preparing for the start of the

clinical Phase II study as a combination therapy for cure in 2023. In addition, a clinical Phase II trial for prevention is being prepared through a new partnership. Preclinical research and new technologies, including a **new 3D culture-based hepatic platform** used to investigate the activity of our drug candidate, have supported the clinical development program.

Preventing and controlling malaria transmission

Preventive methods such as insect repellents are part of the strategic toolkit to combat malaria. We are testing our insect repellent IR3535® for potential use in malaria. IR3535® is already used for protection against insect and tick bites that can transmit diseases such as **Lyme disease**, **Zika**, **dengue fever**, and **chikungunya**.

The laboratory tests conducted in Ghana evaluated the efficacy of a **new formulation of IR3535®** for longer-lasting protection. Based on the positive results, an additional test is being carried out in communities to determine how IR3535® performs in real-life settings. The study aims to confirm that this insect repellent is a safe and efficacious solution to prevent malaria in all populations, including pregnant women and babies.

In partnership with local institutions in Africa, we have established PAVON (Pan-African Vivax and Ovale Network), a network of centers of excellence for the epidemiological surveillance and scientific research on malaria. Across more than ten African countries, PAVON supports policy making and offers training to African scientists.

Engaging stakeholders

Partnerships and dialogue are critical to addressing global health challenges and improving access to healthcare. Our partners include multinational organizations, government agencies and NGOs, as well as academic institutions, health industry associations, private companies, and independent global health experts.

In 2022, we continued to engage with our partners and key stakeholders, including **WHO**, to advance global health discussions and address shared challenges, including neglected tropical diseases. We collaborate with partners such as the **END Fund**, **WIPO** and **DNDi**, as well as with academia in African countries. We engage in consortia of partners, such as the **Pediatric Praziquantel Consortium**, alliances, like the **Swiss Malaria Group**, and advocacy groups, including the **Uniting to Combat NTDs** and **GSA**. In addition, we work closely with foundations that support scientific research and health access, including the **Bill & Melinda Gates Foundation** and the **Access to Medicine Foundation**. We have also joined forces with funders, including the Global Health Innovative Technology Fund (**GHIT**) and the European and Developing Countries Clinical Trials Partnership (**EDCTP**).

We also strengthen our **collaborations with the scientific community** through publications, patent sharing and by taking active roles at international events. For example, in 2022, we organized a panel discussion with experts on schistosomiasis at the Geneva Health Forum (**GHF**). In 2022, our CEO Healthcare represented our company at the Gates CEO Roundtable that discussed the strategy to expand access to medicines in low- and middle-income countries. On several occasions, we presented the progress of the Pediatric Praziquantel Consortium program that we lead, including at the European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), the Global Health EDCTP3 Launch Event, and the International Symposium on schistosomiasis. We also attended the Annual NTD NGO Network and the Coalition for Operational Research on Neglected Tropical Diseases (**COR-NTD**) to address the spread of misinformation about NTDs.

Open innovation sharing

We have a responsibility to improve global access to health through our technological advances. We support a reliable and transparent legal framework for intellectual property that enables sustainable investment in research and development.

Our approach to sharing and protecting intellectual property

The responsible treatment of intellectual property is not a barrier to health, but rather ensures the **safety and high quality** of medicines for patients worldwide. Almost none of the medicines that address the highest burden of disease in low- and middle-income countries are protected by patents. Studies indicate that between 90% and 95% of the pharmaceutical products on the **WHO Model List of Essential Medicines** are off-patent.

We support a sustainable **approach to intellectual property** that drives innovation and enables access to health. We **refrain from enforcing patents** in a majority of low- and middle-income countries. In markets where we do register product patents, we are transparent and committed to sharing data to the greatest possible extent and to improving public access to clinical study data. We report on the patent status of our products via the publicly accessible database **Pat-INFORMED**. Furthermore, we support voluntary licensing agreements, including non-exclusive voluntary licenses, legally binding non-assertion covenants and clauses that aim to widen access to health.

We also support the concept of patent pools and believe that these should be structured to improve access to medicines, prevent anti-competitive behavior and overcome geographic limitations. We consider joining **patent pools** that are relevant to our portfolio and meet all our efficacy, quality and safety requirements.

Through our **open innovation research projects** for global health, we grant access to small sections of our chemical compound libraries. In doing so, we aim to accelerate collaborative research programs that develop novel R&D platforms in search of new active ingredients for infectious diseases.

Roles and responsibilities

Our Open Innovation initiatives are collaborative and cross-functional efforts that facilitate the exchange of intellectual property. We aim to accelerate early discovery in diseases with high unmet needs through intellectual property sharing. We hope to foster the discovery of new generations of health solutions that will address the needs of the most vulnerable populations, with a primary focus on the neglected tropical disease schistosomiasis and on malaria.

Our commitment: supporting transparent and reliable frameworks

We support **TRIPS**, an international agreement administered by the World Trade Organization (WTO), which addresses trade-related aspects of intellectual property rights, as well as TRIPS addenda, such as the Special Declaration on the TRIPS Agreement and Public Health. This agreement extends the deadline for the least developed countries to apply TRIPS provisions to pharmaceutical patents until 2033.

Initiative improves access to patent information

We are a founding member of the Patent Information Initiative for Medicines (**Pat-INFORMED**), a global gateway to medicine patent information. Pat-INFORMED features patent information on **small-molecule drugs** for cardiovascular diseases, diabetes, hepatitis C, HIV, cancer, and respiratory disorders as well as any products on the **WHO Model List of Essential Medicines** that are not within these therapeutic areas.

Creating research opportunities

Our **Open Global Health Library** publicly shares 250 compounds from our proprietary chemical library that may be used for infectious diseases research. Since its launch in 2020, the library has been accessed 28 times for screening in 18 indications.

We were a member of the WIPO Re:Search Consortium until the initiative was terminated at the end of 2022. Our contributions supported screening and drug discovery activities at institutions in low- and middle-income countries to identify potential investigational candidates to treat neglected tropical diseases, such as schistosomiasis. This initiative also enabled the transfer of knowledge and expertise for research, mainly in and for Africa.

Schistosomiasis research grants

We are dedicated to accelerating innovation and advancing science for the benefit of the most neglected populations. That is why we catalyze research in an open innovation spirit and with the intention of reducing financial hurdles. For example, through our **Schistosomiasis Research Grant Initiative**, established in 2021, we awarded 15 research projects with € 30,000 each. In 2022, all projects were launched, and interim reports on their progress have been shared.

Drugs for Neglected Diseases initiative

We are collaborating with the Drugs for Neglected Diseases initiative (DNDi) and, through the memorandum of understanding with DNDi and the Swiss Tropical and Public Health Institute, we are continuing our dialogue for research in the field of **schistosomiasis**. In 2022, DNDi held several expert meetings seeking to establish a target product profile for antischistosomal drugs.

More information on our collaborations regarding open innovation for global health can be found on our **website**.

Prices of medicines

In 2021, pharmaceutical spending accounted for **between 6% and 32%** of total health spending by OECD countries. At the same time, advances in the research and development of innovative medicines are significantly transforming the healthcare landscape, allowing chronic diseases – the greatest cost drivers – to be treated more effectively and affordably.

Our approach to pricing medicines

To help ensure that all patients have access to the most effective medicines for their needs, we are working to prevent cost from becoming a barrier to treatment. Therefore, we adapt our medicine prices according to people's ability to pay in different geographic and socioeconomic segments.

We are committed to **fair, flexible and sustainable pricing** – both within and across countries. We therefore adapt our prices based on local market considerations, such as unmet medical and treatment needs, health system capacity, infrastructure and socioeconomic standards. This approach involves working closely with governments and other stakeholders. In addition, we continuously monitor dynamic healthcare environments and markets, pricing and reimbursement systems as well as legal and regulatory guidelines, adjusting our prices as necessary.

We conduct price analyses annually to validate price thresholds and provide guidance on local pricing to our subsidiaries for the following year. The aim is to ensure they meet patient access needs, taking a **consistent, data-driven approach**. We also make our products affordable to patients in low- and middle-income countries with an equitable value and access strategy that includes participating in government tenders, providing flexible pricing, establishing high-quality affordable brands or branded generics and operating patient access programs.

Furthermore, we support innovative risk-sharing agreements and are working to improve data efficiency in health systems in order to achieve an optimal distribution of funds and resources.

Roles and responsibilities

Our Global Market Access and Pricing (GMAP) unit evaluates market launch prices in coordination with the respective franchises. The team reports directly to a member of our Healthcare Executive Committee. The GMAP unit systematically evaluates our medicine portfolios and applies equal access initiatives to them. Our local affiliates are responsible for managing prices and adapting them to evolving local conditions in compliance with our pricing governance and the defined price approval process.

Our commitment: Medicine price guidelines and principles

The affordability of our health solutions is part of our broader patient value proposition. Our medicine pricing adheres to the stipulations of our overarching **Access to Health Charter** and is defined in detail in an internal guideline. Additionally, our Patient Access Programs Policy sets out standards for offering medicines at affordable prices.

Value-based contracting models

We are committed to advancing value-based healthcare through pricing and contracting mechanisms that fully comply with all applicable local laws and regulations. In collaboration with payers, such as health insurance companies, we have developed various product- and market-specific reimbursement and contracting models. These help to provide patients with prompt **access to our innovations**.

In Germany and Ireland, we continued in 2022 with innovative risk-sharing agreements that provide immediate access to Mavenclad® for patients with multiple sclerosis. In addition, the value-based contracting model for Mavenclad® has also been implemented in four more countries in Europe, Latin America, and the Middle East with more countries under assessment for further implementation. Besides that, we facilitated a roundtable with payers in Argentina, Brazil, Colombia, Germany, Italy, and Spain to discuss the current and future landscape of the value-based contracting model for Mavenclad®.

Equitable value and access approaches to serve low- and middle-income patients

We work in close partnership with governments and other stakeholders on innovative, **differential medicine pricing schemes**. In addition, we supply products at affordable prices to certain countries in Africa, Asia, Latin America, and the Middle East.

Strategic tender activities

Our pharmaceutical tender excellence initiative offers a strategic tender framework. This includes a web-based system that helps country teams increase **quality and agility** in tender decisions, while improving performance tracking and collaboration. We regularly participate in government tenders for products used in public hospitals serving low-income patients. Many of these tenders take place in low- to middle-income countries.

High-quality, affordable second brands

For some of our existing high-quality products, we have created second brands at affordable prices, particularly in countries with a large percentage of patients with very low incomes. For example, second brands for the betablocker bisoprolol (Concor®) are available at affordable prices in Brazil, Chile, Poland, and South Africa.

Patient access programs

We operate patient access programs that enable us to offer certain products at affordable prices in several countries. In India, we offer a program for our oncology drug Erbitux®, for example, to provide financial assistance to eligible underprivileged patients – in line with local laws and regulations. Since the initiation of the program in 2017, it has been made available to over 5,000 patients in the country. In 2022 alone, more than 1,500 patients benefited from the program.

In 2022, we continued to collaborate with national pharmacy chains in Mexico to provide patients with adherence support, discounts on blood tests and education on prediabetes and diabetes, thyroid, cardiovascular and obesity disorders. To improve adherence, in Central America (Costa Rica, the Dominican Republic, Guatemala, Honduras, Nicaragua, and Panama), we offer a digital loyalty program for the aforementioned conditions. To strengthen health systems and raise patient awareness in China, we sponsored the Hypertension Center Program in 2022, which is organized by the China Cardiovascular Association. The program aims to elevate awareness of standard diagnosis and treatment for patients with hypertension and increase blood pressure target achievement.

Building health capacity & awareness

We believe that in order to achieve health for all, it is imperative to help health professionals and patients make informed decisions about treatment paths. This support includes building health capacity as well as awareness. As a prerequisite, health systems need to be strong and benefit from solid collaborations to build resilience against crises and emergencies.

Our approach to building health capacity and awareness

Capacity-building and awareness-building play key roles in our approach to improving **access to health**. We empower patients, communities, scientists, and healthcare professionals by providing appropriate tools, skills and information so that they can make **informed decisions** about prevention, diagnosis, treatment, care, and disease management.

The private sector is a crucial partner in responding to global health threats. Beyond developing innovative health solutions and applying adapted mechanisms for access to medicines, we support countries in building up infrastructure and expertise for preparedness of local health systems to deliver care to all patients in need and address emergencies effectively. That is why we invest to sustainably strengthen the prevention, preparedness and resilience capabilities of health systems in low- and middle-income countries. Our efforts include the following aspects:

- **Increasing country preparedness** by enhancing scientific and healthcare workforce competencies and capacities through a network of experts.
- **Forming partnerships** to extend disease awareness and address the challenge of enabling consistent access to medicines for all patients in need.
- **Optimizing the monitoring and evaluation** of health initiatives at country level through data processing and digitalization.

We operationalize these elements along the entire value chain in our collaborative programs and through our health education initiatives with our local partners.

We also collaborate with committed global partners to conduct educational campaigns for prevention, early diagnosis and awareness. We focus primarily on the diseases for which we have the greatest expertise. Our activities include specific initiatives that promote awareness for **carers** as well as **women's health and economic empowerment** to expand their access to health.

Roles and responsibilities

Our Global Health organization leads collaborative capacity strengthening and awareness initiatives in low- and middle-income countries to support our mission of improving the health of the most vulnerable populations.

Our awareness initiatives are aligned with our Group strategic direction and planned by the various businesses. They are implemented either on global and/or local levels, with projects organized according to the **specific needs of the relevant community**. Our subsidiaries are also responsible for mobilizing our global campaigns locally.

Our commitment: access to health through awareness and education

Our strategy for addressing access to health incorporates the topic of awareness and education as detailed in our **Access to Health Charter**. Our campaigns and initiatives are also subject to the respective marketing principles set out in guidelines such as our Pharma Code for Conducting Pharmaceutical Business and Pharmaceutical Operations. In addition, our campaigns are governed by internal policies that guide our **interactions with health systems** and by communication material review processes that ensure we comply with global, regional and national rules and regulations.

Working with partners to achieve more

Our Global Health portfolio consists of collaborative initiatives that aim to strengthen the capacity and effectiveness of health systems in low- and middle-income countries. We support work in these four key areas:

Local research and development

We build scientific capacity through our **R&D programs** and focus primarily on schistosomiasis and malaria. Some examples include:

- Clinical trials in African health centers to investigate arpraziquantel as a potential new treatment option for pre-school children infected with schistosomiasis. These trials have enabled local healthcare professionals to acquire valuable experience in Good Clinical Practice, which they can apply in future studies.
- Our partnership with the **University of Cape Town for malaria drug discovery** activities that transfers scientific expertise and supports the employment and training of talented local young scientists.
- **PAVON** (Pan-African Vivax and Ovale Network), a network of centers for excellence on malaria surveillance and pandemic preparedness implemented in more than ten African countries. The project offers training to African scientists in a collective effort to strengthen local health systems to treat all forms of malaria.

Manufacturing and supply chains

We manufacture some of our products directly in the regions where they are needed. We also strengthen local manufacturing and supply chain capacities through **technology and best practice transfers**. Our aim is to increase service quality while ensuring safe, effective and reliable access to quality medicines where they are needed most.

- We produce praziquantel, the standard-of-care treatment for schistosomiasis, in our production facility in Mexico, to enable the provision of up to 250 million tablets per year to treat the disease, mainly in school-age children.
- We apply a local production approach in our work with the **Pediatric Praziquantel Consortium** to help countries become self-sufficient and serve local populations in need. Following our 2021 manufacturing agreement with Universal, a contract manufacturer in Kenya, we are preparing for the large-scale production of arpraziquantel upon its registration, in addition to production by Farmaguinhos in Brazil.
- We partner with Business for Health Solutions (**BHS**) to build sustainable supply chains of local distributors in Africa through our **Access Delivery Mentorship program**. In 2022, we started three collaborations with distributors, thus a total of six distributors in five different countries.

Education and awareness raising

We invest in **education and behavioral change initiatives** that raise disease awareness. Examples of those initiatives include:

- In Ethiopia, we operate a joint health education and WASH project in partnership with the **NALA Foundation** and the Ethiopian Ministry of Health. We are aiming to reach 50,000 community members in 8,000 households and more than 170,000 school-age children in districts with the highest prevalence of schistosomiasis.
- In partnership with the Cardiological Society of India (**CSI**), the country's largest professional cardiology association, we implemented an initiative that raises awareness in populations with a high risk of cardiovascular diseases.
- To support behavioral change for schistosomiasis elimination, we have introduced the **Bilharzia Storytelling Lab**. The lab brings together storytellers, health experts and community leaders from one country to develop creative communication products that provide accessible and tailored disease information to risk groups. We award the most promising solution with a € 10,000 prize. We intend to apply the concept in several endemic countries in sub-Saharan Africa. The first lab took place in Kenya in 2021, the second in November 2022 in Rwanda.

Health infrastructure and training

We **build infrastructure and support training** with a strong focus on African countries. In 2022, we

- supported the management of **integrated mobile health units in Cameroon** to diagnose and treat female genital schistosomiasis, **HIV**, **HPV, and cervical cancer** for women aged 14 to 30. This initiative includes training to enhance the skills and experience of local health professionals;
- set up **microscopy stations in Ghana, Burkina Faso and Botswana** and provided training sessions to improve local health workers' ability to detect malaria and other diseases that can be diagnosed via blood samples;
- implemented our collaborative **access to water program in Ghana** to improve healthcare infrastructure through safe water services in health centers as well as training to health workers on schistosomiasis case management;
- partnered with the H3D Foundation at the University of Cape Town to co-create a Massive Open Online Course on research and **development for young African scientists**. Participants earn a certification after taking the course and can also join a Mentorship Program delivered by R&D employees of our company.

More information can be found under **Global Health**.

Global awareness campaigns

We regularly conduct campaigns to raise awareness of various diseases across the globe, often in collaboration with patient advocacy and carer groups. We focus on diseases that are aligned with **our core competencies**, expertise and experience along the health value chain. These diseases include cancer (specifically colorectal cancer, head and neck cancer and bladder cancer), thyroid disorders, diabetes, infertility, and multiple sclerosis. Throughout the year, we also conduct awareness campaigns that focus on tropical diseases, such as schistosomiasis and malaria.

We actively participated in several awareness days:

January 30: World NTD Day

World NTD Day brings together civil society advocates, community leaders, global health experts, and policymakers, who collaborate across disciplines to control and eliminate neglected tropical diseases.

February 4: World Cancer Day

February 4 marks **World Cancer Day**, an annual initiative led by the Union for International Cancer Control (UICC). It aims to raise cancer awareness and improve its prevention, detection and treatment. In 2022, the theme was “Close The Care Gap”.

March 22: World Water Day

Held on 22 March every year since 1993, it celebrates water and raises awareness of the 2 billion people living without access to safe water.

April 7: World Health Day

World Health Day raises awareness about a specific health theme each year to highlight a priority area of concern for the World Health Organization. In 2022, the theme was “Our Planet, Our Health”.

April 25: World Malaria Day

World Malaria Day highlights the need for continued investment in and sustained political commitment to malaria prevention and control.

May 25-31: Thyroid Awareness Week

In collaboration with the Thyroid Federation International (**TFI**), the annual awareness campaign, which used the slogan “Do You Speak Thyroid?” in 2022, focused on preventing information from being lost in translation between thyroid patients and their caregiver teams.

May 30: World Multiple Sclerosis Day

World Multiple Sclerosis Day is an annual awareness day by the MS International Federation (**MSIF**). It brings the global MS community together to share stories, raise awareness and campaign with everyone affected by multiple sclerosis. In 2022, it focused on supporting the community to create meaningful connections.

July 27: World Head And Neck Cancer Day

World Head and Neck Cancer Day is an opportunity to inform the general public about head and neck cancer and recognize the impact it has on those affected in the community.

August 1: World Lung Cancer Day

The Forum of International Respiratory Societies has observed World Lung Cancer Day every year since 2012 to raise awareness about the risk factors of the disease.

September 29: World Heart Day

World Heart Day was established by the World Heart Federation and increases awareness about cardiovascular diseases and how to control them to negate their global impact.

November 1-7: European Fertility Week

European Fertility Week raises awareness about infertility and conveys the issues faced by people with infertility. It also aims to remove the stigma around infertility and amplify the issue of unequal access to treatment in Europe.

November 10: World Science Day

World Science Day for Peace and Development highlights the vital role of science in society and the need to engage the broader public in debates on emerging scientific issues. By linking science more closely with society, World Science Day for Peace and Development aims to ensure that citizens are kept informed about important scientific developments.

November 14: World Diabetes Day

World Diabetes Day was created in response to growing concerns about the escalating health threat posed by diabetes. The 2022 campaign, the theme of which was “Education to Protect Tomorrow“, aimed to keep diabetes in both the public and political spotlight.

Purpose-driven initiatives

Healthy Women, Healthy Economies and **Embracing Carers®** are two initiatives we are using to promote awareness of public health issues extending beyond patients. The interconnectedness of both initiatives is rooted in shared themes and goals. The majority of unpaid and underpaid caregiving hours globally are provided by women and girls. Through these initiatives, we aim to both promote and support women’s health and economic empowerment and expand access to health.

Healthy Women, Healthy Economies

To empower women to overcome the challenges of communicable and non-communicable diseases and reach their economic potential, we are committed to the **Healthy Women, Healthy Economies** initiative – a public-private partnership founded within the Asia-Pacific Economic Cooperation (**APEC**).

Since 2019, the APEC Healthy Women, Healthy Economies **Research Prize**, which we support, has highlighted sex-disaggregated research that enables policymakers, business leaders and other stakeholders to identify and implement measures that improve women’s health in APEC economies. The 2022 prize of US$ 20,000 was awarded to Zheng Ruimin, Director of the Women's Health Care Department at China’s National Center for Women and Children's Health, for an innovative study that developed a comprehensive, accessible and affordable maternal depression screening strategy.

Embracing Carers

Embracing Carers® is our global initiative led in collaboration with prominent caregiving organizations from around the world. Embracing Carers® is designed to increase awareness, action and discussion around the frequently overlooked needs of unpaid caregivers.

To follow up on our 2021 survey, Embracing Carers® worked with global carer advocacy organizations to conduct focus groups with carers to better understand their problems and what can be done to address their needs. This information forms the basis of planning to provide greater support for caregivers, particularly with respect to their mental and emotional health needs.

Product safety & quality

Chemical product safety

Many of our chemical products have intrinsic hazardous properties. Therefore, we are working to minimize the potential risks to both human health and the environment that arise from their use. We continuously strive to improve the safety of our products and reduce the environmental impact of our businesses through innovative solutions and digital communication tools.

Our approach to safe chemical products

Product safety is one of our top priorities. During the product development phase, we investigate the potential adverse impacts of chemical substances. Along the entire value chain of our products – **from raw materials to manufacture and commercialization** – we provide relevant information on their hazardous properties and how to deal with them. These instructions facilitate the safe handling and use of our products in line with all regulatory requirements. We publish this information primarily on the relevant digital channels. As paper safety data sheets are still common in some countries, we can also provide these upon request through our customer service.

We support the implementation of the **European Green Deal** and are preparing to integrate the relevant chemicals sustainability aspects into our business strategies. We are currently developing a portfolio sustainability assessment framework for our Electronics and Life Science business sectors and are preparing to test its suitability and practicability in pilot projects.

Roles and responsibilities

Our Life Science, Healthcare and Electronics business sectors have organizational structures to implement our product safety strategy in line with their **respective business requirements and customer needs**. This approach includes registering chemicals, classifying hazardous substances, and highlighting risks using safety data sheets, labels and digital communication tools.

Our **Group standards** provide a framework for governing the set-up of effective operational processes for product safety, hazard communication and chemicals regulatory compliance throughout our business sectors. In addition, the Group Chemicals Regulations Council fosters cross-sectoral alignment of strategic regulatory activities required for existing and emerging chemicals regulations as well as sustainability and identifies potential impacts for our company.

This approach also applies to innovative fields of development such as nanomaterials, which we use with the greatest of care in line with the precautionary principle. Furthermore, our Group-wide **Policy for Use and Handling of Nanomaterials** provides the necessary guidance on the use of these materials.

Legal requirements and internal guidelines

Our internal guidelines define the roles, responsibilities and basic processes required to comply with national and international regulations. In addition, we have also endorsed **voluntary commitments** of the chemical industry such as the **Responsible Care® Global Charter**.

The legal requirements relevant to compliance with chemicals regulations are mainly related to hazard communication as well as local and regional chemicals registration activities. These requirements are expanding globally, with a growing number of countries adapting their local rules in line with existing regulatory frameworks such as **REACH**. We are well placed to comply with regulations of this kind in important markets, such as China, India, Japan, Korea, and Taiwan. Using the Globally Harmonized System for Classification and Labelling of Chemicals (**GHS**) for hazard communication allows us to streamline our internal processes and provide consistent, harmonized and high-quality information to our customers.

Our **worldwide network of regulatory experts** in all three business sectors continuously monitors changes to legal requirements and scientific developments to stay ahead of trends and best practices.

In 2022, there were no incidents of non-compliance with regulations specifically concerning potential health and safety impacts and the labeling of our chemical products.

Safety analysis of our products

Safe and sustainable by design implies that product safety starts during development. Therefore, at an early stage of our **product development process**, we analyze innovations in terms of their impacts on human health and the environment. We continuously evaluate the intrinsic hazards of both our existing and new products to create relevant product safety information in line with all applicable rules.

Product safety information

Chemical product safety is all about protecting human health and the environment from adverse impacts resulting from the use of chemical products throughout their life cycle. To achieve this, we provide **all relevant information** to our customers and the public, which helps to raise awareness of the hazards and build a greater understanding of how to mitigate risks and use the products safely.

To obtain all the relevant information on hazard profiles, we employ industry-standard **digital tools** that gather all information available on the substances we use. We then cross-reference this data with local and regional rules to establish the relevant hazard classifications. We publish this information digitally on **country-specific safety data sheets** in multiple languages and on the labels of our products. The data sheets are maintained electronically and updated if there are relevant changes. We have automated and standardized most of our hazard communication processes.

For products with little available information, we are investigating the feasibility of using alternative predictive **non-animal testing methods,** such as **read-across** and (Q)SAR. For third-party products, we expect robust product safety documentation from our suppliers, which we feed into our processes or share directly with our customers.

Helping customers access safety information

We employ the latest digital tools and continuously explore new technologies to share information with our product users.

Our Life Science customers and all interested stakeholders can access product safety information in their respective language and according to country-specific regulations through a dedicated **mobile app called My M Safety** (**Android** and **iOS**). Customers can retrieve this information by scanning a barcode on the product label or entering identifiers such as material numbers, names or CAS numbers.

Through our **ScIDeEx™** web tool, anyone can check whether using a particular chemical is safe within the boundaries specified in the EU REACH exposure scenarios. ScIDeEx™ is based on a full implementation of the **ECETOC TRA 3 model** for human exposure assessments in industrial and professional settings.

Patient safety

The safety of patients treated with our medicines is our top priority. Our pharmaceutical products must be effective in treating the respective disease while posing the lowest possible risk to patients. That is why we aim at continuously monitor any risks or adverse effects that may arise and take the necessary actions to minimize them.

Our approach to ensuring patient safety

Through a rigorous benefit-risk management process, we help to ensure that the benefits of our medicinal products always outweigh the risks for patients. Every new medicine goes through a series of precisely defined development stages. Before any medicinal product is administered to human subjects, we conduct extensive preclinical testing both in vitro and in vivo. Through toxicological testing, we determine whether an active pharmaceutical ingredient is toxic to living organisms and, if so, at which dosage. This testing also helps us determine the dose that humans can safely tolerate. Only when this is complete do we perform human **clinical studies** to investigate the safety and efficacy of the medicinal product. During clinical development, we diligently use all the collected data to continuously evaluate the medicinal product's **benefit-risk profile**. If we consider the medicinal product's benefit-risk profile to be positive, we then submit an application for marketing authorization to the relevant regulatory authorities.

Continual monitoring of product safety risk profiles

Once we launch a new medicinal product, the number of patients being treated with the product increases significantly. In rare circumstances, there may be adverse and potentially serious effects that were not detected during clinical development, which is why we continuously monitor risks and assess the benefit-risk profiles of the products after their market launch. **Pharmacovigilance** includes the process of monitoring a medicinal product on an ongoing basis to detect and assess safety signals as part of **signal management** activities. Our pharmacovigilance system and our pharmacovigilance business continuity management ensure continuous monitoring of adverse effects, allowing us to proactively and transparently minimize and communicate any risks. Emergency response procedures for business continuity are managed in accordance with global and local business continuity plans, tested in regular, defined intervals or with mock scenarios. In addition, we always provide healthcare professionals and patients with the **latest information on the safety** of all our marketed medicinal products. The scope of continuous safety monitoring includes the entire life cycle of a product, ranging from development, market launch and commercialization to expiration of the marketing authorization.

As part of our R&D Strategy 2023, we achieved our objective of developing and implementing proactive benefit-risk management, process optimization, automation, and pharmacovigilance oversight. Furthermore, we continue monitoring our service objectives through our **pharmacovigilance quality strategy** and annual quality plan. We also regularly monitor our performance and compliance through the internal and external reporting of key performance indicators (KPIs).

The capabilities we have developed and strengthened in this area include:

- Advanced benefit-risk management
- Safety data analytics in support of benefit-risk strategy implementation (taking into account and integrating real-world data)
- Advanced signal detection methodology
- User-friendly methods for collecting adverse effects

Based on regulatory approval conditions for newly approved medicinal products, we develop and update educational materials for patients and healthcare providers in accordance with the requirement to communicate any known and potential risks and ways to minimize them. We assess the effectiveness of these materials in close collaboration with our **Benefit-Risk Action team.** If required, we adjust the contents of the materials and their distribution and describe the results from the effectiveness analysis in our periodic safety reports and risk management plans. We then submit these to the relevant health authorities for evaluation.

Roles and responsibilities

Our Global Patient Safety unit is responsible for pharmacovigilance. It continuously collects **current safety data** from a wide variety of sources across the globe, including clinical studies, early access programs, spontaneous reports on adverse effects, patient support programs, and articles published in medical and scientific journals. Our vision is to embed a deep knowledge of safety into early decision-making as we evolve **to practice predictive safety.**

Our experts help to ensure that all information on the risks and adverse effects of our medical products is properly documented, tracked and reported to the respective health authorities in accordance with regulatory requirements. Our Global Patient Safety unit analyzes all data and reassesses the benefit-risk profile based on these data, where required. We then inform regulatory authorities, healthcare professionals and patients about new risks, additional risk mitigation measures and potential changes **in the benefit-risk profile.**

Our **Healthcare Quality** unit processes quality complaints related to our products. Whenever quality defects could have an impact on patient safety or lead to adverse effects, Global Patient Safety becomes involved.

Our Global Patient Safety unit hosts a Pharmacovigilance Intelligence Council that focuses on changes in pharmacovigilance legislation and its impacts on our global and local pharmacovigilance systems. This initiative enables us to make strategic decisions and govern changes in pharmacovigilance requirements, which fosters our target to ensure continuous compliance with regulatory requirements.

Our Medical Safety and Ethics Board

Our Medical Safety and Ethics Board (MSEB) oversees the safety and benefit-risk assessments of our medicinal products throughout their clinical development and commercialization. This internal board is chaired by our Chief Medical Officer and comprises experienced physicians, scientists and experts from our company. Throughout a medicinal product’s entire life cycle, the MSEB reviews and assesses important medical safety risks and benefit-risk issues and endorses appropriate **measures to minimize risks**, such as updates to product information. The MSEB furthermore reviews human-related ethical issues as appropriate.

The cross-functional Benefit Risk Action team is responsible for signal management, benefit-risk assessment, risk management and all topics related to product safety and the benefit-risk profile of our medicinal products. Recommendations from the Benefit Risk Action team are endorsed by the Pharmacovigilance Advisory Board, chaired by the Global Patient Safety unit. Important issues may be submitted to the MSEB for final assessment.

Our commitment: Guidelines and statutory requirements

Our aim is to follow international guidance and standard procedures, such as the International Council for Harmonisation (**ICH**) guidelines and the Good Pharmacovigilance Practices (GVP) established by the European Medicines Agency (**EMA**) and national health authorities. Furthermore, we aim at complying with all new statutory pharmacovigilance regulations in the countries where we market our products.

Inspections and audits for drug safety monitoring

Regulatory authorities conduct periodic inspections to verify that we comply with statutory requirements as well as our own internal pharmacovigilance standards. We follow up on the findings of health authority inspections and take necessary actions to ensure the ongoing compliance of our pharmacovigilance system. In 2022, we had four pharmacovigilance inspections.

Furthermore, we perform audits to ensure that all our units and subsidiaries involved in pharmacovigilance consistently meet all global requirements. In 2022, we conducted a total of 19 pharmacovigilance audits and found no significant deviations in our pharmacovigilance systems from these requirements and standards. We also conducted 16 external audits at our vendors and licensing partners involved in pharmacovigilance, helping us improve our pharmacovigilance processes and comply with regulatory requirements.

Applying our proactive safety strategy to benefit-risk assessments

With regard to product safety risk assessments, we have implemented an improved benefit-risk management strategy in order to become a proactive and benefit-risk-focused organization. In this context, we developed in 2021 the concepts and principles for conducting benefit-risk assessments at each stage of product development and post-marketing. Along with the implementation of the redesigned benefit-risk strategy, the new Benefit Risk Action Team co-leadership model was rolled out in 2022. This redesigned approach will enable us to understand in even greater detail the benefit-risk profiles of our products, enabling early decision-making within the organization to protect patient safety. Ultimately, the aim is to be able to provide **the right medicine to the right patient at the right time**.

Product safety assessment and emergency response procedures

A product prioritization tool as a means to objectively score the safety profile of our products has been used as a basis to define our product prioritization strategy. The scores categorize our products as being either high-, medium- or low-risk and subsequently defining our approach for benefit-risk activities and product safety surveillance. These include individual case safety report management, signal management and management of emerging safety issues, risk management, safety communication, our new benefit-risk strategy and aggregate safety reporting. This ensures the **efficient management of safety risks** of our medicinal products throughout their lifecycles.

If our safety risk assessments identify any emerging safety issues, safety observations that require urgent safety measures, or other new safety information that potentially impacts the benefit-risk balance of the product, we promptly notify health authorities via the respective emergency response procedures. These steps include seeking health authority approval for further actions and communicating the information to relevant healthcare professionals. In addition, we promptly share this information with our business partners and clinical trial investigators, enabling them to take proper actions where the medicinal product concerned is used.

Innovative safety signal detection

Through our tools for safety signal detection, we analyze and manage large amounts of global data, such as scientific studies and news about adverse events. This tool helps us comply with regulatory timelines for safety signals and other safety-related factors and ensures that all signal data, documentation and decisions are captured in one place. It also enables easy access to and analysis of our data as well as cross-functional collaboration between the Global Patient Safety unit and other internal and external stakeholders.

Up-to-date labeling and product information

Our product information explains to healthcare professionals and patients how to correctly use the respective product and make informed treatment decisions. In accordance with statutory regulations, the **package leaflet** contains all relevant information such as indication(s) and ingredients as well as dosage, storage, mode of action, instructions for use, warnings, precautions, and possible adverse effects. In addition, should the medicine contain ingredients that could impact the environment, the package leaflet may also contain information about how to dispose of the product correctly. We review and update all product information documents, such as package leaflets, to ensure our medicinal products contain the latest information on safety, efficacy and pharmaceutical formulation. In accordance with regulatory requirements, we submit all modifications to our leaflets to the respective regulatory authorities for approval. In 2022, there were no significant reportable incidents of non-compliance with regulations concerning the labeling of our medicinal products.

Internal and external training

Our pharmacovigilance experts are regularly trained so that they gain and maintain the required experience and knowledge to carry out their activities. We manage our training via a global learning platform and verify compliance with our training requirements by producing training completion reports.

Our approximately 24,000 Healthcare employees receive **basic pharmacovigilance training** once a year that covers the procedure for reporting adverse effects or special circumstances associated with the use of our products. In addition, other training courses keep employees up-to-date with respect to their professional expertise as well as internal standard operating procedures and other relevant requirements. These continuing education and training efforts help us to ensure adherence to pharmacovigilance requirements.

Enhancing patient safety and sharing expertise with other countries

We exchange experience and share our expertise by contributing to initiatives hosted by various non-profit organizations, for example, the TransCelerate Biopharma. As an active member of TransCelerate, we have directly contributed to initiatives such as intelligent automation opportunities in pharmacovigilance, pharmacovigilance agreements optimization, and the interpretation of guidance documents and regulations.

Reporting side effects via app

In line with our goal to enhance patient safety, we implemented a user-friendly mobile and web application in 2017 for use by field forces, sales representatives, healthcare professionals, pharmacists and non-medically trained users to **report any suspected side effects** or adverse events arising from the use of our medicinal products. In the reporting year 2022 we continued to further rolled-out the application, which is now available in 14 different languages, used in more than 50 countries.

Pharmacovigilance in Access to Health

We strive to continue expanding pharmacovigilance expertise worldwide, especially in countries where healthcare workers need to build this expertise.

We continue our efforts to increase the contribution of pharmacovigilance in our **Access to Health** strategy. The key aspects of this strategy include fostering pharmacovigilance initiatives in safety data-sharing with health authorities and sustainably building pharmacovigilance capacity with reputable partners in underserved countries. For example, we have maintained a stable partnership with the Tunisian health authority over many

years to actively help establish the national pharmacovigilance system via various initiatives. These include the good pharmacovigilance practice guideline that was published in August 2022.

In 2022, we continued to raise awareness for **Patient Safety Day** via our affiliates in several countries, including Australia, China, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, and Vietnam.

In other initiatives, we contributed to the review of draft guidance documents for clinical trials and provided feedback to the health authorities in China. We also participated in the review and feedback of draft regulations for good pharmacovigilance practice before its rollout by the Eurasian Economic Union. In addition, we collaborated with the health authority in Chile to test and provide feedback about the new Integrated Vigilance System.

Access to approved medication for unapproved uses

We may receive inquiries about the therapeutic use of our **products beyond the marketing authorization**, also referred to as off-label use. For example, while each medicine is authorized for use in specific indications, a physician, based on an individual risk-benefit assessment, may wish to administer a product to a patient suffering from a disease for which it is not approved.

We promote our medicines strictly within the scope of their specific marketing approval. Any medical-scientific information about the use of our products beyond their existing marketing authorization is provided by qualified medical personnel in response to unsolicited inquiries. The information shared must be backed by scientific evidence and be factually balanced, clearly stating that it applies to unapproved use. In addition, we do not permit our employees to give any recommendations regarding individual patient care or treatment.

Product-related crime

In low- and middle-income countries as well as industrialized countries, illegal, counterfeit and substandard medicines pose a significant risk to public health. In addition, chemicals may be misused for criminal purposes, such as the manufacture of illicit drugs. We take resolute action against both of these criminal activities.

Our approach to product-related crime

Our company develops and manufactures pharmaceutical and chemical products of the highest quality. We take resolute action against product-related crime in order to protect our patients and customers from the harm caused by illegal products. For this purpose, we have implemented a Group-wide strategy, which focuses on identifying and responding to the availability of counterfeit medicines as well as ensuring the integrity of our products and supply chains. Moreover, we are committed to collaborating with government authorities as well as national and international organizations. Together, we want to tackle product-related crime and raise awareness of the issue among stakeholders and the wider public.

How we define product-related crime

1. **Counterfeit products:** In line with the relevant **WHO** standard, we define a counterfeit product as “a product that is deliberately and fraudulently produced and/or mislabeled with respect to its identity and/or source to make it appear to be a genuine product”.
2. **Illegal diversion of products:** This term refers to the diversion of either pharmaceuticals or chemical substances from within the legitimate supply chain either to sell or export them through illegal channels to produce narcotics, weapons or explosives, or to use them for other illegitimate purposes.
3. **Misappropriation of products:** This refers to theft from production sites and warehouses, or while in transit.

Roles and responsibilities

The Corporate Security unit coordinates our approach to tackling product-related crime on the strategic level. A cross-functional team supports the operational implementation of the strategy. The team comprises experts from various units, including Legal/Trademarks, Product Security, Export Control, Supply Chain, Patient Safety, Regulatory Affairs, and Quality Assurance. Furthermore, all our sites have product crime officers who serve as central, local points of contact and act as the interface between both local and global stakeholders, internal and external alike.

Our commitment: Group-wide guidelines and standards

Globally applicable regulations are a key part of our approach to effectively and efficiently tackling product-related crime. The Group-wide guideline entitled “Illicit Trade & Product Crime Prevention” describes our goals and measures for reducing product-related crime and minimizing its impact. Our Group-wide Product Crime Incident Management standard sets out mandatory requirements for effectively managing incidents of product-related crime.

How we are tackling product-related crime

1. Detecting counterfeit medicines and taking them out of circulation

A team of experts examines, evaluates and processes every notification we receive regarding suspected counterfeit medicines. Our response always complies with both the regulatory requirements and our own wider objectives for tackling counterfeit products. We proactively **conduct investigations** both online and offline in order to identify and disrupt the availability of illicit products in legitimate and illegitimate channels. We document all incidents using a central, Group-wide reporting system. Moreover, we support the prosecution of criminals by working closely with the authorities. As a member of the Pharmaceutical Security Institute (**PSI**), we routinely share intelligence about product crime with other pharmaceutical companies.

In 2022, our internal experts examined and pursued numerous incidents, including **counterfeits identified within the legitimate and illegitimate supply chains** as well as theft and illegal diversion.

2. Tracking system for chemical substances

We monitor chemicals that could be misused to produce illegal weapons, explosives or narcotics, tracking them through an **internal system** that flags suspicious orders or orders of sensitive products. These are released only once we have confirmed the existence of a verified end-user declaration.

In addition to fulfilling the duties defined in the **statutory provisions on export control**, we also report suspicious orders and inquiries to the competent authorities. Through these efforts, we are honoring a voluntary commitment of the German Chemical Industry Association (**VCI**) and complying with the terms of the Guideline for Operators published by the European Commission.

3. Protecting the integrity of our products and supply chains

We intend to ensure the integrity of our supply chains on the one hand and reduce the likelihood of illegal medicines circulating on the other hand. For this reason, we have a robust security measures for products and supply chains.

We do our best to fulfill the regulatory requirements on **product serialization** and the implementation of track-and-trace technologies as prescribed in many countries and regions. This includes clear bar coding of individual and collectively packaged products for transport so that they can be traced in the supply chain.

Using a risk-based approach, we apply our own product security features on certain products. This enables the rapid and reliable authentication of our products.

We monitor our supply chain closely and we regularly **audit our distributors and contract manufacturers** to ensure that they comply with our GMP and GDP standards (good manufacturing practice/good distribution practice). Moreover, we carry out special risk-based safety tests on suppliers of pharmaceutical packaging and contract manufacturers.

The security measures at some of our most important global sites are certified externally in accordance with internationally recognized standards, including requirements of the U.S. customs authority’s C-TPAT (Customs-Trade Partnership Against Terrorism) initiative, the AEO-C/S (Authorized Economic Operator) certificate of the European Union, approval as a “recognized shipper” by the Luftfahrt-Bundesamt (German Federal Aviation Office) as well as the ISO standards 28000 and 28001 regarding supply chain security management.

In 2022, we introduced a Group-wide security audit management program, which will help to further increase transparency and the security level performance within our organization and maintain our compliance with security requirements. For this purpose, we have developed key figures to support this process, which will be supplemented by the existing audit management tool.

Furthermore, we sponsor global initiatives to protect patients. For instance, we support the non-profit Global Pharma Health Fund (GPHF), which supplies the GPHF-Minilab®, a compact laboratory used mainly in countries with inadequate access to health solutions, to test the quality of 107 different active ingredients quickly and effectively. In 2022, five additional active ingredients for cardiac care were added to the Minilab's method inventory. Currently, a total of 969 Minilabs are in use. In 2022, 42 Minilabs were delivered, of which 39 went to eleven countries in sub-Saharan Africa.

4. Raising awareness of product-related crime

We aim to continuously raise awareness of product-related crime among our business partners and employees, educating and training our people Group-wide on the subject to strengthen their competencies. All employees involved in security, such as product crime officers, participate in appropriate **training programs**. We are continuously evolving these programs and adapting them to new trends.

EMPLOYEES

Career with us

Our employees advance human progress by solving complex problems and promoting our culture of innovation and inclusion. We encourage them all to pursue careers that align with their individual aspirations, skills and passions. To maximize our potential throughout the Group, we aim to create an environment that inspires our current employees, attracts new talent and helps us to continue to learn and grow.

Our approach: A career with purpose

To ensure our ongoing success, we are focusing on the future by creating meaningful impacts and building needed capabilities. At the same time, we must respond to changing demographics and adapt to the behaviors and expectations of the highly competitive talent market. Therefore, in 2022, we enhanced our **talent acquisition strategy** with a more personal, employee-focused approach. Our goals include reinventing our talent sourcing approach to build targeted and integrated pipelines and effectively recruiting diverse talent to our organization.

Our trainee programs are designed to assess and hire early-career talent who show exceptional potential. We believe vocational training is an effective way to meet current and future demand for qualified professionals.

Supporting our employees' professional and personal development helps us to meet our strategic objectives, driving our success as a company. In a fast-paced environment of continuous growth and innovation, we want to cultivate and develop the capabilities of our employees. As a result, our employees benefit from a diverse learning and development portfolio. In addition, our dedicated management programs help our leaders to promote accountable and inclusive behaviors and educate them on driving sustainable business value and performance.

We have designed our compensation structure to provide **valuable benefits** to our employees and their families. Our reward system recognizes the uniqueness of our employees while providing flexibility wherever possible. Through our competitive compensation structure, we aim to be attractive to future employees in particular. Additionally, our international employee mobility programs create an environment suited to the needs of a rapidly evolving workforce.

We have revised our talent retention approach by tailoring our retention efforts more strongly to different target groups and countries as well as striving to create an inclusive environment that sparks our employees' creativity and growth.

Roles and responsibilities

Group Human Resources (HR) supports and advises all business sectors and Group functions within our organization regarding our human capital, especially topics related to recruiting, vocational training and advanced training. Across all our sites, HR employees work with leaders from various functions and business sectors to employ strategies that engage our people in line with Group-wide HR guidelines and requirements, including attractive compensation models and benefits. Every two to three years, we conduct internal audits to ensure that we implement our guidelines effectively.

The Chair of the Executive Board and CEO is responsible for Group Human Resources. Our Chief HR Officer, who leads the HR function and oversees all our HR activities, reports directly to her. Our Business Services unit

oversees the operational tasks of HR work, such as drafting contracts and payroll accounting. The Chief Financial Officer is responsible for this unit.

All employees can access their personal data via our **HR4You digital platform**, which aligns our basic HR processes globally. For instance, the platform enables employees to participate in online training courses or apply internally for vacant positions.

Our commitment: Structured development

Our High-Impact Culture, founded on **six behaviors**, is integrated into all HR processes, from recruitment and training to feedback processes. We regularly inform executives and employees about these behaviors through global campaigns.

Our People Development and Learning Policy provides a Group-wide framework that guides employees in managing their professional growth. It defines requirements for our development opportunities, roles and responsibilities. The associated processes are described in our People Development and Learning Standards.

Our **flexible work guideline** details our approach to evolving work environments and our aspiration to create a more agile organization. For example, employees can choose their desired working location (with the agreement of local guidance, teams, and managers) provided it is appropriate for their work activity. In addition, we aim to better support and recognize the well-being of carers around the world by creating a carer-friendly workplace.

Attracting and inspiring key talent

Our overarching goal is to attract qualified employees and retain them over the long term. Therefore, we continue to focus on measures that improve the way in which we introduce new employees to our company culture.

In this context, we launched a recruiting initiative for our leaders to become brand ambassadors within their professional networks. Through this program, we support our leaders in engaging in dialogue with their peers and communities about our culture and the opportunities for professional development offered by our company.

Additionally, we are continuously reviewing our application process and hiring manager enablement to maintain a fast, quality-driven process.

A competitive compensation structure

We reward the performance of our employees in order to maintain a competitive edge in attracting qualified professionals. Within our Group, we base compensation on the requirements of each position and each employee’s respective performance. We make no distinctions based on gender or any other diversity criteria.

To ensure we maintain a **competitive compensation structure**, we regularly review our compensation policy based on data analyses and industry benchmarks. This enables us to compare internal factors and market requirements in equal measure. Before making changes to our compensation structure, we consult with key stakeholders such as employee representatives.

In 2022, we introduced a sustainability factor into our Long-Term Incentive Plan (LTIP). More information on the LTIP can be found in the Compensation report. Along with our competitive benefits and rewards program, we also introduced a new global car policy in 2022, aiming to reduce CO_2 emissions by encouraging the use of electric vehicles and supporting charging points.

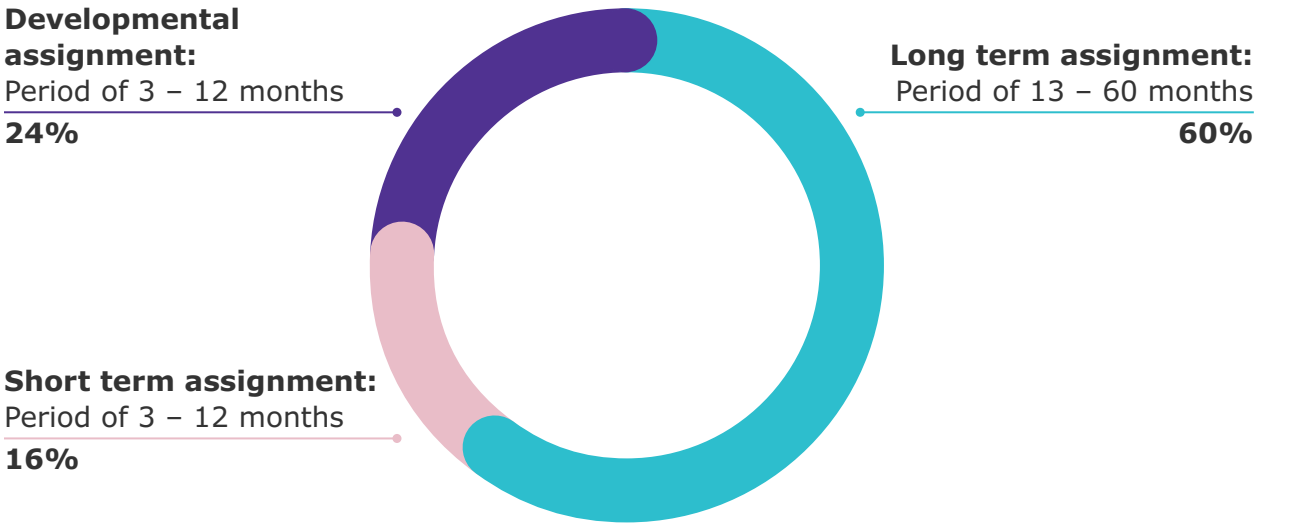
In addition to competitive pay, we also offer attractive benefits. For example, our benefits4me package contains offerings primarily funded by the company, such as company pension plans, U.S. healthcare, prevention and health-related benefits as well as other services, for instance leasing offers for bicycles or IT hardware to meet the multifaceted needs of our global workforce.

Nurturing a global mindset

To broaden the diversity of thought within our teams, we offer multiple international assignment opportunities to enable our employees to experience different cultures, mindsets and ways of working. In 2022, we intensified our focus on international assignments by launching a new policy to promote the opportunity to gain **international experience** and **increase flexibility** for employees and their managers.

Furthermore, we have established a policy that allows employees – under certain conditions and in adherence to compliance measures – to work remotely for personal reasons outside of their country of employment for up to 60 days within a 12-month period.

Mobility split by assignment type



Unlocking our potential with education and professional development

We have implemented a holistic learning and leadership portfolio, which we are continuously enhancing in accordance with the principles of our **High-Impact Culture and set of behaviors** in order to foster greater levels of accountability, inclusiveness and engagement. Our learning portfolio also helps our employees to understand and embrace the principles, values and behaviors of our corporate culture.

We endeavor to support our **employees' personal and professional development** in line with their strengths, skills and behaviors. Therefore, we provide ample opportunities for the functional and technical upskilling required in the various areas of our organization. We recognize that employees need to develop capabilities for the future and acquire skills to adapt quickly to changing markets and organizational needs. Beyond cultural and soft skill learning and development opportunities, functional training, such as digital upskilling or scientific training, provides additional opportunities for development in specific areas.

Furthermore, our Development Advisor tool provides specific learning and development resources. For example, employees can find eLearning courses, formal training offerings, self-facilitator toolkits, and text proposals, which they can use to compile their individual development plans. Different filter criteria help employees to find learning offerings based on their specific needs. It is recommended that employees shape their development plans with components covering formal training (10%), opportunities to interact and learn from others (20%) and learning by doing (70%).

Our employees can also book learning offerings, such as e-learning courses or in-person training, via our **learning management system**. In 2022, about 7 million training courses were completed. Additionally, we encourage our employees and leaders to take courses via the LinkedIn Learning platform.

We have integrated individual and team learning programs into our global learning and leadership portfolio. The **Empower Your Team program** introduces our leadership culture and the basics of leadership, such as decision-making, feedback, motivation, and emotional intelligence. Empower Your Organization is aimed at more experienced leaders and focuses on the capabilities needed to shape our culture, covering topics such as inclusiveness, psychological safety and transformation. About 1,100 of our leaders participated in these courses in 2022.

Merck University is our leadership development program for executives and collaborates with best-in-class business schools, including **Stanford GSB** in the United States and **INSEAD** in France. Established in 1999, approximately 590 of our executives worldwide have participated in the program, enhancing their skills and professional development via state-of-the-art leadership learning methods, content and tools. Senior leaders taking part in Merck University also have several touchpoints with early-career, high-potential individuals in our second flagship program, the International Management Program (IMP). The IMP identifies and nurtures talented people who show potential to become our senior leaders of the future.

Supporting the next generation

We believe in the value of investing in the next generation of talent, not just to build a diverse talent community, but also to develop the skills needed to continue to deliver our products.

As part of this aim, we use the strength of our brand to create **sustainable talent pipelines** through a diversified series of sources. Career events, university relations, social media, and other online platforms such as Candidate Relationship Management are some of the channels we use to attract, maintain and build relationships with our diverse talent community.

We also support talents in joining our organization through various internships and relationships with universities around the world. One example of this is our Healthcare business sector's Co-Op program with Northeastern University, Massachusetts, USA, where students gain first-hand experience with our manufacturing and R&D processes, readying them for a successful career.

On the global level, we run our GoGLobal and OLDP (Operations Leadership Development Program) traineeships. We build relationships with students from multiple disciplines and academic researchers who show great potential and are interested in roles within our company. Each year, we take in approximately 20-25 new trainees across functional areas such as In-house Consulting, Marketing, Commercial, Global Healthcare Operations, Quality Regulatory and Compliance, Research and Development, Procurement, Finance, and Human Resources. We offer our trainees mentoring, training and development opportunities.

Graduate hiring by gender

We have been steadily increasing our focus on vocational training. For example, in 2022, we started the construction of a new **Learning Center** at our global headquarters in Darmstadt. With a capacity for around 600 apprentices, it will enable us to house almost all our vocational training occupations under one roof. We are investing € 70 million in this new Learning Center, which is set to open in 2024.

In 2022, a total of 205 young people in Germany started their vocational training. The overall focus was on **scientific and technical occupations.** During the same period, a total of 181 young people successfully completed their apprenticeships at our Darmstadt site. In addition, we offer programs for refugees and young people struggling to enter the labor market, preparing them for subsequent vocational training.

We also continued to engage in the “Afrika kommt!” program offered by the German Society for International Cooperation (GIZ), which trains experts and leaders from Africa. In supporting this initiative, we are helping to build a pool of regional partners that promote economic cooperation between Germany and Africa. In 2022, ten participants successfully completed the program and we have selected thirteen new candidates for the eleventh intake, starting in February 2023.

Balancing work and personal life

We recognize the importance of **work-life balance** and the need for flexible working models. Accordingly, we have seized the opportunity to rethink our working habits – including when, where and how we work – in order to create the most engaging and productive working environment. As part of this process, in 2022, we completed the rollout of our **Flexible Working policy**, with 38 countries now using a respective model tailored to their local requirements and legislation.

In 2022, we implemented several initiatives to enhance our support for carers and parents at our company. In addition, whether our employees are the primary or secondary caregivers of children, we offer them various options to plan the first years with their child. For example, we have extended paid parental leave for both primary and secondary caregivers to eight weeks in Mexico and to six weeks in Switzerland. In India, we have also implemented a leave policy for secondary caregivers. Overall, we provide support in line with local laws and regulations as well as our Global Benefits guidelines.

Corporate culture

For more than 350 years, we have worked to improve and enhance people's lives worldwide. Our High-Impact Culture enables us to continuously re-examine our way of working and challenge long-held assumptions to advance human progress. It drives us to double down on our people to recruit, develop, retain, and promote the best and most diverse talent, while cultivating and rewarding an inclusive environment.

Our approach: Unlocking our collective potential

We recognize that our daily actions ultimately impact our customers, patients and partners. This is why we have identified a standard set of behaviors that form the foundation of our High-Impact Culture such as 'raising the bar' and 'acting as the owner'. They are firmly embedded in our company culture to provide guidance to all our employees and leaders.

We believe acknowledging and rewarding individual achievements, as well as a **feedback-driven culture**, enable collective success. Accordingly, we are introducing a new approach to performance, providing our teams with a framework that values employee expectations, clarifies goals, provides feedback, and rewards performance as part of our High-Impact Culture.

A constant shift towards learning from others, delivering and receiving feedback, and acknowledging the perspectives of others in constructive ways are also crucial elements of our culture. By promoting an open mindset, we empower our employees and strengthen our organization.

We also work to increase employee engagement and promote individual accountability by creating regular opportunities for dialogue and participation within the company. For example, employee surveys with regular pulse feedback opportunities provide valuable data points for managers, employees, and Human Resources (HR) to conceive new measures and initiatives that promote a culture of dialogue and collaboration in the workplace.

Roles and responsibilities

Global Human Resources (HR) is responsible for advising all business sectors and Group functions on matters concerning human capital. HR addresses the needs of our employees, organizational topics, and company culture founded on ethics and a shared set of company values.

We expect our leaders to understand the needs of their diverse teams and provide support in the form of resources and data. In addition, the ability to access transparent feedback through specially developed tools allows our leaders to gain further insights into how their behavior impacts their teams. For this reason, we work with external providers to train our leaders in proven, science-based approaches to lead more effectively.

Our commitment: Employee representation

As set down in our **Social and Labor Standards Policy**, we will respect our employees' legal rights to form and join worker organizations of their own choosing, including labor organizations and trade unions, and will not discriminate based on an employee's decision to join or not join a labor organization.

Within Europe, 41 of our legal entities in nine countries (Austria, Finland, France, Germany, Italy, Spain, the Netherlands, Ireland, and Switzerland) have employee representatives. Our respective site management teams cooperate with them at the local level. In addition, the Merck Euroforum represents our employees from a European perspective in all EU countries, as well as Switzerland, Norway and (post-Brexit) the United Kingdom. However, not all entitled countries send delegates to the Euroforum. The Euroforum focuses on the current global economic situation, employment rates and significant changes within our company, with regular exchanges during the year and additional meetings as required. In 2022, the regular mandate period ended in most European countries. Awareness-raising measures driven by our country speakers and local HR units supported the election process for new delegates. We now have Merck Euroforum delegates from 14 countries, which is three more than in the last mandate period. All delegates meet once a year.

In Germany, one of our largest locations worldwide, 99% of the local workforce is employed by subsidiaries subject to the German Co-Determination Act. We have a total of 20 subsidiaries in Germany. In 16 of them, our employees are represented by the Group Works Council; in nine of them by the Joint Works Council in Darmstadt; the remainder are represented by their local Works Council. The interests of our senior executives are represented by the Senior Executive Committee, which negotiates topics such as compensation, working hours and organizational changes. In addition, 57% of our employees are covered by collective agreements (12% of our global workforce).

In countries not covered by collective bargaining agreements due to different administrative, trade and judicial structures, we closely work with unions to implement operational decisions and coordinate relations between management and employees. Working conditions and terms of employment of employees in these countries are determined by legal requirements and our Global Guidelines.

Strengthening our High-Impact Culture

We aim to create a positive culture based on our strategic core elements of caring, outperforming and pioneering. By fostering our **High-Impact Culture**, we empower our people to create positive outcomes for our customers, patients and society. As part of this culture, we define a common mindset that guides how we do business and interact with colleagues and stakeholders. By embracing a standard set of behaviors, we can deliver on our purpose and create a work environment where everyone can succeed, develop and grow. These behaviors also embody our shared values and help to ensure our teams reflect different cultures, ways of thinking and life experiences.

These behaviors are:

care	pioneer	outperform
Obsessed with customers and patients	**Be curious and innovate boldly**	**Raise the bar**
We **focus on the impact** we generate, we **start with them in mind** and work backwards.	We **challenge our own thinking and the status quo**, press for better approaches, innovative ways, and **we are externally aware**.	We set **relentlessly high standards** for ourselves – and for our teams. We drive to **deliver the best quality** products, services and processes.
Act as the owner	**Simplify and act with urgency**	**Disagree openly, decide, and deliver (3Ds)**
We are owners, we make decisions and **act on behalf of the company's best interest**, not just our own.	We see beauty in **simplification**, we cut unnecessary processes and **focus on what matters most first** – and we change course quickly when necessary because **speed matters** in every business.	We think independently and **deliver as a team**. We make clear what matters in any decision, **taking accountability** and avoiding deferring difficult decisions. And when a decision is taken **we all commit**.

In 2023, we launch a new approach to how performance is steered, managed and evaluated in our company. MyImpact will replace the existing Performance Management Process and provide a framework for our organization to improve its performance and culture by encouraging continuous feedback.

In 2022, we presented the new approach to senior leadership in all relevant sectors and functions. We also informed the Work Councils and unions, who have been involved in the necessary negotiations prior to implementation. The main features include:

- Customized elements fitting the different nature of roles and responsibilities of our employees
- Simple and flexible year-round commitment setting, adjustable at all times
- Continuous and transparent conversations about performance
- Timely and frequent feedback collected to provide a basis for unbiased dialogue between supervisors and employees
- A new and simplified way to evaluate employee impact, reflecting our High-Impact Culture
- Flexible performance-related recognition and financial award framework available throughout the year

Strengthening our sustainability culture

In addition, we launched two e-learning courses in order to strengthen the **sustainability culture** in our company. The first one is for employees and was already rolled out at the end of 2021. The second one has been available since September 2022 and is targeted to managers with personnel responsibility. The two courses are mandatory for the relevant employees and are available in nine and seven languages, respectively. As of the end of 2022, 83% of all employees had completed the training.

Embracing conversation and dialogue

In our increasingly connected world, we are convinced that feedback enhances open dialogue, builds trust and improves collaboration. Therefore, in 2022, we intensified our efforts to promote continuous feedback across our organization and hierarchies. For example, we anchored this approach into our learning and development portfolio. Our feedback programs give employees and leaders insights from various sources to support individual development.

Furthermore, we have designed a new, simplified **360-degree feedback** tool to provide valuable input to employees while encouraging our organization to promote continuous feedback based on integrity and respect. The tool also provides guidance about integrating feedback practices into daily work and structuring feedback discussions accordingly. Overall, we aim to make feedback a regular habit rather than a formal process.

In this context, we are also taking action to promote psychological safety in our teams. This practice helps employees to work efficiently while feeling safe, respected and accepted. In 2022, we introduced workshops to support teams in better understanding their current psychological safety levels. As leaders play a critical role in creating the right atmosphere within their teams, we also ensured that psychological safety is a core topic of our leadership development program **Empower**. In addition, we provide a dedicated toolkit with practical guidance and actions that leaders can implement to promote psychological safety.

Empowering our employees

We are committed to ensuring our employees and leaders are involved in our business processes and can engage in dialogue through various channels, such as internal communications platforms, anonymous surveys, and roundtables.

In 2022, we developed concrete measures to gain insights into our employees' experiences throughout their employee lifecycle, from onboarding to leaving the company. For example, we now evaluate feedback from the onboarding experience after 90 days and again after three months to understand the experiences of new employees and identify areas for improvement. Similarly, our exit surveys collect insights into their reasons for leaving the company.

In addition, we evaluate the progress made in implementing our High-Impact Culture by conducting pulse surveys on the perceived culture change and newly introduced behaviors. Other main feedback formats include a yearly global employee engagement survey that serves as the main feedback channel for all our employees. With a strong focus on diversity, equity and inclusion in 2022, we conducted an additional inclusion assessment to identify and understand areas where we can strengthen our culture of belonging. This assessment helps us to create a more **inclusive environment** for members of underrepresented groups, such as people with disabilities, people from different ethnic groups, or those identifying as members of the LGBTQI+ community.

Diversity, equity & inclusion

We believe that creating and maintaining a diverse workforce helps us drive innovation, exceed customer expectations and remain economically and socially sustainable. Diversity, Equity & Inclusion (DE&I) also supports our goals of attracting and retaining talent who enrich our culture and help us create new solutions to tomorrow's challenges.

Our approach to creating a culture of inclusion and belonging

We are committed to promoting a strong sense of inclusion among our employees. Therefore, we approach Diversity, Equity & Inclusion (DE&I) with the same purpose as our other global business objectives and aspirations. While we have always been a diverse organization – we currently span 66 countries and have over 64,000 employees from **139 nationalities** – we recognize that our success depends on our ability to foster an environment that champions equity and inclusion. In addition, our DE&I approach fuels our efforts to make positive impacts in the communities where we live and work. We expect our leaders and managers to be mindful and considerate in how they attract, hire, retain, and promote their people. We aim to help every employee maximize their potential, regardless of their gender identity, culture, ethnicity, race, religion or creed, sexual orientation, nationality, socioeconomic and family status, language, disability status, age, mindset, faiths, military service, or political conviction.

We strive to create **equitable outcomes** and identify and eliminate any barriers that may hinder our employees' contributions or their access to opportunities or career advancement. Ultimately, we believe diversity inspires progress and strengthens our ability to innovate in all areas of our business.

The uniqueness of our people that brings science, curiosity and our High-Impact Culture to life. Therefore, we nurture an environment with a **collective sense of belonging** so that all team members feel valued and appreciated. This inclusive approach improves our overall performance and leads to more positive outcomes for our customers, patients and partners.

Roles and responsibilities

The Chief Diversity, Equity and Inclusion Officer is responsible for our global DE&I strategy and steering its related activities. In this role, she reports directly to the Chair of the Executive Board, whose Board responsibilities include Group Human Resources.

In addition, we have established a centralized **Diversity Council** consisting of high-ranking executives from all our business sectors and selected Group functions. The Diversity Council's responsibilities include:

- Supporting equity and inclusion across our organization and its activities.
- Serving as ambassadors and advisors to the Executive Board and managing directors in country organizations.
- Proposing strategic goals, initiating measures and ensuring managers meet their responsibilities in their respective units.
- Exchanging information, sharing best practices and aligning on next steps.
- Working across businesses, functions and countries to integrate DE&I within our daily work to benefit our employees and customers.

Our commitment: International policies and principles

Our **Social and Labor Standards Policy** categorically states that our company does not tolerate any form of discrimination, physical or verbal harassment, or intolerance. To underscore our commitment to equality, fairness, inclusion, and tolerance in the workplace, we also participate in industry-wide initiatives:

- The **Women's Empowerment Principles**, an initiative of UN Women and the UN Global Compact network, help to promote gender equality and women's empowerment in the workplace. In addition, we also participated in the UN Target Gender Equality Programme in 2021/22, which supports companies in achieving gender balance in business.
- The Inclusion Action Plan of the German Mining, Chemical and Energy Industrial Union (IG BCE) defines concrete measures to create a more inclusive workforce for employees with disabilities. In endorsing this plan, we meet the standards of the United Nations Convention on the Rights of Persons with Disabilities.
- The **Equal Opportunity Charter**, through which we pledge to do everything in our power to achieve gender equality within our company.
- We are one of over 4,500 signatories of the **German Diversity Charter**, Charta der Vielfalt e. V., a corporate initiative that promotes diversity in companies and institutions.

In addition, we are a signatory to the **Business Coalition** for the Equality Act, an alliance of leading companies in the United States. We are also active in a number of external associations and public-private partnerships supporting equality, such as Healthy Women, Healthy Economies, ClosinGap (Spain), Women Empowerment Council (China), SEMI industry association (dedicated DE&I initiative), Embracing Carers™, and **Disability:IN** promoting the complete inclusion of people with disabilities.

Meeting statutory requirements

The German Law for the Equal Participation of Women and Men in Leadership Positions in the Public and Private Sector has been in effect in Germany since 2015. Due to our legal status as a KGaA (a corporation with general partners), this law also partly applies to us.

With a 37.5% share of women (6 out of 16 members), our Supervisory Board already meets the requirements of German gender quota legislation. As a KGaA, we are not required to set targets for our Executive Board, which currently has a 20% share of women (1 out of 5). Detailed information can be found in the **Statement on Corporate Governance** in our Annual Report.

Strategy rollout and new structure introduction

In 2022, we rolled out our DE&I strategy globally. We created a network comprising our 18 major countries, nominated dedicated representatives and developed tailored roadmaps for each country. We also streamlined the councils and working groups in the business sectors and major Group functions, renaming them Diversity, Inclusion, Community & Equity Councils.

Progress on our 2030 aspirations

In 2021, we pledged to our people, partners, patients, and industry to intensify our DE&I efforts and set robust aspirations to hold ourselves accountable. In 2022, we continued this strong focus and demonstrated that we are on track to advance toward our 2030 goals.

Gender equity: We developed measures to achieve a more balanced gender structure at various hierarchical levels of our business. We are steadily making progress and have increased the share of women in leadership (roles 4+) to 38% (2021: 36%) while maintaining a stable 43% proportion of women in our global workforce. Building on this effort, we are aiming for gender parity in leadership positions by 2030. Moreover, we are committed to fair and equitable pay for all employees.

Women in leadership roles

Culture and ethnicity: With 24% of our employees based in the United States, it is crucial that we become an employer of choice among underrepresented racial and ethnic groups in this market. Therefore, we plan to increase the share of employees in U.S. leadership (roles 4+) who are members of underrepresented racial and ethnic groups from 21% to 30% by 2030.

Share of underrepresented racial and ethnical groups in US leadership

Additionally, due to our current performance and future growth in Asia, Latin America and the Middle East and Africa (MEA), accounting for 40% of our Group sales, we aim to increase the global share of nationals from Asia, Latin America, and MEA in leadership positions (roles 4+) from 16% to 30% by 2030.

Global share of nationals from Asia, Latin America, Middle East & Africa in leadership

Inclusion: Beyond our aspiration to foster specific types of diversity and equity, we are accelerating our efforts to create a genuinely inclusive culture for all employees. To achieve this, we rolled out training courses to help leaders reflect on how they can lead more inclusively. All leaders will be encouraged to complete these courses over the coming years. At the end of 2022, 64% (2021: 37%) of our leaders had participated in this training program.

Participants in Inclusive Leadership Workshop

Diversity figures are part of our compensation-related corporate goals. We use a prediction algorithm developed in-house to support the modeling and tracking of our key performance indicators for DE&I.

Committed to fair and equitable pay

Our **commitment to pay equity** is a critical aspect of our DE&I strategy. To create transparency around unexplained pay gaps and identify their underlying root causes, we conducted a pay equity analysis in 2021

with a focus on gender-based discrepancies. In this first step, we analyzed ten of our largest countries, covering approximately 80% of our total employees. Based on this analysis, we continued to improve our transparency by releasing pay data publicly for the first time: The identified adjusted (unexplained) gender pay gap is less than 1.5% in favor of men. While this is a good starting point and below the existing benchmark, we will continue to monitor pay data and take measured actions as needed. These include enabling our leaders to ensure we continue making equitable and unbiased pay decisions.

Cultivating inclusion every day

We provide a framework for education in the areas of diversity, equity and inclusion, combined with empowerment to support inclusive leadership strategies. To maximize our leaders' effectiveness in building diverse and inclusive teams, we rolled out the **Inclusive Leadership Workshop** as part of our global inclusion key performance indicators. It corresponds to the Leadership Program of 2021 and was renamed. The workshop combines global leadership interactions, peer coaching, continuous self-reflection, and leadership accountability. It is mandatory for all our leaders.

We also provide many learning opportunities with training and listening sessions on how to be a more inclusive colleague such as our unconscious bias training sessions. With the introduction of the psychological safety module, we help employees understand how important it is to create a safe environment in teams and ensure everyone's voice is heard. In addition, we conducted a global inclusion assessment to better understand specific areas of opportunity and gain employee insights in order to create a more **inclusive workplace**. More information on how we approach employee engagement can be found under **Corporate culture**.

Since we work in an international environment, we support our employees with intercultural training and digital tools such as our **Cultural Navigator**. Furthermore, we offer language training and international networks to assist employees in international assignments and projects. For example, more than 1,000 expatriate employees are members of the International Community, which meets regularly at our global headquarters in Darmstadt.

Helping diverse talent flourish

To broaden diversity within our organization, we have continued to create a strong internal female talent pipeline, promote more women into leadership positions, and actively source external female talent. Additionally, we focus on internal development and external sourcing of international and underrepresented ethnic talent. We have also identified opportunities in each business sector to provide extra recruiting support and leverage existing and new talent to reach more diverse audiences. In addition, we have piloted software to evaluate the inclusivity of our job descriptions and provide recommendations to make them more inclusive. In 2022, we also conducted self-identification campaigns in specific regions in order to better understand our internal demographics. These campaigns encouraged employees to voluntarily provide information about their ethnicity, disability status, sexual orientation, gender identity, or veteran status.

To promote diversity in our hiring for internal roles, we continued our various **mentoring, sponsorship and talent programs.** We are also exploring new partnership opportunities to reach more diverse STEM candidates. These include **HerHackathon** (women in IT), GEM (underrepresented ethnical candidates in science, engineering and technology), and LOC M Scholars (underrepresented ethnic candidate tuition support for family members of existing employees). Furthermore, we have added information about our Employee Resource Group community to our new employee onboarding process, which raises awareness about our employee groups and networks worldwide to new employees in the early stages of their roles.

A sense of belonging: our employee networks

In our internal DE&I employee groups and networks there are over 7,500 members (since a person can be active in more than one group, the number of people may differ from the number of members). These members have created a strong base that fosters a sense of belonging for community members and their allies. Our more than 60 groups and networks include **Women in Leadership, our Black Leaders Network, Rainbow, and I'M Able**. We are also strongly represented at our local sites in a number of women-oriented organizations operating globally.

Our networks drive inclusion

Supporting DE&I in the communities around us

In 2022, we announced a partnership with **CNote**, a women-led impact investment platform, to improve economic growth and opportunities in U.S. communities in which we operate. We will provide US$ 20 million, which can be used to fund BIPOC-owned small businesses in those communities via microfinance loans. CNote provides a diversified and scalable way to support job creation, small business growth, affordable housing development, and sustainable economic growth in underserved communities. This novel approach utilizes cash on hand that is held in our traditional bank accounts and instead deploys the cash to Community Development Financial Institutions.

In our Healthcare business sector in the United States, we have enacted a **supplier diversity** program to comply with local legislation. We are focusing our U.S. efforts on enhancing our current supplier locator tool by broadening the rollout among sourcing managers so as to improve our ability to connect with and potentially award business to a broad range of vendors. Additionally, we are continuing to expand the program to other business sectors in the United States that have pilot planning in place.

I'M IN is our external-facing DE&I initiative to amplify the voices of underrepresented populations and improve the healthcare ecosystem. Since 2019, we have partnered with healthcare practitioners through educational events, allowing them to explore untapped topics of health inequity in multiple sclerosis (MS) care and learn how inclusion positively impacts the patient experience. We are the first company to fund fellowships dedicated to reducing disparities in neurological care for MS patients.

Additionally, we have established a **diversity in clinical trials** project, as we understand the need for a diverse patient population in **clinical trials** and throughout the drug development life cycle. To maintain inclusivity, we focus on four key pillars that identify key tactical and targeted efforts. We have collated these and other examples in an internal DE&I in the business playbook, encouraging our teams to consider inclusive approaches in R&D, product development, procurement, marketing, sales, and partnerships.

Ensuring fair treatment for all

We do not tolerate any form of discrimination in our company, as stipulated with binding effect in our **Code of Conduct** and **Social and Labor Standards Policy**. In 2022, we published two new position papers on **non-discrimination** and **non-harassment**, complementing our position paper on **DE&I**. In addition, we have established various reporting channels to ensure employees have a clear point of contact should they experience harassment or discrimination in the workplace, or any other violations of our standards. Their first points of contact are their supervisors, HR or compliance teams. Alternatively, employees can also make anonymous calls to our compliance hotline. In 2022, 20 alleged cases of discrimination were reported via the compliance hotline and other channels, seven incidents were confirmed.

Solid ranking in diversity, equity and inclusion indices

We continue to make progress on integrating diversity, equity and inclusion within our business:

- We ranked ninth in the **World's Top Female Friendly Companies 22** list by Forbes, which identifies the companies leading the way in supporting women inside and outside their workforces.
- In the Financial Times ranking, we were selected as one of the leading 100 (out of over 15,000) companies on diversity.
- We scored eighth in the **German Diversity Index** published by BeyondGenderAgenda. The index reflects the transparency of the diversity commitments of the DAX 40 German blue-chip companies in their annual and sustainability reports for 2021.
- Our CEO Belén Garijo was presented with the BeyondGenderAgenda **2022 Honorary Award** **"Business"** for her and the company's outstanding commitment to diversity and inclusion.
- We were selected as one of the top 11 large companies in the **LGBTIQ+ Diversity Performance Index** by Uhlala Group
- We ranked seventeenth out of 100 in the 2022 **BCG Gender Diversity Study** by the Boston Consulting Group and the Technical University of Munich. This study rated management board and supervisory board gender diversity among Germany's largest publicly listed companies.

Health & safety

We take responsibility for the health and safety of our employees every single day and do everything we can to protect them against accidents and work-related illnesses. To this end, we take measures to prevent health issues from arising in the first place.

Our approach to preventing accidents and promoting health

We seek to promote the health and well-being of our employees and sustain their long-term performance ability, which in turn necessitates a safe workplace. We are therefore constantly working to further strengthen our **health and safety culture**.

The lost time injury rate (LTIR) is the indicator used to gauge the success of our occupational safety efforts. It is a global measure of the number of accidents resulting in at least one day of missed work per one million hours worked. We determine the Group-wide LTIR both for our employees and supervised temporary staff. Our objective is to lower LTIR to below 1.0 by 2025.

Generally, before starting an activity anywhere in the world, we perform a hazard assessment to identify risks and do everything possible to eliminate them before commencing the activity or commissioning a plant. If this is not feasible, we put measures in place to minimize the likelihood of risks and their potential impacts. Hazard assessments are the responsibility of our individual sites and are therefore conducted by them.

Since the start of 2022, we have been developing a Group-wide health strategy for our employees to enable them to maintain and promote their health.

Through the efforts of our **Health Management unit**, we are bolstering our company and health culture at our global headquarters in Darmstadt, Germany. We examine the effectiveness of Health Management using a **performance indicator system,** based on the employees' health-related responses in our annual anonymous **Employee Engagement Survey**. We use this survey to calculate our Healthiness Index, which aims to reflect the general state of health of our employees Group-wide. The index enables us to assess the data at team level (groups of at least ten), a minimum threshold that enables us to protect the anonymity of individuals.

Moreover, Health Management at our Darmstadt site also makes use of the findings from our company insurance fund's health report, along with evaluations from our Site Medical Center. We use all of this input both to create target group-specific or unit-specific **prevention programs** as well as to advise the local management. When specific indicators such as workplace stress start rising, additional consultation meetings take place between Health Management and the respective units.

Roles and responsibilities

Our EHS (Environment, Health and Safety) management system is the responsibility of Corporate Sustainability, Quality and Trade Compliance, which in turn reports to the Chair of the Executive Board. This Group function sets objectives, oversees the respective initiatives globally and conducts internal EHS audits. **Local EHS managers** and their teams ensure that our individual sites comply with all occupational health and safety laws and regulations. They are also responsible for local projects, campaigns and programs.

Employees concerned about their health or safety are permitted to temporarily step back from their work until the issue has been resolved. Globally, across the Group, they are encouraged to report such concerns via our **compliance hotline**.

At our Darmstadt site, we also have safety councils and committees that convene to address health and safety issues, coordinating strategies and focus areas with site senior leaders, health and safety experts, and employees. Moreover, Health Management at the Darmstadt site contributes to embedding the topic of health into our company culture. After implementing each measure, the Health Management team asks all participants for their anonymous feedback on their experience and suggestions for improvement, which help shape the development of further initiatives.

At the Darmstadt site, our **interdisciplinary Mental Health Team** is working to tackle the growing challenges surrounding mental health in an effort to protect our workforce against psychological stress. The team provides our employees with support from a single source.

In addition to this service, we offer a telephone hotline in all 66 countries in which we operate, giving our employees and their relatives access to confidential mental health and social counseling services around the clock.

Safety delegates and health partners

At our sites globally, we have **safety delegates** who, in addition to their usual duties, help their supervisors ensure compliance with safety regulations and requirements. At the same time, they act as points of contact for their colleagues regarding safety-related matters.

At our Darmstadt site as well as other German sites, **health partners** also act as the interface between our employees and Health Management. They function as a health-related liaison for colleagues while also informing their teams about the health programs and services on offer. At the same time, they make recommendations to Health Management regarding employee needs. Our employees undergo training before taking up their role as a safety delegate or health partner.

Our commitment: Policies and company agreements

Our Corporate **EHS Policy** (Corporate Environment, Health and Safety Policy) describes our fundamental approach to occupational health and safety. It is an integral part of our EHS management system and undergoes an external ISO 45001 audit every year.

Our Group-wide Health Policy specifies our approach to ensuring workplace safety for our employees while also promoting their health and well-being. In this policy, we set out our **Group-wide approach to health and safety management**, which is aimed at preventing workplace accidents and occupational illnesses.

It is our aim to ensure that environmental, health and safety aspects are also respected in our partnerships with contractors throughout the entire relationship, from starting a job to completion. This objective is reflected in our Contractor EHS Management Standard.

At our sites in Germany, we abide by **company agreements** on occupational health and safety that have been drawn up in partnership with employee representatives. For instance, our Occupational Integration Management company agreement, which applies to all our sites in Germany, governs the procedure for employees who have been on extended sick leave. The aim is to retain an employee’s position while also helping to prevent adverse health impacts after the respective employee returns to work.

We also have occupational health and safety company agreements in place at 13 other sites in Europe. These cover all activities required to comply with national occupational safety regulations, such as workplace hazard assessments and regular occupational safety analyses. These company agreements also include on-site health offers for our employees.

Safety certification at our sites

As part of a **Group certificate**, our occupational health and safety management system was **ISO 45001-certified** at 61 sites at the end of 2022. The sites define individually the scope of their certification. For instance, at our global headquarters in Darmstadt, ISO 45001 covers around 70% of the workforce; we ensure occupational health and safety for the remaining 30% of employees who do not work in operating units as well as those working at non-certified sites through our globally integrated management system. This also covers **EHS concerns.** The certification process helps us to identify weak areas as well as opportunities for improvement. This enables us to take appropriate measures in a timely manner in order to ensure the health and safety of our employees in the future. Other sites are also urged to apply this standard.

Accident rates

Our employees are required to immediately report any relevant occupational accidents to Corporate Sustainability, Quality and Trade Compliance, where the incidents are assessed. If necessary, we then implement additional safety measures at our sites. This procedure is now practiced across all of our production facilities around the world.

We track the following occupational safety data across our sites worldwide:

- The LTIR measures the accidents resulting in at least one day of missed work per one million hours worked. In 2022, our LTIR of 1.2 remained unchanged in comparison with the previous year. The majority of incidents resulting in lost time were slips, trips and falls, along with contusions and lacerations from the operation of machinery and equipment. Once more, in 2022, we recorded no fatal accidents.
- We use our Environment, Health and Safety Incident Rate (EHS IR) to **track incidents**.
- Alongside this indicator, in the United States we also use the Occupational Illness Rate to monitor work-related illnesses and their long-term effects.

Clear rules of conduct

Experience shows that most workplace accidents can be prevented by proper conduct. For our occupational health and safety, it is therefore essential that our employees have the relevant EHS training and certification. We not only educate our employees on occupational health and safety, but actively involve them in our efforts. For instance, we ask them to participate in walkabouts and in the selection of personal protective gear. This involvement is crucial because our employees best understand what they need in specific work situations. This enables us to continuously improve our occupational health and safety practices and performance.

Group-wide, all new EHS managers must complete a three-day EHS onboarding that covers topics such as occupational health and safety as well as our **BeSafe! safety culture program**. Through this initiative, we raise

employee awareness of occupational hazards and teach them rules for safe behavior. In addition, we regularly provide occupational safety training at our sites covering both legal requirements as well as the specific local risks.

Promoting employee health

For employees at our Darmstadt site, our Health Management unit offers specific health services such as mindfulness courses and ergonomics consultation. Moreover, we continuously assess the working conditions and the respective working environment, making improvements in accordance with the latest scientific findings. We use a standardized process for this. We publish a health catalog in German and English that summarizes all the services offered by our Health Management unit. It covers various topics including **ergonomics, nutrition, stress, and mental health issues.** In 2022, the BKK umbrella association (of the German company health insurance funds) presented Health Management at the Darmstadt site with the *"Deutsches Siegel Unternehmensgesundheit"*. Its quality and effectiveness in various categories were examined as part of an external auditing process in which experts took our strategies, key figures and offers as well as analyzed results of employee surveys into account. With the support of our company health insurance fund (BKK) and additional in-house interfaces, Health Management was awarded a gold seal – the highest possible recognition, received by only five of the 40 audited companies.

Protective measures and vaccination campaigns

Our measures to protect our workforce against Covid-19 at our sites in Darmstadt and Gernsheim are based on two pillars:

- **Testing:** By the end of December 2022, we had performed approximately 73,650 antigen rapid tests at our in-house company testing centers at the two aforementioned German sites.
- **Vaccinating:** In February 2021, our Site Medical Center initiated a Covid-19 vaccination campaign at the two aforementioned German sites. By December 2022, we had administered more than 21,850 vaccine doses to our employees in Darmstadt and Gernsheim as well as their family members.

In addition to our Covid-19 vaccination campaign, we also offered flu shots to employees at our Darmstadt and Gernsheim sites in autumn 2022, vaccinating more than 2,400 employees.

Fitness initiatives

Across Germany, our employees can take advantage of offerings such as our company fitness program **Fit@Merck,** which encompasses a range of **disease prevention courses** that are subsidized by our company. Additionally, in Darmstadt and Gernsheim, we have a company sports program with 32 different athletic activities. In 2022, we were only able to offer 21 different athletic activities as a result of Covid-19 restrictions.

Physicals and support for our employees

Our Physical Ability Test and Health Preservation process allows us to ensure that all employees meet the health requirements for their particular tasks and duties. Depending on the job profile, some of our employees undergo **pre-hiring physicals and physical aptitude tests**. Our Travel Health & Medical Advisory Service assists employees who travel abroad, providing them with recommendations on necessary vaccinations and advice on hygiene risks.

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, the Merck 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.

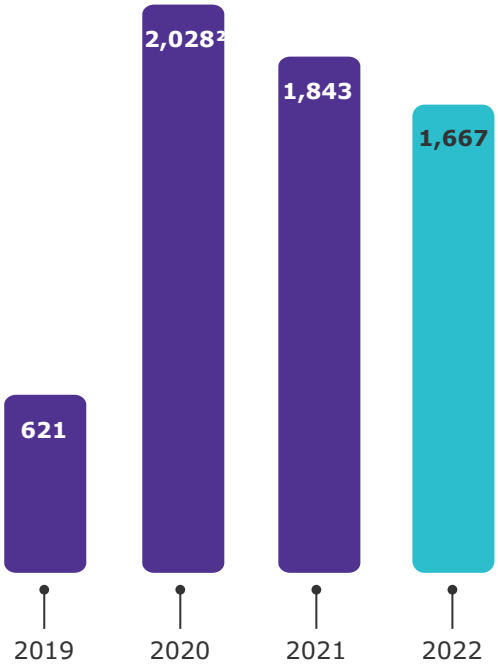
Emissions reduced further

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).

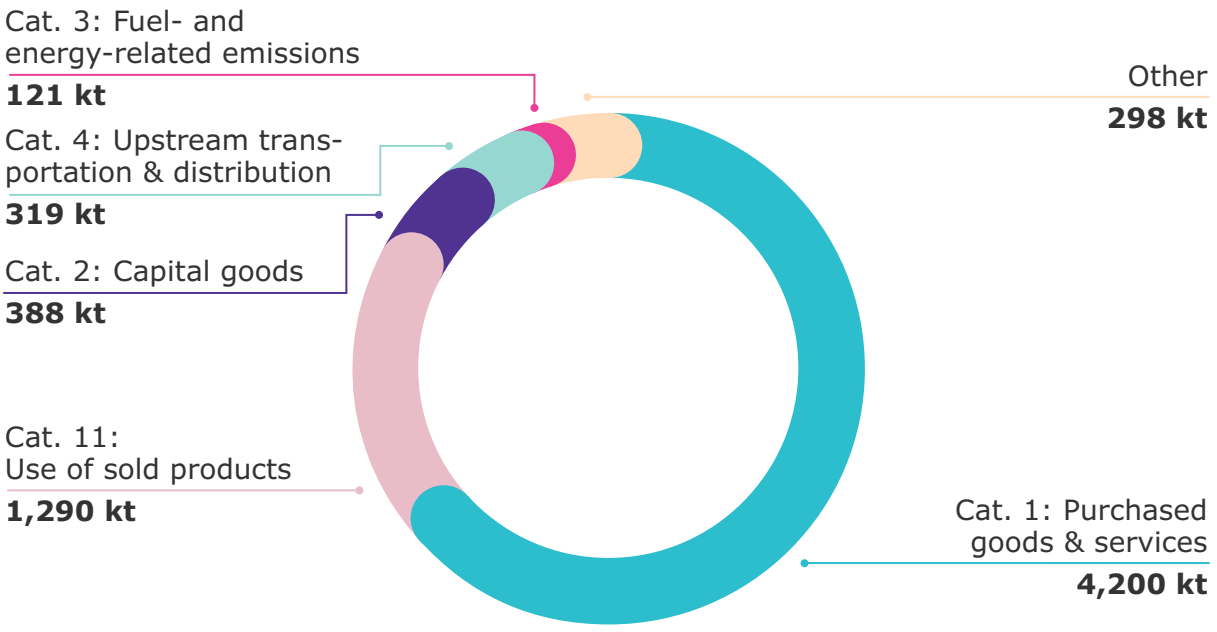
In 2022, we focused on creating more transparency on our Scope 3 emissions. The Greenhouse Gas Protocol defines 15 categories for Scope 3 emissions from upstream and downstream activities. In 2022, these emissions totaled around 6,616,000 metric tons of CO_2eq. Categories 1 and 2 (Purchased Goods and 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 Merck 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.

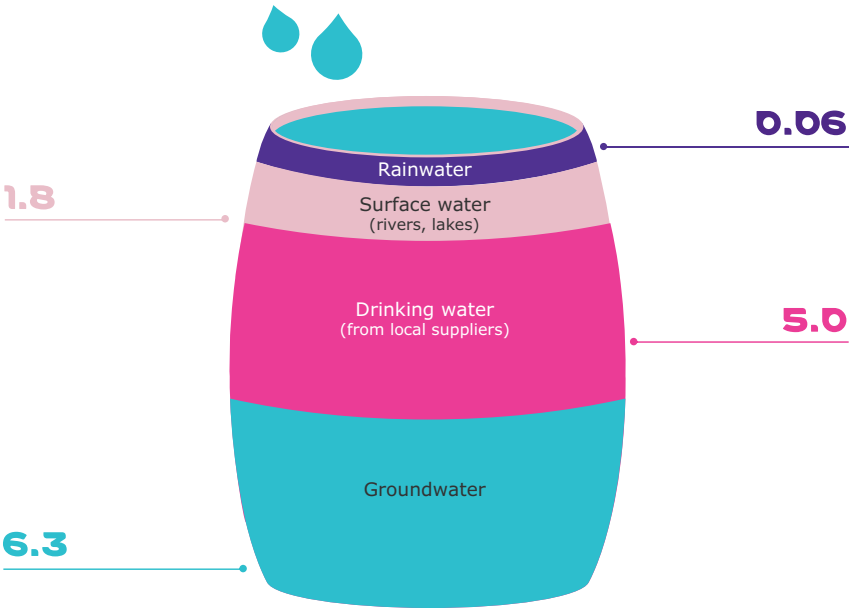
Our Wastewater Standard defines criteria for assessing our wastewater discharges into the ecosystem. It also helps us to achieve our target as regards trace substances in wastewater from our operations. The Water Use Standard sets out mandatory Group-wide requirements for the responsible consumption 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 cubic meters) – 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 cubic meters of water (2021: 23.5 million cubic meters).

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 cubic meters of water in total (2021: 13.5 million cubic meters). 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 Merck 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 Merck 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 meters/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 cubic meters/year.

Our wastewater

In 2022, we generated a total of 12.4 million cubic meters of wastewater (2021: 13.3 million cubic meters). This consisted of around 8.6 million cubic meters of freshwater, which we discharged into surface waters. 3.8 million cubic meters 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.

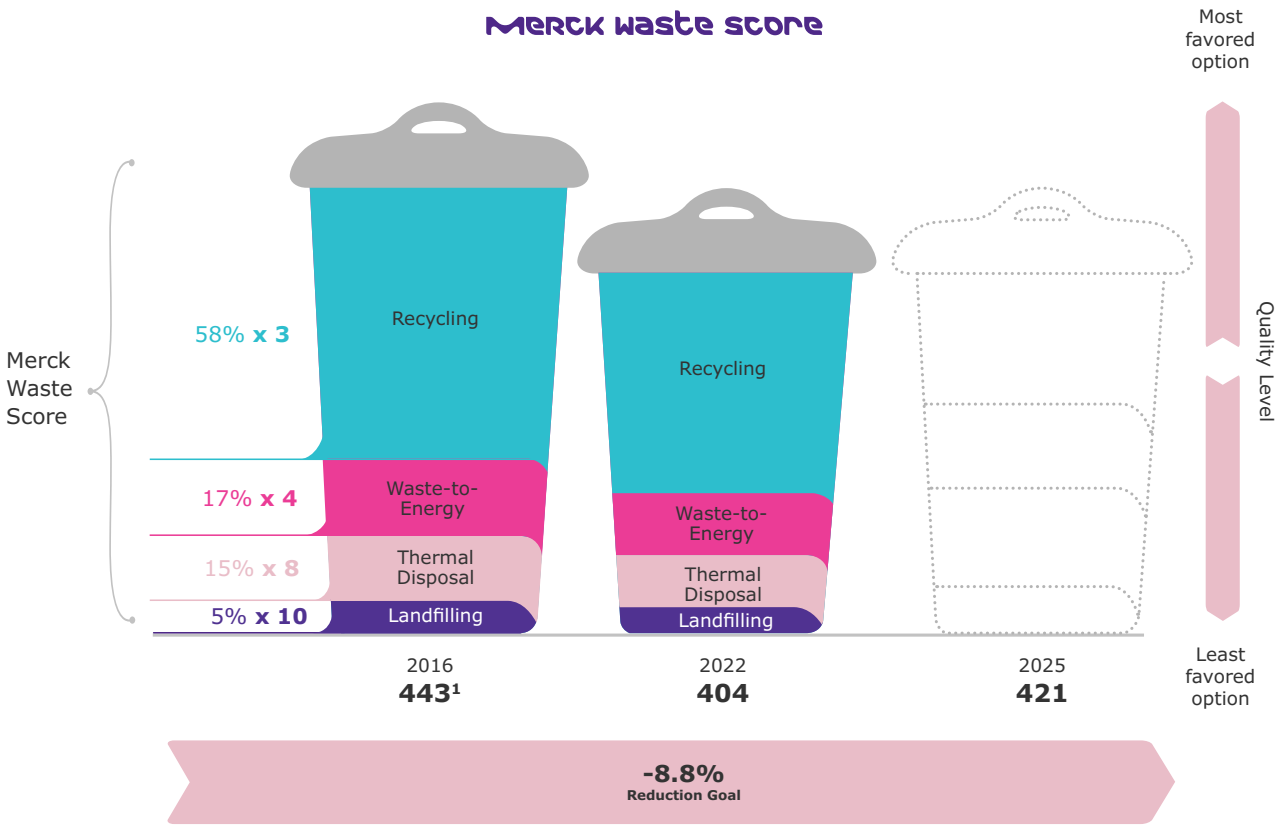
Further information can be found under **Environmental protection**.

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 landfil 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

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, 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.

COMMUNITY

Community engagement

We see ourselves as part of society – both at our individual sites as well as worldwide. Our aspiration is to help shape society – through our products, technologies and community engagement. That is why we work with our employees to promote a diverse range of social initiatives that help tackle challenges at the local level.

Our approach to community engagement

Worldwide, we are deeply committed to supporting the communities in which our various sites are located. In this context, we focus on health, education and culture as well as environmental protection. Moreover, we provide disaster relief and offer support to people in need in the vicinity of our sites.

In particular, we advocate for improving **access to health** for people worldwide. We do this by getting involved in numerous healthcare projects and purposefully contributing our experience in healthcare.

We also **promote culture and science education**. This has a long tradition in our company. As a science and technology company, we champion creativity, the joy of discovery and curiosity as well as the courage to push boundaries.

Protecting the environment and using natural resources responsibly is a task for us all. Therefore, we support various initiatives around the world that help **raise environmental awareness**.

We regularly evaluate the achievement of objectives and the impact of our projects. Our analysis is based on the so-called **iooi method** (input – output – outcome – impact) developed by the Bertelsmann Foundation. In the first step, we measure our **input** based on the product or monetary donations made and the time our employees invest in volunteer projects, for instance. In the second step, we record the immediate output, for example the number of organized training programs that were made possible thanks to our financial donations. We are also interested in the impact achieved for the specific target group. Our goal is to ensure that our community engagement continues to have a positive impact on society. For this reason, we are constantly working to make the **sustainable impact of our projects (outcome and impact)** measurable for the respective target groups.

The impact of our projects is particularly important to us, which is why we mainly initiate projects that aim to improve specific social situations or solve societal problems. 86% of our project spending goes towards this. We also support short-term and one-time charitable activities as well as initiatives that are beneficial to our business (e.g. in recruiting staff) on the one hand and can also help the community on the other hand.

Together with partner organizations, we support many long-term projects and form **strategic partnerships**. This enables us to strengthen our relationship with various **stakeholders** and helps reinforce our social license to operate.

Roles and responsibilities

The Group function Corporate Sustainability, Quality and Trade Compliance sets the framework and records data on our Group-wide community engagement. The coordination of the **Deutsche Philharmonie Merck** is also among its responsibilities. The Global Health unit within the Healthcare business sector steers the Merck Schistosomiasis Elimination Program and the Global Pharma Health Fund (**GPHF**). Furthermore, the Global Strategic Partnership unit, which is also part of Healthcare, coordinates **Embracing Carers**. In addition, our business sectors are launching their own projects, such as the educational program **SPARK™**. Our subsidiaries abroad are independently responsible for deciding on local activities in a decentralized manner. Some of our health initiatives in low- and middle-income countries are included within the scope of the **Merck Foundation**.

The Merck family of entrepreneurs also has a long history of supporting charitable causes. Their activities are organized via the **Merck Family Foundation** and the Merck'sche Gesellschaft für Kunst und Wissenschaft e.V. (Merck Society for Art and Science).

Our commitment: The principles of our community engagement

In designing our projects, we are guided by our Group Standard on Community Engagement, which defines what community engagement means for the entire Group and what objectives we are pursuing. This standard gives our business sectors and subsidiaries abroad a framework for structuring their respective activities themselves and also stipulates roles and responsibilities.

Health initiatives are also governed by guidelines from our Healthcare business sector and our **Access to Health Charter**. We calculate the value of our pharmaceutical donations in accordance with the **Guidelines for Medicine Donations** issued by the World Health Organization (**WHO**).

With our Corporate Volunteering Guideline, we want to strengthen and encourage **volunteering initiatives by our employees**. They may take up to two days of paid leave per year to participate in volunteering activities that are either run or supported by our company.

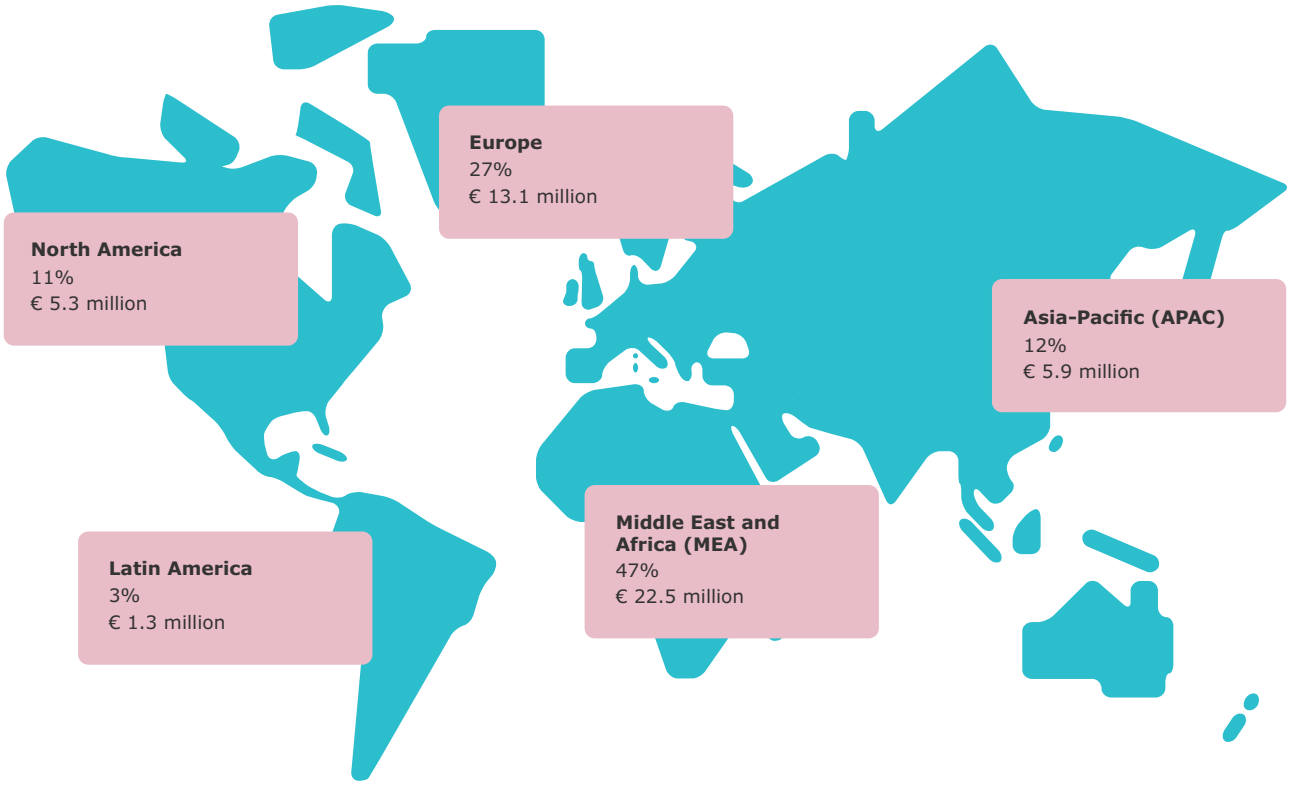
Our Good Deeds

Our community engagement activities are collectively referred to as **Our Good Deeds**. In 2022, we supported **182 projects in 99 countries** in the fields of health, education and culture. In addition, we supported people in need in our local communities and provided disaster relief.

Our community engagement activities – 2022

Our projects include **volunteering initiatives as well as monetary and product donations**. In 2022, we spent a total of around 48 Million Euros on community engagement. Product and in-kind donations accounted for 47% and cash donations for 50% of this amount. Our employees actively participated in 35% of the projects, either through monetary donations or volunteer work. As part of the volunteering initiatives, more around 3,100 employees volunteered around 2,200 hours during their working hours. The amount contributed by the Merck Foundation is not included in this figure. Nor are initiatives that primarily serve to market our products.

Spending on community engagement by target region



Support for health projects

We use our expertise to support health initiatives around the world. In particular, we focus on providing basic and advanced training for health workers, promoting local healthcare infrastructure and educating people on health issues.

We are dedicated to **improving medical care** around the world. Through our Global Medical Education and Academic Organization Relations units, we organize education programs, which aim to broaden the knowledge and competence of scientists and healthcare professionals and, ultimately, improve patient outcomes.

In 2022, the majority of our medical education programs across selected therapeutic areas took place digitally. Additional programs were conducted in a hybrid format (i.e. both in person and with live broadcast or on-demand material) in order to enable more in-person interaction during the milder phase of the pandemic. In particular, we supported 324 Independent/Continuing Medical Education (IME/CME) programs and designed 141 new company-led medical education programs.

We are committed to the prevention and treatment of the neglected tropical disease **schistosomiasis** in school children in sub-Saharan Africa. As part of our Schistosomiasis Elimination Program (**MSEP**) and in partnership with WHO, we donate praziquantel for the prevention and treatment of the neglected tropical disease schistosomiasis in school-aged children in sub-Saharan Africa. In 2022, we supplied 200 Millionen praziquantel tablets. Further details about our MSEP program can be found under **Global Health**.

More information on our health projects can be found on the **Our Good Deeds** website.

Promoting cultural and educational projects

Our projects in the field of education help to improve **school and university education**. In order to spark young people's interest in science, we organize competitions, recognize special achievements and offer opportunities for hands-on learning.

In Germany, we support and hold various **STEM competitions**. For example, we have been supporting the "**Jugend forscht**" competition for more than 35 years as the host of the competition in the German federal state of Hesse. The event took place in hybrid format in 2022. In addition, we support the one-week "Erfinderlabor"(Inventors' Lab) for upper secondary school students as well as the Germany-wide "Tag der Mathematik" (Mathematics Day).

In 2022, as part of our school partnerships, we honored the 65 best students in advanced STEM courses in Darmstadt and the surrounding area for their outstanding high school graduation achievements.

Together with the German journal "Chemie in unserer Zeit", we award the Julius Adolph Stöckhardt prize to teachers. This award, which includes prize money of € 2,000, was granted to a teacher in Bolanden in the German federal state of Rhineland-Palatinate. The award was granted in recognition of a teaching concept for the quantitative concentration analysis of a dye with the aid of smartphones.

Moreover, we actively promote knowledge transfer through new digital educational formats. In a newly developed, virtual and extracurricular format called "100 Minutes for Sustainability" – upper secondary school students discuss sustainability topics in a scientific context.

In 2022, we started the "Kindergartenbox" with the aim of getting children interested in science early on and sparking their curiosity. Our employees can get involved in this experimentation programas part of our volunteer project.

Our student laboratories, which we operated together with TU Darmstadt, once again took place in person as of April 2022. In 2022, a total of 3,661 participants came together at 198 events.

Further information on the programs of our school partnerships can be found on our **website**.

As part of our SPARK™ global volunteer program, employees from our Life Science business sector share their skills and experience with students in order to spark their curiosity in science and inspire them to consider a STEM career.

Two key programs, the Curiosity Cube® and Curiosity Labs™, help us do this. The Curiosity Cube® is a shipping container that has been retrofitted and converted into a mobile science lab. It is equipped for hands-on science experiments designed to spark curiosity in the next generation of scientists. After a two-year hiatus during the pandemic, we relaunched the lab in North America and furthermore held its first European tour in 2022. Throughout the tour, we organized a total of 190 events in 122 communities across 12 countries, reaching more than 31,400 students. In addition, the Curiosity Labs™ program engages students through hands-on, inquiry-based learning. It also applies scientific concepts to "real world" scenarios and connects students with professional scientists – allowing them to learn first-hand about STEM concepts and careers in their very own communities. In 2022, we introduced two new Curiosity Labs™ lessons to our lesson library, focusing on graphene and the soil microbiome.

In 2022, about 1,700 employees volunteered in the Curiosity Cube® and Curiosity Labs™ programs for around 15,400 hours across 28 countries and reached around 43,700 students.

Apart from our educational projects, we promote music and literature. We are convinced that culture inspires people – and that inspiration can lead to progress.

We support the **Deutsche Philharmonie Merck**, a professional symphony orchestra established in 1966. It is an integral part of cultural life in Darmstadt and the surrounding region and regularly tours internationally. In 2022, the orchestra gave 21 concerts before live audiences, four of which were guest performances. The musical Advent calendar, a digital video project, was also continued.

Like music, literature is an important mediator between cultures. We therefore award **five literary prizes worldwide**: in Germany, India, Italy, Japan, and Russia. These awards mainly recognize authors whose work builds bridges between cultures as well as between literature and science.

More information about our cultural and educational projects can be found on our website **Our Good Deeds**.

Supporting environmental initiatives

We are involved in various environmental initiatives and promote **environmental awareness among our employees** through group activities. Our engagement ranges from joint litter collection and tree planting campaigns to supporting organizations that improve access to clean water in remote areas.

More information about the environmental initiatives that we support can be found on our website **Our Good Deeds**.

Disaster relief

In March 2022, we initiated a donation campaign for those affected by the war in Ukraine. Around 4,000 employees participated and donated around € 570,000 via a dedicated donation platform run by the German Red Cross. The company matched these donations. We thus contributed to immediate aid, support and reconstruction programs. In addition, two trucks took more than 40 metric tons of supplies and food from our Darmstadt site to refugees in Wroclaw, Poland. We also collected money and supplies, including various medicines, worth over € 1 Million.

FACTS & FIGURES

Report profile

Our company has a long history of corporate responsibility. This is also reflected in our reporting practices. We have been publishing reports on our efforts to live up to our corporate responsibility since 1993, focusing initially on environmental topics. In 2003, we began reporting on sustainability topics every two years. Since 2016, we have been publishing a report annually.

In this Sustainability Report, we describe the **strategic direction** of our sustainable entrepreneurship as well as focus areas in which we intend to achieve our sustainability goals. We want to inform our **stakeholders** transparently and comprehensively about our activities and successes as well as the challenges we face. This also includes classifying actual and potential positive and negative **impacts** of our business activities.

Effective immediately, we report our progress towards implementing the principles of the United Nations Global Compact via the **portal** dedicated to this purpose. For this reason, our Sustainability Report no longer includes Communication on Progress.

Reporting framework

This report covers fiscal 2022 and pertains to our entire Group, including its 224 fully consolidated companies with personnel in 66 countries. Any deviations from this reporting framework are indicated on a case-by-case basis.

Determining report content

We align the content of our report with the internationally recognized sustainability reporting standards of the Global Reporting Initiative (**GRI**). In doing so, we observe prescribed reporting principles, such as accuracy, balance, topicality, and verifiability. The report has been prepared in accordance with the current **GRI standards 2021**.

Moreover, we are integrating our disclosures pursuant to the **SASB** standards (Sustainability Accounting Standards Board) and the requirements of the Task Force on Climate-Related Financial Disclosures (**TCFD**) into the Sustainability Report. In doing so, we intend to meet the increasing transparency expectations of various investor groups and other stakeholders.

Every year, we carry out a materiality analysis to determine the sustainability topics of relevance to our Group. We have derived the content of this Sustainability Report from the results of the materiality analysis, which can be found together with the materiality matrix under **Materiality analysis**.

Our Executive Board has reviewed and approved the Sustainability Report for 2022.

Data collection and consolidation systems

The 2022 Sustainability Report generally provides non-financial indicators for the entire Group. The majority of the figures we publish reflect the status as of December 31, 2022. We explicitly state when, in individual cases, the information provided deviates from these parameters.

We use a Group-wide electronic data collection system to collect environmental and occupational health and safety data. The data are recorded at site level and are subject to approval in accordance with the dual-control principle. To improve the quality of these data, we support the sites both in optimizing their collection processes and their corresponding quality assurance measures. Moreover, our Corporate Sustainability, Quality and Trade Compliance function takes measures, such as internal EHS audits, to review both the processes and the data provided.

We collect environmental performance indicators across all our production sites. We also record these indicators for the warehouse, research and office locations that are relevant in terms of their environmental impact. This report’s scope of consolidation therefore covers all Group sites that have relevant impacts on the environment.

All employee master data is continually updated in an SAP database. Some employee data are only disclosed for select sites or countries, which are indicated accordingly in the respective text passages.

We use community data management software to track data pertaining to our community engagement activities.

Non-financial statement pursuant to the German Commercial Code

The combined management report of Merck KGaA and the Merck Group for fiscal 2022 includes a combined non-financial statement in accordance with sections 315b and 315c in conjunction with 289b to 289e of the German Commercial Code (HGB) in the form of a separate chapter. The non-financial statement is aligned with the requirements of the Global Reporting Initiative (GRI) standard. It also includes reporting in accordance with the EU Taxonomy Regulation. The content of this non-financial declaration has also been reviewed by the Supervisory Board in accordance with section 111 (2) of the German Stock Corporation Act (AktG).

External audit

KPMG AG Wirtschaftsprüfungsgesellschaft has audited the consolidated financial statements and combined management report of our company for the fiscal year spanning January 1 to December 31, 2022 and has issued an unqualified opinion. The combined non-financial statement contained in the management report underwent an audit with limited assurance by KPMG AG Wirtschaftsprüfungsgesellschaft.

Furthermore, our company also received an **independent audit certificate** with limited assurance for this Sustainability Report for 2022.

The additional content provided on both the company's websites as well as external web pages that are linked in this report are not part of the information assured by KPMG. This also applies to the voluntary information in the **SASB** and **TCFD** indexes.

Contacts:

We welcome your feedback and would be happy to answer any questions.

Merck KGaA
Corporate Sustainability, Quality and Trade Compliance
Group Corporate Sustainability

Maria Schaad
Frankfurter Str. 250
64293 Darmstadt Germany

Tel.: +49 6151 72-0
E-mail: **corporate-sustainability@merckgroup.com**

The current report was published on April 13, 2023. We published the previous Sustainability Report in April 2022. Our next Sustainability Report is scheduled for publication in April 2024.

Gender-neutral language:
It is our aim to ensure that our communication is inclusive and so we strive to use language that is both non-discriminatory and easy to read. This report attempts to use gender-neutral language, which may not yet be consistent in all instances.

Indicators

Economics

Net sales, operating result (EBIT) and research and development costs, by business sector[1]

€ million	Life Science	Healthcare	Electronics	Group
2021				
Net sales[2]	8,992	7,089	3,606	**19,687**
Operating result (EBIT)[2]	2,480	1,823	508	**4,179**
R&D costs[3]	351	1,712	278	**2,426**
2022				
Net sales	10,380	7,839	4,013	22,232
Operating result (EBIT)	2,808	1,895	572	4,474
R&D costs[3]	399	1,694	308	2,521

1 As a non-operating segment, Corporate and Other is not shown here as a separate item, but rather under Segment Reporting in our 2022 Annual Report (p. 247-251).
2 2021 figures have been adjusted due to product reallocations between the Life Science and Electronics business sectors.
3 Not presented are research and development costs of € 119 million (2021: € 85 million) allocated to Corporate and Other. The 2021 figure has been adjusted due to a change in functional allocation between administration expenses, research and development costs as well as other operating expenses.

Business ethics

Compliance training

	2019[1]	2020[2]	2021	2022 Merck Group	2022 thereof Merck KGaA
Total number of persons trained on anti-corruption guidelines[3]	**36,109**	**28,827**	**5,790**	**5,082**	**431**
Total number of employees trained on anti-corruption guidelines	**35,673**	**28,805**	**5,772**	**5,071**	**431**
% of employees trained on anti-corruption	63	50	10	8	5
by employee category[4]					
Number of Role 2+ employees trained on anti-corruption	26,890	27,123	5,284	4,658	430
% of Role 2+ employees trained on anti-corruption	96	90	17	14	9
% of employees below Role 2 trained on anti-corruption	30	6	2	1	0
by region (%)					
Europe	71	51	8	7	5
North America	59	45	11	8	not applicable
Asia-Pacific (APAC)	47	44	12	9	not applicable
Latin America	62	44	8	7	not applicable
Middle East and Africa (MEA)	80	66	12	9	not applicable

1 As of 2019, we changed our reporting method. Previously, our reports covered the active workforce who has been trained on a specific subject during a particular year. In 2019, we report on the active, trained workforce in the company, regardless of whether their training has already taken place prior to the reporting year. The possibility of trend forecasts for year-to-year comparisons is therefore limited.

2 In 2020, we began using our own global learning management tool and therefore now have a different reporting structure. As of 2020, we report on the active workforce that is part of the target group and has completed the training in the reporting year. The possibility of trend forecasts for year-to-year comparisons is therefore limited.

3 Includes contractors, external supervised workers (e.g. temps) and contract partners working on-site who were trained on anti-corruption guidelines (2022: Merck Group: 11; Merck KGaA: 0).

4 Employees whose role level had not yet been recorded in our database by December 31 of the respective reporting year have been allocated to "employees below Role 2".

The (employee) target audience for a specific training is related to the risk level associated with employee positions and Role levels. Target audiences therefore may not include all Group employees and also may vary from training to training.

In order to address the special responsibility held by management personnel, and staff with HR responsibility, trainings on anti-corruption guidelines for these employees are in focus. This applies to all employees rated Role 2+.

Our new Anti-Corruption E-learning was rolled out in 2020. The majority of employees within the defined target group already completed the training in 2020. Therefore, the 2021 completion number is lower as the training was only assigned to new joiners, internal transfers or employees who did not complete the E-learning in 2020.

Internal audits on corruption

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA[1]
Number of audits relating to corruption	50	52	56	55	19
% of audits relating to corruption	65	66	67	70	24

1 Includes global audits which are conducted at the headquarters in Darmstadt and/or the management of the audited function is reporting into KGaA.

Human rights violations[1]

	2019[2]	2020	2021	2022
Number of reported violations of Social and Labor Standards Policy	-	108	121	136
Number of confirmed violations of Social and Labor Standards Policy	-	29	41	68
thereof number of incidents of discrimination	-	2	6	7

1 In 2020, we modified our reporting structure for human rights violations. Previously, we reported on such violations in the "Reported compliance violations" table. Since 2020, we report on violations of our Social and Labor Standards Policy, which was implemented across the entire Group in 2019.
2 Due to our revised reporting practices, we have decided not to report the data from previous years.

Reported compliance violations

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total number of reported compliance violations					
Number of reported compliance incidents	75	81	79	79	3
Number of confirmed cases	30	41	42	28	0
Confirmed cases by category					
Bribery and corruption	9	6	1	2	0
Violation of cartel laws and fair competition rules	0	0	0	1	0
Fraudulent actions against Merck	8	11	6	11	0
Other violations of the Merck Compliance Principles for the relations with business partners	4	0	0	2	0
Other violations of Merck values, internal guidelines or legal requirements	9	24	35	12	0

Data Privacy

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Reported violations of Data Privacy Guidelines	1	3	3	4	1
Customer Privacy[1]					
Total number of substantiated complaints received from outside parties	0	0	0	0	0
Total number of complaints from regulatory bodies	1	0	0	0	0
Total number of identified leaks, thefts, or losses of customer data	1	0	0	0	0

1 These data only reflect incidents classified as significant.

Legal actions

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total number[1] of legal actions pending or completed (for anti-competitive behavior, violations of anti-trust or violations of monopoly legislation)	3	4	4	3	2
pending	3	4	3	2	1
completed	0	0	1	1	1

1 As published in the annual reports, the herein listed total number of legal actions refers to the significant legal risks as per the company's definition. The significance of legal risks is based on potential negative effects on projected financial objectives as well as on the probability of occurrence.

For further information please see our annual reports:
Annual Report 2019, pages 120-122 and pages 243-245, No. 26
Annual Report 2020, pages 125-127 and pages 252-256, No. 27
Annual Report 2021, pages 100-101 and pages 280-284, No. 27
Annual Report 2022, pages 97-98 and pages 282-285, No. 27

Employees

Total number of employees

As of Dec. 31	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total number of employees	**57,071**	**58,127**	**60,348**	**64,243**	**8,485**
Men	32,531	33,204	34,274	36,452	5,510
Women	24,540	24,923	26,074	27,791	2,975

Number of employees by hierarchical level

As of Dec. 31	2019[1]	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total employees	**57,071**	**58,127**	**60,348**	**64,243**	**8,485**
Senior management (Role 6+)	190	193	194	191	66
Middle management (Role 4 & 5)	3,352	3,637	3,831	4,018	886
Low management (Role 3)	9,499	10,286	10,880	11,877	2,277
Other employees (below Role 3)	44,030	44,011	45,443	48,157	5,256
% of women (total)	**43**	**43**	**43**	**43**	**35**
thereof in senior management (Role 6+)	39	42	49	51	18
thereof in middle management (Role 4 & 5)	1,146	1,284	1,413	1,550	281
thereof in low management (Role 3)	4,029	4,352	4,669	5,123	879
thereof other employees (below Role 3)	19,326	19,245	19,943	21,067	1,797
% of men (total)	**57**	**57**	**57**	**57**	**65**
thereof in senior management (Role 6+)	151	151	145	140	48
thereof in middle management (Role 4 & 5)	2,206	2,353	2,418	2,468	605
thereof in low management (Role 3)	5,470	5,934	6,211	6,754	1,398
thereof other employees (below Role 3)	24,704	24,766	25,500	27,090	3,459
by age group					
Up to 29 years old (%)	**15**	**15**	**15**	**15**	**14**
thereof in senior management (Role 6+)	0	0	0	0	0
thereof in middle management (Role 4 & 5)	8	6	8	12	5
thereof in low management (Role 3)	190	199	241	263	61
thereof other employees (below Role 3)	8,362	8,365	8,880	9,651	1,115
30 to 49 years old (%)	**60**	**60**	**60**	**60**	**54**
thereof in senior management (Role 6+)	69	68	63	58	24
thereof in middle management (Role 4 & 5)	1,933	2,032	2,172	2,235	525
thereof in low management (Role 3)	6,516	6,926	7,298	8,007	1,495
thereof other employees (below Role 3)	25,859	25,948	26,624	28,124	2,505
50 years or older (%)	**25**	**25**	**25**	**25**	**32**
thereof in senior management (Role 6+)	121	125	131	133	42
thereof in middle management (Role 4 & 5)	1,411	1,599	1,651	1,771	356
thereof in low management (Role 3)	2,793	3,161	3,341	3,607	721
thereof other employees (below Role 3)	9,809	9,698	9,939	10,382	1,636

1 In 2019, the position assessment had not yet been carried out for employees of Versum Materials as well as of Allergopharma. In the figures, employees whose positions have not been assessed have been allocated to “other employees (below Role 3)”.

Average number of employees by functional area[1]

	2019[2]	2020[3]	2021	2022
Group	**53,645**	**57,612**	**58,731**	**62,565**
thereof women	**23,503**	**24,746**	**25,295**	**27,123**
Production	16,455	17,624	19,782	22,086
thereof women	5,529	6,043	6,541	7,510
Logistics/Supply Chain	4,109	4,298	4,557	4,850
thereof women	1,626	1,734	1,838	1,928
Marketing and Sales/Commercials	13,970	14,127	14,318	15,095
thereof women	6,608	6,787	6,906	7,349
Administration	10,342	11,342	11,824	11,889
thereof women	5,194	5,499	5,718	5,868
Research and Development	7,561	7,504	7,168	7,335
thereof women	4,053	3,996	3,694	3,740
Infrastructure and Other	1,208	2,717	1,083	1,309
thereof women	493	687	598	727

1 The average employee headcount is calculated by adding up all employees at the end of each of the last 13 months, and dividing this total by 13.

2 To calculate the average number of employees in fiscal 2019, the employee headcount of Versum Materials has been included on a pro rata basis as of October 2019 owing to the acquisition. They are allocated to the functional area “Infrastructure and Other”.

3 The average employee headcount for fiscal 2020 incorporates the Allergopharma employees on a pro rata basis up until the end of March 2020 due to the divestment of the Allergopharma business as of March 31, 2020.

Number of employees by region

As of Dec. 31	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total	**57,071**	**58,127**	**60,348**	**64,243**	**8,485**
Europe	**26,715**	**26,587**	**27,217**	**28,244**	**8,485**
Women	11,909	11,743	12,098	12,620	2,975
Women (%)	45	44	44	45	35
Number of employees with temporary contracts	1,137	1,105	988	882	219
% of employees with temporary contracts	4	4	4	3	3
North America	**12,829**	**13,312**	**14,070**	**15,847**	**0**
Women	5,285	5,527	5,800	6,501	not applicable
Women (%)	41	42	41	41	not applicable
Number of employees with temporary contracts	158[1]	139	115	31	not applicable
% of employees with temporary contracts	1[1]	1	1	0	not applicable
Asia-Pacific (APAC)	**12,728**	**13,518**	**14,285**	**15,412**	**0**
Women	5,049	5,425	5,874	6,351	not applicable
Women (%)	40	40	41	41	not applicable
Number of employees with temporary contracts	3,263[1]	3,362	3,660	3,726	not applicable
% of employees with temporary contracts	26[1]	25	26	24	not applicable
Latin America	**3,433**	**3,387**	**3,529**	**3,490**	**0**
Women	1,690	1,630	1,721	1,715	not applicable
Women (%)	49	48	49	49	not applicable
Number of employees with temporary contracts	55	67	12	8	not applicable
% of employees with temporary contracts	2	2	0	0	not applicable
Middle East and Africa (MEA)	**1,366**	**1,323**	**1,247**	**1,250**	**0**
Women	607	598	581	604	not applicable
Women (%)	44	45	47	48	not applicable
Number of employees with temporary contracts	182	420	59	9	not applicable
% of employees with temporary contracts	13	32	5	1	not applicable

1 Employees whose contract type had not yet been recorded in our database by December 31, 2019 were divided up proportionally between the categories “employees with permanent contracts” and “employees with temporary contracts”.

Employees by business sector

As of Dec. 31	2019	2020	2021	2022
Life Science employees	**21,934**	**23,196**	**25,323**	**28,013**
thereof women	9,487	10,175	11,255	12,473
thereof women (%)	43	44	44	45
Healthcare employees	**18,136**	**17,463**	**17,269**	**17,339**
thereof women	9,232	8,788	8,717	8,805
thereof women (%)	51	50	50	51
Electronics employees	**7,329**	**7,228**	**7,432**	**8,262**
thereof women	1,712	1,666	1,704	1,870
thereof women (%)	23	23	23	23

Employees by contract type

As of Dec. 31	2019	2020	2021	2022
Total employees	**57,071**	**58,127**	**60,348**	**64,243**
Number of employees with permanent contracts	52,276[1]	53,034	55,514	59,587
% of employees with permanent contracts	92[1]	91	92	93
thereof women	22,237[1]	22,500	23,640	25,418
thereof women (%)	43[1]	42	43	43
Number of employees with temporary contracts	4,795[1]	5,093	4,834	4,656
% of employees with temporary contracts	8[1]	9	8	7
thereof women	2,303[1]	2,423	2,434	2,373
thereof women (%)	48[1]	48	50	51
full-time employees	54,265	55,220	57,091	60,127
% full-time	95	95	95	94
thereof women	22,208	22,572	23,585	24,872
thereof women (%)	41	41	41	41
part-time employees	2,806	2,907	3,257	4,116
% part-time	5	5	5	6
thereof women	2,332	2,351	2,489	2,919
thereof women (%)	83	81	76	71

1 Employees whose contract type had not yet been recorded in our database by December 31, 2019 were divided up proportionally between the categories “employees with permanent contracts” and “employees with temporary contracts”.

New employees

As of Dec. 31	2019[1]	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total number of new employee hires	**7,924**	**6,669**	**8,960**	**10,682**	**647**
by age group					
up to 29 years old	3,432	2,889	3,679	4,314	318
30 to 49 years old	4,055	3,347	4,610	5,397	302
50 or older	437	433	671	971	27
by gender					
Women	3,622	3,016	4,101	4,569	252
Men	4,302	3,653	4,859	6,113	395
by region					
Europe	2,529	2,160	2,567	3,015	647
North America	1,733	1,789	2,855	3,971	not applicable
Asia-Pacific (APAC)	2,729	2,206	2,803	3,071	not applicable
Latin America	578	396	579	460	not applicable
Middle East and Africa (MEA)	355	118	156	165	not applicable
Rate of new employee hires[2] (%)	**14**	**11**	**15**	**17**	**8**
by age group[3]					
up to 29 years old	43	43	41	40	49
30 to 49 years old	51	50	51	51	47
50 or older	6	7	8	9	4
by gender[3]					
Women	46	45	46	43	39
Men	54	55	54	57	61
by region[3]					
Europe	32	32	29	28	100
North America	22	27	32	37	not applicable
Asia-Pacific (APAC)	34	33	31	29	not applicable
Latin America	7	6	6	4	not applicable
Middle East and Africa (MEA)	5	2	2	2	not applicable

1 These figures exclude the approximately 2,400 Versum Materials and Intermolecular employees who are not classified as new hires because they joined our company as part of the acquisitions.

2 Formula for calculating the rate of new employee hires: Total number of new employee hires divided by number of employees at the end of the fiscal year.

3 Formula for calculating the rate of new employee hires by age/gender/region: New employee hires of the focus group divided by the total number of new employee hires.

Staff turnover[1,2]

	2019	2020[3]	2021	2022 Merck Group	2022 thereof Merck KGaA
Total turnover rate	**9.07**	**8.22**	**10.82**	**10.16**	**2.58**
Turnover rate by gender					
Men	8.69	8.22	10.69	10.40	2.66
Women	9.54	8.22	11.00	9.93	2.44
Turnover rate by age group					
Up to 29 years old	13.13	11.30	16.64	15.91	2.99
30 to 49 years old	8.90	7.74	10.05	9.55	2.26
50 or older	7.03	7.52	9.22	8.05	2.94
Turnover rate by region					
Europe	5.72	5.64	6.00	5.91	2.58
North America	11.02	9.79	15.44	14.33	not applicable
Asia-Pacific (APAC)	13.18	10.60	14.66	12.84	not applicable
Latin America	13.47	11.40	12.95	13.38	not applicable
Middle East and Africa (MEA)	12.14	11.80	16.57	13.04	not applicable
Total number of leavers	**4,863**	**4,721**	**6,354**	**6,358**	**215**
by gender					
Men	2,621	2,697	3,575	3,673	144
Women	2,242	2,024	2,779	2,685	71
by age group					
Up to 29 years old	1,042	974	1,451	1,542	35
30 to 49 years old	2,898	2,677	3,545	3,569	100
50 or older	923	1,070	1,358	1,247	80
by region					
Europe	1,500	1,490	1,601	1,640	215
North America	1,264	1,281	2,078	2,182	not applicable
Asia-Pacific (APAC)	1,484	1,394	2,015	1,905	not applicable
Latin America	459	398	449	467	not applicable
Middle East and Africa (MEA)	156	158	211	164	not applicable

1 The table contains unadjusted turnover rates. The rate excludes employees who pause due to parental leave or a long-term illness, as well as employees who are transitioning to the non-working phase of partial retirement.

2 The employee turnover rate is calculated as follows: Total number of leavers from the past 12 months divided by the average employee headcount multiplied by 100.

3 The figures do not reflect the approximately 500 Allergopharma employees, who were not included in the employee turnover rate due to the divestment of the business.

In 2022, the average length of service for employees Group-wide was 9.2 years (2021: 9.5 years), with 15.4 years (2021: 15.7 years) for Merck KGaA employees.

Work-related accidents[1]

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Lost Time Injury Rate (LTIR = workplace accidents resulting in missed days of work per one million hours worked)	1.6	1.3	1.2	1.2	2.0
by region					
Europe	2.6	2.4	2.1	1.7	2.0
North America	1.0	0.8	1.2	1.7	not applicable
Asia-Pacific (APAC)	0.2	0.1	0.1	0.3	not applicable
Latin America	1.7	0.8	0.4	0.6	not applicable
Middle East and Africa (MEA)	0.0	0.4	0.0	1.1	not applicable
Number of deaths	0	0	0	0	0
by region					
Europe	0	0	0	0	0
North America	0	0	0	0	not applicable
Asia-Pacific (APAC)	0	0	0	0	not applicable
Latin America	0	0	0	0	not applicable
Middle East and Africa (MEA)	0	0	0	0	not applicable
by gender					
Women	0	0	0	0	0
Men	0	0	0	0	0

1 Including supervised temporary staff

Through the LTIR, we record work-related accidents that involve at least one day of missed work. A work-related accident is an injury that results from the type of work, in the course of doing said work, and that has no internal cause. Work-related accidents are considered relevant if they occur on the premises, on business trips, during goods transport, as a result of external influences (e.g. natural disasters), or due to criminal acts involving personal injury. Commuting accidents and accidents during company sporting activities are not included. First-aid incidents are generally not included in the LTIR since these usually do not result in more than one day of missed work.

We aim to sustainably lower our LTIR to 1.0 by 2025.

The LTIR is the key occupational safety indicator for the Merck Group as a whole. Therefore, we do not publish any other indicators such as workplace accidents, lost days or days of absence. The LTIR is not broken down by gender as this differentiation is not relevant to our strategic planning.

For Merck KGaA (about 13% of the employees of the Merck Group), we only report work-related illnesses if these have been certified as an occupational illness by the employers' liability insurance association. In 2022 period, two cases of work-induced illness were verified.

Employees who regularly receive a performance and development evaluation[1]

	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
% of employees who receive a performance and development evaluation	**98**	**98**	**98**	**98**	**100**
by gender					
Women	98	98	98	99	100
Men	98	98	98	98	100
by employee category					
Senior management (Role 6+)	100	100	100	100	100
Middle management (Role 4 & 5)	100	100	100	100	100
Low management (Role 3)	100	100	100	100	100
Other employees (below Role 3)	98	98	98	98	100

1 Employees whose role level had not yet been recorded in our database by December 31 of the reporting year are included under “other employees (below Role 3)”.

Regular feedback and employee performance evaluations are essential to fairly ranking individual performance and to helping all employees follow their own career path at Merck. Our globally uniform Performance Management Process requires annual feedback meetings and performance assessments. Apart from evaluating employee performance, this helps us to identify individual development opportunities.

In Germany, all permanent employees have been participating in the Performance Management Process since 2013. In 2022, a total of 63,043 employees worldwide were involved in the process. The Performance Management Process is coordinated via our online platform HR4You.

Internationality of employees

As of Dec. 31	2019[1]	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Number of nationalities	139	141	142	139	83
Number of nationalities in management positions (Role 4 or above)	73	75	79	78	34
% of non-Germans in management positions (Role 4 or above)	64	66	66	66	13

1 In 2019, the position assessment had not yet been carried out for employees of Versum Materials as well as of Allergopharma.

Employee age by region

As of Dec. 31

Number of employees	Worldwide	North America	Europe	Merck KGaA	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
2021							
Up to 29 years old	9,129	2,219	3,341	1,125	2,912	482	175
thereof women	4,359	961	1,598	415	1,437	265	98
30 to 49 years old	36,157	6,939	15,653	4,288	10,260	2,404	901
thereof women	15,888	2,958	7,224	1,550	4,081	1,225	400
50 or older	15,062	4,912	8,223	2,668	1,113	643	171
thereof women	5,827	1,881	3,276	824	356	231	83
Average age	**41.6**	**43.9**	**43.1**	**43.1**	**37.1**	**40.8**	**39.7**
Total employees	**60,348**	**14,070**	**27,217**	**8,081**	**14,285**	**3,529**	**1,247**
2022							
Up to 29 years old	9,926	2,753	3,530	1,181	2,999	476	168
thereof women	4,637	1,178	1,655	441	1,441	264	99
30 to 49 years old	38,423	7,811	16,216	4,549	11,174	2,333	890
thereof women	16,909	3,278	7,528	1,664	4,498	1,196	409
50 or older	15,894	5,283	8,498	2,755	1,239	681	192
thereof women	6,245	2,045	3,437	870	412	255	96
Average age	**41.6**	**43.3**	**43.1**	**43.1**	**37.3**	**41.1**	**40.3**
Total employees	**64,243**	**15,847**	**28,244**	**8,485**	**15,412**	**3,490**	**1,250**

Age of youngest employee

As of Dec. 31	2019	2020	2021	2022
Age of youngest employee, excluding apprentices	18	18	18	18

Voluntary insurance benefits (voluntarily introduced and (co-) financed)

As of Dec. 31	2019[1]	2020[1]	2021	2022 Merck Group	2022 thereof Merck KGaA
% of employees with healthcare benefits[2]	68	63	64	62	0
% of employees with Group accident insurance[3]	36	41	41	37	6
% of employees with life insurance[4]	58	56	59	59	0
% of employees with disability insurance (short-term and long-term)[5]	39	39	39	43	0

1 The figures exclude Versum Materials and Intermolecular since the integration process was still underway at this point of time.
2 Any spend on voluntarily introduced and (co-) financed healthcare benefits for employees and possibly their dependents. Not taking into consideration any mandatory social security cover (mostly covered by an insurance policy).
3 Any spend on voluntarily introduced and (co-) financed accident insurance that pays a defined amount in case of death or disability caused by a work-related accident (not taking into consideration any mandatory social security cover, e.g. workman's compensation).
4 Any spend on voluntarily introduced and (co-) financed life insurance cover that pays a defined amount of money in case of natural death (not accidental).
5 Any spend on voluntarily introduced and (co-) financed insurance cover that disability pays for salary continuation in case of inability to work caused by an insured incident.

All our employees are where possible covered by either statutory or voluntary accident insurance and health benefits. Employees of Merck KGaA are covered by statutory insurance as stipulated by the regulations in force in Germany.

We offer a company pension in numerous countries along with various programs for supplemental company pensions and survivor's benefits.

The global benefits listed in the table above are designed to provide additional security to our workforce and their families and to improve their quality of life. Benefits represent voluntarily employer-initiated as well as employer-financed assistance to our workforce in addition to the regular compensation package.

Our benefits offer meaningful choices, where possible, to support a diverse workforce and are sensitive to the needs and customs of the employees who use them, regardless of country, age, family status, interests, or values.

Long-term pension obligations and post-employment benefits

€ million	2019	2020	2021	2022
Present value of all defined benefit obligations as of Dec. 31	5,644	6,352	5,995	4,287
Pension expenses	357	408	461	460

Depending on the legal, economic and fiscal circumstances prevailing in each country, different retirement benefit systems are provided for the employees. Generally, these systems are based on the years of service and salaries of the employees. Pension obligations include both defined benefit and defined contribution plans and comprise both obligations from current pensions and accrued benefits for pensions payable in the future. Further information can be found in the note on Provisions for employee benefits (p. 289-295, No. 33) of our Annual Report 2022.

Flexible working hours in Germany

As of Dec. 31	2019	2020	2021	2022
% of employees utilizing the “mywork@Merck” working model	43	48	51	55

In coordination with their teams and supervisors, employees taking advantage of “mywork@merck” can choose when and where they work.

Parental leave[1]

As of Dec. 31	2019	2020	2021	2022
Number of employees with a right to parental leave	375	351	414	423
thereof women (recorded via maternity leave in the respective year)	239	225	255	287
thereof men (recorded via special paternity leave in the respective year)	136	126	159	136
Number of employees who took parental leave[2]	542	538	617	564
thereof women	248	265	278	237
thereof men	294	273	339	327
Number of employees on parental leave who worked part time during their leave	164	104	198	164
thereof women	140	73	172	137
thereof men	24	31	26	27
Number of employees who returned from parental leave[2]	536	529	597	581
thereof women	243	252	273	235
thereof men	293	277	324	346
Return to work rate (%)	98.9	98.3	96.8	103.01
thereof women	98.0	95.1	98.2	99.2
thereof men	99.7	101.5	95.6	105.81
Number of employees still working for Merck one year after their return from parental leave	496	490	556	-[3]
thereof women	218	220	250	-[3]
thereof men	278	270	306	-[3]
Retention rate (%)	92.5	92.6	93.1	-[3]
thereof women	89.7	87.3	91.6	-[3]
thereof men	94.9	97.5	94.4	-[3]

1 Figures pertain only to Merck KGaA (which accounted for around 13% in 2022). Figures are calculated on the basis of the data from one entire year, which also includes those employees who took parental leave during the calendar year but who had not yet returned by Dec. 31.

2 Since parental leave can be taken for a period ranging from one month to three years, it is possible for employees to be recorded across a period of up to four calendar years. This explains why the number of employees on parental leave exceeds the number of employees who have a right to it. It also explains why the “Number of employees who returned from parental leave” might exceed the “Number of employees who took parental leave”.

3 Figure will be available on December 31, 2023.

Employees with disabilities[1] (%)

	2019	2020	2021	2022
Employees with disabilities	4.4	4.7	4.8	4.9

1 Only pertains to Merck KGaA (which accounted for around 13% of Merck Group employees in 2022, calculations based on the German Social Code IX - SGB IX).

Apprentices in Germany

As of Dec. 31	2019	2020	2021	2022
Number of apprentices	589	607	602	595
% of apprentices	4.3	4.6	4.1	4.0

Environment

Total greenhouse gas emissions (Scope 1 and 2 of the GHG Protocol)[1,2]

metric kilotons	2019	2020[3]	2021	2022 Merck Group	2022 thereof Merck KGaA
Total CO_2eq[4] emissions	**621**	**2,028**	**1,843**	**1,667**	**148**
Thereof					
direct CO_2eq emissions (Scope 1)	341	1,706	1,522	1,425	108
indirect CO_2eq emissions[5] (Scope 2)	280	322	321	242	40
Biogenic CO_2 emissions	**13**	**13**	**15**	**13**	**0**

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 Baseline for our emission targets is 2020.
3 Includes Versum Materials as of 2020.
4 eq = equivalent
5 The figures presented here have been calculated in accordance with the market-based method.

Our response to the **CDP Climate change** contains a detailed description of our calculation methods.

We have included the following gases in our calculation of direct and indirect CO_2eq emissions:

Direct CO_2 emissions: CO_2, HFCs, PFCs, CH_4, N_2O, NF_3, SF_6.

Indirect CO_2 emissions: CO_2.

In 2022, we emitted 0.07 kg of CO_2eq per euro of net sales.

Other relevant indirect greenhouse gas emissions (Scope 3 of the GHG Protocol)[1]

in metric kilotons of CO_2eq[2]	2019	2020	2021	2022
Total gross other indirect emissions	**339**	**5,030**	**5,716**	**6,616**
Purchased goods & services (category 1)[3]	n/a	3,040	3,572	4,200
Capital goods (Category 2)[3]	n/a	293	291	388
Fuel- and energy-related emissions, not included in Scope 1 or 2 (category 3)	127	102	143	121
Upstream transportation & distribution (category 4)[4]	n/a	264	264[5]	319[6]
Waste generated in operations (category 5)	50	85	79	85
Business travel (category 6)	87	32	26	78
Employee commuting (category 7)	75	90	94	99
Upstream leased assets (category 8)[7]	0	0	0	0
Downstream transportation & distribution (category 9)[4]	n/a	8	8[5]	6[6]
Processing of sold products (category 10)[8]	0	0	0	0
Use of sold products (category 11)[4]	n/a	1,091	1,213	1,290[9]
End-of-life treatment of sold products (category 12)[4]	n/a	23	23[5]	26[9]
Downstream leased assets (category 13)	0	2	2	2
Franchises (category 14)[10]	0	0	0	0
Investments (category 15)	n/a	0	1	2

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 eq = equivalent

3 The reported figures contain 95-97% of our total spend. The difference stems from smaller sites that are not integrated in our Group-wide purchase volume data. 2020 data are slightly over-reported (approx. 3%) as the currency conversion factor (USD to EUR) from 2021 was used. Non-categorized spends are distributed pro rate to category 1 and 2.

4 Compared to other Scope 3 categories, the screening of the emissions in this category contains more uncertainties. Their impact cannot be estimated more precisely at this time. We are working on improving the accuracy of these data.

5 Due to high efforts for data preparation, we reference 2020 data for 2021.

6 Since 2022, we have applied a new calculation approach – a mix of primary data, distance-based data and a small share of spend-based data. The previous years' figures have not been recalculated retrospectively.

7 Already covered under Scope 1 and 2 emissions

8 Our company produces a huge variety of intermediate products for various purposes. Due to their many applications and our customer structure, the associated greenhouse gas emissions cannot be tracked in a reasonable fashion.

9 Due to high efforts for data preparation, we partly use 2020 data for 2022.

10 This category is not relevant for us as we do not operate franchises, i.e. businesses operating under a license to sell or distribute another company’s goods or services. Out-licensing in the pharmaceutical sector is not regarded as franchising.

Details on the calculation (methodology, assumptions, uncertainties) of the Scope 3 categories can be found in the **Scope 3 document**.

Biogenic emissions (Scope 3), if present, are not being recorded.

Emissions of ozone-depleting substances

metric tons	2019	2020	2021	2022
Total emissions of ozone-depleting substances	1.0	2.2	1.5	1.1
CFC-11eq[1]	0.1	0.1	0.1	0.1

1 CFC-11eq is a unit of measure used to compare the potential of various substances to deplete the ozone. Reference value 1 indicates the potential of CFC-11 to cause the depletion of the ozone layer.

Substances included: R-12, R-22, R-123, R-141b, R-401a, R-402a, R408a, R-409a, R-502, R-503.

Source for the emission factors: Montreal Protocol.

Other air emissions

metric kilotons	2019	2020	2021	2022
Volatile organic compounds (VOC)	0.3	0.3	0.3	0.3
Nitrogen oxide	0.3	0.2	0.3	0.2
Sulfur dioxide	0.010	0.004	0.004	0.005
Dust	0.010	0.010	0.020	0.020

The VOC, nitrogen oxide, sulfur dioxide, and dust emissions reported here are attributable to production activities as well as energy generation. These figures do not include emissions from vehicles. Emissions are determined partially based on measurements and partially based on calculations or estimates. Only some sites are required to measure individual parameters.

Transport of finished goods, by means of transportation

	2019	2020	2021	2022
% truck	70	70	71	73
% boat	19	22	21	19
% airplane	11	8	8	8
% rail	0	0	0	0.03

The figures contain the volumes of the biggest global distribution centers of our Life Science, Healthcare and Electronics business sectors. These figures pertain to the total weight of transported products and indicate the primary means of transport.

In shipping finished goods from our production sites to the local warehouses of our subsidiaries, we have been working to reduce the use of air shipping in favor of sea freight. This change aims to both reduce costs as well as lower transport-related CO_2 emissions.

In 2023, we used rail transportation for the first time.

Energy consumption[1]

In GWh	2019	2020	2021	2022 Merck Group	2022 thereof Merck KGaA
Total energy consumption	**2,178**	**2,374**	**2,454**	**2,432**	**586**
Direct energy consumption	**1,288**	**1,266**	**1,318**	**1,294**	**521**
Natural gas	1,222	1,179	1,232	1,188	492
Liquid fossil fuels[2]	33	52	48	70	29
Biomass and self-generated renewable energy	33	35	38	36	0
Indirect energy consumption	**890**	**1,108**	**1,136**	**1,138**	**65**
Electricity	745	945	958	984	65
Steam, heat, cold	145	163	178	154	0
Total energy sold	**0.1**	**0.2**	**0.1**	**0.01**	**0.0**
Electricity	0.1	0.2	0.1	0.01	0.0
Steam, heat, cold	0.0	0.0	0.0	0.0	0.0
In TJ					
Total energy consumption	**7,839**	**8,546**	**8,834**	**8,755**	**2,110**
Direct energy consumption	**4,637**	**4,558**	**4,745**	**4,658**	**1,876**
Natural gas	4,399	4,244	4,435	4,277	1,771
Liquid fossil fuels[2]	119	187	173	252	104
Biomass and self-generated renewable energy	119	126	137	130	0
Indirect energy consumption	**3,202**	**3,989**	**4,090**	**4,097**	**234**
Electricity	2,682	3,402	3,449	3,542	234
Steam, heat, cold	520	587	641	554	0
Total energy sold	**0.5**	**0.7**	**0.4**	**0.04**	**0.0**
Electricity	0.5	0.7	0.4	0.04	0.0
Steam, heat, cold	0.0	0.0	0.0	0.0	0.0

1 In line with the Greenhouse Gas Protocol, for all previous years energy consumption has been 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 Light and heavy fuel oil, liquefied petroleum gas (LPG), diesel, biodiesel, gasoline and kerosene

We use photovoltaics to produce power at multiple sites.

We currently only record purchased secondary energy – this is primarily electricity and, to a lesser extent, heat/steam/cold. Details on the local energy mix, including the respective percentage of primary energy, renewable energy, etc. are not available. Data on local energy efficiency in electricity or heat generation are not available either. Our production sites are located in countries with a widely varying energy mix.

Our Darmstadt and Gernsheim sites in Germany consume the most energy, representing 24% of our Group-wide total. Here, fossil energy (coal, gas, etc.) accounts for approx. 42%, nuclear energy approx. 13% and renewable energies approx. 45% of the energy mix. Renewable energies account for a higher share of electricity generation at production sites in Switzerland, with nuclear energy taking the lead in France. Based on an estimated global energy efficiency of 37% for the conversion and distribution of generated electricity, this results in a primary energy consumption of 2,659 GWh for 2022. Based on an estimated global energy efficiency of 85% for heat/steam/cold, this results in a primary energy consumption of 181 GWh for 2022. This yields a total primary energy consumption of 2,840 GWh for 2022. (The calculation is based on factors stated in the “Manual for energy management in practice - Systematically reducing energy costs” published by DENA, 12/2012).

In 2022, our energy intensity relative to net sales totaled 0.11 kWh/€.

Water withdrawal

millions of m^3	2019	2020	2021	2022 Merck Group	2022 Water stress areas
Total water withdrawal	**14.0**	**14.0**	**13.5**	**13.2**	**0.17**
Surface water (rivers, lakes)	1.9	1.8	1.9	1.8	0.004
Groundwater	6.8	6.7	6.3	6.3	0.003
Drinking water (from local suppliers)	5.2	5.4	5.2	5.0	0.16
Rain water and other sources	0.05	0.06	0.06	0.06	0.004

These figures do not include the ground water that we use for safety measures at our Gernsheim site in Germany. Here, the water is fed back directly into natural circulation.

The volume of seawater and produced water withdrawn is not significant and is therefore not reported separately.

Water reused

millions of m^3	2019	2020	2021	2022
Water reused	23.3	22.0	23.5	20.7

The recirculating cooling system at our Darmstadt, Germany facility accounts for the majority of reused water as it allows the water to be re-utilized multiple times. The volume of reused water is thus greater than the total volume of consumed water.

Wastewater volume

	2019	2020	2021	2022 Merck Group	2022 Water stress areas
Total wastewater volume (millions of m^3)	13.2	13.4	13.3	12.4	0.130
Wastewater discharged directly	9.3	9.2	9.5	8.6	0.000
Wastewater discharged to third parties	3.8	4.1	3.8	3.8	0.110

The volume of seawater and groundwater discharged is not significant and is therefore not reported separately.

Discrepancies between total wastewater volume and the sum of directly discharged wastewater and wastewater sent to third parties arise from other disposal methods, which, however, only result in minor amounts of wastewater. Direct discharges correspond to the “freshwater” classification of the GRI. Indirect discharges correspond to their “other water” classification.

Wastewater quality[1]

	2019	2020	2021	2022
Chemical oxygen demand (metric tons of O_2)	1,568	1,482	1,426	1,013
Phosphorous (metric tons)	12	15	11	10
Nitrogen (metric tons)	481	291	392	363
Nickel (kg)	32	30	37	46
Lead (kg)	34	37	15	16
Cadmium (kg)	6	6	3	5
Mercury (kg)	0	0	1	0

1 In alignment with ICCA reporting requirements specified by Cefic, we track heavy metal emissions from lead, cadmium, nickel, and mercury.

The wastewater treatment plant at our site in Gernsheim, Germany also treats wastewater from a neighboring municipality. The communal wastewater from this municipality is included in the emissions stated in the table.

Emissions are determined partially based on measurements and partially based on calculations or estimates. Only some sites are required to measure individual parameters.

These figures reflect the wastewater as it is when it leaves our facilities. Some of the substances in the water are then later removed by third-party purification plants before the water is ultimately discharged into the ecosystem.

Hazardous and non-hazardous waste

metric kilotons	2019	2020	2021	2022
Total waste	**244**	**229**	**214**	**371**
Hazardous waste disposed[1]	44	38	34	36
Non-hazardous waste disposed[1]	41	34	33	31
Hazardous waste recycled[2]	78	90	84	84
Non-hazardous waste recycled[2]	81	67	63	220

1 Disposed = incineration (without energy recovery) and landfill
2 Recycled = incineration (with energy recovery) and material recycling

Exported/Imported hazardous waste

metric kilotons	2019	2020	2021	2022
Exported[1]	4.3	4.0	4.6	3.7
Imported	0.000	0.000	0.000	0.000

1 Disposal primarily within the EU and the United States.

In 2022, approx. 3% of hazardous waste was shipped internationally.

Waste by disposal method

	2019	2020	2021	2022
Total waste (metric kilotons)	**244**	**229**	**214**	**371**
Disposed waste	**85**	**72**	**66**	**67**
Landfilled waste	26	17	18	20
Incinerated waste	59	55	48	47
Recycled waste	**159**	**157**	**148**	**304**
Material recycling	132	133	124	274
Waste-to-energy	27	24	24	30
Recycling rate (%)	**65**	**69**	**69**	**82**

As in previous years, the total waste generated continues to be heavily influenced by the waste from construction and remodeling activities. Construction, excavation and demolition waste accounted for 53% of our waste in 2022. Around 181 metric kilotons of construction, excavation and demolition waste was recycled.

Significant spills

	2019	2020	2021	2022
Total number of significant spills	0	0	0	2

Community

Spending on community engagement

€ million	2019	2020	2021	2022
Total spending	46.2	53.6	43.3	48.1

We calculate the value of pharmaceutical product donations according to the WHO Guidelines for Medicine Donations; for other product donations, we apply their fair value.

The main reasons for the decline in total spending in 2021 were lower Covid-19-related donations as well as a drop in demand for praziquantel tablets in the affected countries due to Covid-19.

Community engagement spending by region[1]

	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
2021					
€ million	10.8	5.0	7.2	0.6	19.7
%	25	12	17	1	45
2022					
€ million	**13.1**	**5.3**	**5.9**	**1.3**	**22.5**
%	**27**	**11**	**12**	**3**	**47**

1 This table presents the regions across the globe in which we support initiatives. For projects that benefit multiple regions, we have calculated the amount per region by dividing the project spending evenly per country.

Focus of our local community engagement[1]

%	2019	2020	2021	2022
Health	33	36	33	33
Education and culture	38	43	45	32
Environment	3	1	2	5
Disaster relief	2	1	2	8
Other	24	19	18	22

1 Based on number of projects

Motivations for our community engagement[1]

%	2019	2020	2021	2022
Charitable activities	6	23	21	12
Community investment	91	72	76	86
Commercial initiatives in the community	3	5	3	2

1 Based on total spending on all projects

We categorize the motivations for our activities based on the London Benchmarking Group model as well as the guidelines of the Bertelsmann Foundation for corporate social responsibility. Projects that primarily aim to make improvements within the community are classified as community investment.

Initiatives that are predominantly aimed at company-relevant factors such as image or personnel recruitment are classified as commercial initiatives in the community. Charitable activities cover any other projects that benefit a charitable organization, but cannot be listed under either of the other two motivation categories due to missing data or their narrow scope.

GRI content index

General disclosures

GRI Standard and disclosure	Reference	Omission reason and Comment
2-1 Organizational details	Company profile List of shareholdings	
2-2 Entities included in the organization's sustainability reporting	Report profile List of shareholdings	
2-3 Reporting period, frequency and contact point	Report profile	
2-4 Restatements of information	Report profile	
2-5 External assurance	Assurance report	
2-6 Activities, value chain and other business relationships	Company profile Supply chain management Mica supply chain Report profile Fundamental information about the Group Macroeconomic and sector-specific environment	
2-7 Employees	Report profile Indicators: employees	Comment: We report employee figures in line with internal management categories, possibly independent of the region. The employment format "non-guaranteed hours employees" stipulated by the GRI does not represent a relevant employment category for us and is therefore not reported.
2-8 Workers who are not employees	Career with us	Omission reason: Information unavailable/ incomplete Comment: Workers who are not employees (e.g. supervised temporary staff) are not logged in our employee data base.
2-9 Governance structure and composition	Sustainability strategy & goals Management Statement on corporate governance Procedures of the Boards Objectives of the Supervisory Board	

2-10 Nomination and selection of the highest governance body	Procedures of the Boards Objectives of the Supervisory Board Promote women in management positions Diversity policy	
2-11 Chair of the highest governance body	Statement on corporate governance	
2-12 Role of the highest governance body in overseeing the management of impacts	Sustainability strategy & goals Report of the supervisory board Risk & opportunities	
2-13 Delegation of responsibility for managing impacts	Sustainability strategy & goals	
2-14 Role of the highest governance body in sustainability reporting	Report profile	
2-15 Conflicts of interest	Information on corporate governance practices	
2-16 Communication of critical concerns	Sustainability strategy & goals Compliance management Indicators: business ethics Information on corporate governance practices	Omission reason: Confidentiality constraints Comment: Due to the sensitive nature of critical concerns, these figures are only for internal use (except where external reporting is legally required). Significant additions to or changes in the risk register are disclosed in due course to the Executive Board on an ad hoc basis, as per stipulations in the risk policy.
2-17 Collective knowledge of the highest governance body	Sustainability strategy & goals Information on corporate governance practices	
2-18 Evaluation of the performance of the highest governance body	Procedures of the boards Articles of association Compensation report	
2-19 Remuneration policies	Compensation report	
2-20 Process to determine remuneration	Compensation report Voting results Annual General Meeting 2022	
2-21 Annual total compensation ratio	Career with us	Omission reason: Not applicable Comment: Competitive salaries and additional benefits not only increase our attractiveness as an employer; they also motivate our people and build loyalty to the company. The compensation we offer is based on market analyses in the relevant field, the value of the respective position, and the employee's skill set and performance.

		Compensation and benefits across the entire Group are defined by our global HR policies and frameworks. As far as possible, we strive to offer all our employees comparable compensation structures. Furthermore, we monitor our compliance with minimum standards. We do not consider the information required under GRI 2-21 to be relevant to assessing the fairness of our compensation structures.
2-22 Statement on sustainable development strategy	Letter from the CEO	
2-23 Policy commitments	Governance Compliance management Human rights	
2-24 Embedding policy commitments	Governance Compliance management Human rights Information on corporate governance practices	
2-25 Processes to remediate negative impacts	Sustainability strategy & goals Materiality analysis Compliance management Human rights Indicators: business ethics Report on Risks and Opportunities	
2-26 Mechanisms for seeking advice and raising concerns	Sustainability strategy & goals Stakeholder dialogue Compliance management	
2-27 Compliance with laws and regulations	Other provisions Compliance management Interactions with health systems Indicators: business ethics	
2-28 Membership associations	Stakeholder dialogue	
2-29 Approach to stakeholder engagement	Stakeholder dialogue	
2-30 Collective bargaining agreements	Corporate culture	

GRI Standard and disclosure	Reference	Omission reason and Comment
3-1 Process to determine material topics	Materiality analysis	
3-2 List of material topics	Materiality analysis	

Economic Standards

GRI Standard and disclosure	Reference	Omission reason and Comment
GRI 201: Economic Performance 2016		
3-3 Management of material topics	Company profile Statement on Corporate Governance Economic performance Pension schemes Report on Risks and Opportunities	
201-1 Direct economic value generated and distributed	Indicators: employees Indicators: economics Indicators: community Consolidated income statement Consolidated cash flow statement Operating activities Personnel expenses	
201-2 Financial implications and other risks and opportunities due to climate change	Climate action Water management TCFD index CDP Climate change CDP Water security Report on Risks and Opportunities	Comment: We report in detail on various aspects of climate change as part of our participation in the CDP (formerly known as the Carbon Disclosure Project).
201-3 Defined benefit plan obligations and other retirement plans	Indicators: employees Pension schemes	
201-4 Financial assistance received from government	Accounting: Property, plant and equipment Research and development costs	
GRI 202: Market Presence 2016		
3-3 Management of material topics	Career with us Corporate culture	
202-1 Ratios of standard entry level wage by gender compared to local minimum wage	Career with us Diversity, equity & inclusion	Omission reason: Not applicable Comment: This indicator is not relevant to us, which is why we do not collect data on the ratio of the standard entry-level wage compared to the local minimum wage. Our Global Rewards Policies apply to all our subsidiaries worldwide and guarantee a systematic compensation structure. Both base pay and short-term variable compensation are oriented to the median

		base pay of the relevant reference market. Our pay ranges are reviewed on an annual basis and reflect market conditions. We adhere to local minimum wage levels.
202-2 Proportion of senior management hired from the local community	Career with us Diversity, equity & inclusion	Omission reason: Not applicable Comment: We promote both the recruitment of local employees and their international deployment at all hierarchical levels. However, we do not record the proportion of local managers, as this is not relevant for the strategic personnel management of our company.
GRI 203: Indirect Economic Impacts 2016		
3-3 Management of material topics	Global health Prices of medicines Health capacity & awareness	
203-1 Infrastructure investments and services supported	Global health Health capacity & awareness Mica supply chain Community engagement	
203-2 Significant indirect economic impacts	Prices of medicines Health capacity & awareness Community engagement Materiality analysis	
GRI 204: Procurement Practices 2016		
3-3 Management of material topics	Sustainable supply chain management Mica supply chain Human rights	
204-1 Proportion of spending on local suppliers	Sustainable supply chain management	Omission reason: Not applicable Comment: We have no internal guidelines stipulating that preference be given to local vendors in allocating contracts and therefore do not collect this type of data. In some countries, local laws require contracts to be awarded to regional suppliers.
GRI 205: Anti-corruption 2016		
3-3 Management of material topics	Compliance management Responsible interactions with health systems	
205-1 Operations assessed for risks related to corruption	Compliance management Indicators: business ethics Report on Risks and Opportunities	

205-2 Communication and training about anti-corruption policies and procedures	Compliance management Indicators: business ethics	
205-3 Confirmed incidents of corruption and actions taken	Compliance management Indicators: business ethics Report on Risks and Opportunities	Comment: As applicable, we report on risks from litigation and legal proceedings in our Report on Risks and Opportunities.
GRI 206: Anti-competitive Behavior 2016		
3-3 Management of material topics	Compliance management Responsible interactions with health systems	
206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	Indicators: business ethics Report on Risks and Opportunities	

Environmental Standards

GRI Standard and disclosure	Reference	Omission reason and Comment
GRI 301: Materials 2016		
3-3 Management of material topics	Sustainable products & packaging	
301-1 Materials used by weight or volume	Sustainable products & packaging	Omission reason: Information unavailable/ incomplete
		Comment: We only record the weight of the raw materials that are directly used in our pharmaceuticals and chemicals, which came to 416 metric kilotons in 2022 (2021: 400 metric kilotons). Additionally, we utilize operating supplies and packaging materials, such as folding boxes, glass bottles and ampules.
301-2 Recycled input materials used	Sustainable products & packaging	Omission reason: Information unavailable/ incomplete
		Comment: In all our endeavors, we attempt to efficiently utilize materials and recycle as much as possible. Where feasible, we use recycled materials (in packaging, for instance.) Overall, our company considers material consumption to be a major concern. There are few opportunities to use recycled material in our production processes because our business model puts us at the start of the value chain. We therefore do not collect such data at Group level. Individual data and measures are reported in the respective chapters.
301-3 Reclaimed products and their packaging materials	Sustainable products & packaging	Omission reason: Information unavailable/ incomplete
		Comment: Owing to the multitude of products we supply and the minimal comparability of our various initiatives, we do not collect quantitative data at the Group level. The individual measures taken by our various businesses are reported in the respective chapters.
GRI 302: Energy 2016		
3-3 Management of material topics	Climate action Environmental protection Sustainable products & packaging	
302-1 Energy consumption within the organization	Climate action Indicators: environment	

302-2 Energy consumption outside of the organization	Climate action Indicators: environment	**Omission reason**: Information unavailable/ incomplete **Comment**: To date, we have not been tracking energy consumption outside our organization, but we are working to create more transparency on our Scope 3 emissions. Going forward, we will also make efforts to track energy consumption outside of our organization.
302-3 Energy intensity	Climate action Indicators: environment	
302-4 Reduction of energy consumption	Climate action Indicators: environment	
302-5 Reductions in energy requirements of products and services	Climate action Indicators: environment	
GRI 303: Water and Effluents 2018		
3-3 Management of material topics	Water management Environmental protection	
303-1 Interactions with water as a shared resource	Water management	
303-2 Management of water discharge-related impacts	Water management	
303-3 Water withdrawal	Water management Indicators: environment	**Omission reason**: Not applicable **Comment**: The amount of seawater and produced water withdrawn is not significant and is therefore not reported separately. The breakdown of the water withdrawal sources in accordance with the GRI categories “fresh water” and “other water” is not relevant for us owing to the high water quality required and is therefore not reported.
303-4 Water discharge	Water management Indicators: environment	**Omission reason**: Not applicable **Comment**: The volume of seawater and groundwater discharged is not significant and is therefore not reported separately.
303-5 Water consumption	Water management Indicators: environment	**Omission reason**: Not applicable **Comment**: Most of the water we use in our production streams is released back into aquatic ecosystems through direct or indirect discharges. Evaporation processes are not a material part of our manufacturing operations. At individual manufacturing sites, we incorporate small amounts of water into our products. We do not operate processes that withdraw water in relevant volumes from

		the aquatic environment like incorporation in products or evaporation into the atmosphere. Neither do we operate technical installations like water reservoirs with the purpose of water withdrawal. Thus, water consumption is not material to our company.
GRI 304: Biodiversity 2016		
3-3 Management of material topics	Environmental protection Sustainable products & packaging	
304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	Environmental protection	Omission reason: Information unavailable/ incomplete Comment: Our land use planning takes biodiversity impacts into account, with appropriate protective measures being taken on a case-by-case basis.
304-2 Significant impacts of activities, products and services on biodiversity	Environmental protection Materiality analysis	
304-3 Habitats protected or restored	Environmental protection	
304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations	Environmental protection	Omission reason: Information unavailable/ incomplete Comment: Our land use planning takes biodiversity impacts into account, with appropriate protective measures being taken on a case-by-case basis.
GRI 305: Emissions 2016		
3-3 Management of material topics	Climate action Environmental protection	
305-1 Direct (Scope 1) GHG emissions	Climate action Indicators: environment	
305-2 Energy indirect (Scope 2) GHG emissions	Climate action Indicators: environment	
305-3 Other indirect (Scope 3) GHG emissions	Climate action Indicators: environment CDP Climate change	
305-4 GHG emissions intensity	Climate action Indicators: environment	
305-5 Reduction of GHG emissions	Climate action Sustainable products & packaging Indicators: environment CDP Climate change	
305-6 Emissions of ozone-depleting substances (ODS)	Indicators: environment	

305-7 Nitrogen oxides (NO_X), sulfur oxides (SO_X), and other significant air emissions	Indicators: environment	
GRI 306: Waste 2020		
3-3 Management of material topics	Waste & recycling Environmental protection	
306-1 Waste generation and significant waste-related impacts	Waste & recycling	
306-2 Management of significant waste-related impacts	Waste & recycling	
306-3 Waste generated	Waste & recycling	
306-4 Waste diverted from disposal	Indicators: environment	
306-5 Waste directed to disposal	Waste & recycling Indicators: environment	
GRI 306: Effluents and Waste 2016		
306-3 Significant spills	Waste & recycling	
GRI 308: Supplier Environmental Assessment 2016		
3-3 Management of material topics	Sustainable supply chain management Mica supply chain	
308-1 New suppliers that were screened using environmental criteria	Sustainable supply chain management	**Omission reason**: Not applicable **Comment**: We do not report the “percentage of new suppliers that were screened using environmental criteria” since this information is not relevant for managing our sustainable supplier management activities.
308-2 Negative environmental impacts in the supply chain and actions taken	Sustainable supply chain management Mica supply chain	**Omission reason**: Information unavailable/ incomplete **Comment**: We work closely with our strategic suppliers and monitor various risk domains via our supplier risk assessments. In this context, we help our suppliers to achieve improvements and to set up risk mitigation measures. The GRI disclosures 308-2-d and 308-2-e are not reported since they are not relevant for us.

Social Standards

GRI Standard and disclosure	Reference	Omission reason and Comment
GRI 401: Employment 2016		
3-3 Management of material topics	Career with us Corporate culture Human rights	
401-1 New employee hires and employee turnover	Indicators: employees	
401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	Career with us	**Omission reason**: Information unavailable/ incomplete **Comment**: Part-time employees receive the same eligibility for employee benefits as full-time workers. Employees with temporary contracts, however, may not be entitled to all company benefits, such as a company pension.
401-3 Parental leave	Career with us Indicators: employees	
GRI 402: Labor/Management Relations 2016		
3-3 Management of material topics	Corporate culture	
402-1 Minimum notice periods regarding operational changes	Corporate culture	**Omission reason**: Not applicable **Comment**: The regulations on periods of notice vary worldwide. We apply the rules that are in force locally. There is no need for us to track periods of notice at Group level.
GRI 403: Occupational Health and Safety 2018		
3-3 Management of material topics	Health & safety Plant, process & transport safety	**Comment**: The disclosures under GRI 403 pertain to our employees as well as supervised temporary staff. They do not include employees of contractors. Consequently, not all the employee groups specified by GRI are reflected.
403-1 Occupational health and safety management system	Health & safety	
403-2 Hazard identification, risk assessment, and incident investigation	Health & safety Plant, process & transport safety	
403-3 Occupational health services	Health & safety	

403-4 Worker participation, consultation, and communication on occupational health and safety	Health & safety	Comment: Occupational health and safety committees are required by law in Germany. All employees of Merck KGaA are therefore represented by such committees, which operate at site level. These employees represent around 13% of our global workforce. The majority of sites outside Germany also have health and safety committees to represent their employees. The organization of these committees is the responsibility of our individual sites. Health and safety issues are governed Group-wide by our EHS Policy. The organizational implementation of this policy is the responsibility of our individual sites and is subject to local laws and regulations. Merck KGaA, which accounts for approximately 13% of our global workforce, has company agreements in place on occupational health and safety.
403-5 Worker training on occupational health and safety	Health & safety Plant, process & transport safety	
403-6 Promotion of worker health	Health & safety	
403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	Health & safety Human rights Plant, process & transport safety	
403-8 Workers covered by an occupational health and safety management system	Health & safety	
403-9 Work-related injuries	Health & safety Plant, process & transport safety Indicators: employees	Comment: We have identified the lost time injury rate (LTIR) as a key performance indicator for our company.
403-10 Work-related ill health	Health & safety Plant, process & transport safety Indicators: employees	Omission reason: Information unavailable/ incomplete Comment: At Group level, we do not collect data regarding the types of potential work-related illnesses or fatalities. Our sites may collect data on the incidence of occupational illness as needed.

GRI 404: Training and Education 2016		
3-3 Management of material topics	Career with us Diversity, equity & inclusion Corporate culture	
404-1 Average hours of training per year per employee	Career with us	Omission reason: Not applicable Comment: We do not keep track of the average hours our employees spend on vocational training and continuing education because this indicator does not have any bearing on the quality or success of our efforts.
404-2 Programs for upgrading employee skills and transition assistance programs	Sustainable supply chain management Human rights Product-related crime Plant, process & transport safety Career with us Corporate culture Diversity, equity & inclusion Environmental protection	
404-3 Percentage of employees receiving regular performance and career development reviews	Career with us Indicators: employees	
GRI 405: Diversity and Equal Opportunity 2016		
3-3 Management of material topics	Diversity, equity & inclusion Career with us Corporate culture Objectives of the Supervisory Board with respect to its composition	
405-1 Diversity of governance bodies and employees	Diversity, equity & inclusion Indicators: employees The Executive Board The Supervisory Board Objectives of the Supervisory Board with respect to its composition Diversity policy	

405-2 Ratio of basic salary and remuneration of women to men	Career with us Diversity, equity & inclusion	**Omission reason**: Not applicable **Comment**: As a core principle, our compensation systems and processes do not distinguish between women and men. The salaries we offer are predicated on the respective job description and are based on our Global Job Catalog, which has fixed salary bands that are identical for men and women. Variable salary components that fall under performance-based compensation are paid based on whether mutually agreed targets have been achieved. A performance management system governs this process.
GRI 406: Non-discrimination 2016		
3-3 Management of material topics	Diversity, equity & inclusion Corporate culture	
406-1 Incidents of discrimination and corrective actions taken	Diversity, equity & inclusion Indicators: business ethics	
GRI 407: Freedom of Association and Collective Bargaining 2016		
3-3 Management of material topics	Sustainable supply chain management Human rights Corporate culture	
407-1 Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	Sustainable supply chain management Human rights	
GRI 408: Child Labor 2016		
3-3 Management of material topics	Sustainable supply chain management Mica supply chain Human rights	
408-1 Operations and suppliers at significant risk for incidents of child labor	Sustainable supply chain management Human rights Mica supply chain	
GRI 409: Forced or Compulsory Labor 2016		
3-3 Management of material topics	Sustainable supply chain management Mica supply chain Human rights	
409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor	Sustainable supply chain management Mica supply chain Human rights	

GRI 410: Security Practices 2016		
3-3 Management of material topics	Human rights Sustainable supply chain management	
410-1 Security personnel trained in human rights policies or procedures	Human rights	**Omission reason**: Information unavailable/ incomplete **Comment**: As part of our Security Governance Framework, we plan to integrate human rights aspects even more strongly into security-relevant processes, for instance in training courses for security personnel. To this end, we will offer webinars on the topic of human rights on the established Security Academy platform in regular intervals, among other things.
GRI 414: Supplier Social Assessment 2016		
3-3 Management of material topics	Sustainable supply chain management Mica supply chain Human rights	
414-1 New suppliers that were screened using social criteria	Sustainable supply chain management	**Omission reason**: Not applicable **Comment**: We do not report the “percentage of new suppliers that were screened using social criteria” since this information is not relevant for managing our sustainable supplier management activities.
414-2 Negative social impacts in the supply chain and actions taken	Sustainable supply chain management Mica supply chain	
GRI 415: Public Policy 2016		
3-3 Management of material topics	Stakeholder dialogue	
415-1 Political contributions	Stakeholder dialogue	
GRI 416: Customer Health and Safety 2016		
3-3 Management of material topics	Clinical studies Patient safety Product-related crime Chemical product safety Sustainable products & packaging Report on Risks and Opportunities	
416-1 Assessment of the health and safety impacts of product and service categories	Chemical product safety	

416-2 Incidents of non-compliance concerning the health and safety impacts of products and services	Clinical studies Chemical product safety Report on Risks and Opportunities	Comment: As applicable, we report on risks from litigation and legal proceedings in our Report on Risks and Opportunities.
GRI 417: Marketing and Labeling 2016		
3-3 Management of material topics	Compliance management Responsible interactions with health systems Patient safety Chemical product safety	
417-1 Requirements for product and service information and labeling	Patient safety Chemical product safety	Comment: All pharmaceuticals are subject to reporting and notification requirements, which we fulfill. In line with the statutory requirements, we provide our customers with easily accessible and relevant information on the safe handling and use of our chemical products. We report on the individual requirements in the respective chapters.
417-2 Incidents of non-compliance concerning product and service information and labeling	Patient safety Chemical product safety Report on Risks and Opportunities	
417-3 Incidents of non-compliance concerning marketing communications	Report on Risks and Opportunities	Comment: As applicable, we report on risks from litigation and legal proceedings in our Report on Risks and Opportunities.
GRI 418: Customer Privacy 2016		
3-3 Management of material topics	Data protection & cyber security Clinical studies	
418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data	Data protection & cyber security Clinical studies Indicators: business ethics	

Additional material topics

Additional material topics		
Clinical studies		
3-3 Management of material topics	Clinical studies	
Animal welfare		
3-3 Management of material topics	Animal welfare	
Bioethics		
3-3 Management of material topics	Bioethics	
Digital ethics		
3-3 Management of material topics	Digital ethics	
Health for all (incl. prices of medicines, acceess to health, health awareness)		
3-3 Management of material topics	Global health Open innovation sharing Prices of medicines Health capacity & awareness	
Product-related crime		
3-3 Management of material topics	Product-related crime	

SASB index

SASB disclosure 2022

We integrated our Sustainability Accounting Standards Board (SASB) disclosures into our 2022 Sustainability Report. In addition to our disclosures pursuant to the SASB standard “Biotechnology & Pharmaceuticals”, we voluntarily report information for the “Medical Equipment & Supplies” and “Semiconductors” industries. We thus cover our three business sectors. With our voluntary SASB disclosures, we want to meet the increasing demands of our investors and other stakeholders. The reported data provide transparent, financially material and meaningful information on sustainability. To meet the evolving interests and requirements of our stakeholders in the future as well, we will continuously develop and expand our SASB reporting.

The SASB disclosures were not part of the **limited assurance engagement** conducted by an independent auditor for our 2022 Sustainability Report.

Biotechnology & Pharmaceuticals

Safety of Clinical Trial Participants		
HC-BP-210a.1	Discussion, by world region, of management process for ensuring quality and patient safety during clinical trials	Clinical studies Patient safety R&D: Positions & Policies (Healthcare)
HC-BP-210a.2	Number of FDA Sponsor Inspections related to clinical trial management and pharmacovigilance that resulted in: (1) Voluntary Action Indicated (VAI) and (2) Official Action Indicated (OAI)	There were no FDA Good Clinical Practice (GCP) sponsor inspections related to clinical trials in 2022.
HC-BP-210a.3	Total amount of monetary losses as a result of legal proceedings associated with clinical trials in developing countries	Not reported
Access to Medicines		
HC-BP-240a.1	Description of actions and initiatives to promote access to health care products for priority diseases and in priority countries as defined by the Access to Medicine Index	Global Health Open innovation sharing Prices of medicines Health capacity & awareness
HC-BP-240a.2	List of products on the WHO List of Prequalified Medicinal Products as part of its Prequalification of Medicines Programme (PQP)	Currently there is no product on the list.
Affordability & Pricing		
HC-BP-240b.1	Number of settlements of Abbreviated New Drug Application (ANDA) litigation that involved payments and/or provisions to delay bringing an authorized generic product to market for a defined time period	Not reported

HC-BP-240b.2	Percentage change in: (1) average list price and (2) average net price across U.S. product portfolio compared to previous year	The following overview shows the percentage change in the average list price (WAC) of our Healthcare US product portfolio compared to the previous year: ◆ Rebif®: 4.0% ◆ Mavenclad®: 4.7% ◆ Bavencio®: 3.3% ◆ Gonal-f®: 6.4% ◆ Cetrotide®: 6.4% ◆ Ovidrel®: 6.4% ◆ Serostim®: 6.1% ◆ Saizen®: 4.9% See also: Prices of medicines
HC-BP-240b.3	Percentage change in: (1) list price and (2) net price of product with largest increase compared to previous year	We only report the percentage change in average list price across our U.S. product portfolio. The largest increase compared with the previous year amounted to 6.4% (Gonal-f®, and Ovidrel®).
Drug Safety		
HC-BP-250a.1	List of products listed in the Food and Drug Administration's (FDA) MedWatch Safety Alerts for Human Medical Products database	See FDA website: ◆ Safety information and adverse event reporting program ◆ Adverse event reporting system (FAERS) public dashboard
HC-BP-250a.2	Number of fatalities associated with products as reported in the FDA Adverse Event Reporting System	See FDA website: Adverse event reporting system (FAERS) public dashboard
HC-BP-250a.3	Number of recalls issued, total units recalled	In 2022, we had three drug product recalls in total. None of these recalls was global; they affected individual countries only. None of the recalls was related to the USA. None of the recalls was related to serious injury or fatality, all were either Class II or III. According to our internal policies, any recall type is reported and discussed with the relevant national regulatory authority, including the U.S. FDA. All recall processes are managed under a Global Standard Procedure "Product Recall and Withdrawal Management" which is applied worldwide for medicinal products (pharmaceutical prescription, biological) and devices.
HC-BP-250a.4	Total amount of product accepted for take-back, reuse, or disposal	We do not take back products for reuse. In line with legal requirements in each country we take back products for disposal.
HC-BP-250a.5	Number of FDA enforcement actions taken in response to violations of current Good Manufacturing Practices (cGMP), by type	We had no such FDA enforcement actions in 2022.

Counterfeit Drugs		
HC-BP-260a.1	Description of methods and technologies used to maintain traceability of products throughout the supply chain and prevent counterfeiting	Product-related crime
HC-BP-260a.2	Discussion of process for alerting customers and business partners of potential or known risks associated with counterfeit products	We have implemented processes and procedures to ensure that all suspected counterfeit medicines are assessed by a team of experts. The scope of any notification that we provide is the outcome of strategic alignment between relevant functions (e.g. Medical, Procurement, Legal, Quality, Corporate Security, Regulatory Affairs, Communications). Levels of details and format of any notification, including the HA information and collaboration, dedicated patient communication, information/ awareness communication to distributors, pharmacies, physicians etc. about the presence of counterfeit or diverted products in the market, is decided on a case-by-case basis in accordance with the identified risks and taking into account corporate, legal and regulatory responsibilities. See also: Product-related crime
HC-BP-260a.3	Number of actions that led to raids, seizure, arrests, and/or filing of criminal charges related to counterfeit products	Product-related crime
Ethical Marketing		
HC-BP-270a.1	Total amount of monetary losses as a result of legal proceedings associated with false marketing claims	Not reported
HC-BP-270a.2	Description of code of ethics governing promotion of off-label use of products	Responsible interactions with health systems
Employee Recruitment, Development & Retention		
HC-BP-330a.1	Discussion of talent recruitment and retention efforts for scientists and research and development personnel	Career with us Diversity, equity and inclusion
HC-BP-330a.2	(1) Voluntary and (2) involuntary turnover rate for: (a) executives/senior managers, (b) mid-level managers, (c) professionals, and (d) all others	Indicators: employees

Supply Chain Management		
HC-BP-430a.1	Percentage of (1) entity's facilities and (2) Tier I suppliers' facilities participating in the Rx-360 International Pharmaceutical Supply Chain Consortium audit program or equivalent third-party audit programs for integrity of supply chain and ingredients	Our Healthcare business sector does not participate in the Rx-360 International Pharmaceutical Supply Chain Consortium. However, our facilities are frequently audited by the respective health authorities of the countries in which we distribute our healthcare products. As a major supplier to the pharmaceutical industry, our Life Science business sector participates in the Rx-360 audit program. Regarding our supplier base, we have access to sustainability audits and assessments of our suppliers through our membership in the industry initiatives “Together for Sustainability” (TfS) and “Pharmaceutical Supply Chain Initiative” (PSCI). See also: Supply chain management
Business Ethics		
HC-BP-510a.1	Total amount of monetary losses as a result of legal proceedings associated with corruption and bribery	Not reported
HC-BP-510a.2	Description of code of ethics governing interactions with health care professionals	Responsible interactions with health systems Compliance management
Activity metrics		
HC-BP-000.A	Number of patients treated	In 2022, our Healthcare medicines were used to treat around 94 million patients. Additionally, we donated more than 200 million praziquantel tablets, enough to treat schistosomiasis in more than 80 million school-aged children in 2022. See also:Global Health
HC-BP-000.B	Number of drugs (1) in portfolio and (2) in research and development (Phases 1-3)	Our Healthcare portfolio Research & Development (Healthcare) Our Healthcare pipeline

Medical Equipment & Supplies

Affordability & Pricing		
HC-MS-240a.1	Ratio of weighted average rate of net price increases (for all products) to the annual increase in the U.S. Consumer Price Index	Not reported
HC-MS-240a.2	Description of how price information for each product is disclosed to customers or to their agents	Our Life Science portfolio
Product Safety		
HC-MS-250a.1	Number of recalls issued, total units recalled	We conduct monthly reviews of key performance quality indicators which include a review of multiple quality metrics including number of recalls. Quarterly trends are evaluated and reported through management reviews. In 2022, there were no recalls for our Life Science business.
HC-MS-250a.2	List of products listed in the FDA's MedWatch Safety Alerts for Human Medical Products database	In 2022, there were no Life Science products listed in the FDA's MedWatch Safety Alerts for Human Medical Products database.
HC-MS-250a.3	Number of fatalities related to products as reported in the FDA Manufacturer and User Facility Device Experience database	In 2022, there were no fatalities related to our Life Science products reported to the FDA's MedWatch Safety Alerts for Human Medical Products database.
HC-MS-250a.4	Number of FDA enforcement actions taken in response to violations of current Good Manufacturing Practices (cGMP), by type	Life Science received one U.S. FDA 483 forms in 2022.
Ethical Marketing		
HC-MS-270a.1	Total amount of monetary losses as a result of legal proceedings associated with false marketing claims	Not reported
HC-MS-270a.2	Description of code of ethics governing promotion of off-label use of products	Before any products can be purchased from our Life Science platform, we use a customer screening process to guard against the purchase of our products for illegal purposes. Core steps of this process cover data sourcing, hazard assessment, safe-use/risk assessment and labels/safety data sheets. Besides our own process, we cooperate with responsible authorities in the U.S. (FBI and the Bureau of Alcohol, Tobacco, Firearms and Explosives, ATF), as well as international authorities (Interpol). If we become aware that any of our Life Science products is used beyond our marketed intention, we evaluate the situation to determine whether to continue sales or not. Proper use of our products is included in our Terms and Conditions under Use of products.

		See also: Chemical product safety
Product Design & Lifecycle Management		
HC-MS-410a.1	Discussion of process to assess and manage environmental and human health considerations associated with chemicals in products, and meet demand for sustainable products	We assess environmental, human health, and further sustainability aspects of chemical products that we are sourcing and/or producing and selling. Furthermore, we screen our entire Life Science portfolio against growing demands arising from external stakeholders. For example, in alignment with the European Chemicals Strategy for Sustainability (CSS) we work towards a more sustainable product portfolio. Our Product Stewardship Council drives the transformation of existing products by considering appropriate measures like the substitution of chemical substances. Regarding future products, the selection of benign substance alternatives is done during ideation and early R&D through our Design for Sustainability program. In support of this, we have developed a tool which monitors latest chemical regulations. Besides flagging banned substances, it also flags substances that are already considered critical but not yet regulated. In addition to this, experts of the Chemicals Regulations teams are directly consulted for further insights and advice. See also: Chemical product safety Sustainable products & packaging
HC-MS-410a.2	Total amount of products accepted for take-back and reused, recycled, or donated, broken down by: (1) devices and equipment and (2) supplies	Since 2013, we have been partnering with Seeding Labs, a non-profit organization dedicated to equipping scientists in resource-limited countries with scientific equipment and support. In 2022, we donated 434 items of scientific equipment valued at more than $699,148. See also: Sustainable products & packaging Sustainability and Social Business Innovation

Supply Chain Management		
HC-MS-430a.1	Percentage of (1) entity's facilities and (2) Tier I suppliers' facilities participating in third-party audit programs for manufacturing and product quality	As a major supplier to the pharmaceutical industry, our Life Science business participates in the Rx-360 audit program. The Life Science facilities are regularly audited by customers and respective health authorities for regulated products. (1) Rx-360 audit programs are conducted across the Life Science business on a multi-year cycle with approximately 15% of our manufacturing facilities audited annually. (2) Approximately 5% of our tier 1 supplier facilities participated in third party audit programs such as Rx-360.
HC-MS-430a.2	Description of efforts to maintain traceability within the distribution chain	Product safety (Life Science) Quality & regulatory management (Life Science)
HC-MS-430a.3	Description of the management of risks associated with the use of critical materials	Sustainable supply chain management
Business Ethics		
HC-MS-510a.1	Total amount of monetary losses as a result of legal proceedings associated with bribery or corruption	Not reported
HC-MS-510a.2	Description of code of ethics governing interactions with health care professionals	Responsible interactions with healthcare systems Compliance management
Activity metrics		
HC-MS-000.A	Number of units sold by product category	Not reported

Semiconductors

Greenhouse Gas Emissions		
TC-SC-110a.1	(1) Gross global Scope 1 emissions	Indicators: environment
	(2) amount of total emissions from perfluorinated compounds	CDP Climate change
TC-SC-110a.2	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Climate action
Energy Management in Manufacturing		
TC-SC-130a.1	(1) Total energy consumed	Indicators: environment
	(2) percentage grid electricity	40% See also: Indicators: environment
	(3) percentage renewable	Indicators: environment
Water Management		
TC-SC-140a.1	(1) Total water withdrawn	Indicators: environment
	(2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Water management CDP Water Security
Waste Management		
TC-SC-150a.1	Amount of hazardous waste from manufacturing, percentage recycled	Indicators: environment
Employee Health & Safety		
TC-SC-320a.1	Description of efforts to assess, monitor, and reduce exposure of employees to human health hazards	Health and safety
TC-SC-320a.2	Total amount of monetary losses as a result of legal proceedings associated with employee health and safety violations	Not reported
Recruiting & Managing a Global & Skilled Workforce		
TC-SC-330a.1	Percentage of employees that are (1) foreign nationals and	Indicators: employees
	(2) located offshore	Indicators: employees

Product Lifecycle Management		
TC-SC-410a.1	Percentage of products by revenue that contain IEC 62474 declarable substances	Not reported
TC-SC-410a.2	Processor energy efficiency at a system-level for: (1) servers,	Not applicable
	(2) desktops,	Not applicable
	(3) laptops	Not applicable
Materials Sourcing		
TC-SC-440a.1	Description of the management of risks associated with the use of critical materials	Research & Development (Electronics) Report on risks and opportunities
Intellectual Property Protection & Competitive Behavior		
TC-SC-520a.1	Total amount of monetary losses as a result of legal proceedings associated with anti-competitive behavior regulations	Not reported
Activity metrics		
TC-SC-000.A	Total production	Not reported
TC-SC-000.B	Percentage of production from owned facilities	Not reported

TCFD index

TCFD disclosure 2022

The Task Force on Climate-related Financial Disclosures (**TCFD**) aims to develop consistent, comparable and accurate climate-related financial disclosures. Companies can use this data to provide information to investors, lenders, insurers, and other **stakeholders**, allowing them to assess and analyze climate-related risks and opportunities. TCFD reporting was not part of the **limited assurance engagement** conducted by an independent auditor for our 2022 Sustainability Report.

Our TCFD disclosure is based on our responses to the **CDP Climate Change answers** as well as a qualitative climate scenarios which we conducted this year for the first time. Going forward, we plan to continue expanding our quantitative disclosures on climate-related topics as we increasingly integrate the TCFD recommendations into our businesses.

Governance

TCFD core elements	Required information	CDP climate change questionnaire 2022 reference
Disclose the organization's governance around climate-related risks and opportunities.	A. Executive Board's oversight of climate-related risks and opportunities	C1.1a (p.4) C1.1b (p.5) C2.2 (p.11)
	B. Management's role in assessing and managing climate related risks and opportunities	C1.2a (p.7)
Related Chapters	Sustainability strategy Climate action	

Strategy

TCFD core elements	Required information	CDP climate change questionnaire 2022 reference
Disclose the actual and potential impacts of climate related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	A. Description of climate-related opportunities and risks the organization has identified over the short, medium and long term	C2.1a (p.9) C2.2 (p.11) C2.3a (p.16)
	B. Impact of climate-related risks on the organization's businesses, strategy, and financial planning	C3.3 (p.29) C3.4a (p.32)
	C. Resilience of the organization's strategy, taking into consideration different climate-related scenarios	C3.2b (p.28)
Related Chapters	Sustainability strategy Climate action	

Risk management

TCFD core elements	Required information	CDP climate change questionnaire 2022 reference
Disclose how the organization identifies, assesses, and manages climate-related risks.	A. Organization's processes for identifying and assessing climate-related risks	C2.2 (p.11) C2.2a (p.13)
	B. Organization's processes for managing climate-related risks	C2.2 (p.11)
	C. Integration of processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management	C2.2 (p.11)
Related Chapters	Compliance management Climate action	

Metrics and targets

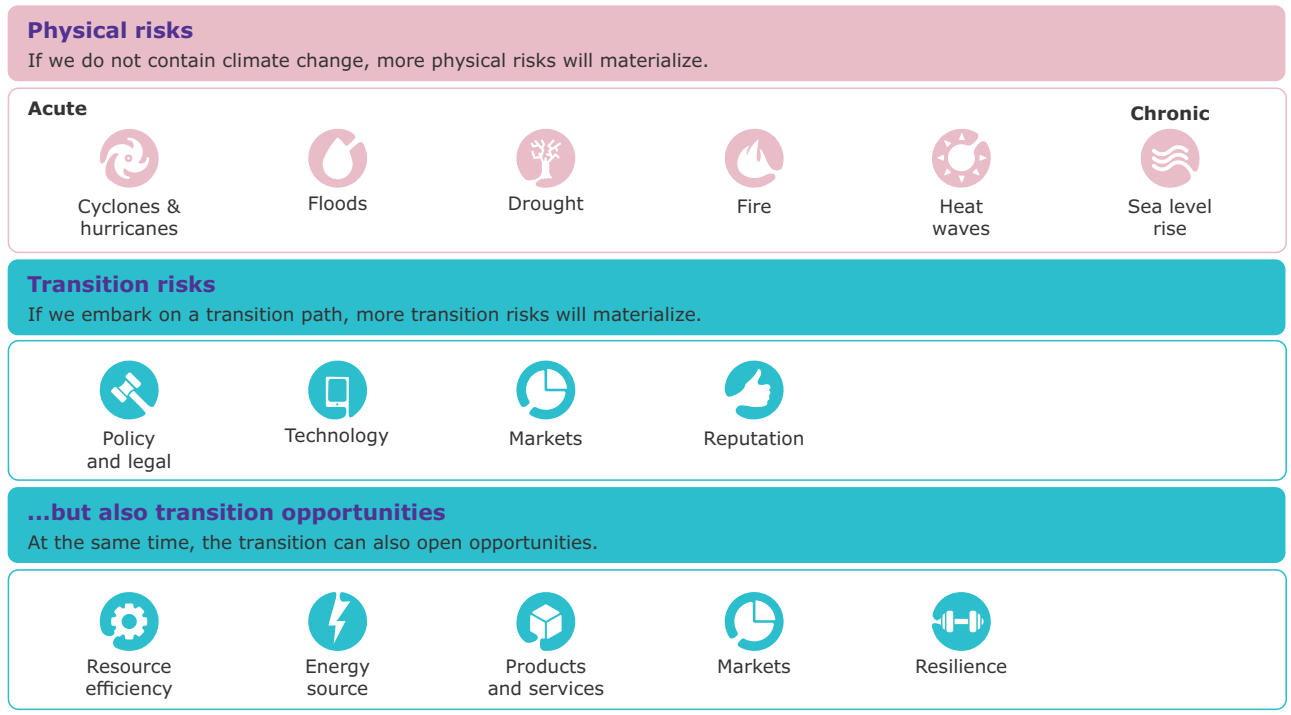
TCFD core elements	Required information	CDP climate change questionnaire 2022 reference
Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	A. Metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process	C4.1 (p.32) C4.2 (p.39) C5 (p.44) C7 (p.63) C8 (p.66)
	B. Disclosure of Scope 1, Scope 2, and Scope 3 greenhouse gas (GHG) emissions and the related risks	C6.1 (p.49) C6.3 (p.49) C6.5 (p.51) C7 (p.63)
	C. Targets used by the organization to manage climate-related risks and opportunities and performance against targets	C4.1 (p.32) C4.1a (p.33) C4.2 (p.39)
Related Chapters	Climate action Environmental protection Water management Waste & recycling	

Climate Scenarios

In 2022, we developed climate scenarios in accordance with the recommendation of the Task Force on Climate-Related Financial Disclosure (TCFD). Climate scenarios allow us to identify, assess and manage climate-related risks and opportunities we could face under different hypothetical futures. Risks and opportunities were developed in collaboration with our three business sectors Life Science, Healthcare and Electronics, as well as other functions like Finance, Environmental Health and Safety, and Group Corporate Sustainability. The outcome of the exercise was shared with the Merck Sustainability Board and the business sectors. Results can be taken into consideration in relevant processes, projects and decisions in the future. Additionally, we plan to quantify the effects of these climate-related risks and opportunities on our business sectors in 2023 to assess their financial impact.

We developed two qualitative scenarios, not considering mitigating measures, by asking ourselves the following questions: What are the relevant risk and opportunity drivers in the scenario narratives? What are the most relevant business activities along our value chain? And what risks and opportunities are most relevant for us along the value chain in 2030 and 2050? For both scenarios, we rely on the climate impact pathways, developed by an external consultancy, which describe the translation of risk types into material business impacts.

Physical and transitional risks and opportunities



Source: PWC

The physical risk and opportunities analysis (4 °C)

The physical risk and opportunities analysis focuses on various physical hazards that could occur due to continuous and increased production of greenhouse gas emissions and a global temperature increase of 4 °C. In this scenario, the aggravation of physical risks is expected to be the most extreme. Physical risks are analyzed at country level along the value chain and at site level for selected production sites. Ten production sites were selected based on their financial impact, regulatory requirements and geographic distribution.

Within the value chain, own operations could be most affected by physical risks, including flooding, sea level rises and tropical cyclones. Even if supplier countries are affected by climate-related physical risks, the impact for our company could be limited because of a diversified supply chain. As an opportunity, Merck could also benefit by helping to contain the spread of infectious diseases that increase in line with changing climatic conditions.

The transition risk and opportunities analysis (1.5 °C)

Climate-related transition risks were analyzed along the whole value chain for suppliers, customers, transport as well as our own operations. Risks were assessed on a business sector basis for Life Science, Healthcare and Electronics, taking into consideration regional and product-specific differences. The scenario represents the ambitious target of the Paris Agreement to reach net zero emissions by 2050.

Supply Chain

In the applied transition scenario, the phasing out of fossil fuels and the increased use of renewable energies could lead to decreasing energy costs. These decreasing energy costs may lead to opportunities along the supply chain with lower prices for transport and packaging, as well as for chemicals and pharmaceutical raw materials. However, organic chemicals are an exception, as their production consumes large amounts of energy, and they are partially reliant on fossil fuels. This reliance on fossil fuels could result in CO_2 costs and thus, indirectly, influence procurement prices. At the same time, the use of renewable energies and more efficient production processes in the chemical sector could limit the impact of increasing CO_2 costs. As the demand for electronic products is expected to increase due to continued digitalization and automation, the prices for special equipment in this sector could increase, affecting supply costs for our Electronics business sector.

Production process

In the production process, electricity costs have a high cost share. As electricity costs are decreasing in the transition risk scenario, this could represent an opportunity. Also gas is used in production; however, prices are expected to remain relatively constant. The main risk is therefore expected to be increasing prices for greenhouse gas emissions if gas usage remains at the same level. In this scenario, the disposal of hazardous waste will show a significant price increase after 2030.

Demand

Demand in Life Science for solutions and equipment as well as demand in the Healthcare sector could be positively impacted by higher gross domestic product and population growth, enabling broader sections of the population to gain access to medical solutions, medical equipment and pharmaceuticals. In the Electronics business sector, demand for the whole product range could further increase. Growing demand for semiconductors and other electronic products is linked to a generally increasing trend towards digitalization and automation across sectors. Semiconductors are already the main growth driver for the Electronics business sector. In addition, growth in the real estate and automotive sectors driven by economic and population growth could positively impact the Display Solutions and Surface Solutions business units.

Assurance report

Limited Assurance Report of the Independent Auditor regarding Sustainability Information[1]

To the Executive Board of Merck KGaA, Darmstadt

We have performed an independent limited assurance engagement on the qualitative and quantitative disclosures on sustainability in the “Sustainability Report 2022” (further “Sustainability Report”), published at **https://www.merckgroup.com/en/sustainability-report/2022/**, of Merck KGaA, Darmstadt, (further “Company” or “Merck”) for the period from January 1 to December 31, 2022.

It was not part of our engagement to review product- or service-related information, references to external information sources, expert opinions, future-related statements and information contained in the SASB and TCFD indices in the Sustainability Report.

As described in the Sustainability Report, Merck engaged external providers to perform assessments and audits. The evaluation of the adequacy and accuracy of the conclusions from these external assessments was not part of our limited assurance engagement.

Management’s Responsibility

The legal representatives of the Company are responsible for the preparation of the Sustainability Report in accordance with the Reporting Criteria. Merck applies the principles and standard disclosures of the Standards of the Global Reporting Initiative (GRI) in combination with the Corporate Accounting and Reporting Standard (Scope 1 and Scope 2) and the Corporate Value Chain Standard (Scope 3) of the Greenhouse Gas Protocol initiative by the World Resources Institute and the World Business Council for Sustainable Development (WBCSD) as Reporting Criteria (further “Reporting Criteria”).

The responsibility of the legal representatives includes the selection and application of appropriate methods to prepare the Sustainability Report and the use of assumptions and estimates for individual qualitative and quantitative sustainability disclosures which are reasonable under the circumstances. Furthermore, the legal representatives are responsible for the internal controls they deem necessary for the preparation of the Sustainability Report that is free of – intended or unintended – material misstatements.

Independence and Quality Assurance on the Part of the Auditing Firm

In performing this engagement, we applied the legal provisions and professional pronouncements regarding independence and quality assurance, in particular the Professional Code for German Public Auditors and Chartered Accountants (in Germany) and the quality assurance standard of the German Institute of Public Auditors (Institut der Wirtschaftsprüfer, IDW) regarding quality assurance requirements in audit practice (IDW QS 1).

Practitioner’s Responsibility

It is our responsibility to express a conclusion on the Sustainability Report based on our work performed within a limited assurance engagement.

We conducted our work in the form of a limited assurance engagement in accordance with the International Standard on Assurance Engagements (ISAE) 3000 (Revised): “Assurance Engagements other than Audits or Reviews of Historical Financial Information” and the International Standard on Assurance Engagements (ISAE) 3410: “Assurance Engagements on Greenhouse Gas Statements”, published by IAASB. Accordingly, we have to plan and perform the assurance engagement in such a way that we obtain limited assurance as to whether any matters have come to our attention that cause us to believe that the Sustainability Report of the Company for the period from January 1 to December 31, 2022 has not been prepared, in all material respects, in accordance with the Reporting Criteria. We do not, however, issue a separate conclusion for each disclosure. As the assurance procedures in a limited assurance engagement are less comprehensive than in a reasonable assurance engagement, the level of assurance obtained is substantially lower. The choice of assurance procedures is subject to the auditor’s own judgement.

Within the scope of our engagement, we performed, amongst others, the following procedures:

- Inquiries of group-level personnel responsible for the materiality analysis in order to understand the processes for determining material topics and respective reporting boundaries of Merck
- A risk analysis, including media research, to identify relevant information on Merck’s sustainability performance in the reporting period
- Evaluation of the design and implementation of systems and processes for the collection, processing and monitoring of the sustainability disclosures included in the scope of this engagement, including the consolidation of data
- Inquiries of group-level personnel who are responsible for determining and consolidating disclosures and for performing internal controls, including the explanatory notes
- Inspection of selected internal and external documents
- Analytical evaluation of data and of the trends of quantitative disclosures as reported at group level by all sites
- Evaluation of local data collection, validation and reporting processes as well as of the reliability of reported data based on a sample of the sites in Nanke in Taiwan, Milwaukee & Sheboygan in USA and in Darmstadt in Germany in the form of virtual meetings
- Use of the insights and relevant work regarding audit procedures performed for the group and statutory audit of the (consolidated) financial statements for the fiscal year 2022 of Merck KGaA for the information and indicators that were derived from those consolidated financial statements
- Evaluation of the consistency of GRI Standards in accordance with option “In accordance with GRI” as reported by Merck with the qualitative and quantitative disclosures in the Sustainability Report
- Assessment of the overall presentation of the disclosures

In our opinion, we obtained sufficient and appropriate evidence for reaching a conclusion for the assurance engagement.

Conclusion

Based on the procedures performed and the evidence obtained, nothing has come to our attention that causes us to believe that the qualitative and quantitative disclosures on sustainability for the period from January 1 to December 31, 2022, published in the Sustainability Report, have not been prepared, in all material respects, in accordance with the Reporting Criteria.

Restriction of use/General Engagement Terms

This assurance report is issued for purposes of the Executive Board of Merck KGaA, Darmstadt, only. We assume no responsibility with regard to any third parties.

Our assignment for the Executive Board of Merck KGaA, Darmstadt, and professional liability as described above was governed by the General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften (Allgemeine Auftragsbedingungen für Wirtschaftsprüfer und Wirtschaftsprüfungsgesellschaften) in the version dated January 1, 2017 (**https://www.kpmg.de/bescheinigungen/lib/aab_english.pdf**). By reading and using the information contained in this assurance report, each recipient confirms notice of the provisions contained therein, including the limitation of our liability as stipulated in No. 9, and accepts the validity of the General Engagement Terms with respect to us.

Mannheim, March 20, 2023

KPMG AG
Wirtschaftsprüfungsgesellschaft
[Original German version signed by:]

Beyer
Wirtschaftsprüfer
[German Public Auditor]

Brokof
Wirtschaftsprüferin
[German Public Auditor]

[1] Our engagement applied to the German version of the Sustainability Information contained in the Sustainability Report 2022. This text is a translation of the Independent Assurance Report issued in German, whereas the German text is authoritative.

Glossary

(Q)SAR

Structure-activity relationship (SAR) and quantitative structure-activity relationship (QSAR) models – collectively referred to as (Q)SARs – are mathematical models that can be used to predict the physicochemical, biological and environmental fate properties of compounds from the knowledge of their chemical structures. These models are available for free or as commercial software.

Arpraziquantel

Arpraziquantel is a potential pediatric treatment option for schistosomiasis. It aims to close the treatment gap of preschool-age children affected by this disease. It contains the pharmacologically active enantiomer of praziquantel. The new tablet is small, orally dispersible – it dissolves in the mouth or in water –, has taste properties that are acceptable for children, and withstands the challenges presented by a tropical climate.

BIPOC

This abbreviation stands for Black, Indigenous, and people of color. Pronounced “bye-pock,” this is a term specific to the United States, intended to center the experiences of Black and Indigenous groups and demonstrate solidarity between communities of color.

Big Data

Large data sets that may be analyzed computationally to reveal patterns, trends and associations, especially relating to human behavior and interactions.

Biodiversity

The diversity of ecosystems, habitats and landscapes on earth, the diversity of species, and the genetic diversity within a biological species or population

CAPA

The quality management process CAPA (Corrective and Preventive Action) is used to systematically analyze deviations or errors as well as to take corrective and preventive action.

CO2 equivalents

CO_2 equivalents (CO_2eq) indicate how much a specified quantity of a specific greenhouse gas contributes to the greenhouse effect using the global warming potential of carbon dioxide as a reference.

CRISPR/Cas

A biomolecular method for targeting, cutting and editing the DNA of an organism (gene editing). Experts think this technique has great potential for curing diseases or generating plants and animals with new traits.

Cyber security risk

Potential loss or harm resulting from a cyberattack or data breach related to technical infrastructure, use of technology.

Cyberattack

Any intentional unauthorized attempt to access an information and communication technology or operational technology systems for malicious purposes such as data theft or modification, malware injection, or the initiation of additional attacks.

Data breach

Data breaches are defined as unintentional loss, destruction or unauthorized or unlawful processing of personal data

Dimethyl sulfoxide (DMSO)

A non-toxic organosulfur compound with the formula $(CH_3)2SO$. This colorless liquid is an important polar aprotic solvent that dissolves both polar and nonpolar compounds and is miscible in a wide range of organic solvents as well as water. It is used in various medicinal applications and in research.

Due diligence

Due diligence means a risk analysis exercised with particular care that is done in preparation for a business transaction, e.g. an acquisition.

EHS

Short for “Environment, Health and Safety”, this refers to environmental management, health protection and occupational safety throughout a company.

End-user declaration

An end-user declaration is a binding customer declaration regarding the intended use of a product.

Endemic countries

Countries in which a certain disease, in many cases an infectious disease, is prevalent.

Environmental, Social, and Corporate Governance (ESG)'

ESG represents an evaluation of a company’s collective conscientiousness for environmental, social and governance factors. An ESG score is compiled from data collected surrounding specific metrics related to intangible assets within the enterprise.

Equality Act

A pending United States law with a special focus on LGBTQI+ people (lesbian, gay, bisexual, transgender, queer or questioning, intersex, and additional self-identifying members of the community). It prohibits discrimination on the basis of gender, sexual orientation and gender identity.

Exposure assessment

Exposure assessment aims to make a quantitative or qualitative estimate of the dose / concentration of the substance to which humans and the environment are or may be exposed. Exposure assessment under REACH consists of two steps: 1) development of exposure scenarios and 2) exposure estimation. These steps must be iterated until it can be concluded that the resulting exposure scenarios would ensure adequate control of risks upon implementation.

Freshwater

Water containing 1,000 mg or less of dissolved solids per liter.

GEM

This abbreviation stands for the National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. This initiative offers MS (Master of Science) and Ph.D. (Doctor of Philosophy) level students an access to Engineering and Science firms and Universities in the US.

GHS

Short for “Globally Harmonized System of Classification and Labelling of Chemicals”. This refers to an international standard system to classify chemicals. It covers labeling as well as safety data sheets.

Germline

The cell sequence from which the germ cells (oocytes and sperm) arise within the individual development of multicellular animals and humans. The somatic cell lines branching off from the germ line form the body (the soma).

Good clinical practice (GCP)

An international quality standard issued by the “International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use” (ICH) that describes the responsibilities and expectations of all involved participants (e.g. sponsors, investigators, and ethics committees) in the conduct of clinical studies. The standard covers aspects of the design, implementation, oversight, recording, and reporting of clinical studies.

Good distribution practice (GDP)

An EU guideline that regulates the proper distribution of medicinal products for human use.

Good manufacturing practice (GMP)

A system for ensuring that products are consistently manufactured and controlled according to quality standards. These guidelines are used in the production of medicines, active pharmaceutical ingredients and cosmetics, as well as food and animal feed.

Greenhouse gases

Gases in the atmosphere that contribute to global warming. They can be either naturally occurring or caused by humans (such as CO_2 emissions generated by burning fossil fuels).

ISO 14001

This international environmental management

standard sets globally recognized requirements for an environmental management system.

ISO 45001

This international standard defines globally recognized requirements for an occupational health and safety management system.

ISO 50001

This international standard defines globally recognized requirements for energy management systems.

ISO 9001

This international standard defines globally recognized requirements for a quality management system.

In vitro

In vitro (latin for in glass, or in the glass) studies are performed outside of a living organism with microorganisms, cells, or biological molecules. In-vivo studies in contrast are performed in a living organism.

In vivo

Latin for “within the living”, this term describes processes that take place within a living organism.

Investigational product

A pharmaceutical form of an active ingredient or placebo being tested or used as a reference in a clinical trial, including approved as well as unapproved products when used or assembled (formulated or packaged) in a way different from the approved form, when used for an unapproved indication, or when used to gain further information about an approved use.

LGBTQI+

This abbreviation stands for Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Intersex, and additional self-identifying members of the community.

LOC

This abbreviation stands for Leaders of Color.

LTIR

The lost time injury rate measures the number of accidents resulting in missed days of work (one or more days) per one million working hours.

Liquid crystals (LC)

A hybrid of a crystalline and liquid state. In general, molecules are perfectly arranged only when in a solid crystal state, in contrast to the liquid state, when they move around chaotically. However, liquid crystals are a hybrid of the two states: Although they are liquid, they exhibit a certain crystalline arrangement. Their rod-shaped molecules align themselves like a shoal of fish. In addition, they respond to the electromagnetic waves of light like tiny antennae. Therefore, such swarms of molecules can either allow specially prepared “polarized” light to pass through, or they can block it. This takes place in the pixels of liquid crystal displays. A similar phenomenon occurs in liquid crystal windows, which can provide shade against sunlight.

Location-based approach

Location-based figures are calculated on the basis of the average emission factors of the area in which the electricity consumption takes place. In most cases, this method utilizes the national average.

Managing director

This individual is responsible for ensuring that our subsidiaries, including R&D and manufacturing centers, comply with all applicable laws and regulations, including applicable internal guidelines.

Market-based approach

Marked-based figures are calculated on the basis of emission factors provided by electricity suppliers specifically for the electricity they sell.

NMP

N-Methyl-2-pyrrolidone is a polar aprotic compound that is miscible with water and has good solvency properties. NMP is used in the manufacture of polymers, semiconductors, batteries, and pharmaceuticals. The ECHA (European Chemicals Agency) has designated NMP as a substance of very high concern (SVHC) and included it in the candidate list for authorization.

Neglected tropical disease (NTD)

Neglected tropical diseases affect more than 1 billion people in primarily poor populations living in tropical and subtropical climates in low- and middle-income countries. NTDs include schistosomiasis, intestinal worms, trachoma, lymphatic filariasis, and

onchocerciasis. This group of 20 diseases is called neglected because, despite the large number of people affected, they have historically received less attention and research funding than other diseases.

Neuromorphic computing

Neuromorphic computing aims at processing information similar to the human brain. Like in the human brain neuromorphic computing systems use an architecture where the memory and the processing units are co-located within the same hardware element and interlinked in a network. These elements are called memristors and can both store and process information.

No-effect threshold

The no-effect threshold is defined as the concentration of a given substance below which no adverse effects to species in water can be expected. The respective values are derived from eco-toxicological studies according to recognized scientific standards.

Non-communicable disease (NCD)

Non-communicable diseases tend to be of long duration and are the result of a combination of genetic, physiological, environmental, and behavioral factors. The main types of NCD are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. NCDs disproportionately affect people in low- and middle-income countries where more than three quarters of global NCD-related deaths occur.

Nucleases

A group of enzymes whose primary function is to partially or fully degrade nucleic acids.

Other water

Water with more than 1,000 mg of dissolved solids per liter.

Patent pool

A consortium of at least two competing companies that allows partners to share the use of patents relating to a particular technology.

Patient access programs

This refers to commercial programs that are typically self-sustaining and provide medicines for underserved populations, for example by offering a reduced treatment fee.

Patient support programs

Any organized system providing services and direct patient or patient-caregiver interactions that are intended and designed to educate patients about certain diseases, and help patients with access to and/or the management of prescribed medicines and/or disease outcomes and/or offer doctors support for their patients.

Pharmacovigilance

The science and activities related to the detection, evaluation, understanding, and prevention of adverse reactions or other drug-related problems.

Phase I clinical trial

Phase I clinical trials test a new therapeutic candidate in a small group of subjects (for example, 20-80) for the first time (‘first in man study’) to evaluate safety (for instance, to determine a safe dosage range and to identify side effects).

Phase II clinical trial

Phase II clinical trials study the medical or behavioral intervention in a larger group of subjects (several hundred) to determine efficacy (biological activity) and to further evaluate its safety.

Phase III clinical trial

Phase III clinical trials investigate the efficacy of the medical or behavioral intervention in large groups of subjects (from several hundred to several thousand) by comparing the intervention to other standard or experimental interventions as well as to monitor adverse effects and collect information that will allow the intervention to be used safely.

Potential loss or harm

A possible adverse impact to organizational operations (i.e financial loss, function limitation or loss), asset (i.e damage, mis-operation), or individuals (i.e. personnel injury, loss of life).

Prediabetes

A condition regarded as indicative that a person is at risk of progressing to Type 2 diabetes.

Primary or secondary caregivers

Primary caregiver is the birth mother of a newborn, the biological father in case of homo-parental family or the initial primary caregiver of a newly adopted child. Only one person can be the child's primary caregiver. Secondary caregiver means a person who has parental responsibility for the child but is not the primary caregiver.

Process-related emissions

Greenhouse gases released into the atmosphere during manufacturing operations.

Product serialization

During serialization, every product within a production line receives a clear, usually random and encrypted number, which is stored in a database. The manufacturer of each individual product can later be traced securely.

Pulse survey

A pulse survey is a short employee survey that focuses on a specific topic to gauge the current sentiment of the workforce. This can, for example, relate to a single business unit in the case of change processes or be targeted to the entire workforce.

Relevant suppliers

Relevant suppliers either indicate a specific country and industry risk or contribute to a significant percentage of our supplier spend (at least 50%)

Risk-sharing agreement

An agreement between the producer or manufacturer and the payer or provider that allows access to a health technology through coverage or reimbursement under certain conditions.

Role

Our company uses a market-oriented system to rate positions within the company. To facilitate consistency across the organization, each position is assigned a specific role, with an overarching job architecture classifying each role as one of 11 levels, 15 functions and an array of career types (Core Operations, Services & Support Groups; Experts; Managers; Project Managers).

SQ

The abbreviation for our Corporate Sustainability, Quality and Trade Compliance function.

STEM

This abbreviation stands for Science, Technology, Engineering, and Mathematics.

Schistosomiasis

Schistosomiasis is a chronic condition and one of the most common and most devastating parasitic diseases in tropical countries. Flatworms transmit the disease. It is widespread in regions where large sections of the population have no access to clean water or sanitary installations. People are infected by the parasite when exposed to infested water during routine agricultural, domestic, occupational, and recreational activities. The minuscule larvae penetrate human skin, enter the blood vessels and attack internal organs. The infection rate is particularly high among children. Untreated schistosomiasis can cause potentially fatal chronic inflammation of vital organs as well as anemia, stunted growth and impaired learning ability, all of which have devastating consequences for the lives of children.

Scope 1

This includes emissions that occur in our company, for instance by generating energy from fossil fuels or by releasing process-related emissions.

Scope 2

This includes emissions from purchased energy such as electricity, heat, steam, or cold.

Scope 3

Scope 3 includes indirect greenhouse gas emissions, such as the extraction and production of purchased materials, transport-related activities, waste disposal, and employee travel.

Scorecard

An evaluation tool for measuring, documenting and controlling activities using metrics.

Security

This relates to all necessary measures and governance activities to detect, analyze, handle, and mitigate

security- and crime-based threats to the company. It is integral to protecting both our employees and the tangible and intangible assets of the company.

Shadow price

A shadow price is a hypothetical cost of carbon attached to each ton of CO_2eq. It can be used to reveal hidden risks and opportunities throughout operations and supply chains and to support strategic decision-making related to future capital investments.

Signal management

A set of activities performed to determine whether, based on an examination of individual case safety reports, aggregated data from active surveillance systems or studies, scientific literature information, and other data sources, new risks are associated with an active ingredient or a medicinal product or whether known risks have changed. These activities also provide any related recommendations, decisions, communications, and tracking.

Small-molecule drugs

Substances with a low molecular weight ("small"-molecule) substances consist of only a few hundred atoms. Compared to larger biological treatments, the particularly small size of these drugs makes it more likely that they will reach their target in the body. Today, the vast majority of pharmaceuticals are of the small-molecule kind.

Spontaneous reports on adverse effects

An unsolicited communication by a healthcare professional or consumer to a company, regulatory authority or other organization (e.g. the World Health Organization, a regional center or poison control center) that describes one or more adverse reactions in a patient who was given one or more medicinal products and that does not derive from a study or any organized data collection scheme.

Stakeholder

People or organizations that have a legitimate interest in a company, entitling them to make justified demands. Stakeholders include people such as employees, business partners, neighbors in the vicinity of our sites, and shareholders.

Stem cell lines

Groups of stem cells derived from animal or human tissue. They can be cultivated in vitro and multiply indefinitely.

Stem cells

Undifferentiated cells with the potential to develop into many different cell types that carry out different functions.

TRIPS

The Agreement on Trade-Related Aspects of Intellectual Property Rights is an international legal agreement between all the member nations of the World Trade Organization. TRIPS seeks to ensure that the measures and procedures for enforcing intellectual property rights do not become a barrier to lawful trade.

Technical infrastructure

Information and communication systems, or systems used for operational capabilities.

Tetramethylammonium hydroxide (TMAH)

A quaternary ammonium salt. It is a strong base and is commonly encountered as concentrated solutions in water or methanol. TMAH has numerous and diverse industrial and research applications, such as the anisotropic etching of silicon.

Thin films

A very thin layer (one atom or one molecule thick) of a substance deposited on a supporting material such as a semiconductor. Customers use our products to create such thin films.

Trace substances

Substances dissolved in water that are present only in minute amounts. Also referred to as micropollutants, these are synthetic substances present in concentrations ranging from one nanogram to one microgram per liter of water.

Transfer of value

Direct and indirect transfers of value, whether in cash, in kind or otherwise (for instance promotional purposes).

Vivarium

The vivarium, also known as animal research facility, is a specially designed building type, which accommodates controlled environments for the care, use and maintenance of experimental animals.

WAC

Wholesale acquisition cost (WAC) means, with respect to a drug or biological, the manufacturer's list price for the drug or biological to wholesalers or direct purchasers in the United States, not including prompt pay or other rebates, discounts or reductions in price, for the most recent month for which the information is available, as reported in wholesale price guides or other publications of drug or biological pricing data. WAC is the US equivalent for Ex-Factory (EXF) wholesale price that our company uses globally to label the price from the manufacturer to the wholesaler.

WASH

This stands for "water, sanitation and hygiene". The acronym is used to refer to a set of activities addressing inadequate access to clean water and sanitation facilities, as well as poor hygiene behavior.

iooi-method

The abbreviation iooi stands for input - output - outcome - impact and is a method for measuring goal achievement and outcome and impact developed by the Bertelsmann Foundation.

Imprint

Published on April 13, 2023 by
Merck, Group Corporate Sustainability
Frankfurter Strasse 250, 64293 Darmstadt, Germany

Tel.: +49 (0) 6151-72 0
Email: **service@merckgroup.com**

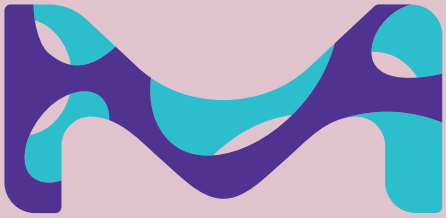
www.merckgroup.com

Contact for questions regarding this report:
Maria Schaad, Group Corporate Sustainability
corporate-sustainability@merckgroup.com

Concept and implementation of HTML & PDF:
nexxar GmbH, Vienna – Online annual reports and online sustainability reports

Text and consulting:
Stakeholder Reporting GmbH & Co. KG
www.stakeholder-reporting.com

Photos and graphics:
Merck, Bernd Hartung



Merck, Group Corporate Sustainability
Frankfurter Strasse 250,
64293 Darmstadt, Germany
Telephone: + 49 6151 72-0
Email: corporate-sustainability@merckgroup.com
www.merckgroup.com